FISHERY MANAGEMENT INVESTIGATIONS

IDAHO DEPARTMENT OF FISH AND GAME

FISHERY MANAGEMENT ANNUAL REPORT

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SALMON REGION 2011

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SALMON REGION FISHERY MANAGEMENT 2011 ANNUAL REPORT

Mountain Lake Stocking, Surveys, and Management Plan

ABSTRACT

The Idaho Department of Fish and Game (IDFG) stocked 66 mountain lakes in the Salmon-Challis National Forest, Sawtooth National Recreation Area (SNRA), and Sawtooth Wilderness Area in 2011. Forty lakes were stocked with 20,452 westslope cutthroat trout *Oncorhynchus clarkii lewisi* fry. Twelve lakes were stocked with 5,638 Arctic grayling *Thymallus arcticus* fry. Seven lakes received a total of 6,725 golden trout *O. aguabonita* fry, and seven other lakes were stocked with 1,655 Troutlodge triploid rainbow trout *O. mykiss* fry.

IDFG personnel surveyed seven mountain lakes during 2011 by backpacking in the Boulder-White Cloud Mountains in the SNRA. Survey crews observed fish in all seven lakes; westslope cutthroat trout was the primary fish species caught in four of seven lakes. Rainbow trout were observed in two lakes and apparent cutthroat trout x rainbow trout *O. clarkii x O. mykiss* hybrids were caught in one lake. Amphibians were detected in three of seven lakes surveyed this year. Columbia spotted frogs *Rana luteiventris*, western long-toed salamanders *Ambystoma macrodactylum*, and western toads *Anaxyrus boreas* were detected during the surveys. All seven lakes were rated as having low human impact using Bahls (1992) campsite impact rating table.

INTRODUCTION

The Salmon Region of the Idaho Department of Fish and Game (IDFG) has approximately one thousand mountain lakes within its administrative boundaries. Of these 1,000 lakes, 202 are requested to be stocked on a three-year rotation with either Arctic grayling *Thymallus arcticus*, golden trout *Oncorhynchus aquabonita*, triploid rainbow trout *O. mykiss*, or westslope cutthroat trout *O. clarkii lewisi* fry. Five lakes are scheduled to be stocked every year. The stocking rotations provide diverse mountain lake fishing opportunities to the public. Stocking rotation A includes 64 mountain lakes, rotation B is comprised of 82 lakes, and rotation C has 66 lakes. Adjustments were made to the number of lakes in two rotations in February 2011. Seventeen lakes were moved from rotation B to rotation C to make stockings more logistically efficient. Years of stocking for rotations A, B, and C for 2011 through 2019 are shown in Table 1.

In recent years, the Salmon Region has prioritized conducting mountain lake surveys. The anticipated development of a mountain lake management plan, increased concern about stocked fish and amphibian interactions, maintaining high levels of angler satisfaction, and increased requests for information on mountain lake fisheries all precipitated the need for updated and more extensive mountain lake data. Since 1999, the Salmon Region has sought to increase the number of mountain lakes surveyed, including amphibian surveys. The information collected from these surveys is stored in a statewide geo-referenced database which is used to provide mountain lake information for IDFG regional planning, the angling public, and other government agencies.

OBJECTIVES

Mountain Lake Stocking

Maintain a viable and diverse mountain lake fishery in the Salmon Region.

Mountain Lake Surveys

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

Mountain Lake Management Plan

Develop a statewide plan with affected regional fishery managers which will describe, identify, and assist decision making pertaining to stocking, survey information, and management direction for mountain lakes.

STUDY AREA AND METHODS

Mountain Lake Stocking

Salmon Region mountain lakes in the Salmon-Challis National Forest (SCNF), Sawtooth National Recreation Area (SNRA), and Sawtooth Wilderness Area (SWA) were stocked with Arctic grayling, golden trout, rainbow trout, and westslope cutthroat trout fry by Mackay Fish Hatchery personnel and Sawtooth Flying Service using a Cessna – 185 fixed-wing aircraft in August and September, 2011.

Regional stocking of fry into mountain lakes followed a three-year rotation with each lake in the stocking list usually receiving fish once every three years. Salmon Region fisheries biologists used the nomenclature rotations A, B, and C to describe which lakes were stocked each year. Mountain lakes included in rotations A, B, and C were published in the 2009 Salmon Region annual report (Curet et al. 2010). However, rotational adjustments were made in February 2011 to improve flight efficiency during stocking runs. Seventeen lakes were moved from rotation B to C so they would be included in congruent lake stocking areas. Also,we determined that five lakes annually receive heavy fishing pressure and should be stocked yearly, i.e. in rotations A, B, and C. For these reasons, we listed the mountain lakes included in each rotation again with updated stocking information. This list, included in Appendix A, indicates each lake's IDFG catalog number, lake's location on national forest, national recreation land, or in the SWA, and the species and number of fish stocked. Appendix B shows each lake's unique latitude-longitude concatenation identification (LLID) and its location in WGS84 datum, latitude and longitude decimal degree coordinates.

Mountain Lake Surveys

Regional IDFG personnel conducted surveys by backpacking into seven mountain lakes in the SNRA. We documented fish presence and species by visual observation and angling. Fish were identified to species, measured to the nearest mm total length (TL), and weighed (g) Fish spawning potential of inlets and outlets was assessed, along with total spawning area (m^2) available, and the presence of fry and fingerlings. Physical characteristics of each lake, surrounding geology and plant morphology, weather conditions at survey time, and access (km) by trail and cross-country travel were also recorded. *S*horeline areas were visually inspected for campsites, fire rings, and other signs of human use. We used Bahls (1992) campsite impact rating (Table 2) to assess the condition of areas surrounding the lakes. Amphibian surveys were conducted on all lakes using a modification of the timed visual encounter survey (VES) methodology of the lake's shoreline perimeter. The main deviation from the VES methodology was that the fisheries crew performed a full perimeter search when physically possible without accounting for various habitat types. Genetic samples were taken from a sample of captured adults. All survey data were entered into the statewide mountain lake Microsoft™ Access database for future analysis. Genetic sample data were entered into the Region's genetic database. Physical locations and characteristics of the surveyed mountain lakes are detailed in Appendix C. Data sheets were archived at the Salmon Region IDFG office.

Mountain Lake Management Plan

As part of the development of a statewide management plan, IDFG staff created an Access 2007 (Microsoft® Office, Redmond, Washington) metafile for a statewide mountain lake database designed to encompass the informational needs of affected regional managers. Once the initial database framework was complete, historical surveys (1956-1998), recent surveys

(1999-2011), and geo-referenced information was appended into the database and cursorily analyzed. Once completed this work-in-progress document will provide managers with a new tool to manage mountain lakes within a statewide context.

RESULTS AND DISCUSSION

Mountain Lake Stocking

In 2011, Mackay Fish Hatchery personnel stocked 66 mountain lakes by aircraft in the SCNF, SNRA, and SWA on five dates: August 30, and September 3, 8, 21, and 23. Forty lakes were stocked with 20,452 cutthroat trout fry. Twelve lakes were stocked with 5,638 Arctic grayling fry, seven lakes were stocked with 6,725 golden trout fry, and seven other lakes received 6,725 Troutlodge triploid rainbow trout fry. At the time of stocking, cutthroat trout fry averaged 35 mm TL, Arctic grayling averaged 36 mm TL, golden trout fry averaged 24 mm TL, and rainbow trout fry averaged 37 mm TL. Nine lakes scheduled to receive cutthroat trout fry in 2011 were not stocked due to scheduling shifts to even out the three rotations. The 2011 total flight time was 16.6 hours at a cost of $7,387 or an average of $111.92 per lake. By comparison, in 2010, 38 lakes were stocked during 11.1 hours of flight time at a cost of $5,287 or an average of $139.13 per lake.

Mountain Lake Surveys

Surveys of seven mountain lakes in the Boulder-White Cloud Mountains, located in the SNRA, were conducted during July and August 2011. IDFG personnel observed fish in all seven lakes surveyed (Table 3). Westslope cutthroat trout were detected in four lakes, rainbow trout were found in two lakes, and apparent cutthroat trout x rainbow trout *O. clarkii x O. mykiss* hybrids were found in one lake (Table 3).

Amphibians were observed in three (43%) of seven amphibian surveys conducted during mountain lake surveys in 2011 (Table 3). Columbia spotted frogs *Rana luteiventris* and western long-toed salamanders *Ambystoma macrodactylum* were detected in Island Lake. Western toads *Anaxyrus boreas* were observed at Baker and Noisy lakes.

MANAGEMENT RECOMMENDATIONS

Continue stocking mountain lakes using Rotation B in 2012.

Stock all golden trout lakes in 2012 that were not stocked in 2007 through 2011.

Coordinate with the IDFG Fisheries Bureau to find a reliable, consistent source of Arctic grayling and golden trout.

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

Continue to work with affected regional fishery managers to draft a mountain lake management plan.

Table 1. Salmon Region stocking rotations A, B, and C by year, 2011 through 2019.

	Stocking Rotation Sequence		
	A	B	C
Year of Stocking	2011	2012	2013
	2014	2015	2016
	2017	2018	2019

Table 2. Bahls (1992) total campsite impact rating for mountain lakes.

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

Table 3. Salmon Region mountain lakes (*n* = 7) surveyed in 2011.

LLID[a]	IDFG Catalog No.	Lake Name	Survey Date	Primary Fish Species Observed	Amphibian Species Observed
1145639440558	0700001408.0	Baker Lake	7/20/2011	Westslope cutthroat trout	Western toad
1145943440947	0700001371.0	Island Lake	8/3/2011	Rainbow trout	Columbia spotted frog and western long-toed salamander
1145834440581	0700001409.0	Noisy Lake	8/18/2011	Apparent cutthroat x rainbow trout hybrid	Western toad
1145934440539	0700001410.0	Quiet Lake	8/19/2011	Rainbow trout	None
1145956440618	0700001423.0	Scree Lake	7/25/2011	Westslope cutthroat trout	None
1145991440632	0700001424.0	Shallow Lake	7/24/2011	Westslope cutthroat trout	None
1146095441228	0700001349.0	Tin Cup Lake	8/4/2011	Westslope cutthroat trout	None

[a] LLID = Concatenated latitude-longitude in decimal degrees for centroid of lake.

SALMON REGION FISHERY MANAGEMENT 2011 ANNUAL REPORT

Surveys and Inventories - Lowland Lakes

ABSTRACT

Regional fishery staff sampled fish populations in selected lowland lakes to assess population size structure, relative weight, and relative changes in zooplankton abundance and forage availability in 2011. In Carlson Lake, brook trout *Salvelinus fontinalis* relative weights improved slightly in 2011 when compared to the last sample year, from 95.8 in 2009 to 97.1 this year. The tiger muskellunge (northern pike *Esox lucius* x muskellunge *E. masquinongy*) introductions appear to be maintaining a desirable size range of brook trout.

The 2011 gillnet survey in Herd Lake was conducted in a continuing effort to determine the effectiveness of tiger muskellunge introductions on the size structure of fish populations. Results showed a continued decrease in average total length and weight of rainbow trout in Herd Lake while the average relative weight of 94.4 this year represents the highest value calculated for the past seven sampling periods. The 2011 zooplankton quality index (ZQI) average value of 0.05 in Herd Lake is among the lower recorded values since 2002 and indicates that forage may be limited.

Results from gillnetting in Jimmy Smith Lake found that rainbow trout average length and weights decreased in 2011 while the average relative weight value increased to 89.1 compared to 81.0 in 2010. Lower catch rates and decreased average lengths and average weights for the past four sample years suggest an increasing population size in the lake. This year's ZQI sampling in Jimmy Smith produced an average value of 0.61, which is the highest recorded of the seven sampling periods, suggesting that competition for food is unlikely.

Four days of gillnetting in Stanley Lake resulted in 181 fish, comprised of 41 kokanee *O. nerka* (lacustrine sockeye salmon), 53 lake trout *S. namaycush*, 54 brook trout, 32 hatchery rainbow trout, and 1 westslope cutthroat trout. Thirty-three lake trout received numbered, non-reward tags in 2011 to help monitor lake trout growth during future sampling, adding to nine spaghetti tags affixed to lake trout in 2010 and 26 tags in 2007. Eight gill nets were fished a total of 398 hours for an average catch rate of 0.5 fish/hour compared to 0.7 fish/hour in 2010. Based on a creel survey at Stanley Lake in 2011, anglers fished an estimated 12,848 hours and caught 12,912 fish. Rainbow trout represented 89% of the total estimated catch, followed by kokanee at 6% and bull trout *S. confluentus (*2%).

In 2011, we determined the average ZQI for Williams Lake to be 0.61, an improvement over the 2010 average of 0.22.

An overnight gillnet effort in Yellowbelly Lake collected a total of 234 fish during 80.1 gill-net hours in 2011. Salmonids comprised 4.7% of the catch while sucker *Catastomus sp.* and northern pikeminnow *Ptychocheilus oregonensis* comprised the remaining balance of the catch. In a continuing effort to establish a cutthroat trout fishery in Yellowbelly Lake, 34,915 cutthroat fry were released in 2011. Fishery management staff has requested that approximately 30,000 cutthroat fingerlings be stocked for two more years in Yellowbelly Lake as part of a five-year release and evaluation program.

INTRODUCTION

The Salmon Region contains 23 lowland lakes, 2 reservoirs, and 11 public ponds (Curet et al. 2010). Regional fishery staff defines lowland lakes as being generally 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.

OBJECTIVES

Carlson Lake

Assess the effects of tiger muskellunge (northern pike *Esox lucius* x muskellunge *E. masquinongy*) introductions in controlling and improving the size structure of the localized, self-sustaining brook trout population.

Herd Lake

Assess the effects of a tiger muskellunge introduction in controlling and improving the size structure of the localized, self-sustaining rainbow trout population.

Monitor zooplankton quality index (ZQI) values to detect any relative changes in zooplankton population and forage availability.

Conduct a creel survey to determine angling effort and harvest.

Hyde Pond

Assess the harvest contribution of January-stocked rainbow trout in Hyde Pond for an ice derby in January 2011 relative to the contribution of previously stocked rainbow trout by using uniquely numbered Floy T-bar anchor tags.

Jimmy Smith Lake

Monitor rainbow trout in Jimmy Smith as a control population for the tiger muskellunge introductions in Herd Lake, and determine whether management action is necessary to improve the trout population's size structure.

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

Conduct a creel survey to determine angling effort and harvest.

Stanley Lake

Conduct a mark-recapture effort on the lake trout population in Stanley Lake.

In conjunction with the sockeye monitoring program, conduct a creel survey to determine angling effort and harvest.

Williams Lake

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.

Collect fertilized rainbow trout eggs during adult spawning operations for potential expansion of egg production timeframe at IDFG's Hayspur Fish Hatchery.

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

Yellowbelly Lake

Survey the fish population in Yellowbelly Lake to assess the status of westslope cutthroat trout introductions.

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

STUDY AREA AND METHODS

Carlson Lake

Carlson Lake is a sub-alpine lake approximately two hectares in size located in the Pahsimeroi River drainage (WGS84 datum, latitude longitude decimal degrees coordinates of 44.28153^{o}N, 113.75283^{o}W) 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.

A survey conducted 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 manipulate the size structure of the brook trout population. An additional 32 tiger muskellunge were stocked in 2006.

Carlson Lake was sampled on July 6-7, 2011 using eight experimental variable mesh gill nets, four floating and four sinking. The nets were set in the evening of July 6, fished overnight, then checked and removed the following morning. Captured fish were identified to species, measured in 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).

Herd Lake

Herd Lake is a landslide lake located in the East Fork Salmon River drainage in Custer County at 2,187 m elevation (WGS84 datum, latitude longitude decimal degrees coordinates of 44.08921^{o}N, 114.17364^{o}W). The lake has a surface area of 6.7 ha and is a coldwater rainbow trout fishery managed under general fishing rules. The inlet to Herd Lake is Lake Creek. In an

effort to improve the size and weight of the rainbow trout population, 72 tiger muskellunge were stocked in 2006.

Prior to a gill netting effort, regional staff angled and marked rainbow trout using an adipose fin clip on July 1 and 5, 2011 for mark-recapture. Subsequent gillnet efforts noted the number of marked recaptures. Data collected from these efforts were also used to calculate a population estimate of rainbow trout in Herd Lake. A Petersen mark-recapture population estimate (with a Chapman (1948) modification) and a 95% confidence interval was generated as follows (Ricker, 1975):

$$N = \frac{(M + 1)(C + 1)}{R + 1}$$

Where,

N = the population estimate
M = the number of fish marked
C = the number of fish caught
R = the number of marked fish recaptured

Regional fishery staff sampled Herd Lake on July 6-7, 2011 using four experimental variable mesh gill nets (2 floating and 2 sinking). The nets were set in the afternoon of July 6, fished overnight, checked, and removed the following morning. Fish captured were identified to species, measured in TL mm, and weighed (g). Relative weight values were calculated using methods described above under “Carlson Lake.”

Zooplankton tow samples were taken at Herd Lake on August 26, 2011 near the inlet, mid-lake, and at the outlet following methods outlined by Teuscher (1999). The fishery crew deviated from these methods by sampling the inlet site at 7.7 m due to decreased lake depth. Samples were stored in 100% ethyl alcohol for 11 days, at which time ZQI values were analyzed using methodology developed by Yule (unpublished) and Teuscher (1999).

A roving creel was conducted by two creel clerks at Herd Lake during June and July, 2011. Between June 15 and July 8, 14 sample days were randomly generated by computer. Each sample day was split into two eight-hour shifts: 0600 to 1400 hours and 1400-2200 hours. Each sample day included one instantaneous count and a corresponding creel interview time that were also randomly generated. The creel clerk collected angler effort and catch data during interviews, including the interview time, size of each fishing party, specific hours and total time fished, access type (bank or boat), distance travelled to fish, and the number and species of fish kept and released . Harvested fish were measured in mm FL. When an angler or angling party had just begun fishing, the survey was delayed until the angler or angling party had fished at least 30 minutes. Water temperature and weather conditions were also noted. Expanded angler effort and catch estimates were developed using the South Dakota Creel Entry Analysis Software (CAS).

Hyde Pond

Hyde Pond, a man-made pond managed by the U. S. Department of the Interior, Bureau of Land Management’s (BLM) Salmon Field Office, is located 11.8 km south of the City of Salmon at WGS84 datum, latitude and longitude decimal degree coordinates of 45.09403^{o}N, -113.88173^{o}W. The pond covers 0.2 ha surface area. The Department, in cooperation with the

Salmon BLM, began stocking the pond in 1994 with catchable-size rainbow trout. To date, Hyde Pond annually receives about 1,200 triploid Troutlodge Kamloops rainbow trout.

IDFG and other agency personnel sponsor an ice fishing day at the pond each January for children 1 to 16 years of ages. For the past 20 years, fishing success has been variable despite stocking of 200-300 rainbow trout prior to each ice fishing event. The Region initiated a study in 2009 in an effort to determine which fish stocking contributed to harvest on the day of the fishery (Curet et al. 2010). Replicating methods used in the previous year, regional fishery personnel angled and tagged eight rainbow trout with numbered T-bar anchor tags on January 20, 2011. These tagged fish represented 2010 stockings ("old fish") made before the pond iced over for the winter. The pond was stocked with another 300 rainbows the same day. IDFG fishery personnel tagged seven fish from this stocking, which represented "new fish."

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 26.0 ha (WGS84 datum, latitude and longitude decimal degree coordinates of 44.16907°N, 114.40249°W). 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 IDFG's Mackay Fish Hatchery between 1927 and 1938. The lake has not been stocked since that time.

Prior to a gill netting effort at Jimmy Smith Lake on June 15, regional staff angled and marked rainbow trout with an adipose clip. Subsequent data from gillnet efforts recorded the number of marked recaptures. Data collected from these efforts were also used to calculate a population estimate for rainbow trout. A Petersen mark-recapture population estimate (with a Chapman (1948) modification) and a 95% confidence interval was generated as follows (Ricker 1975):

$$N = \frac{(M + 1)(C + 1)}{R + 1}$$

Where,

N = the population estimate
M = the number of fish marked
C = the number of fish caught
R = the number of marked fish recaptured.

Two floating and two sinking experimental, variable mesh gill nets were used June 26-27, 2011 to sample the rainbow trout population of Jimmy Smith Lake. The nets were set on the afternoon of June 26, fished overnight, checked, and removed the following afternoon. Captured fish were identified to species, measured for TL mm, and weighed (g). Rainbow trout relative weight values were calculated using formulas developed by Murphy et al. (1991).

Zooplankton sampling was conducted at Jimmy Smith Lake on August 26, 2011 near the inlet, mid-lake, and at the outlet following methods outlined by Teuscher (1999). As with Herd

Lake, the sample crew deviated from these methods by sampling the inlet site at 7.7 m. Samples were stored in 100% ethyl alcohol for seven days, at which time ZQI values were analyzed using methodologies described above by Yule (unpublished) and Teuscher (1999).

A roving creel was conducted at Jimmy Smith Lake during June and July, 2011 following the same methods outlined above for Herd Lake.

Stanley Lake

Stanley Lake, located in southern Custer County, is at 1,987 m elevation (WGS84 datum, latitude and longitude decimal degree coordinates of 44.24497°N, 115.05603°W) and has a surface area of 72.6 ha. The lake's primary in-flow is from Stanley Lake Creek, located on the west end of the lake, along with two other intermittent streams and numerous seeps. The outlet stream begins on the east end of the lake and includes a concrete barrier located approximately 402 m downstream from the lake. The barrier was constructed by the Department in the mid 1950's to eliminate the number of non-game fish entering the lake.

Historically, there were few investigations into the fish composition of Stanley Lake. In 1975, Jeppson and Ball (1979) reported that 15,219 lake trout fingerlings (averaging 89 mm TL) were stocked to help reduce the number of stunted kokanee *O. nerka* (lacustrine sockeye salmon). Three years following the introduction of lake trout, Jeppson and Ball (1979) collected three lake trout averaging 222 mm in length that were in poor body condition. In May 1981, IDFG creel surveys reported 14 lake trout were caught, averaging approximately 365 mm total length (Ball et al. 1982). Reingold and Davis (1987b) captured 12 lake trout averaging 650 mm TL in 1986. In 1993, Teuscher (1995) reported a wide range of lake trout lengths, measuring approximately 250 to 700 mm TL. The smaller lake trout identified by Teuscher in 1993 served as the first indicator of natural reproduction within the lake trout population. Catch rates for lake trout were 0.19 and 0.18 fish/hour for June and September 1993 surveys, respectively (Teuscher 1995). Lake trout lengths ranged from 253 to 699 mm during these two 1993 surveys. Brook trout, rainbow trout, and kokanee were also reported in the 1993 surveys. Department staff surveyed the lake by gillnets again in 2007. Lake trout averaged 651 mm TL during 165.4 hours of gillnetting (Curet et al. 2009a). Brook trout, hatchery rainbow trout, kokanee, and redside shiner *Richardsonius balteatus* were captured during the 2007 effort, resulting in an overall catch rate of 0.4 fish/hour. In 2010, regional fishery staff gillnetted 83 fish, consisting of 46 kokanee, 43 lake trout, 3 brook trout, and 5 hatchery rainbow trout (Curet et al. 2011). Lake trout ranged from 269-915 mm TL. Recently, the lake has become one of the trophy fisheries within the Stanley Basin and the Salmon Region.

In 2011, regional fishery staff gillnetted Stanley Lake using three sampling methodologies as part of an effort to estimate the lake trout population in the lake. On May 31, the crew set eight experimental, variable mesh gill nets (4 floating and 4 sinking) for an approximate 4-hour evening set. The next day, June 1, the crew set 16 nets (7 floating and 9 sinking) for a day-long effort of approximately 12 hours per net. The following week, a fishery crew set eight experimental, variable mesh gill nets (2 floating, 6 sinking) during the afternoon of June 8. The nets were fished overnight and then removed the next morning. Fish captured were identified to species, measured in mm TL, and weighed (g). Live-captured lake trout were placed in a large cooler with fresh water until the entire net was retrieved into the boat. Generally, live-captured lake trout less than 500 mm TL received a uniquely-numbered orange T-bar anchor Floy tag while lake trout greater than 500 mm TL received a 30.5 mm orange spaghetti tag looped and tied through the fish under its dorsal fin. All tagged fish were released in Stanley Lake following tagging. These non-reward tags, stamped with "IDFG" and a five-digit

number, will be used to monitor lake trout growth during subsequent sampling and are also part of an exploitation study managed through IDFG's Nampa Research Office. Otoliths were taken from lake trout mortalities for aging purposes and stored in individually labeled vials at IDFG's Salmon Regional office.

Fishery staff conducted a creel survey on Stanley Lake from May 28 to October 31, 2011. The creel season was divided into two-week segments throughout the sample period. Within each segment, four random sampling dates were computer generated to include two week days and two weekend days. Two instantaneous count times on each sample day were also randomly generated. The creel clerk performed an instantaneous count of boat and bank anglers at the scheduled time on the sample day. The only deviation occurred when a count was scheduled after dark in October; the clerk then conducted the count in the last half-hour before dark. Angler interviews followed the instantaneous counts for all active fishing parties. When an angler or angling party had just begun fishing, the survey was delayed until the angler or angling party had fished at least 30 minutes. Interview questions included number of anglers, hours fished, whether the party fished by boat or bank, fishing gear used (bait or fly), number and species of fish kept and released, angler's residence, and seven other management questions about anglers' fishing experiences and preferences. Summary responses to these management questions are shown in Appendix D.

Williams Lake

Williams Lake, an early eutrophic lake, is located in central Lemhi County (WGS84 datum, latitude and longitude decimal degree coordinates of 45.01643^{o}N, 113.97619^{o}W) at 1,600 m elevation. The lake has a surface area of 72.8 ha, maximum depth of 58 m, and 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 (>400 mm TL). Bull trout *S. confluentus* is the only other fish species recorded inhabiting the lake. Posted boundary signs at the mouth of Lake Creek and in nearby campgrounds prohibits fishing in Lake Creek during rainbow trout spawning season. Fishing in Lake Creek opens July 1 and remains open until November 30.

Zooplankton sampling was conducted at Williams Lake in 2011 at three locations (near the inlet, at mid-lake, and near the outlet) on the afternoon of August 19, 2011 following methods outlined above. Samples were stored in 100% ethyl alcohol for 10 days, at which time ZQI values were analyzed using methods outlined previously.

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

Additionally, fertilized eggs were collected using the dry method from pairings of adult rainbow trout on May 12, 2011 for potential broodstock use at Hayspur Fish Hatchery.

Dissolved oxygen (DO) levels have been sampled at Williams Lake during the winter for eight of the past 12 years. Regional staff responded to a 2011 report of "smelly, colored" water when ice fishermen were drilling holes at Williams Lake. Staff drilled a series of holes in the ice on February 25, 2011 near the reported location of the discolored water. The crew performed visual, olfactory, and DO sampling at each test site. The first hole was drilled about 3 m from shore in a bay on the northwest side of the lake. For the second hole, they moved about 45 m towards the middle of the lake, drilled, and sampled the water again. They repeated this

procedure at a third sample hole another 45 m from the second hole. They also drilled another hole at the approximate location of the lake's deepest point (Zmax) to perform standardized DO sampling. The team used a YSI Model 556 DO multi-probe sensor, sampling the DO level at the lake's surface and at one meter intervals through the water column from one to ten meters in depth. One water temperature reading at the lake surface was also recorded.

A sample of anglers at Williams Lake were interviewed during the winter ice fishery from January 2 to March 13, 2011. Angler data collected during interviews included the number of angers actively fishing, total time fished per party, the number of rainbow trout kept and/or released and the number of bull trout released. Expanded angler effort and catch estimates were developed using the South Dakota Creel Entry Analysis Software (CAS).

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 lake is located at WGS84 datum, latitude and longitude decimal degree coordinates of 44.00050^{o}N, 114.87677^{o}W. The principle in-flow is provided by Yellowbelly Lake Creek. Until 2011, Yellowbelly Lake was 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 *Ptychocheilus oregonensis*, and sucker (various species) *Catastomus sp*. 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 mainstem Salmon River.

Eight experimental, variable mesh gill nets (4 floating and 4 sinking) were used on June 27-28, 2011 to sample the fish population of Yellowbelly Lake. Nets were set in the late evening, fished overnight, checked hourly to reduce bull trout take, and removed the following morning. Captured fish were identified to species, measured in mm TL, and weighed (g). Genetic samples were collected from bull trout and stored in individually labeled vials at the IDFG Salmon Regional office.

Zooplankton samples were taken at three locations (near the inlet, at mid-lake, and near the outlet) on Yellowbelly Lake on the afternoon of August 22, 2011. Samples were stored in 100% ethyl alcohol for 11 days, at which time ZQI values were analyzed using methodology outlined previously.

RESULTS AND DISCUSSION

Carlson Lake

Regional fishery staff captured 287 brook trout during an overnight gill net set at Carlson Lake July 6-7, 2011 (Table 4). Brook trout had a size range of 70 to 291 mm TL and averaged 218 mm TL (Figure 1). Average trout length was down this year compared to the last sampling in 2009 when brook trout averaged 234 mm TL. Average weight also dropped in this year's sample, from 129.4 g in 2009 to 102.0 g in 2011. Brook trout relative weights improved slightly in 2011 when compared to the last sample year, from 95.8 in 2009 to 97.1 in 2011. The tiger muskellunge introductions appear to be maintaining a desirable size range of brook trout. The

catch per unit of effort (CPUE) in nets increased from 1.8 fish per hour calculated in 2009 to 2.2 fish per hour in 2011. However, a decrease in lengths and weights, coupled with an increase in the CPUE, may be signaling a shift towards smaller fish and may also indicate another tiger muskellunge stocking is needed.

Herd Lake

A gillnet set on July 6-7, 2011 resulted in a total catch of 282 wild rainbow trout (Table 5). Results of this year's survey showed a continued decrease in average TL and average fish weight compared to 2009 and 2010. In 2011, rainbow trout ranged in size from 118 to 292 mm TL (Figure 2) with an average TL of 184 mm. The average TL was 230 and 224 mm in 2009 and 2010, respectively. The average rainbow trout weight this year was 72 g compared to 119 g and 106 g for 2009 and 2010, respectively (Table 5). The average relative weight of 94.4 this year represents the highest average relative weight calculated for the past seven sampling periods. Additionally, the past four most recent values were all higher when compared to the relative weight values of 73.8 and 71.8 observed in the pre-tiger muskellunge introduction samples in 2005 and 2003, respectively (Table 5). Likely, a larger proportion of small fish led to a decrease in both average total length and average weight of Herd Lake rainbow trout sampled in 2011. We noted that in the 2006 sample of smaller sized fish that a higher average relative weight value was observed as well. A linear regression of relative weights to lengths for the 2011 sample showed an inverse negative relationship (Figure 3). This year's CPUE of 4.6 fish/hour closely mirrored the 2010 catch rate of 4.5 fish/hour.

Desirable changes in the rainbow trout size structure resulting from the 2006 tiger muskellunge introduction were expected to be observed in the 2010 survey, and certainly by 2011. However, no size improvements were detected either year. Tiger muskellunge have not been collected in gillnets, during angling surveys, nor reported anecdotally by anglers fishing Herd Lake. The lack of response in CPUEs and the decreasing average lengths and weights of rainbow trout suggest the introduction was likely unsuccessful. The bag limit liberalization from 6 fish to 25 fish per day in the 2011-2012 fishing rules may have a positive impact on the size structure of the rainbow trout population if angling effort and harvest is adequate.

Staff angling marked 407 rainbow trout prior to gill netting recapture effort in Herd Lake. Gillnetting efforts captured 282 rainbow trout, of which 27 were marked. The population estimate was 4,124 fish with 95% confidence intervals of 2,699 to 5,548 fish. This estimate is highly suspect as we have removed almost 900 fish in the past four sample periods through gill netting (2008-2011). We likely did not remove almost 20% of the fish with these efforts. We will repeat this effort in coming seasons in an effort to re-evaluate the population estimate.

The 2011 ZQI average value of 0.05 is among the lower recorded values since 2002 and indicates that forage may be limited (Tables 6 and 7; Figure 4). Since the ZQI sampling period has generally occurred in late August, we suspect the apparently larger number of smaller fish observed during gillnet sampling this year may have cropped off the larger zooplankton.

Anglers fished an estimated 153 hours at Herd Lake during the creel sample period in June and early July, 2011. They caught an estimated 323 rainbow trout, of which 238 were harvested and 85 more were released (Table 8). Of the rainbow trout checked during interviews, fish lengths ranged from 132 to 225 mm FL with an average size of 187 mm. Six weekend days were creeled during the sample period (June 18, 25, 26, and July 2, 3, 7) while eight week days (June 15, 17, 20, 21, 28, 29, and July 8) were also sampled.

Hyde Pond

On January 29, 2012, approximately 120 rainbow trout were captured during the annual kid's ice fishing derby at Hyde Pond. Five captured fish were Floy tagged, of which all five fish were from the November 2011 stocking. These carry-over ("old") fish appeared to provide most of the harvest on the day of the ice fishery. This result corroborated the 2010 finding when five of six tagged trout caught were from the "old fish" stocking (Curet et al. 2010).

Jimmy Smith Lake

Regional fishery staff collected 676 rainbow trout during 90.3 gillnetting hours at Jimmy Smith in 2011 (Table 9). Rainbow trout had a size range of 150 to 250 mm TL with an average length of 183 mm (Table 9, Figure 5). By comparison, the 2010 sample had a size range of 100 to 295 mm TL and an average length of 205 mm. This year's catch rate of 7.5 fish per hour was lower than the three previous samples (2008 through 2010) of 10.1, 9.9 and 8.2 fish per hour, respectively (Table 9). The average weight of rainbow trout dropped to 66.5 g in 2011, compared to 100 g, 84 g, and 81 g in 2008 through 2010, respectively. Average relative weights of rainbow trout increased in 2011 to 89.1. Average relative weights for the 2008, 2009, and 2010 were 80.1, 77.7, and 77.0, respectively. Decreased average length and average weight for the past four sample years suggest an increasing population size.

Gillnetting in 2011 represents the first year that sampled fish in Jimmy Smith Lake were smaller in size than in neighboring Herd Lake. New fishing rules implemented in January 2011 increased the daily bag limit from 6 fish to 25 fish in Jimmy Smith Lake. This change in rules was directed at increasing effort and harvest in an attempt to improve the size structure of fish. However, the undesirable small size of the rainbow trout may not encourage additional harvest. Likely, Jimmy Smith Lake is a candidate for a tiger muskellunge introduction.

The average ZQI value for 2011 was 0.05 (Table 10 and Figure 6), indicating that competition for food was likely, according to the Teuscher (1999) rating index in Table 6. The previous four sample periods (2004 to 2010) also showed values of <0.10 each sample, supporting Teuscher's (1999) rating that forage resources in the lake have been limiting for some time.

Angling by regional fishery staff resulted in 279 rainbow trout marked with an adipose fin clip for a mark-recapture population estimate. Gillnetting efforts captured 676 rainbow trout, of which 9 fish were marked. The population estimate was 18,956 fish with 95% confidence intervals of 7,837 to 30,075 fish.

Anglers fished an estimated 238 hours at Jimmy Smith Lake during the 24-day creel sample period in 2011. They caught an estimated 816 rainbow trout, of which 476 were harvested and 340 more were released (Table 8). Lengths of fish checked during the creel were very close to those observed at Herd Lake. Rainbows measured at Jimmy Smith ranged in length from 150 to 230 mm FL and averaged 179 mm. Instantaneous counts and interview dates for week and weekend days were the same as Herd Lake.

Stanley Lake

Regional fishery staff collected 181 fish during four days of gillnetting in Stanley Lake during 2011. Fish composition consisted of 41 (23%) kokanee, 53 (29%) lake trout, 54 (30%) brook trout, 32 (18%) hatchery rainbow trout, and 1 (1%) westslope cutthroat (Table 11). In

2010, by comparison, gillnet efforts resulted in capturing 20 (28%) kokanee, 43 (60%) lake trout, 3 (4%) brook trout, and 5 (7%) hatchery rainbow trout (Table 11). Kokanee captured in 2011 had an average TL of 215 mm and ranged in size from 180 to 252 mm. Lake trout averaged 679 mm and had the widest range of lengths, from 302 to 1,017 mm TL. Brook trout sampled in 2011 averaged 251 mm TL with a range of 170 to 378 mm. Hatchery rainbow trout averaged 305 mm TL and ranged in size from 167 to 470 mm. Eight gillnets were fished a total of 398 hours for an average CPUE of 0.5 fish/hour, similar to 0.7 fish/hour in 2010 (Table 11).

Thirty-three lake trout received IDFG numbered spaghetti or T-bar anchor Floy tags during 2011 tagging operations. All tagged fish were released into Stanley Lake after tagging. Eight lake trout received Floy tags and 25 were given spaghetti tags. Otoliths were extracted from 11 lake trout mortalities in 2011 and were archived in the Salmon Region office. No marked lake trout were collected in the 2011 recapture event; thus, a population estimate was not calculated.

A creel survey at Stanley Lake resulted in 279 angler interviews during the May to October 2011 sample period. Anglers reported catching a total of 792 fish, of which 426 (54%) were kept and 366 (46%) were reported released. Bank anglers comprised 177 of the interviews, followed by 94 boat anglers, and 8 using float tubes. The catch composition consisted of rainbow trout, kokanee, bull trout, brook trout, lake trout, westslope cutthroat trout, suckers (various species), and mountain whitefish (*Prosopium williamsoni*). The first interview was conducted June 4 and the last survey was on October 22, 2011.

Expanded creel estimates indicated that anglers spent 12,848 hours of effort to catch 12,912 fish at Stanley Lake during the 2011 creel (Table 12). Boat anglers contributed an estimated 7,310 hours of fishing time, bank anglers added 5,310 hours, and float tube anglers accounted for the remaining 228 hours. Of the estimated 12,912 fish caught, 7,535 were harvested and 5,377 were released. Rainbow trout comprised the majority of the estimated catch with 11,478 fish, of which 7,086 were kept and 4,392 were released. The total estimated number of kokanee caught was 715. Anglers kept 257 kokanee and released 458 more. Bull trout rounded out the top three fish species caught this year with an estimated 288 released. Idaho fishing rules allow no harvest for bull trout; therefore, all were estimated to have been released. Catch and harvest estimates for the eight species caught in 2011 is shown in Table 12. The overall CPUE was 1.05 fish/hour caught and 0.59 fish/hour kept. Creel results of lake trout suggest that few fish are angled relative to other species and anglers released a high proportion (72%) of the lake trout caught (Table 12).

Angler residency demographics showed that 69% (n = 191) of anglers were Idaho residents, 31% (n = 85) were non-residents, and 1% (n = 2) were from foreign countries (Appendix D). Results of management questions posed during the creel, including the number of angler interviews by Idaho counties, other states, and foreign countries are shown in Appendix D.

Williams Lake

Zooplankton sampling produced an average value of 0.61 in 2011 (Table 13), suggesting that competition for food is unlikely using Teuscher's (1999) ratings (Table 6). This year's value fell about midway within the ZQI range of values of 0.22 to 0.92 calculated over the previous eight sampling events (Table 13, Figure 7).

On May 12, 2011, 10 female and 10 male rainbow trout from Lake Creek were collected and spawned, followed by an additional 12 pairs of rainbow trout collected and spawned on May 17, 2011. Regional IDFG cooperator Ken John tended the fertilized eggs until "button up." Approximately 45,000 fry were released into Lake Creek on June 24, 2011. Additionally, eggs from six rainbow trout pairs spawned on May 12th were transported to the Eagle Fish Health Lab that day. Progeny from these eggs will be reared as a potential addition to IDFG's Hayspur Fish Hatchery's broodstock program. Tissue samples and ovarian fluids from all adult rainbow trout used in this project were sampled and tested for pathogens. Results were negative for all tested pathogens.

An IDFG crew drilled a series of sample holes in a northwest bay of Williams Lake in response to observations of "smelly, colored" water during the 2011 ice fishery. The first hole produced water with some "color" and a slight organic smell. The second hole also produced slightly discolored water sample with no smell. The crew found clear water and no smell at the third test hole. DO sampling at this site found similar results to those found during regular DO sampling at the Zmax site detailed below.

On February 25, 2011, DO sampling at the approximate deepest point of Williams Lake (Zmax) indicated acceptable DO levels of 10.2 mg/L to 5.0 mg/L in the first four meters of depth below the ice (Table 14). DO levels decreased from 4.4 mg/L at 5 m to 1.5 mg/L at 10 m (Table 14). This DO profile is one which has repeated itself during most winter samplings of the lake and indicates that habitable space is limited during the winter months at Williams Lake (Figure 8).

Anglers fished an estimated 3,732 hours to catch a total of 1,861 trout during a sample of the winter ice fishery at Williams Lake in 2011 (Table 8). Of the overall estimated catch, 1,621 were rainbow trout and 240 were bull trout. The CAS program estimated that 1,580 rainbows were harvested and 40 more were released during the 74-day sample period (January 1 to March 13). Although more estimated effort was expended in February, anglers caught and harvested more fish in January (Table 8). The CAS program estimated 240 bull trout were released during January and February with the majority of bull trout caught and released in January. No effort or catch estimates could be generated for March as the creel included only two data points with no catch.

Yellowbelly Lake

Regional fishery staff collected a total of 234 fish during 80.1 gillnetting hours in 2011 (Table 15). Salmonids comprised 4.7% of the catch while non-game species took the balance of fish captured. The salmonid catch consisted of four bull trout, two westslope cutthroat trout, four brook trout, and one hatchery rainbow trout (Table 15). Non-game fish included 186 largescale suckers *C. macrocheilus*, and 37 northern pikeminnow. Sampled bull trout had an average total length of 341 mm TL, westslope cutthroat trout 395 mm, brook trout 256 mm, largescale sucker 260 mm, and northern pikeminnow 236 mm. The 2011 CPUE of 2.9 fish/hour represents the second highest catch rate recorded for the ten Yellowbelly Lake gillnetting efforts (Table 15).

The percentage of salmonids decreased from 9% in 2010 to 5% in the 2011 sample (Table 15). The proportion of salmonids in Yellowbelly Lake has decreased steadily since 2001 when the salmonid proportion was calculated at 59%. Four bull trout were counted in this year's sample while seven bull trout were encountered in the 2010 survey (Table 15). Westslope cutthroat trout samples remain in the single digits with two recorded this year compared to five

fish in 2010. Four brook trout were observed in this year's gillnets, closely mirroring last year's sample of three brook trout. One hatchery rainbow trout and no mountain whitefish were observed in this year's sample. As noted by Esselman et al. (2008), the removal of the migration barrier at the outlet in 2000 may be contributing to the movement and/or colonization of different species from the mainstem Salmon River. Yellowbelly Lake gillnet surveys from 2004 to 2011 indicated the continued dominance of non-game species, particularly sucker species.

Each year from 2002 to 2006, between 1,200 and 6,600 westslope cutthroat trout fry were stocked in Yellowbelly Lake. These stockings appear to have been unsuccessful in establishing an adequate westslope cutthroat trout population. This may have been due to the relatively low numbers of westslope cutthroat trout fry available for stocking and/or the inconsistent stocking pattern that occurred in those years. The goal of establishing a westslope cutthroat fishery in a drainage and lake system dominated by non-salmonids and a non-native salmonid (brook trout) continues to challenge regional fishery staff. In 2008, cutthroat stocking increased to 11,000 fry and was increased again in 2009 with 19,044 cutthroat fingerlings and 12,500 cutthroat fry. The IDFG stocking request database was updated in 2009 to reflect the region's request for 30,000 cutthroat fingerlings per year for five years. In 2011, 34,915 westslope cutthroat fry were stocked into Yellowbelly Lake.

Genetic samples from four bull trout taken during the 2011 survey in Yellowbelly Lake were archived at the Salmon Regional office.

MANAGEMENT RECOMMENDATIONS

Carlson Lake

Request 50 fish for another tiger muskellunge introduction.

Herd Lake

In 2012, reintroduce 70 tiger muskellunge into Herd Lake to improve the size structure of the rainbow trout population. Survey Herd Lake periodically to assess the rainbow trout size structure resulting from bag limit liberalization and tiger muskellunge introduction.

Jimmy Smith Lake

Explore opportunities to improve the size structure of rainbow trout in Jimmy Smith Lake.

Continue to monitor ZQIs in 2012.

Monitor the rainbow trout population periodically to assess size structure changes due to the increased bag limit which went into effect in 2011.

Promote the lake's robust fishery and enhanced daily bag limit using multiple public media to increase angler effort and harvest.

Stanley Lake

Currently, regional staff is developing a management plan for Stanley Lake. Concerns over the removal of the migration barrier, the possibility of lake trout expansion into other lakes in the drainage, threats to established bull trout and sockeye salmon populations in Stanley basin lakes, along with angler reaction to the elimination of a trophy lake trout fishery are being considered. Possible options to consider include the use of daughterless lake trout technology, rotenone treatment, or focused contract gill netting to eradicate lake trout.

Williams Lake

Standardize sampling methodology to correspond to previous Williams Lake surveys, including the use of five gill nets, an overnight set, and a September/October sampling timeframe. Continue to request bull trout take to allow overnight gillnetting. A consistent sampling methodology would provide a more accurate evaluation of rainbow trout and bull trout populations.

As funds and personnel are available, continue to monitor DO levels and water temperature at the specified location and depths to provide a long-term dataset of water quality parameters in Williams Lake. Consider having an IDFG cooperator monitor DO levels on a monthly, semi-monthly, or quarterly schedule.

Continue rainbow trout trapping and spawning operations in Lake Creek. Continue using cooperator Ken John as a spawning assistant, egg tender, and supporter of IDFG projects at Williams Lake. Stock the resulting fry in Lake Creek above Williams Lake. This effort continues to encourage property owner support and educational opportunities at the lake.

Continue the broodstock enhancement project for Hayspur Fish Hatchery, including pathogen testing of Williams Lake adult rainbow trout spawners. Utilize these gametes to increase the genetic diversity of Hayspur broodstock. This effort will likely improve eyed egg production and possibly help the timeframe of hatchery requests for eyed eggs.

Yellowbelly Lake

The goal of a wild, quality westslope cutthroat trout fishery has yet to be realized at Yellowbelly Lake. The drainage upstream of the lake is dominated by non-native brook trout and the lake is primarily populated with non-game species. Species composition continues to favor non-game species despite past chemical treatments. Recent management direction is now focused on stocking westslope cutthroat fry at a rate of 200 fry per surface acre or 38,000 fry total per year for a five-year period initiated in 2010. The increased level of westslope cutthroat trout stocking is an attempt to improve fishing in the lake. Likely, the goal of a quality westslope cutthroat fishery may need modification.

Table 4. Summary of brook trout sampling efforts in Carlson Lake, 1998 to 2000, 2002 to 2006, 2008, 2009, and 2011.

Year	Sample Dates	Total No. Fish	Total length (mm)	Average Total Length (mm)	Average Weight (g)	Total Gill-net Hours	Fish/Net Hour (CPUE)	Average Relative Weight	Population Estimate
1998	05/22-23	818	120-292	196.0	--	488.3	1.7	--	--
1999	05/27-29	1,151	112-300	198.0	--	386.1	3.0	--	--
2000	10/08-09	665	108-270	191.0	--	270.9	2.5	--	--
2002[a]	06/13-14	546	102-266	191.8	77.3	147.8	3.7	89.6	9,900
2003	06/13-14	562	96-270	209.0	78.1	416.9	1.3	89.8	9,027
2004	06/15-16	48	156-251	223.9	96.1	60.5[b]	0.8	85.9	--
2005	06/22-24	599	145-290	230.5	127.3	369.5	1.6	98.5	6,024
2006[a]	06/19-20	151	127-301	216.0	129.5	160.7	0.9	113.6	--
2008	07/22-23, 08/14-15	67	154-270	224.5	115.0	20.5[c]	3.3	96.6	--
2009	07/07-08	246	130-319	233.8	129.4	151.7	1.6	95.8	--
2011	07/06-07	287	70-291	218.4	102.0	132.7	2.2	97.1	--

[a] Tiger muskellunge introduction years.
[b] Hoop net survey.
[c] Hook and line survey.

Table 5. Summary of rainbow trout sampling efforts in Herd Lake for 1994, 1996, 2001 to 2003, 2005, 2006, 2008 to 2011.

Survey Dates	Sample Size	Size Range (Total Length mm)	Average Total Length (mm)	Average Weight (g)	No. Gill Nets	Total Gillnet Hours	Fish/Net Hour (CPUE[a])	Average Relative Weight
08/01-02/1994	113	140-260	199	--		30.0	3.8	--
06/11-12/1996	15	160-292	258	--		16.0	0.9	--
06/21-22/2001	30	95-280	178	49.1		32.6	0.9	--
06/06-07/2002	81	97-350	200	106.7	4	51.2	1.6	--
07/31-08/01/2003	93	107-308	212	101.6	2	49.3	1.9	73.8
06/07-08/2005	272	163-292	207	82.7	4	65.2	4.2	71.8
06/13-15/2006[b]	682	141-268	192	78.9	16	165.8	4.1	86.8
06/05/2008	100	135-312	226	122.1	--[c]	--	10.0[d]	79.9
05/20-21/2009	129	157-306	230	119.1	4	98.3	1.3	76.6
05/25-26/2010	358	113-315	224	105.8	4	79.5	4.5	77.1
07/06-07/2011	282	118-292	184	72.1	4	64.6	4.6	94.4

[a] CPUE = Catch per unit effort.
[b] Tiger muskellunge introduction year.
[c] Sampled by angling.
[d] Reported as fish/angling hour.

Table 6. 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 7. Zooplankton quality index (ZQI) values and average zooplankton ratio (ZPR) for Herd Lake, 2002 to 2004, 2006 to 2009, and 2011.

	ZQI[a] Sample			ZQI	ZPR[b]
Year	Inlet	Mid-lake	Outlet	Average	Average
2002	0.01	0.01	--	0.01	0.04
2003	0.01	0.01	--	0.01	0.05
2004	--	0.07	0.00	0.04	0.02
2006	0.01	0.02	--	0.02	0.14
2007	--	1.30	1.26	1.28	0.50
2008	--	1.13	0.82	0.98	1.02
2009	0.20	0.20	0.26	0.22	0.36
2011	0.04	0.08	0.02	0.05	0.16

[a] ZQI = zooplankton quality index.
[b] ZPR = zooplankton ratio.

Table 8. Estimated fishing effort, total catch, harvest, and number of fish released at Herd, Jimmy Smith, and Williams lakes in 2011.[a]

Lake and Fish Species	Estimated Angler Effort			Estimated Total Catch			Estimated Harvest			Estimated Releases		
	Hours Fished	80% CI[b]	95% CI	No. of Fish	80% CI	95% CI	No. of Fish	80% CI	95% CI	No. of Fish	80% CI	95% CI
Herd												
Rainbow Trout	153	--	--	323	160	244	238	58	89	85	102	155
Jimmy Smith												
Rainbow Trout	238	--	--	816	407	622	476	542	829	340	136	207
Williams												
January:												
Rainbow Trout	--	--	--	919	554	847	919	554	847	0	--	--
Bull Trout	--	--	--	220	208	317	--	--	--	220	208	317
Total	1,506	789	1,206	1,139	704	1,077	919	554	847	220	208	317
February:												
Rainbow Trout	--	--	--	702	415	634	662	396	606	40	34	52
Bull Trout	--	--	--	20	26	40	0	--	--	20	26	40
Total	2,226	848	1,297	722	434	663	662	396	606	60	55	84
Overall:												
Rainbow Trout	--	--	--	1,621	692	1,058	1,580	681	1,042	40	34	52
Bull Trout	--	--	--	240	209	320	0	--	--	240	209	320
Total	3,732	1,158	1,771	1,861	827	1,265	1,580	681	1,042	280	215	328

[a] Estimates were calculated for creel data only during the sampled months.
[b] CI = Confidence interval.
[c] No harvest is allowed for bull trout.

Table 9. Summary of rainbow trout sampling efforts in Jimmy Smith Lake for 1964,1996, 2001, 2003, 2005, 2006, and 2008 to 2011.

Survey Date	Sample Size	Size Range (Total length mm)	Average Total Length (mm)	Average Weight (g)	No. Gill Nets	Total Gillnet Hours	Fish/Net Hour (CPUE[a])	Average Relative Weight
12/15/1964	--	130-380	233	--	--	Creel sample	--	--
06/11/1996	157	155-332	213	--	1	15.0	10.5	--
06/21-22/2001	113	110-370	203	--	1	16.5	6.8	--
07/21/2003	144	112-368	277	283.3	4	62.2	2.3	105.5
06/07-08/2005	351	138-412	238	311.4	4	65.2	5.4	107.8
06/13-15/2006	809	133-419	222	162.7	4	181.8	4.4	107.5
07/31-08/01/2008	914	147-320	201	100.0	4	90.3	10.1	81.0
05/20-21/2009	689	132-325	203	83.7	4	69.8	9.9	77.7
05/25-26/2010	591	100-295	205	80.5	4	71.7	8.2	75.5
06/27-28/2011	676	150-250	183	66.5	4	90.3	7.5	89.1

[a] CPUE = Catch per unit of effort.

Table 10. Zooplankton quality index (ZQI) values and average zooplankton ratio (ZPR) values at Jimmy Smith Lake, 2002 to 2004, 2006 to 2009, and 2011.

Sample Date	ZQI[a].Sample Location			ZQI Average	ZPR[b].Sample Location			ZPR Average
	Inlet	Mid-lake	Outlet		Inlet	Mid-lake	Outlet	
08/01/2002	--	0.00	0.00	0.00	--	0.00	0.00	0.00
08/01/2003	0.10	0.20	--	0.20	0.10	0.10	--	0.10
08/09/2004[c]	--	--	--	0.03	--	--	--	0.03
08/24/2007	--	0.02	0.02	0.02	--	0.12	0.20	0.16
08/29/2008	--	0.02	0.02	0.02	--	0.25	0.25	0.25
08/31/2009	0.01	0.01	0.01	0.01	0.01	0.06	0.08	0.05
08/19/2011	0.01	0.02	0.11	0.05	0.01	0.05	0.14	0.07

[a] ZQI = Zooplankton quality index.
[b] ZPR = Zooplankton ratio.
[c] Field data lost during a computer hard drive failure; averages taken from annual report.

Table 11. Summary of gillnet efforts in Stanley Lake, 1978, 1981, 1986, 2007, 2010, and 2011.

Survey Date	Species[a]						Total No. Fish	No. Gillnet Hrs	Fish/ Gillnet Hour
	CT	EBT	KOK	LT	HRBT	RSS			
10/03 and 10/05/1978	1	2	1	3	0	5	12	--[b]	--
05/20-23/1981	0	12	13	14	0	0	68	504.0	0.1
06/03 and 10/09/1986	0	0	22	12	0	0	59	ND	--
05/16-18/2007	0	3	20	43	5	1	72	164.5	0.4
06/28-29/2010	0	16	46	18	3	0	83	111.5	0.7
05/31-06/01 and 06/08-09/2011	1	54	41	53	32	0	181	397.8	0.5

[a] Species: BU = Bull trout, CT = Cutthroat trout, EBT = Brook trout, KOK = Kokanee, LT = Lake trout, HRBT = Hatchery rainbow trout, SUC = Sucker (various species), NPM = Northern pikeminnow, and RSS = Redside shiner.

Table 12. Expanded catch and harvest estimates for Stanley Lake from creel surveys, May to October, 2011.

Species	Estimated No. of Fish Harvested	Estimated No. of Fish Released	Estimated Total No. of Fish Caught	Catch Per Unit Effort (CPUE)
Rainbow trout	7,086	4,392	11,478	0.89
Kokanee	257	458	715	0.06
Bull trout	0	288	288	0.02
Brook trout	101	28	129	0.01
Lake trout	27	71	98	0.01
Trout (unspecified)	63	32	95	0.01
Westslope cutthroat trout	0	45	45	<0.00
Sucker (various species)	0	41	41	<0.00
Mountain whitefish	0	21	21	<0.00
Total	7,535	5,377	12,912	
Average CPUE for fish caught				1.05
Average CPUE for fish kept				0.59

Table 13. Zooplankton quality index (ZQI) values and average zooplankton ratio (ZPR) values at Williams Lake, 2000 to 2003, 2005, and 2008 to 2011.

Sample Date	ZQI[a].Sample Location			ZQI Average	ZPR[b].Sample Location			ZPR Average
	Inlet	Mid-lake	Outlet		Inlet	Mid-lake	Outlet	
August 2000	--	--	--	0.67	--	--	--	0.85
08/13/2001	0.65	0.71	1.40	0.92	0.51	0.66	0.77	0.65
08/19/2002	0.29	0.98	0.71	0.66	0.43	0.56	1.10	0.70
08/19/2003	0.50	0.80	0.80	0.72	--	--	--	1.55
08/17/2005	0.15	0.60	0.92	0.56	0.53	0.78	0.82	0.71
08/18/2008	0.24	0.72	1.23	0.73	0.68	1.33	0.38	0.80
08/31/2009	0.85	0.85	0.39	0.70	0.38	0.52	0.65	0.51
08/31/2010	0.11	0.33	0.23	0.23	0.30	1.17	0.38	0.62
08/19/2011	0.51	0.60	0.72	0.61	0.41	0.37	0.82	0.53

[a] ZQI = Zooplankton quality index.
[b] ZPR = Zooplankton ratio.

Table 14. Summary of dissolved oxygen samplings taken at Williams Lake, 2000, 2002 to 2006, 2010, and 2011.

Year	Sample Date	Dissolved Oxygen Measurements (mg/L) Taken at 1 Meter Depth Increments											Water Temp. (°C)
		At Surface	1 m	2 m	3 m	4 m	5 m	6 m	7 m	8 m	9 m	10 m	
2000	06/20	--	9.6	--	--	--	--	--	9.4	8.5	--	4.9	--
2002	03/06	9.8	8.0	6.0	4.2	3.7	3.4	3.2	3.0	1.9	0.5	0.4	0.0
2003	03/19	--	1.9	1.8	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.8	4.0
2004	02/06	9.4	8.8	8.2	7.6	6.9	6.3	5.7	5.1	4.4	3.8	3.2	0.0
2005	02/15	6.2	4.4	3.2	2.4	2.2	2.1	2.1	1.9	1.9	1.7	1.2	--
2006	01/20	12.8	10.8	10.1	10.0	10.0	9.7	9.4	9.2	9.0	8.6	8.2	--
2010	02/11	13.1	11.1	4.7	3.7	3.2	3.0	2.7	2.3	2.0	1.7	1.4	0.2
2011	02/25	10.2	6.9	5.6	5.5	5.0	4.4	3.4	2.9	2.4	2.0	1.5	2.1

Table 15. Summary of Yellowbelly Lake gillnetting efforts, 1961, 1978, 2001, 2004 to 2007, and 2009 to 2011.

		Salmonid Species[a]							Other species[b]				
Sample Date	Total Catch	HRBT	CT	RBTxCT	EBT	BU	MWF	Total Salmonids (%)	SUC	NPM	RSS	Total Gill-net Hours	Fish/ Hour
Year 1961	57	0	0	0	0	2	3	5 (3.0)	43	9	0	--	--
10/04/1978	58	0	1	0	4	0	0	5 (9.0)	50	1	2	--	--
06/23/1986	86	0	0	0	11	0	0	11 (12.8)	75	0	0	--	--
06/12-13/2001	96	0	1	0	56	0	0	57 (59.0)	39	0	0	70.4	1.4
07/01-02/2004	384	9	4	4	36	0	0	49 (14.0)	304	27	0	123.5	3.1
06/16-17/2005	239	0	5	0	20	12	0	37 (16.0)	167	35	0	141.8	1.7
06/21-22/2006	157	0	3	0	6	0	0	9 (6.0)	129	19	0	160.7	1.0
06/13/2007	163	3	5	0	8	1	0	17 (10.4)	127	19	0	64.9	2.5
06/04-05/2009	106	0	2	0	3	8	0	13 (12.0)	72	21	0	123.5	0.9
06/02-03/2010	176	0	5	0	3	7	0	15 (8.5)	119	42	0	161.4	1.1
06/27-28/2011	234	1	2	0	4	4	0	11 (4.7)	186	37	0	80.1	2.9

[a] Salmonids: RBT = Rainbow trout, CT = Westslope cutthroat trout, EBT = Brook trout, BU = Bull trout, and MWF = Mountain whitefish.

[b] Other species: SUC = Sucker (various species), NPM = Northern pikeminnow, and RSS = Redside shiner.

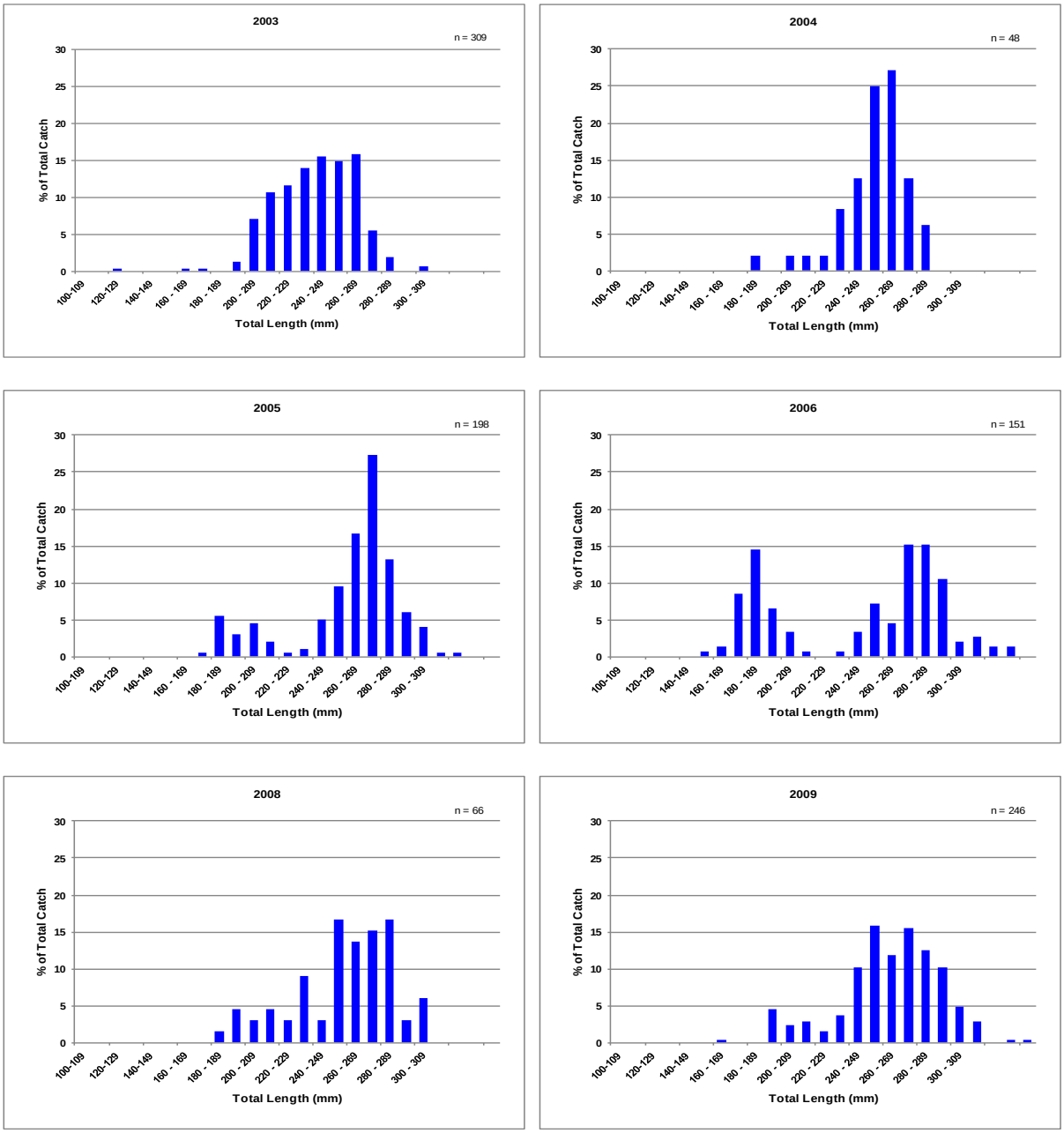

Figure 1. Brook trout length frequency histograms for Carlson Lake, 2003 to 2006, 2008, 2009, and 2011.

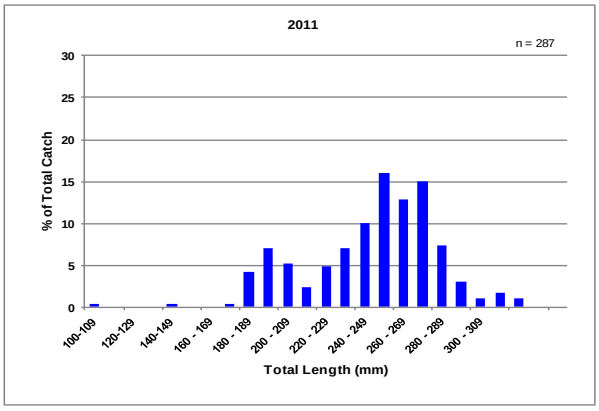

Figure 1. Continued.

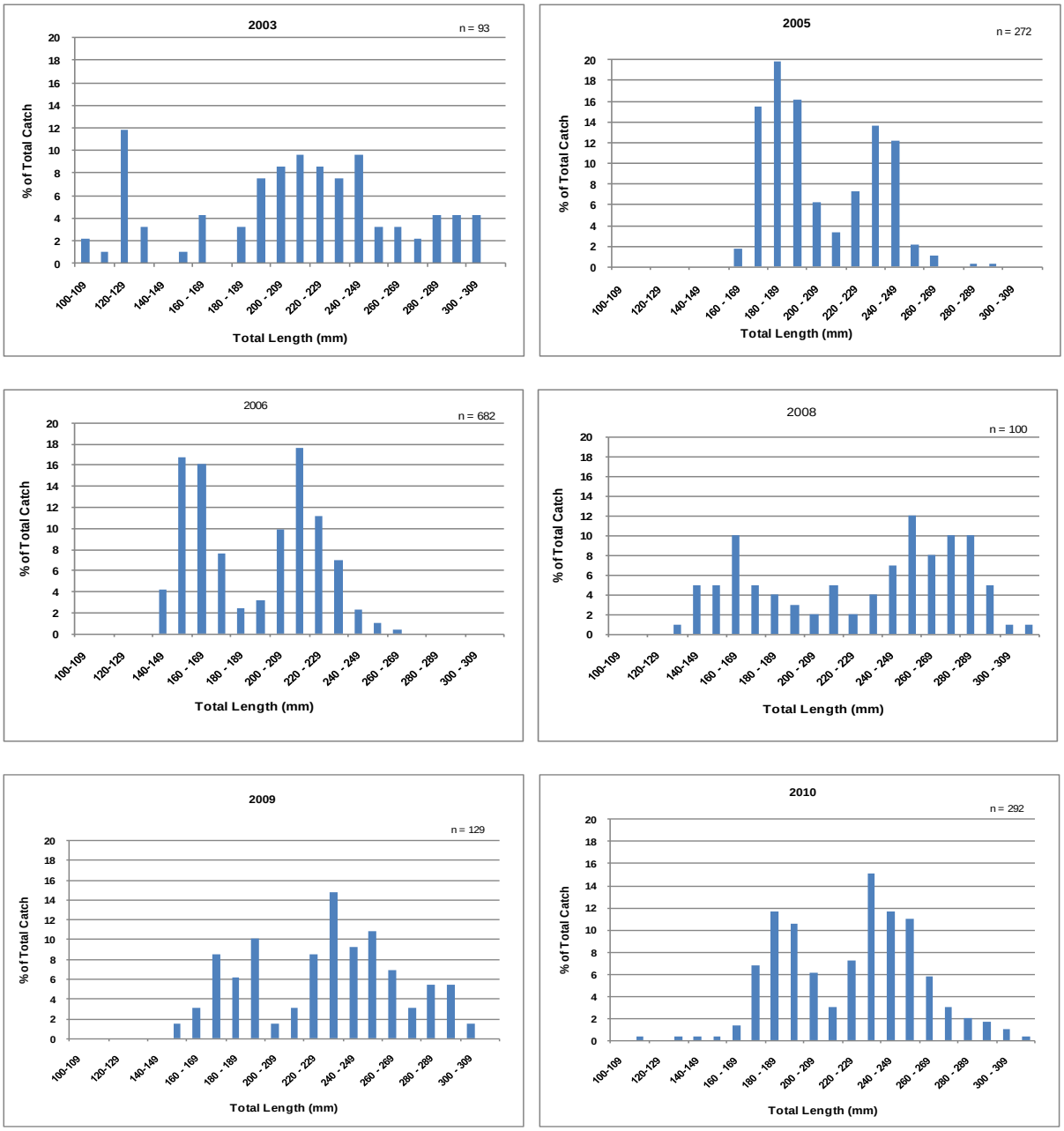

Figure 2. Rainbow trout length frequency histograms from gillnet efforts in Herd Lake, 2003, 2005, 2006, 2008 to 2011.

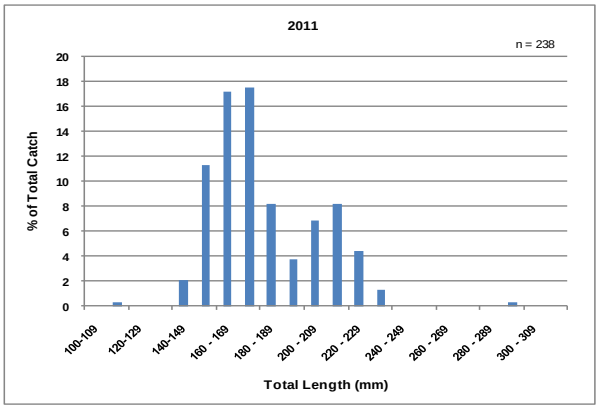

Figure 2. Continued.

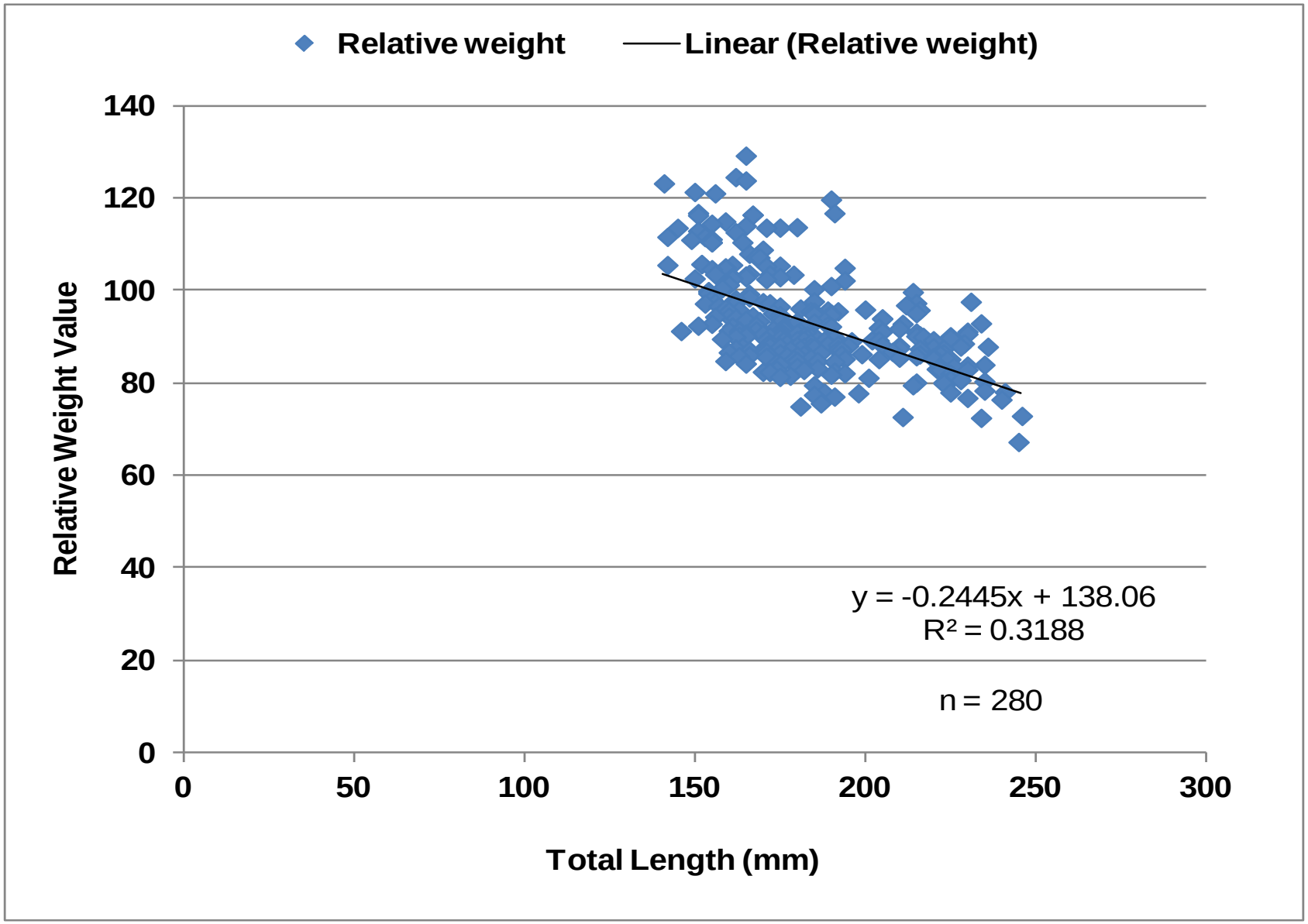

Figure 3. Linear regression of rainbow trout relative weights to total length mm at Herd Lake, 2011.

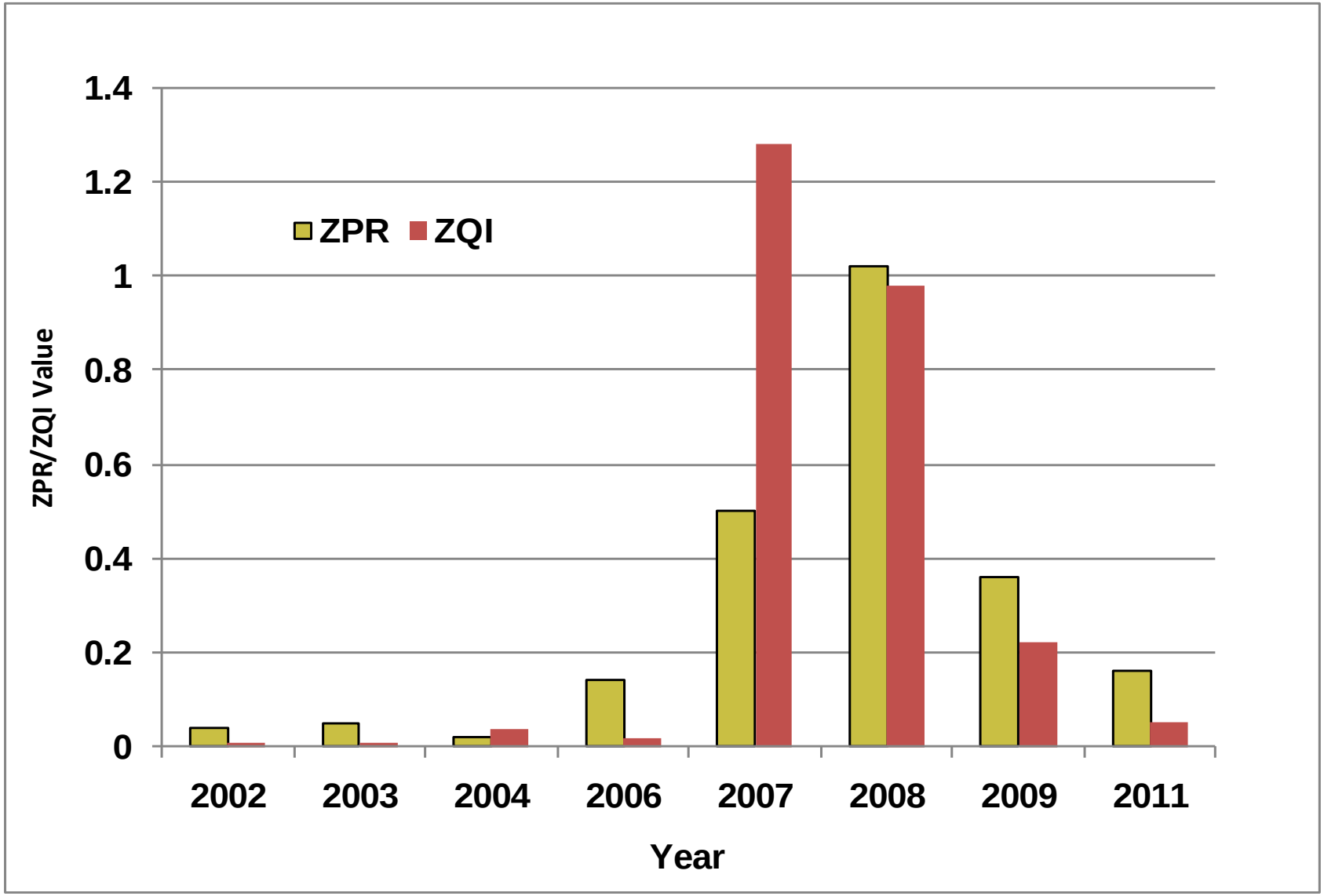

Figure 4. Zooplankton ratio (ZPR) and zooplankton quality index (ZQI) values for Herd Lake, 2002 to 2004, 2006 to 2009, and 2011.

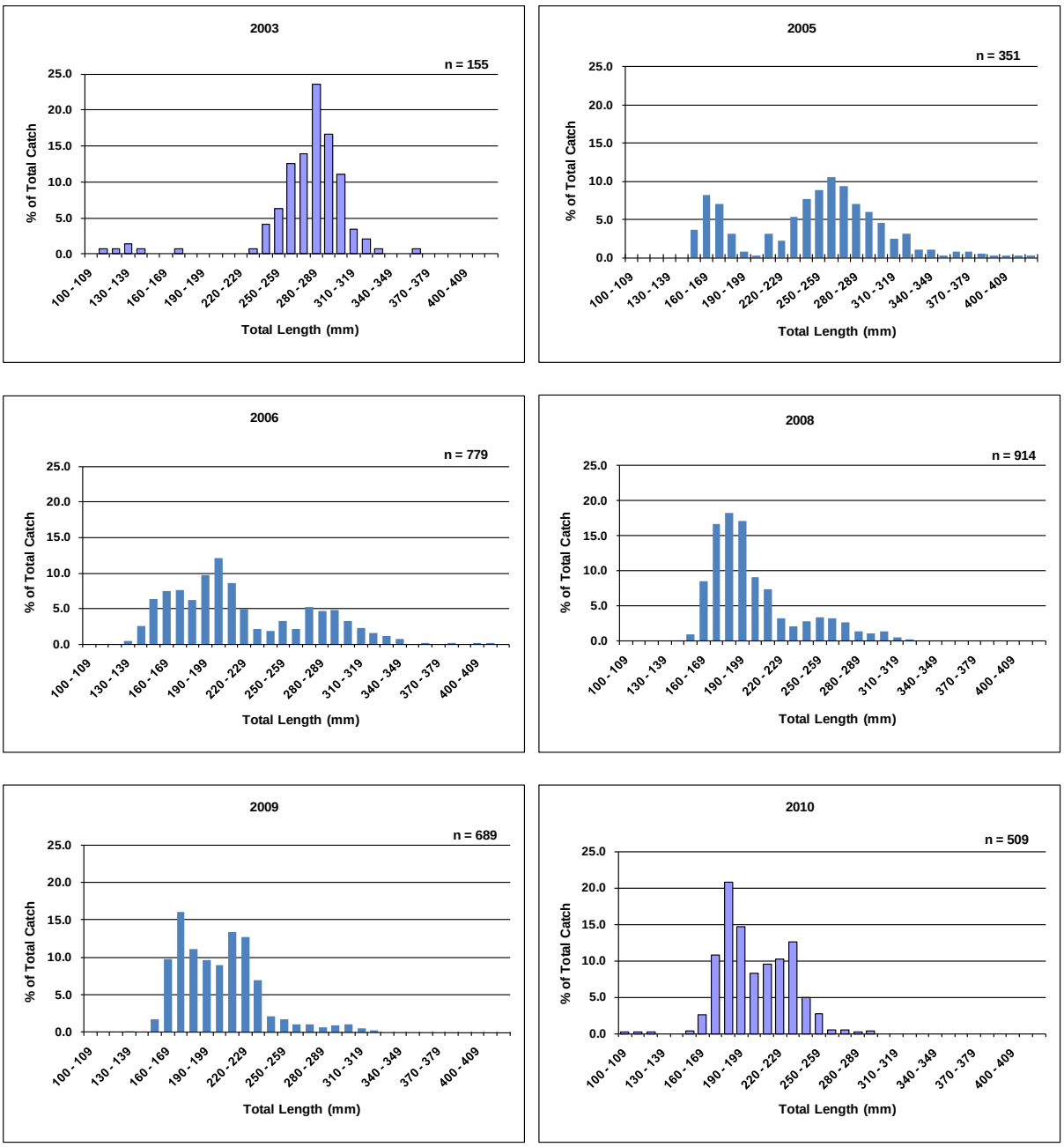

Figure 5. Rainbow trout length frequency histograms from gillnet efforts in Jimmy Smith Lake, 2003, 2005, 2006, and 2008 to 2011.

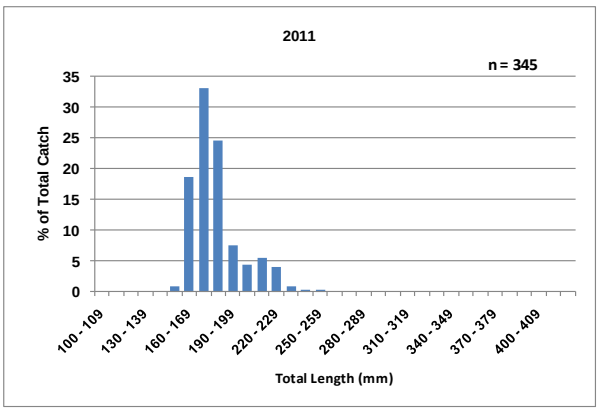

Figure 5. Continued.

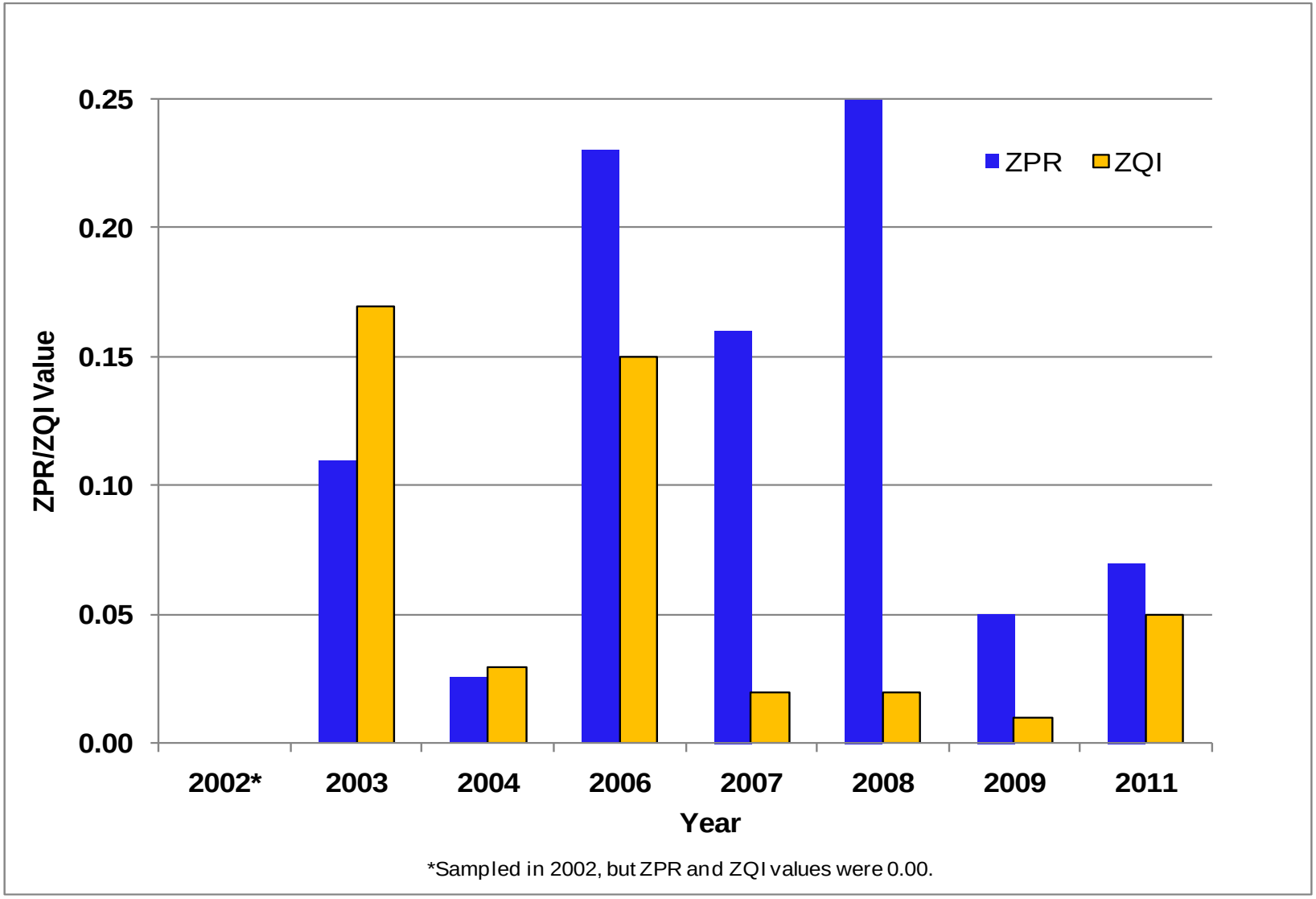

Figure 6. Zooplankton ratio (ZPR) and zooplankton quality index (ZQI) values for Jimmy Smith Lake, 2002 to 2004, 2006 to 2009, and 2011.

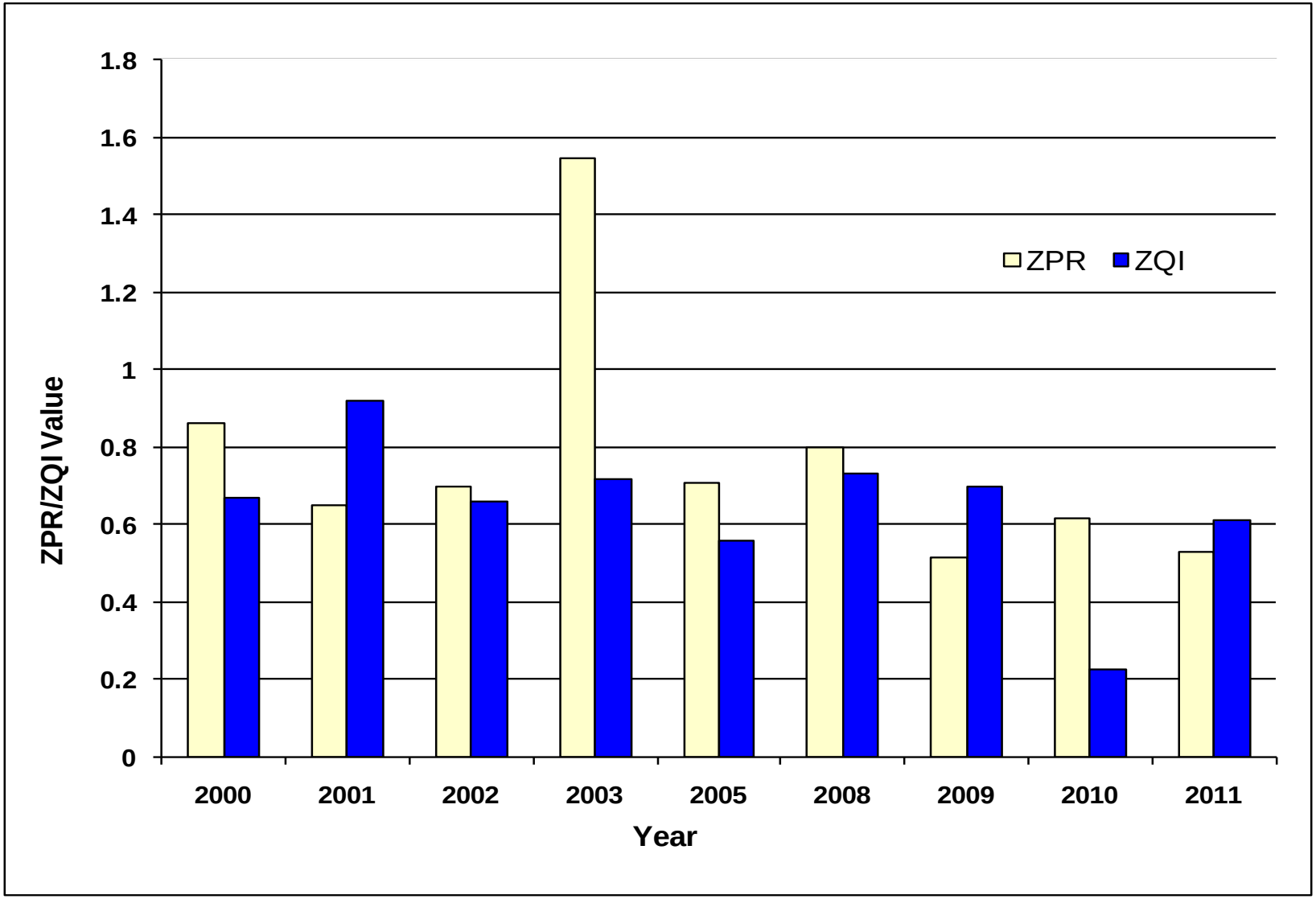

Figure 7. Average zooplankton ratio (ZPR) and zooplankton quality index (ZQI) values at Williams Lake, 2000 to 2003, 2005, and 2008 to 2011.

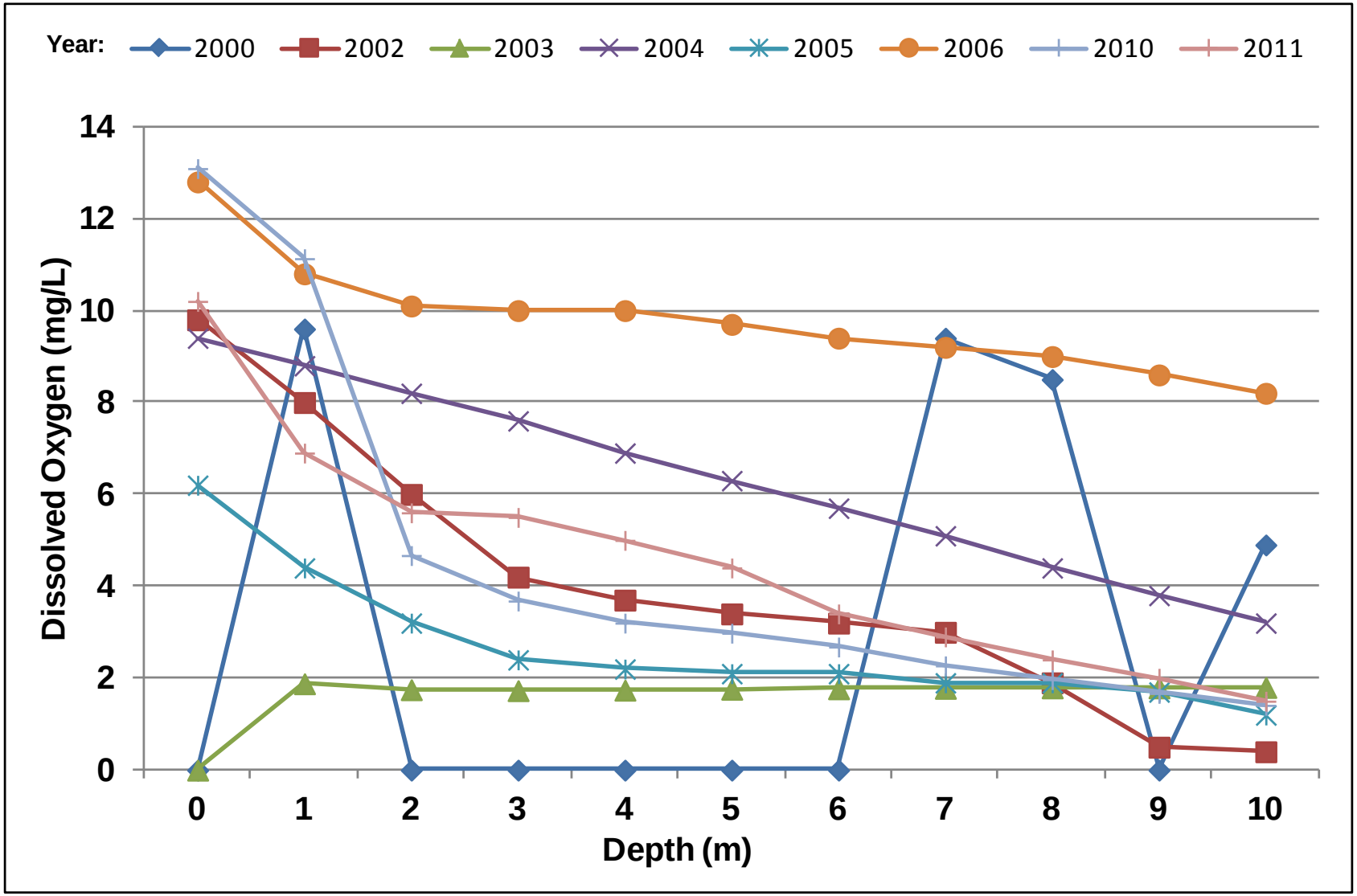

Figure 8. Results of dissolved oxygen sampling conducted at the approximate deepest point (Zmax) in Williams Lake, 2000, 2002 to 2006, 2010, and 2011.

SALMON REGION FISHERY MANAGEMENT 2011 ANNUAL REPORT

River and Stream Surveys - Wild Trout Population Monitoring

ABSTRACT

During the summer and fall of 2011, IDFG personnel sampled 33 streams in the upper Salmon River basin by electrofishing to determine fish species composition, relative abundance, and size distribution. Rainbow trout/steelhead were found in 88% of the streams surveyed and had total lengths ranging from 35 to 376 mm. Bull trout were found in 55% of the streams and had total lengths ranging from 35 to 650 mm. Juvenile Chinook salmon *O. tshawytscha* were found in 30% of surveyed streams in 2011. Westslope cutthroat trout were found in 27% of the streams and had total lengths ranging from 57 to 290 mm. Brook trout were found in 18% of the surveyed streams and had total lengths ranged from 40 to 275 mm. Apparent bull trout x brook trout hybrid *S. confluentus x S. fontinalis* were found in 3% of streams and total lengths ranged from 140 to 145 mm.

Other species recorded during 2011 stream surveys included sculpin *Cottus sp.,* found in 48% of the 33 streams, and longnose dace *Rhinichthys cataractae*, found in 39% of the surveyed streams. Redside shiner and mountain whitefish *Prosopium williamsoni* were each found in 3% of streams electrofished in 2011.

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 172 rainbow trout redds were counted in three survey transects in the upper Lemhi River and one of its tributaries, Big Springs Creek. Regional fishery staff counted 49 bull trout redds in a new trend transect in upper Hayden Creek. Big Timber Creek had a total of 36 bull trout redds observed. Also in 2011, four bull trout transects in the upper Salmon River drainage near Stanley produced a total of 69 redds compared to 77 bull trout redds counted in 2010.

Fish hatchery personnel in the Salmon Region collected data on resident salmonid and non-game species encountered at their respective weirs. During 2011, resident fish counted at the Pahsimeroi Fish Hatchery rack included 107 rainbow trout and 8 bull trout. Resident fish encountered at the East Fork Satellite Facility included 251 bull trout, 7 rainbow trout, 1 apparent cutthroat trout x rainbow trout hybrid, 2 wild/natural steelhead smolts, 114 mountain whitefish, and 3 suckers (various species). Fish collected in 2011 at the Sawtooth Fish Hatchery weir included 30 bull trout, 8 westslope cutthroat trout, 13 rainbow trout, 7 mountain whitefish, 590 sockeye salmon, 1 wild/natural Chinook salmon smolt, and 10 suckers. The Redfish Lake Creek trap encountered 113 bull trout, 542 sockeye salmon, 4 Chinook salmon, 463 suckers, and 242 northern pikeminnow in 2011.

INTRODUCTION

Wild Trout Population Surveys

During the summer and fall of 2011, IDFG personnel 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, are known to inhabit the upper Salmon River basin.

Fluvial Trout Monitoring

Alpine and Fishhook Creeks

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

Bear Valley Creek

Bull trout redd counts in Bear Valley Creek, a tributary of Hayden Creek in the Lemhi River drainage, were initiated in 2002. The trend area surveyed in Bear Valley Creek is located within a relatively low gradient meadow formed by a historic landslide. The transect is located about 3.2 km upstream from the confluence of Bear Valley Creek and Hayden Creek. Bear Valley Creek is an important tributary for spawning fluvial bull trout in the Lemhi River drainage (Esselman et al. 2008).

Big Springs Creek and Lemhi River

In 1994, IDFG began surveying resident rainbow trout redds on Big Springs Creek, a tributary to the upper Lemhi River near Leadore, Idaho. By 1997, regional fishery staff had established three transect areas to monitor long-term resident rainbow trout population trends. Two transects are located on Big Springs Creek, and one on the upper Lemhi River. The annual monitoring effort on Big Springs Creek and the Lemhi River transect is conducted to identify trends in the number of redds observed. Fishing rule changes on the Lemhi River were implemented in 1994 where only rainbow trout 356 mm and larger could be harvested. Theoretically, rule changes, habitat improvement projects, and tributary reconnect projects in the Lemhi River drainage should produce increased number of rainbow trout spawners within these transects.

Big Timber Creek

Bull trout redd counts were started in Big Timber Creek, a tributary to the Lemhi River near Leadore, Idaho in 2007. These surveys were established to determine bull trout distribution and abundance. In 2008, 2010, and 2011, transect sections in Big Timber Creek and one of its tributaries, Rocky Creek, were further refined to monitor fish population responses to in-stream habitat improvement projects.

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 trend transect since 2002.

Fourth of July Creek

Bull trout redd counts in Fourth of July Creek in the Stanley basin 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. Fourth of July Creek is a tributary to the mainstem Salmon River 23 km south of Stanley, Idaho 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.

Hayden Creek

Historically, Hayden Creek has been monitored annually in the early fall for Chinook salmon spawning redds. In 2005 during Chinook salmon redd counts, 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 in 2006. The locations of these counts have been variable while trying to determine distribution, abundance, and timing of bull trout redd building. Recent analysis has focused on determining a trend transect to monitor this population. 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).

Pahsimeroi, East Fork Salmon River, Redfish Lake Creek, and Sawtooth weirs and traps

Annually, resident salmonid and some non-game species are encountered at the Pahsimeroi, East Fork Salmon River, Redfish Lake Creek, and Salmon River (Sawtooth Fish Hatchery) weirs as part of routine steelhead and Chinook salmon trapping activities. The resident salmonid encounters 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 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, Hayden, East Fork Hayden, Big Timber, 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, distribution, abundance, and timing efforts, fishery biologists are moving towards identifying trend transects.

STUDY AREA AND METHODS

Wild Trout Population Surveys

Between January 19 and October 13, 2011, 33 streams in the Salmon River basin were surveyed by regional electrofishing crews for fish composition, relative abundance, and size distribution. Stream characteristics, including temperature, transect length, width, and area sampled, were typically recorded for each transect surveyed in 2011. Drainage information and map coordinates were also documented. 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 electrofishing, typically with a backpack electrofisher (generally a Smith Root, Inc. Model 15 or 15D). We attempted to catch all sizes of fish while moving upstream in transects that ranged from 37 to 170 m in length following one of two stream survey protocols. For a standard stream survey, the most commonly used survey method in 2011, a given transect was sampled one, two, or three times. Captured fish were measured in total length (mm), placed in holding pens, and monitored for recovery. Once electrofishing was completed, fish were released back into the surveyed reach. Genetic samples were taken on some resident game fish for analysis. Mountain whitefish and non-game fish were enumerated and in some instances a subsample were measured. The second electrofishing survey type was done to only determine presence and absence of fish species. In this survey, 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 project objectives and needs at sampling locations.

Where applicable, density estimates were expressed as the number of fish per 100 m^2 of stream surface area. Population estimates were calculated using Microfish© population software (Van Deventer and Platts 1986). Population estimates for all species of salmonids were calculated for two- and three-pass electrofishing transect sites when a 50% reduction in salmonid numbers occurred. Estimates were based on total sample size of all salmonids sampled during each electrofishing pass. When consecutive electrofishing 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 electrofishing surveys. Negative 95% confidence interval values obtained from population estimate calculations were identified with a footnote but not reported.

Fluvial Trout Monitoring

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. In addition to the trend transect in Fishhook Creek, a second transect site was established in 2008 after survey crews observed bull trout spawning below the trend transect site in 2006 and 2007 (K. Plaster, IDFG, personal communication). A similar situation arose in Alpine Creek where no bull trout or redds were observed in the trend transect in 2008, 2009, and 2010. Fishery staff observed one bull trout redd below the trend transect in Alpine Creek in 2010. Since then, fishery staff explored lower Alpine and Alturas Lake creeks to locate where bull trout may be

spawning. In 2012, staff intend to survey Alturas Lake Creek above the mouth of Alpine Creek for suitable spawning habitat (K. Plaster, IDFG, personal communication).

For each stream and transect, all redds in progress or completed redds were counted during the first survey and flagged for identification. On the second survey in each transect, additional completed redds were counted and included with the number of flagged redds to provide a total number of redds. Using the WGS84 datum, latitude and longitude coordinates in decimal degrees, the Alpine Creek trend transect started at 43.90685°N, -114.93049°W, and ended at 43.90509°N, -114.93806°W. Coordinates for the Fishhook Creek trend transect started at 44.13706°N, -114.96703°W, and ended at 44.13472°N, -114.97622°W. Coordinates for the second, recently established (2008) Fishhook Creek transect began at 44.14882°N, -114.93716°W and ended at 44.13992°N, -114.96205°W. Redd counts were conducted by IDFG research personnel on Alpine Creek and Fishhook Creek. Surveys on the two Alpine Creek transects were conducted August 25 and September 12, 2011. Redd counts surveys on the two Fishhook Creek transects were conducted August 24 and September 13, 2011.

Bear Valley Creek

Fluvial and resident bull trout redd counts on Bear Valley Creek were conducted August 30, and September 9, 16, 19, 22, and 26, 2011 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 while redds visually measured smaller in size were considered to be constructed by resident bull trout. Using the WGS84 datum, the trend transect started at latitude and longitude decimal degree coordinates of 44.77604°N, -113.74279°W and ended at 44.78339°N, -113.75476°W. The Bear Valley transect consists of c-channel 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 at the Bear Valley Creek trail pack bridge (Start: 44.78339°N, -113.75476°W and end: 44.79727°N, -113.81159°W). In 2011, this transect was divided into two reaches that still encompassed the same total stream distance as established in 2007. This transect, located above the trend transect site in Bear Valley Creek, was surveyed on August 30, and September 19 and 22, 2011 using methods outlined above.

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 Leadore. The two sites on Big Springs Creek include the stream flowing through the property known as the Karl Tyler Ranch (Using WGS84 latitude and longitude decimal degrees, the start was at 44.70896°N, -113.39917°W and end: 44.72855°N, -113.43430°W) and the historic Darwin Neibaur Ranch (Start: 44.70047°N, -113.38436°W, and end: 44.70896°N, -113.39917°W). The upper Lemhi River site includes that section of the 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: 44.68689°N, -113.36273°W, and end: 44.69945°N, -113.37074°W). 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 4, 2011.

Big Timber Creek

Resident bull trout redd counts in Big Timber Creek drainage were conducted September 20 and 29, and October 6, 2011 using visual ground count methods. Coordinates of

the likely trend transect in Rocky Creek, a tributary to Big Timber Creek, started at WGS84 datum, 44.52933°N, -113.46067°W and ended at 44.52073°N, -113.43355°W. Coordinates of other transects in Big Timber Creek are as follows: Big Timber Creek transect directly upstream of Rocky Creek began at 44.49958°N, -113.46215°W and ended at 44.52073°N, -113.43355°W, and the Big Timber Creek transect immediately downstream of Rocky Creek began at 44.52073°N, -113.43355°W and ended at 44.54818°N, -113.41308°W.

East Fork Hayden Creek

Resident bull trout redd counts on East Fork Hayden Creek were conducted September 16, 2011 using visual ground count methods. The trend transect started at WGS84 datum, latitude and longitude decimal degree coordinates 44.72984°N, -113.67145°W, and ended at 44.72438°N, -113.66671°W. The East Fork Hayden Creek transect consists of c-channel type habitat.

Fourth of July Creek

Salmon Region fishery staff conducted the Fourth of July Creek bull trout redd count on September 8, 2011 using visual ground count methods. Coordinates for the Fourth of July Creek survey, using WGS84 datum and latitude and longitude decimal degrees, started at 44.04112°N, -114.75831°W and ended at 44.05039°N, -11469165°W.

Hayden Creek

The trend transect site in Hayden Creek, first identified in 2006, started at the mouth of Bear Valley Creek and ended upstream 3.4 km at a fence line near Tobias Creek. This transect produced single digit bull trout redd counts each year between 2006 and 2009. In 2010, the trend transect site was moved upstream to a roadless area deemed more suitable for fluvial bull trout spawning (M. Biggs, IDFG, personal communication). The new transect location began in a meadow near a rock slide located 4.6 km upstream from Tobias Creek. From the rock slide, the new transect extended 2.7 km upstream to the confluence of Hayden and West Fork Hayden creeks. Using WGS84 datum, the latitude and longitude decimal degree coordinates for this transect started at 44.70624°N, -113.73430°W and ended at 44.70533°N, -113.75771°W.

Classification of fluvial and resident bull trout redds followed the same protocol as listed above for Bear Valley Creek. In past years, 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 in the trend transect. Three counts were conducted in 2011 in this new trend transect on September 9, 16, and 23.

Pahsimeroi, East Fork Salmon River, Redfish Lake Creek, and Salmon River weirs and traps

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 is operated annually on Redfish Lake Creek to monitor salmonid movement in and out of Redfish Lake. Counts of bull trout on Redfish Lake Creek were established to more accurately track migratory bull trout populations using the Redfish Lake system.

RESULTS AND DISCUSSION

Wild Trout Population Surveys

Salmonids and non-game fish were found in all 33 streams surveyed by IDFG electrofishing crews in the Salmon Region during 2011 (Tables 16-18). Rainbow trout (*n* = 962) was the most abundant salmonid species observed during 2011. Rainbow trout were found in 29 (88%) of the 33 streams and ranged in size from 35 to 376 mm TL (Tables 16 and 17). The highest densities of rainbow trout were found in Iron and Fourth of July creeks with densities of 10.1 and 2.9 fish/100m^2, respectively (Table 16). Bull trout (*n* = 327) were observed in 18 (55%) streams and had with total lengths ranging from 35 to 650 mm. The highest densities of bull trout occurred in Fourth of July and 4th of July creeks with 9.4 and 3.0 fish/100m^2, respectively. Brook trout (*n* = 139) were found in 6 (18%) streams and had total lengths ranging from 40 to 275 mm. The highest densities of brook trout were found in the two transects of Duck Creek with 7.4 and 1.5 fish/100m^2. Juvenile Chinook salmon (*n* = 106) were found in 10 (30%) fish-bearing streams. Generally, most stream transects surveyed with Chinook salmon did not have total transect areas measured in 2011. Of the streams with total area calculations, Hughes and Sheep creeks had the highest densities of juvenile Chinook salmon with 0.6 and 0.4 fish/100m^2, respectively. Westslope cutthroat trout (*n* = 78) were found in 9 (27%) surveyed streams and had total lengths ranging from 57 to 290 mm. Allan and Sheep creeks had the highest westslope cutthroat trout densities with 2.9 and 0.4 fish/100m^2, respectively. Apparent bull trout x brook trout hybrid (*n* = 2) were found in 1 (3%) of the 33 streams surveyed in 2011. Apparent bull trout x brook trout hybrid lengths ranged from 140 to 145 mm total length and were observed solely in Porphyry Creek.

Mountain whitefish, sculpin, longnose dace *Rhinichthys cataractae*, and redside shiner were also recorded during 2011 surveys (Table 18). Sculpin were detected and counted in 12 (36%) tributaries surveyed with fish present, totaling 2,330 observations. The highest densities of sculpin were found in Duck and Hughes creeks with 69.7 and 67.4 fish/100m^2, respectively (Table 18). Longnose dace (*n* = 4), were encountered in two (6%) streams surveyed with fish present. Redside shiners were detected in one (3%) fish-bearing stream and totaled 2 fish. Mountain whitefish (*n* = 3) were identified in two (6%) of the 33 streams surveyed.

Standard stream survey protocol was followed on 31 streams surveyed in 2011. The remaining two streams were sampled for presence and absence. More detailed information on stream survey sites is located in Appendix E, which lists stream transects, sampling dates, transect measurements, sub-basin locations, and WGS84 datum, latitude and longitude coordinates.

It should be noted that Salmon Region fish survey data from cooperating federal agencies, including the U.S. Forest Service and Bureau of Land Management, is no longer reported in the Region's annual report. Annual stream survey data from IDFG and cooperating federal agencies was entered into IDFG's statewide Standard Stream Survey database for storage and data retrieval.

Fluvial Trout Monitoring

Alpine and Fishhook Creeks

No bull trout redds were observed in the trend transect on Alpine Creek in 2011, mirroring results of zero redds in 2008, 2009, and 2010 (Table 18, Figure 9). Fishery staff were

unable to find a blockage to upstream migration before conducting the 2011 counts. Two redds were counted in the new transect in 2011.

Eleven redds were observed in the trend transect in Fishhook Creek in 2011, the same number of redds observed in 2010 (Table 20, Figure 10). The second bull trout spawning transect, located downstream of the original trend transect site in Fishhook Creek, produced seven redds in 2011 compared to 10 redds counted in 2010 (Table 21, Figure 11).

Bear Valley Creek

Regional fishery staff counted 36 fluvial bull trout redds in the Bear Valley Creek trend transect in 2011 compared to 37 bull trout redds observed in 2010 (Table 22, Figure 12). The trend of bull trout redds counted in this transect has been generally stable. This year's count is above the 10-year average of 34 redds. It should be noted that upstream of this transect the number of bull trout redds has increased the last two years. Likely, the recent above-average snowpack and resultant spring freshets have led to stream morphology changes.

Big Springs Creek and Lemhi River

We observed a total of 172 rainbow trout redds in two Big Springs Creek transects and one transect in the upper Lemhi River (Table 23, Figure 13). One hundred and three redds were counted in the historic Neibaur Ranch transect while 49 redds were observed in the current Tyler Ranch transect (Table 23). Twenty redds were counted in the current Beyeler Ranch transect in the upper Lemhi River. This year's total count was 35 fewer redds than counted in 2010.

Reviewing redd counts from the three survey reaches over time suggests a general increasing trend (Figure 13). The total number of redd counts has fluctuated annually and likely indicates that variable factors are affecting the rainbow trout spawning population. These sites will continue to be monitored annually and redd count trends will be evaluated.

Big Timber Creek

Bull trout redds counted in the Big Timber Creek drainage totaled 36 in 2011, 15 more redds than observed in 2010 (Table 24). The total includes two transects in Big Timber Creek and one transect in Rocky Creek. Although not directly comparable because of continued exploratory development of transects, these count totals relate to 16 redds observed in 2008 and 25 redds counted in 2007.

East Fork Hayden Creek

A total of 32 bull trout redds were observed in East Fork Hayden Creek trend transect in 2011 compared to 55 counted in 2010 (Table 22, Figure 14). Bull trout redd counts in this transect have declined in the last two years. Only one count was conducted in 2011 instead of the usual two. One count may have not captured the peak of spawning in this Hayden Creek tributary. In addition, high flows in early summer this year could have transported fish downstream to Hayden Creek. Once flows moderated, the irrigation diversion on the lower end of this tributary could have impeded upstream movement. Fishery staff noted a decrease in the number of adult bull trout observed this year compared to previous counts.

Fourth of July Creek

Fifty-one completed bull trout redds were counted in the Fourth of July Creek trend transect in 2011, a similar number observed for the last three years (Table 25, Figure 15). Since counts were initiated in 2003, there has been a general upward trend in redd counts, which is interesting considering a large wildfire in the drainage in 2005 included the transect area. This population is likely responding to improved passage conditions within the watershed that includes screening facilities on irrigation ditches to protect juvenile salmonids, and increased flows during the fall migration of spawning adults.

Hayden Creek

Forty-nine bull trout redds were counted in the Hayden Creek trend site in 2011 while 29 bull trout redds were counted in 2010 (Table 22). Both resident and fluvial-sized bull trout were observed spawning in Hayden Creek in 2011, marking the seventh consecutive year of these differing life histories being observed in the same tributary.

Pahsimeroi, East Fork Salmon River, Salmon, and Redfish Lake Creek weirs and traps

In the last 12 years, the trend in the number of resident rainbow trout migrating past the Pahsimeroi Fish Hatchery weir has increased (Table 26; Figure 16). In 2011, 107 resident rainbow trout were encountered compared to 144 counted last year. This is the second highest number of rainbow trout trapped since 1991 (Table 26). The male to female sex ratio continues to consistently favor females over the recorded period. This year, 81% of the rainbow trout encountered at the Pahsimeroi trap were female. Picket spacing at the Pahsimeroi weir likely favors passage of resident male rainbow trout upriver through the weir while inhibiting female movement. Twelve bull trout were also encountered during the 2011 spring trapping period.

Trapping at the East Fork Salmon River Satellite Facility resulted in capturing 250 bull trout, 8 rainbow trout (including one apparent cutthroat trout x rainbow trout hybrid), 187 mountain whitefish, 2 wild/natural steelhead smolts, and 3 suckers counted in 2011 (Table 27). Generally, bull trout numbers appear to be increasing during the last seven years (Figure 17). Westslope cutthroat and rainbow trout numbers are relatively stable but have numbered in single digits since 2004 (Table 27). The number of mountain whitefish remained in the triple digits for 2011 and have ranged from 91 to 339 counted per year since 2004.

Sawtooth Fish Hatchery personnel encountered 30 bull trout, 13 westslope cutthroat trout, 15 rainbow trout, 7 mountain whitefish, 590 sockeye salmon, 1 wild/natural Chinook salmon smolt, 1 wild/natural steelhead smolt, and 10 suckers at the trap located on the mainstem Salmon River (Table 28). The number of bull trout encountered at the Sawtooth trap this year was within the range of the last 10 years (Figure 18). Generally, counts of resident salmonids have increased in the past six years. Variable trapping dates make trend comparisons of individual species encountered at the trap difficult.

The Redfish Lake Creek trap resulted in capturing 128 bull trout, 542 sockeye salmon, 4 Chinook salmon, 242 northern pikeminnow, and 463 suckers encountered during the 2011 trapping season (Table 29). The overall salmonid count decreased while non-salmonids increased in 2011 when compared to 2010. However, since 1999 the number of bull trout encountered at the trap has shown an increasing trend (Figure 19).

MANAGEMENT RECOMMENDATIONS

Report yearly non-target fish encountered at the Pahsimeroi Fish Hatchery during the Chinook salmon trapping season.

Coordinate with Sawtooth Fish Hatchery staff to differentially record resident and hatchery rainbow trout encountered during steelhead and Chinook salmon trapping seasons.

Continue to monitor fluvial bull trout population trends in the Salmon and Lemhi river drainages through annual redd counts surveys.

Table 16. Combined salmonids (excluding mountain whitefish) sampled, population estimates (including fry) with 95% confidence intervals (CI), and species composition for selected streams surveyed in the upper Salmon River basin, 2011.

Stream	Tran-sect[a]	Sample Date	Transect Area (m^2)	No. Fish Sampled	Population Estimate (95% CI)	Fish/ 100 m^2	Species Composition %[b]						
							CT	RBT	BU	CTxRBT	EBT	CK	BUxEBT
Agency	M	07/12/2011	--	26	26 (24, 28)	--		96	4				
Agency	M	07/13/2011	--	41	46 (36, 56)	--		100					
Agency	M	07/15/2011	--	38	40 (35-45)	--		100					
Agency	M	08/04/2011	--	59	74 (52, 96)	--		97	3				
Allan	L	07/14/2011	68.5	5	--	7.3	40	60					
Bear Valley	L	07/25/2011	--	10	--	--			100				
Bear Valley	M	07/27/2011	--	16	--	--			100				
Bear Valley	M	08/02/2011	--	24	26 (19, 33)	--		4	96				
Big Springs	U	10/13/2011	--	61	--	--		33			66	1	
Big Timber	L	07/26/2011	--	38	40 (32, 48)	--							
Big Timber	L	07/29/2011	--	52	44 (22, 66)	--		63			37		
Bohannon	L	07/21/2011	--	89	92 (87, 97)	--		100					
Bohannon	U	07/22/2011	--	35	35 (34, 36)	--			100				
Ditch	L	07/14/2011	366.0	8	--	2.2		100					
Duck	M	06/21/2011	483.5	40	50 (32, 68)	8.3		10			90		
Duck	M	06/22/2011	466.9	10	--[c]	2.1		30			70		
East Fork Bohannon	M	07/19/2011	--	7	7 (6, 8)	--		14	86				
Elkhorn	L	07/29/2011	--	23	--	--	9	87	4				
Flume	L	07/14/2011	--	44	47 (41, 53)	--	11	86	3				
4th of July[d]	L	08/10/2011	530.0	11	--	2.1		46	46		8		
4th of July	M	08/10/2011	574.0	19		3.3	10		90				
4th of July	M	08/09/2011	526.0	9	--	1.7			100				
4th of July	U	08/09/2011	490.0	14	--	2.9			100				
Fourth of July[e]	L	07/06/2011	254.0	27	--	10.6		12	88				
Hayden	M	08/11/2011	--	37	--	--	19	3	78				
Hayden	M	08/15/2011	--	47	49 (44, 54)	--	15		85				
Hughes	L	07/21/2011	749.3	32	--[c]	4.3	6	81				13	
Hughes	L	07/21/2011	647.0	8	--	1.2		88				12	

Table 16. Continued.

Stream	Tran-sect[a]	Sample Date	Transect Area (m^2)	No. Fish Sampled	Population Estimate (95% CI)	Fish/ 100 m^2	Species Composition %[b]						
							CT	RBT	BU	CTxRBT	EBT	CK	BUxEBT
Hughes	L	07/21/2011	527.0	13	--	2.5		85				15	
Iron	L	07/27/2011	680.0	13	214 (112, 316)	1.9		100					
Iron	L	08/15/2011	--	114	--	--		81				19	
Iron	L	07/27/2011	925.0	10	--	1.1		100					
Iron	L	08/15/2011	597.0	60	--	10.1		100					
Kenney	L	07/18/2011	--	52	53 (47, 59)	--							
Kenney	M	07/28/2011	--	64	64 (62, 66)	--	28	19	53				
Kenney	M	08/08/2011	--	51	51 (49, 53)	--	55		45				
Little Pahsimeroi River	M	08/16/2011	--	26	--	--					100		
Little Springs	M	07/12/2011	--	6	6 (4, 8)	--		100					
Loon	L	08/01/2011	--	17	--	--		35	6			59	
Pahsimeroi River	M	08/16/2011	640.0	5	5 (2, 8)	0.8					100		
Pahsimeroi River	M	08/16/2011	--	0	--	--							
Pahsimeroi River	M	08/16/2011	--	0	--	--							
Papoose	L	08/03/2011	--	24	--	--		92	8				
Pennal Slough	L	01/19/2011	--	21	--	--		76				24	
Pistol	L	07/30/2011	--	37	--	--		38				62	
Porphyry	L	07/05/2011	339.3	28	--[c]	8.3		39	54				7
Porphyry	L	07/06/2011	349.2	3	--	0.9			100				
Rapid River	L	07/30/2011	--	8	--	--		12				88	
Ship Island	L	08/03/2011	--	6	--	--		83	17				
South Fork Iron	L	06/29/2011	253.1	4	--	1.6		25	75				
South Fork Iron	L	06/29/2011	387.0	1	--	0.3			100				
Sheep	L	08/04/2011	634.0	9	--	1.4	25	38	12			25	
Sheep	L	08/04/2011	685.0	8	--	1.2	12	50				38	
West Fork Iron	L	07/12/2011	411.0	10	--	2.4			100				
Wilson	L	08/02/2011	--	51	--	--	2	70	4			24	
Wimpey	L	07/20/2011	--	67	71 (64, 78)	--		100					

[a] L = transect's lower reach, M = middle reach, and U = upper reach.
[b] CT = Westslope cutthroat trout, RBT = Rainbow trout/steelhead, BU = Bull trout, CTxRBT = Apparent cutthroat trout x rainbow trout hybrid, EBT = Brook trout, CK = Chinook salmon, and BUxEBT = Apparent bull trout x brook trout hybrid.
[c] Population estimate calculation returned a negative value at the 95% confidence interval and was not reported.
[d] Salmon River tributary.
[e] Panther Creek tributary.

Table 17. Salmonid species (excluding mountain whitefish), number of fish observed, average total length (mm), and size range (total length mm) for selected streams surveyed in the upper Salmon River basin, 2011.

Stream	No. Fish Observed	Salmonid Species[a]	Mean Total Length (mm)	Size Range (Total Length mm)
Agency	2	BU	177.3	161-200
Agency	161	RBT	134.1	58-240
Allan	2	CT	75.0	75
Allan	3	RBT	76.7	70-90
Bear Valley	49	BU	204.4	71-650
Bear Valley	1	CT	197.0	197
Big Springs	1	CK	125.0	125
Big Springs	40	EBT	171.1	74-265
Big Springs	20	RBT	129.7	63-260
Big Timber	21	EBT	175.4	145-241
Big Timber	69	RBT	145.4	85-252
Bohannon	35	BU	150.7	59-209
Bohannon	89	RBT	131.0	40-327
Ditch	8	RBT	90.6	55-125
Duck	43	EBT	87.8	40-205
Duck	7	RBT	113.1	91-120
East Fork Bohannon	6	BU	154.2	92-260
East Fork Bohannon	1	RBT	182.0	182
Elkhorn	1	BU	110.0	110
Elkhorn	2	CT	155.0	145-165
Elkhorn	20	RBT	107.8	75-190
Flume	1	BU	218.0	218
Flume	5	CT	179.4	154-230
Flume	38	RBT	119.0	52-207
Fourth of July[b]	23	BU	97.6	50-140
Fourth of July	3	RBT	138.3	70-175
Fourth of July	1	YOY	20.0	20
4th of July[c]	46	BU	107.4	35-180
4th of July	2	CT	147.5	140-155
4th of July	1	EBT	195.0	195
4th of July	5	RBT	151.0	130-200
Hayden	69	BU	191.2	59-330
Hayden	14	CT	168.3	96-262
Hayden	1	RBT	267.0	267
Hughes	7	CK	55.0	55[d]
Hughes	2	CT	282.5	275-290
Hughes	44	RBT	88.6	55-175
Iron	22	CK	--	--
Iron	172	RBT	100.3	35-170
Iron	3	YOY	26.7	20-35
Kenney	57	BU	143.2	74-332
Kenney	46	CT	164.4	57-260

Table 17. Continued.

Stream	No. Fish Observed	Salmonid Species[a]	Mean Total Length (mm)	Size Range (Total Length mm)
Kenney	2	EBT	109.0	92-126
Kenney	62	RBT	114.9	50-231
Little Pahsimeroi River	26	EBT	108.1	75-190
Little Springs	6	RBT	283.7	198-376
Loon	1	BU	185.0	185
Loon	10	CK	71.5	65-80
Loon	1	RBT	90.0	90
Loon	5	YOY	42.5	40-45
Pahsimeroi River	5	EBT	138.0	100-275
Papoose	2	BU	185.0	185[d]
Papoose	22	RBT	167.0	110-240
Pennal Slough	5	CK	--	--
Pennal Slough	16	RBT	--	--
Pistol	32	CK	66.6	60-80
Pistol	4	RBT	111.3	105-120
Pistol	10	YOY	42.5	40-45
Porphyry	17	BU	104.7	70-185
Porphyry	1	EBT	145.0	145
Porphyry	2	BUxEBT	142.5	140-145
Porphyry	11	RBT	105.9	50-155
Rapid River	7	CK	61.6	47-74
Rapid River	1	RBT	117.0	117
South Fork Iron	4	BU	76.3	35-140
South Fork Iron	1	RBT	180.0	180
Sheep	1	BU	190.0	190
Sheep	5	CK	--	--
Sheep	3	CT	233.3	130-290
Sheep	7	RBT	148.2	72-281
Sheep	1	YOY	25.0	25
Ship Island	1	BU	170.0	170
Ship Island	5	RBT	130.0	80-185
West Fork Iron	10	BU	117.0	60-200
Wilson	2	BU	248.0	226-270
Wilson	12	CK	65.0	65[e]
Wilson	1	CT	--	--[d]
Wilson	36	RBT	130.1	65-273
Wimpey	67	RBT	106.8	52-192

[a] 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, BUx EBT= Apparent bull trout x brook trout hybrid trout, RBT = Rainbow trout, and YOY = Young of year (trout fry).

[b] Panther Creek tributary.

[c] Salmon River tributary in the SNRA.

[d] One not measured.

[e] Three of 12 measured.

Table 18. Combined mountain whitefish and non-game fish sampled, population densities, and species composition for selected streams surveyed in the upper Salmon River basin, 2011. Amphibian presence is identified by a footnote in the transect column.

						Species Composition (%)[b]					
Stream	Transect[a]	Sample Date	Transect Area (m^2)	No. of Fish Sampled	Fish/ 100 m^2	SCU	LND	SPD	MWF	SUC	RSS
Allan	L[c]	07/14/2011	68.5	0	--						
Big Springs	U	10/13/2011	--	44	--	100					
Ditch	L[c]	07/14/2011	366.0	19	5.2	100					
Duck	M	06/21/2011	483.5	337	69.7	100					
Duck	M	06/22/2011	466.9	298	63.8	100					
Elkhorn	L	07/29/2011	--	13	--	92	8				
4th of July	L	08/10/2011	530.0	11	2.1	100					
4th of July	M	08/10/2011	574.0	6	1.0	100					
4th of July	M	08/09/2011	526.0	2	0.4	100					
Hughes	L[c]	07/21/2011	749.3	505	67.4	100					
Hughes	L	07/21/2011	647.0	101	15.6	100					
Hughes	L[c]	07/21/2011	527.0	6	1.1	100					
Iron	L	07/27/2011	680.0	145	21.3	100					
Iron	L	08/15/2011	--	226	--	100					
Iron	L	07/27/2011	925.0	127	13.7	100					
Iron	L[c]	08/15/2011	597.0	44	7.4	100					
Little Pahsimeroi River	M	08/16/2011	--	64	--	100					
Loon	L	08/01/2011	--	21	--	100					
Pahsimeroi River	M	08/16/2011	640.0	2	0.3						100
Pistol	L	07/30/2011	--	25	--	100					
Porphyry	L	07/05/2011	339.3	183	53.9	100					
Rapid River	L	07/30/2011	--	12	--	100					
South Fork Iron	L[c]	06/29/2011	253.1	0	--						
South Fork Iron	L[c]	06/29/2011	387.0	0	--						
Sheep	L	08/04/2011	634.0	64	10.1	98			2		

Table 18. Continued.

						Species Composition (%)[b]					
Stream	Transect[a]	Sample Date	Transect Area (m^2)	No. of Fish Sampled	Fish/ 100 m^2	SCU	LND	SPD	MWF	SUC	RSS
Sheep	L[d]	08/04/2011	685.0	49	7.2	98			2		
Wilson	L	08/02/2011	--	38	--	92	8				

[a] L = stream transect's lower reach, M = middle reach, and U = upper reach.

[b] SCU = Sculpin (various species), LND = Longnose dace, SPD = Speckled dace, MWF = Mountain whitefish, SUC = Sucker (various species), and RSS = Redside shiner.

[c] Tailed frogs observed.

[d] Western toads observed.

Table 19. Bull trout redd counts observed in trend survey sections of Alpine Creek, 1998 to 2011.

Year	Survey Dates	No. Redds
1998	08/23, 09/11	0, 1
1999	08/26[a]	3
2000	08/30, 09/15	6, 9
2001	08/28, 09/11[b]	11, 15
2002	08/30, 09/12	8, 14
2003	08/27, 09/08	11, 14
2004	08/30, 09/09	6, 9
2005	08/30, 09/12	9, 13
2006	08/29, 09/12	6, 13
2007	08/28, 09/12	17, 18
2008	08/28, 09/11	0, 0[c]
2009	08/27, 09/09	0, 0[c]
2010	08/31, 09/13	0, 0
2011	08/25, 09/12	0, 0

[a] Only one count completed.
[b] Counts done independently, not cumulatively.
[c] An unknown blockage preventing upstream migration is suspected below the transect site.

Table 20. Bull trout redd counts observed in the trend survey section of Fishhook Creek, 1998 to 2011.

Year	Survey Dates	No. Redds
1998	08/22, 09/10	5, 11
1999	08/22, 08/26	0, 15
2000	08/31, 09/14	12, 18
2001	08/28, 09/11[a]	15, 11
2002	09/04, 09/11	6, 17
2003	08/27, 09/08	6, 17
2004	08/30, 09/09	10, 11
2005	08/30, 09/12	12, 23
2006	08/29, 09/13	16, 25
2007	08/29, 09/13	21, 21
2008	08/29, 09/11	8, 13
2009	08/27, 09/11	9, 33
2010	08/31, 09/13	11, 11
2011	08/24, 09/13	8, 11

[a] Counts done independently, not cumulatively.

Table 21. Bull trout redd counts observed in the second survey section of Fishhook Creek, 2008 to 2011.

Year	Survey Dates	No. Redds
2008	08/29, 09/12	5, 14
2009	08/27, 09/10	2, 12
2010	08/31, 09/13	0, 10
2011	08/24, 09/13	0, 7

Table 22. Bull trout redd count summary in the Hayden Creek drainage, 2002 to 2011. Both fluvial and resident bull trout redds were included in transect counts.

	No. Bull Trout Redds in Selected Trend Transects			
Year	Hayden Creek	Hayden Creek "new" (2010)	East Fork Hayden Creek	Bear Valley Creek
2002			33	26
2003			25	42
2004			26	44
2005			41	34
2006	74 [a]		49	26
2007	115[a]		52	25
2008	28[a]		61	27
2009	22[a]		54	42
2010		29	55	37
2011		49	32	36

[a] Includes transects in variable locations.

Table 23. Number of resident rainbow trout redds counted in the Lemhi River and Big Springs Creek, 1994 to 2011.

Date	Lemhi River (Beyeler Ranch)	Big Springs Creek (Neibaur Ranch)	Big Springs Creek (Tyler Ranch)	Total No. Rainbow Trout Redds
04/26/1994	--	--	--	40[a]
05/03/1995	--[b]	57	--	57
05/03/1996	7	32	--	39
04/21/1997 and 05/03/1997	8	44	45	97
05/03/1998	18	93	124[c]	235
04/29/1999	29	39	71	139
04/20/2000	23	160	123	306
04/05/2001	2	95	186	283
04/25/2002	3	360	193	556
04/22/2003	56	128[d]	103	287
04/22/2004	15	174	45	234
04/26/2005	3	75	43	121
04/27/2006	9	63	143	215
04/26/2007	8	163	62	233
05/05/2008	9	82	108	199
05/04/2009	10	100	54	164
05/04/2010	18	132	57	207
05/04/2011	20	103	49	172

[a] Incidental count taken during a Lemhi Model Watershed Project habitat survey; includes all of Big Springs Creek but not the Lemhi River.
[b] Habitat improvement project implemented in spring 1995.
[c] Habitat improvement project implemented in spring 1998.
[d] Habitat improvement project completed in 2003.

Table 24. Big Timber Creek drainage bull trout redd counts, 2007, 2008, 2010, and 2011.

Year	Survey Dates	No. of Bull Trout Redds
2007	09/11, 09/12	25
2008	09/30, 10/02	16
2010	09/22, 10/06, and 10/07	21
2011	09/20, 09/29, and 10/06	36

Table 25. Fluvial bull trout redd counts observed in the trend survey section of Fourth of July Creek, 2003 to 2011.

Year	Survey Date	No. of Bull Trout Redds
2003	09/17	16
2004	09/09	33
2005	09/02	41
2006	09/06	71
2007	09/05	49
2008	09/01	26
2009	09/10	50
2010	09/09	56
2011	09/08	51

Table 26. Summary of resident trout encountered at the Pahsimeroi Fish Hatchery during spring steelhead trapping, 1991 to 2011.

		No. Resident Rainbow Trout				
Year	Trapping Dates	Males	Females	Total	No. Bull Trout	Other Salmonids[a]
1991	02/13-05/15	--	--	81	0	0
1992	02/07-04/30	--	--	55	0	0
1993	02/19-05/04	7	36	43	0	0
1994	02/15-05/06	10	17	27	0	0
1995	02/20-05/16	11	17	28	0	0
1996	03/01-05/25	5	23	28	0	0
1997	03/01-05/09	1	7	8	0	0
1998	03/01-05/08	8	17	25	0	0
1999	02/19-05/03	7	17	24	0	0
2000	02/25-05/01	10	27	37	0	0
2001	03/01-03/17	27	41	68	0	0
2002	03/01-05/05	19	43	62	0	0
2003	02/28-05/02	9	31	40	0	0
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[b]
2007	03/09-05/27	5	23	28	0	1 CT[b], 1 EBT
2008	02/27-05/21	14	62	76	5	1 RBT sex unknown, 1 EBT
2009	02/20-05/21	16	34	50	0	0
2010	02/22-05/13	43	101	144	1	5 MWF
2011	02/23-05/10	20	86	106	8	1 RBT sex unknown

[a] CTxRBT = Apparent cutthroat trout x rainbow trout hybrid, CT = Westslope cutthroat trout, EBT = Brook trout, and MWF = Mountain whitefish.

[b] Encountered outside range of steelhead trapping dates.

Table 27. Salmonid and non-game species encountered during steelhead and Chinook salmon trapping dates at the East Fork Satellite Facility, 1984 to 2011.

Year	Trapping Dates	Salmonid and Non-game Species[a]						
		BU	CT	RBT	EBT	MWF	SUC	Total
1984	06/20-08/07[b]	49	3	316	0	1,872	0	2,240
1985	03/15-05/22, 06/11-09/04	ND[c]	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	03/22-04/30, 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[d]	1	1	1	0	117	0	120
1999	04/02-05/03[d]	0	0	2	0	29	0	31
2000	03/29-05/03[d]	0	1	1	1	108	0	111
2001	03/23-05/11[d]	ND	ND	ND	ND	ND	0	--
2002	03/26-05/21[d]	0	12	4	0	150	0	166
2003	03/25-05/09[d]	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	228	6[e]	5	0	91	0	330
2008	03/24-05/14, 06/04-09/24	168	5[e]	2	0	128	2	305

Table 27 Continued.

Year	Trapping Dates	Salmonid and Non-game Species[a]						
		BU	CT	RBT	EBT	MWF	SUC	Total
2009	03/20-05/12, 06/10-09/21	200	7[e]	0	0	98	0	305
2010	03/25-05/13, 06/11-09/21	209	2	7	0	225	0	443[f]
2011	03/29-05/10, 06/11-09/21	251	0	7	0	187	3	451[g]

[a] BU = Bull trout, CT = Westslope cutthroat trout; RBT = Rainbow trout, EBT = Brook trout, MWF = Mountain whitefish, and SUC = Sucker.
[b] Trap not operated for steelhead.
[c] ND = No data.
[d] Trap not operated for Chinook salmon.
[e] One fish apparent cutthroat/rainbow hybrid trout encountered during Chinook salmon trapping season.
[f] Total includes two sockeye salmon and one wild/natural steelhead encountered during Chinook salmon trapping season.
[g] Total includes one apparent cutthroat x rainbow hybrid trout and two wild/natural steelhead smolts encountered during Chinook salmon trapping season.

Table 28. Salmonid and non-game fish encountered during steelhead and Chinook salmon trapping dates at Sawtooth Fish Hatchery, 1984 to 2011.

		Salmonid and Non-game Species[a]							
Year	Trapping Dates	BU	CT	RBT	EBT	MWF	SOCK	SUC	Total
1984	07/07-09/06[b]	1	0	0	0	0	0	0	1
1985	03/14-05/15, 06/14-09/15	--	--	--	--	--	--	--	--
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	--	--	--	--	--	--	--	--
1988	03/03-05/03, 05/23-09/06	--	--	--	--	--	--	--	--
1989	03/13-05/03, 06/07-09/11	--	--	--	--	--	--	--	--
1990	03/02-05/07, 05/21-09/14	7	0	0	0	1	0	0	8
1991	02/28-05/14, 06/07-09/15	17	0	0	0	0	0	0	17
1992	03/02-04/30, 05/28-09/18	24	0	0	0	0	0	0	24
1993	03/18-05/12, 06/18-09/06	5	0	0	0	0	0	0	5
1994	03/16-05/09, 05/31-10/26	38	0	0	0	0	0	0	38
1995	03/15-05/10, 06/12-09/06	6	0	0	0	0	0	0	6
1996	03/20-05/13, 06/20-09/11	4	1	1	0	9	0	226	241
1997	03/20-05/12, 06/16-09/04	5	0	6	0	1	0	116	11
1998	03/23-05/08, 06/10-09/14	4	4	5	0	12	0	252	277
1999	03/23-05/06, 06/28-09/07	8	4	10	0	34	0	97	153
2000	03/20-05/04, 05/30-09/25	27	1	3	0	1	0	0	32
2001	03/19-05/03, 05/24-09/14	31	0	0	0	0	0	0	31
2002	03/20-05/02, 05/28-09/09	23	0	3	0	8	0	26	60
2003	03/28-05/05, 06/12-09/09	29	0	2	0	1	0	8	40
2004	03/15-04/29, 05/25-09/15	8	0	2	0	5	0	14	29
2005	03/25-05/05, 06/05-09/19	33	1	2	0	15	0	5	56
2006	03/27-05/01, 06/19-09-15	25	3	18	0	35	0	0	81
2007	03/15-05/01, 05/25-09/11	72	13	27	0	8	0	189	309
2008	03/19-05/06, 06/11-09/17	18	10	10	0	20	0	1,089	1,147
2009	03/19-05/07, 06/24-10/16	24	10[c]	8	0	6	0	170	218

Table 28. Continued.

		Salmonid and Non-game Species[a]							
Year	Trapping Dates	BU	CT	RBT	EBT	MWF	SOCK	SUC	Total
2010	03/23-05/04, 05/27-09/16	76	13	24	0	71	648[d]	741	1,573[e]
2011	03/24-05/05, 07/10-09/09	30	13	15	0	7	590	10	667[f]

[a] BU = Bull trout, CT = Westslope cutthroat trout; RBT = Rainbow trout, EBT = Brook trout, MWF = Mountain whitefish, SOCK=Sockeye salmon, and SUC = Sucker.
[b] Trap not operated for steelhead.
[c] Includes 2 apparent cutthroat x rainbow hybrid trout.
[d] First year of reporting sockeye salmon incidental to Chinook salmon trapping.
[e] Total includes 2 wild/natural Chinook salmon smolts encountered during steelhead trapping season.
[f] Total includes 1 wild/natural Chinook salmon smolt encountered during Chinook trapping season and 1 wild/natural steelhead smolt.

Table 29. Salmonid and non-game fish encountered during sockeye salmon trapping at Redfish Lake Creek temporary weir, 1999 to 2011.

		Salmonid and Non-game Species[a]						
Year	Trapping Dates	BU	SOCK	CK	MWF	NPM	SUC	Total
1999	07/15-10/14	10	6	2	0	1	87	106
2000	07/05-09/23	1	43	1	0	1	21	67
2001	06/26-09/09	1	15	2	0	0	10	28
2002	07/15-10/11	7	10	2	0	1	18	28
2003	07/10-09/25	12	2	4	0	16	65	89
2004	07/13-09/13	6	1	4	0	0	6	17
2005	06/30-09/21	6	2	4	0	4	54	70
2006	07/07-10/03	3	1	2	0	0	4	10
2007	07/03-10/22	29	1	8	2	33	207	280
2008	07/09-10/22	96	432	2	2	76	338	946
2009	07/06-10/20	72	584	1	1	263	250	1,171
2010	07/10-10/12	187	652	4	1	111	368	1,323
2011	07/22-10/14	113	542	4	0	242	463	1,364

[a] BU = Bull trout, SOCK = Sockeye salmon; CK = Chinook salmon, MWF = Mountain whitefish, NPM = Northern pikeminnow, and SUC = Sucker (various species).

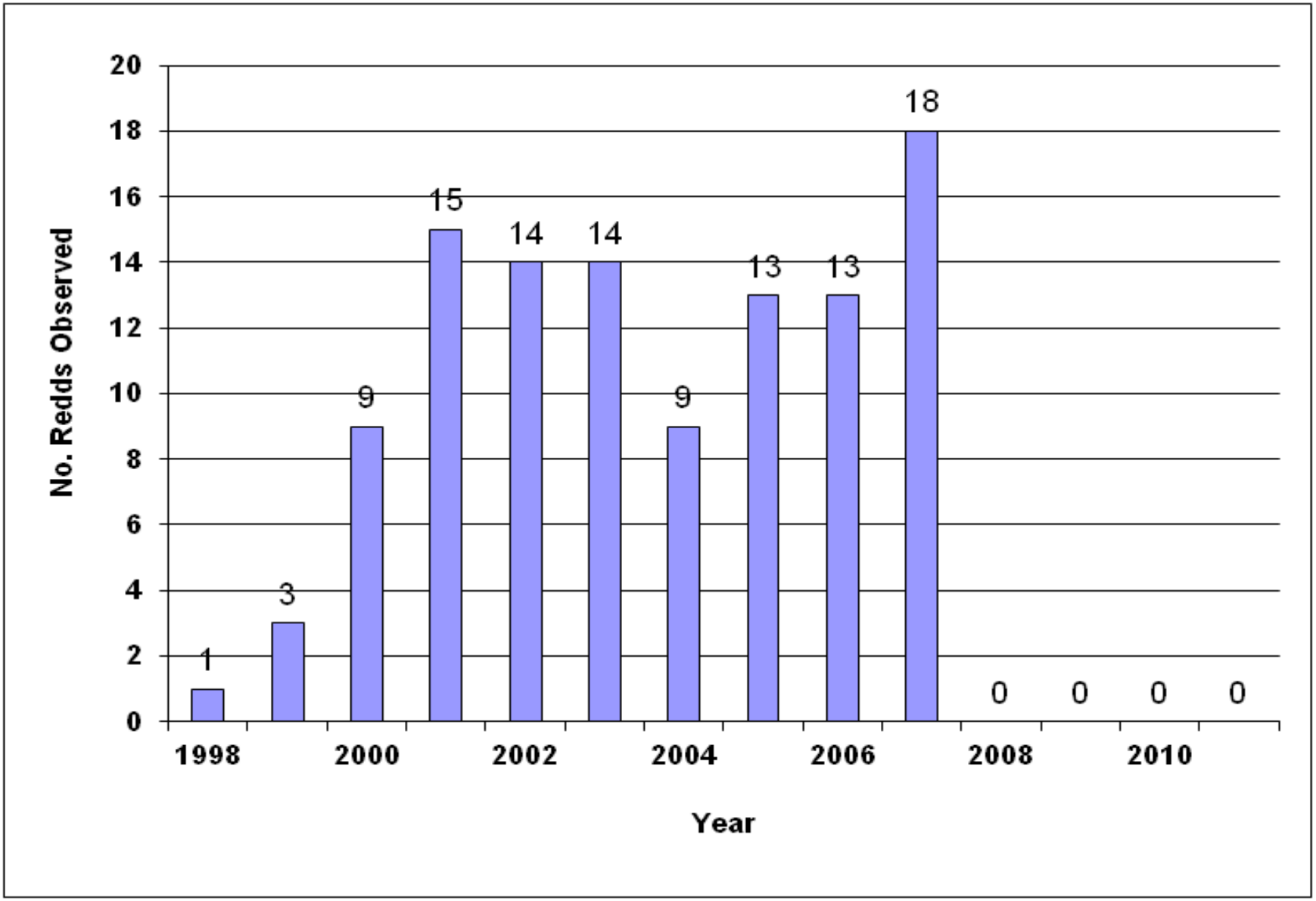

Figure 9. Bull trout redd counts in Alpine Creek, 1998 to 2011.

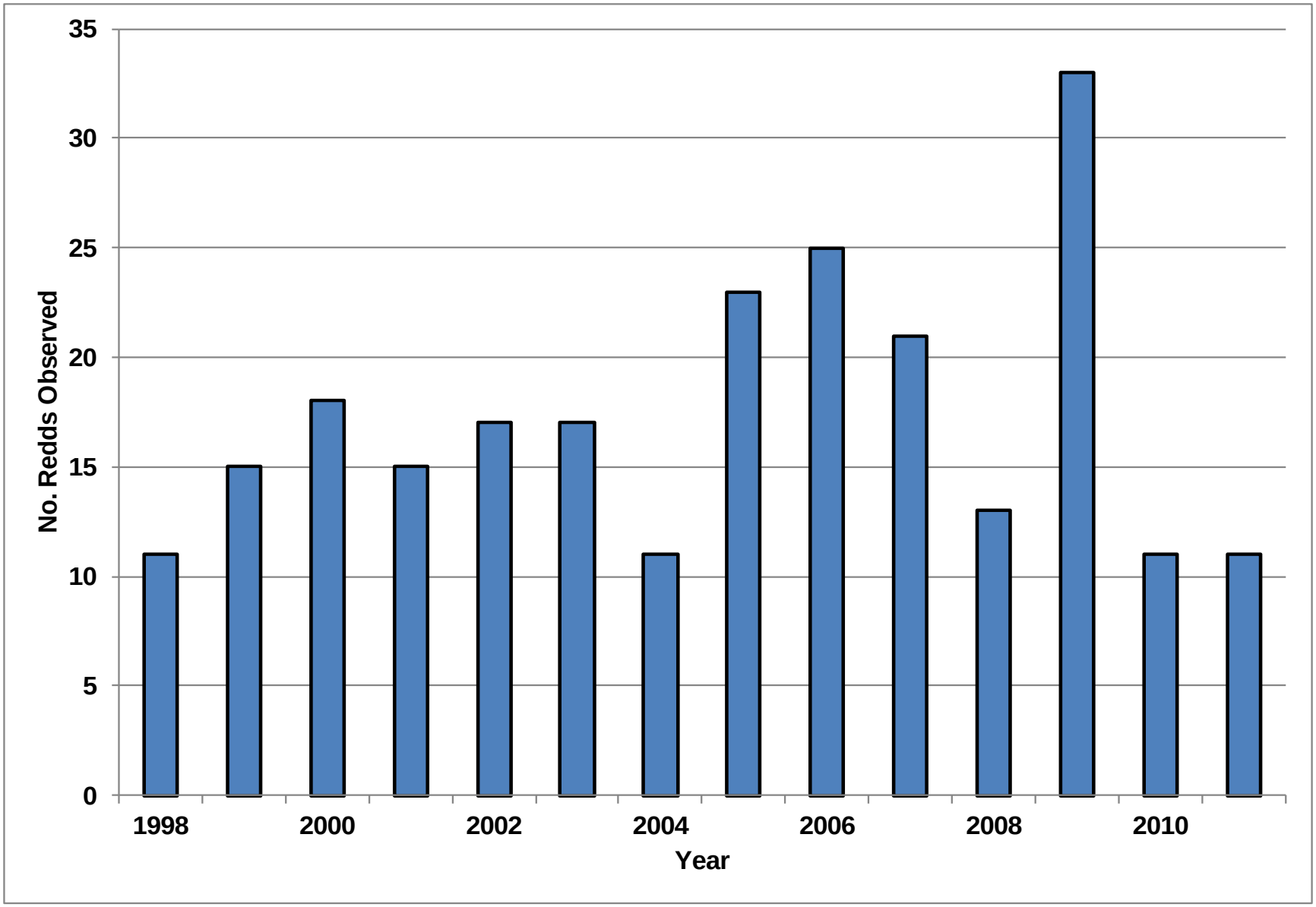

Figure 10. Bull trout redd counts observed in the trend transect of Fishhook Creek, 1998 to 2011.

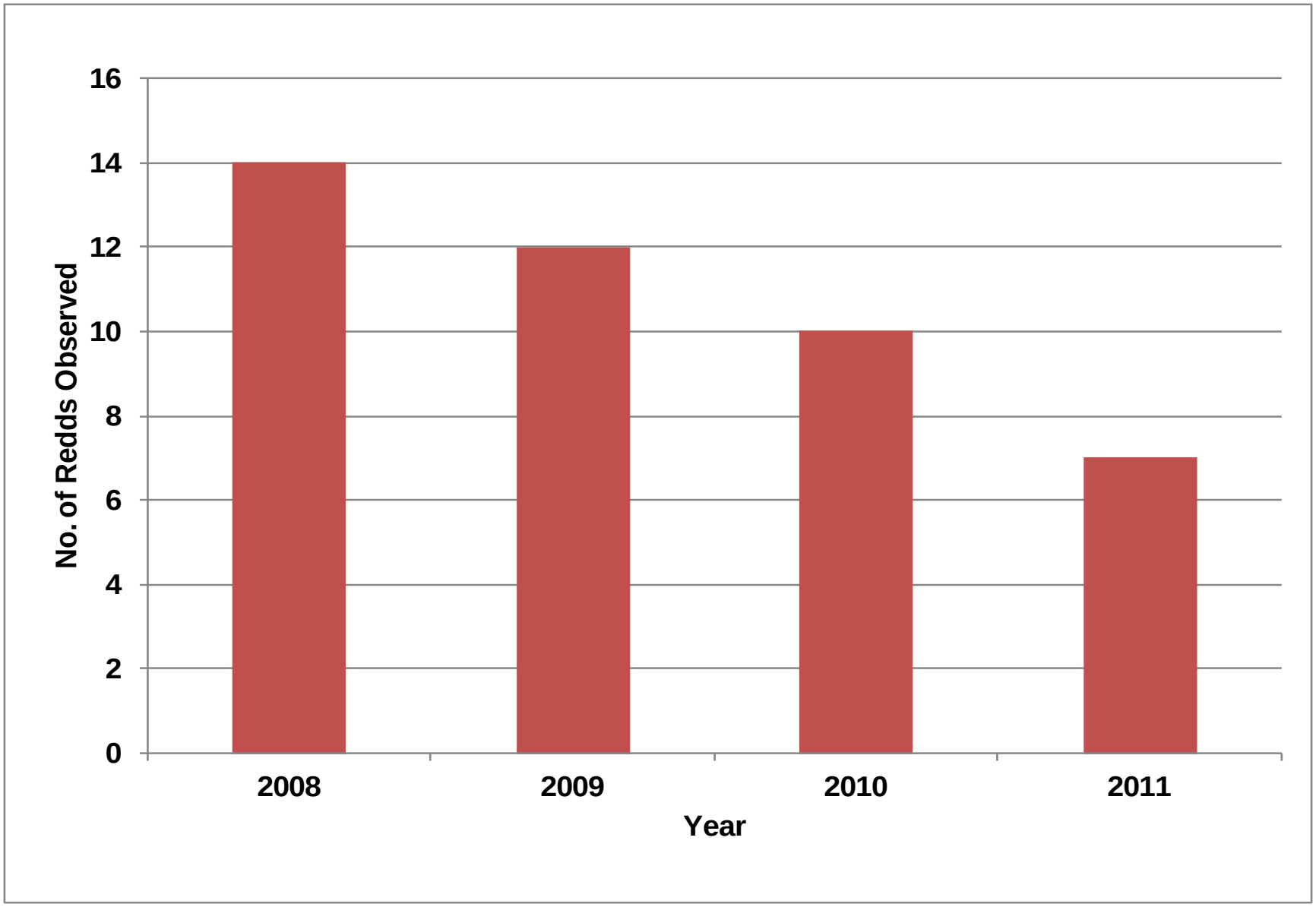

Figure 11. Bull trout redd counts observed in the second transect in Fishhook Creek, 2008 to 2011.

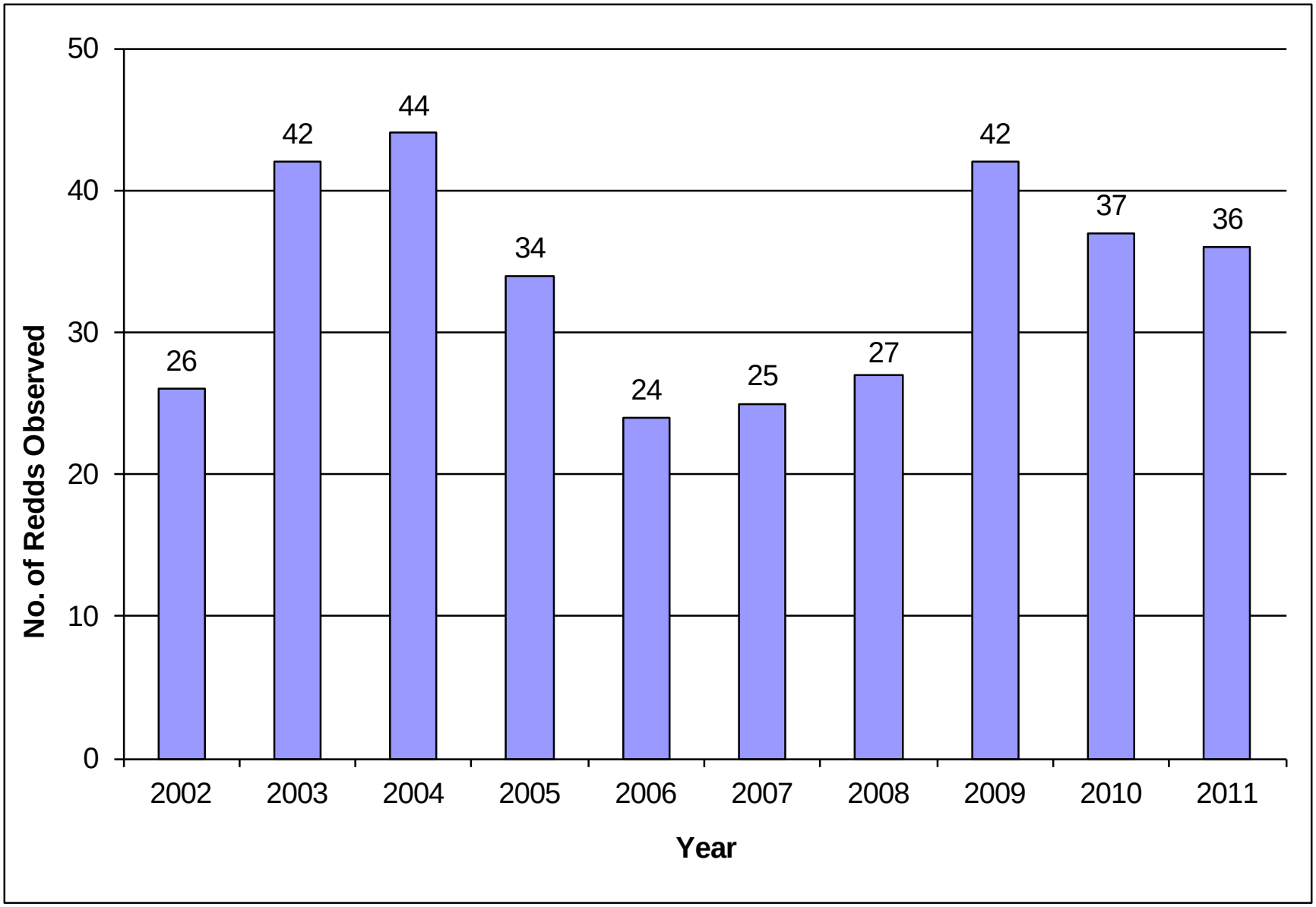

Figure 12. Fluvial bull trout redd counts observed in the trend transect in Bear Valley Creek, 2002 to 2011.

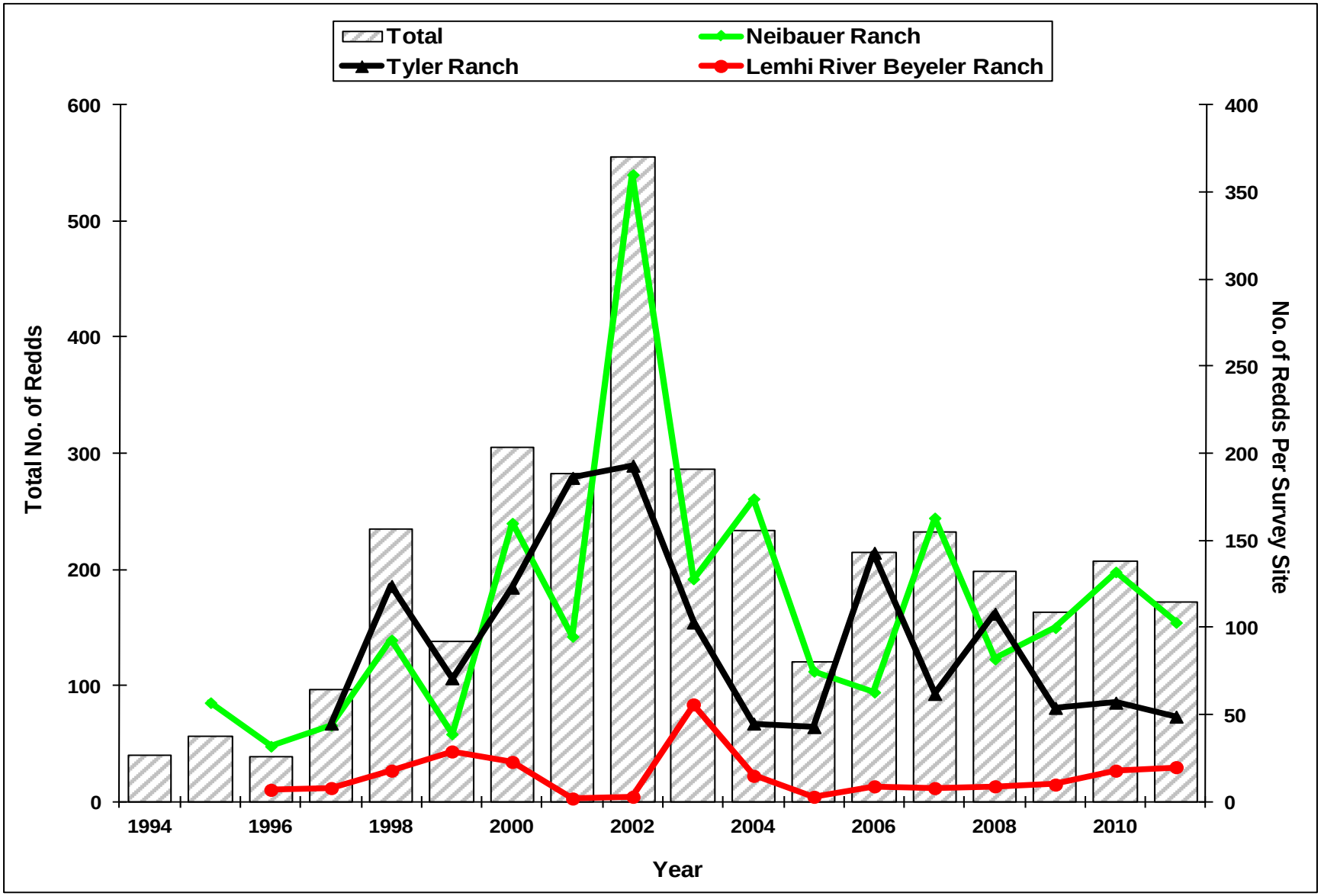

Figure 13. Resident rainbow trout spawning redds counted during ground surveys in the upper Lemhi River (Beyeler Ranch) and Big Springs Creek (Neibaur and Tyler ranches), 1994 to 2011.

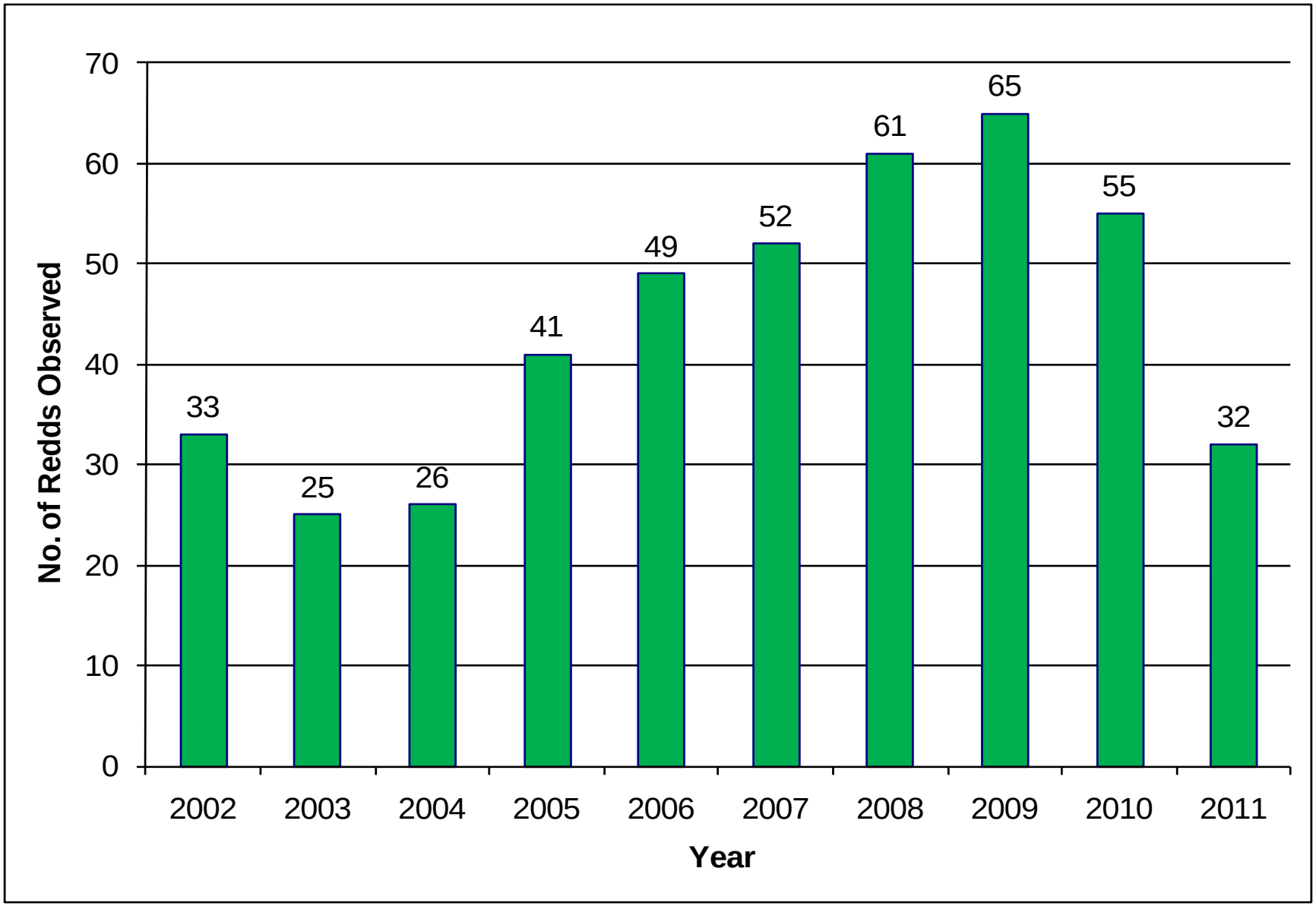

Figure 14. Resident bull trout redd counts in East Fork Hayden Creek, 2002 to 2011.

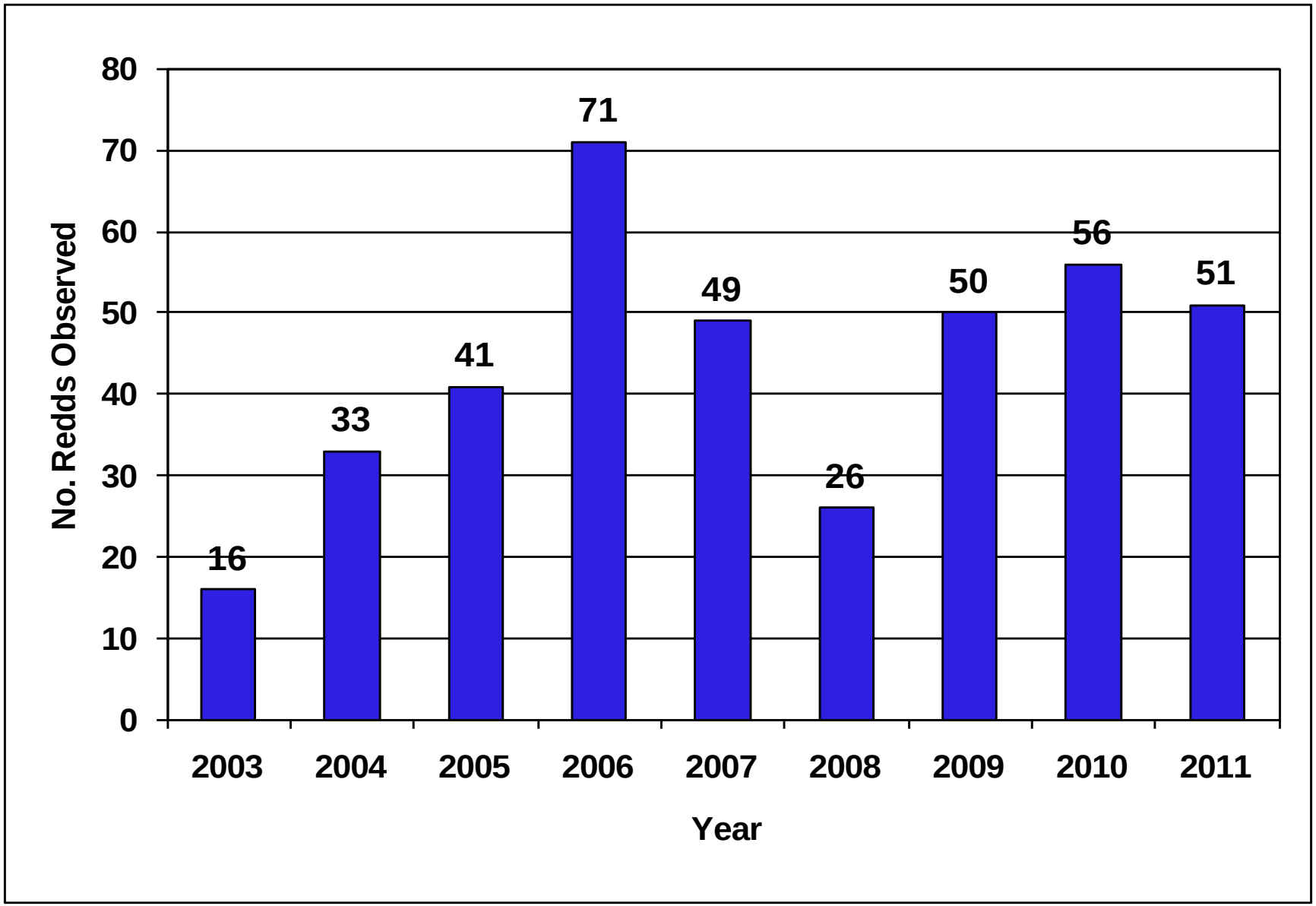

Figure 15. Fluvial bull trout redd counts in Fourth of July Creek (Sawtooth National Recreation Area), 2003 to 2011.

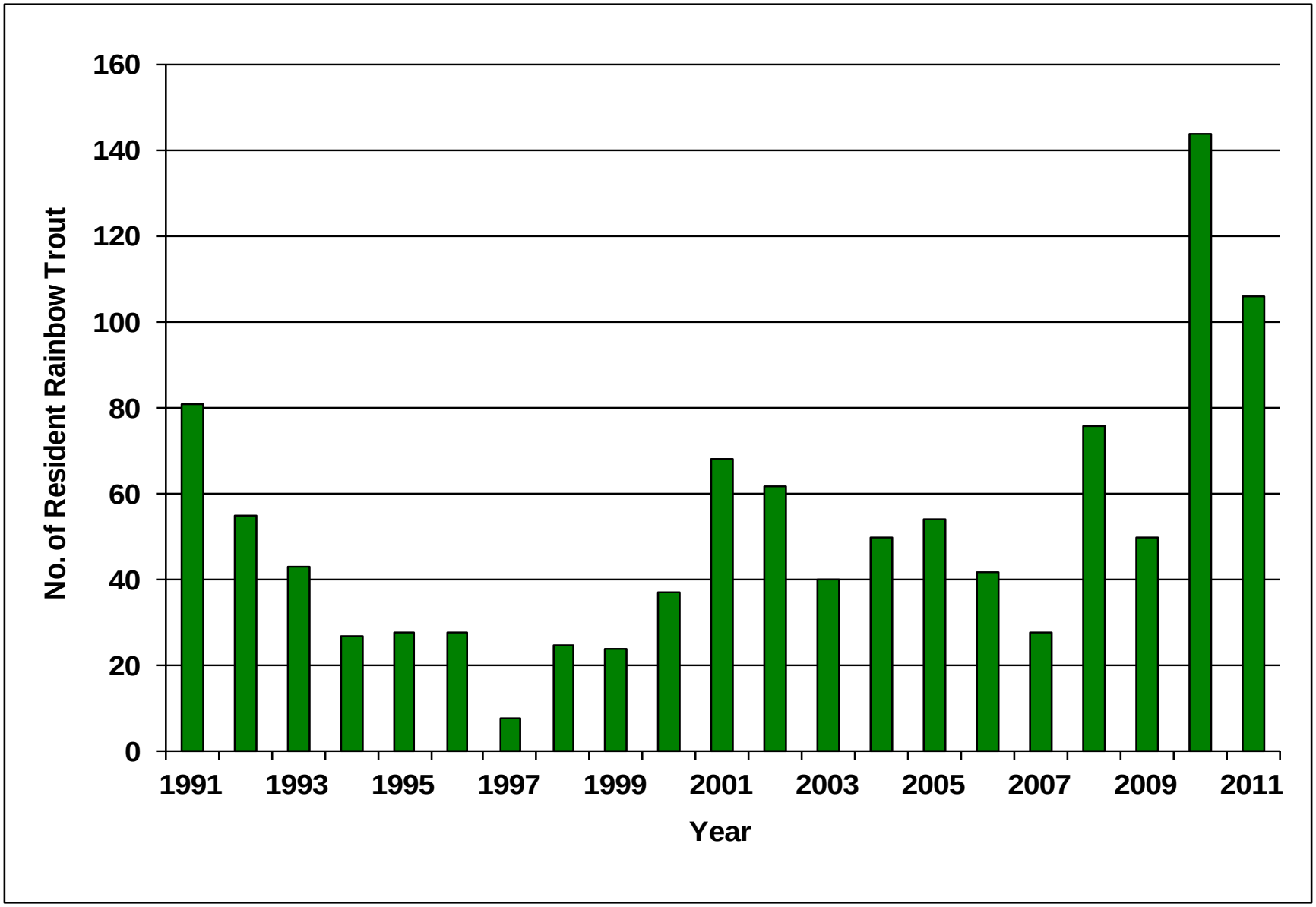

Figure 16. Annual count of resident rainbow trout trapped at the Pahsimeroi Fish Hatchery, 1991 to 2011.

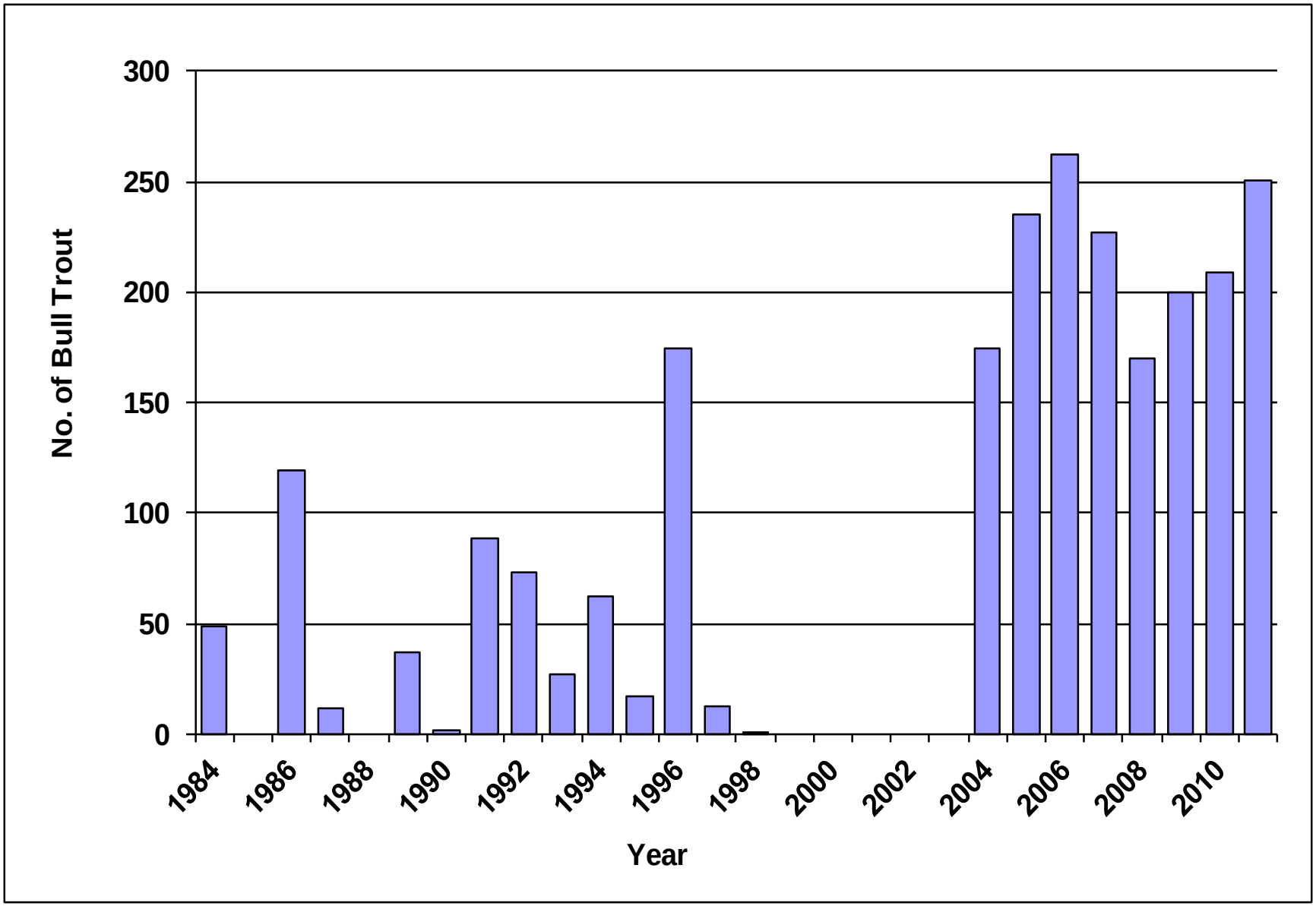

Figure 17. Annual count of bull trout trapped at East Fork Satellite Facility, 1984 to 2011.

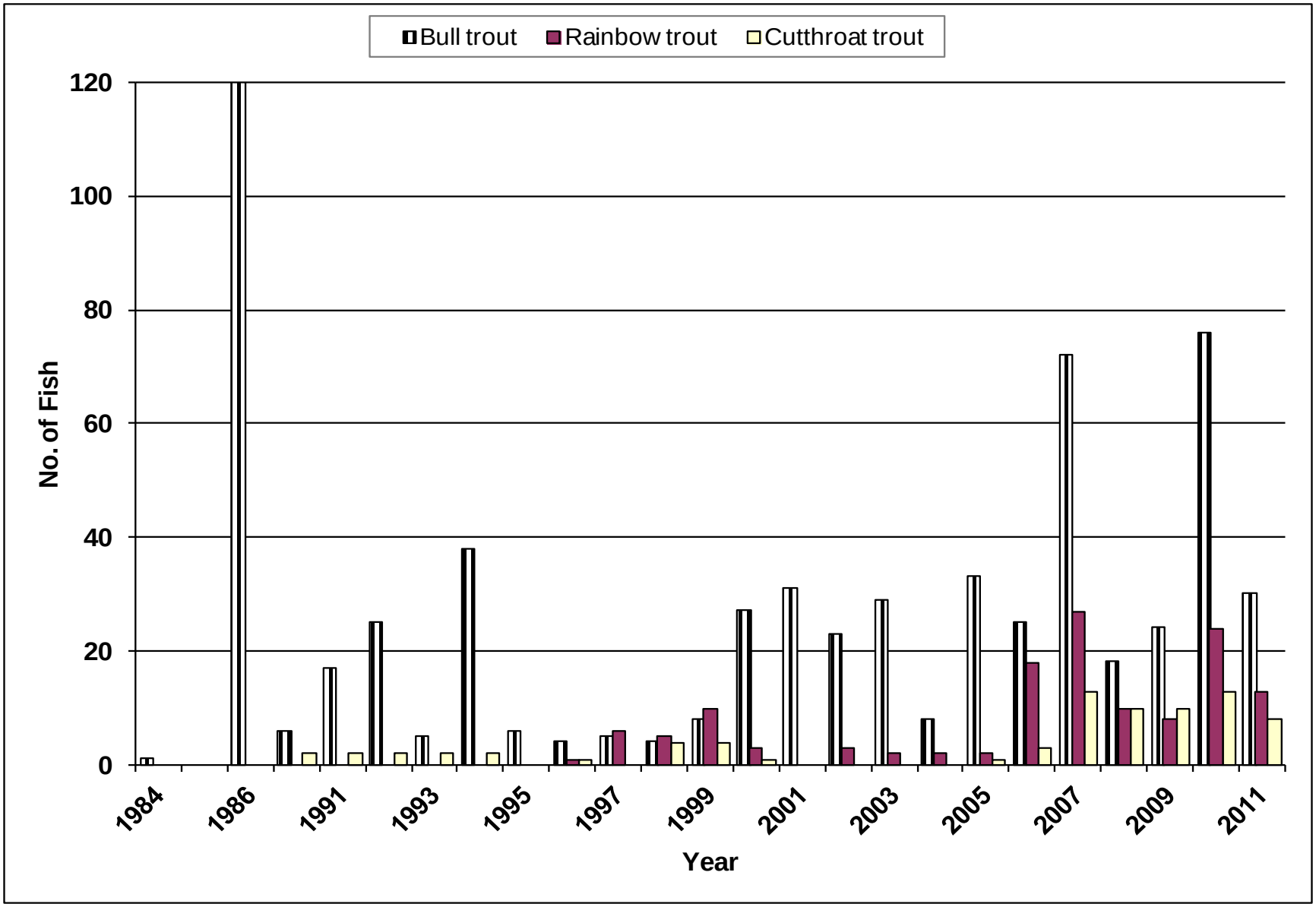

Figure 18. Annual count of selected resident salmonids trapped at Sawtooth Fish Hatchery, 1984 to 2011.

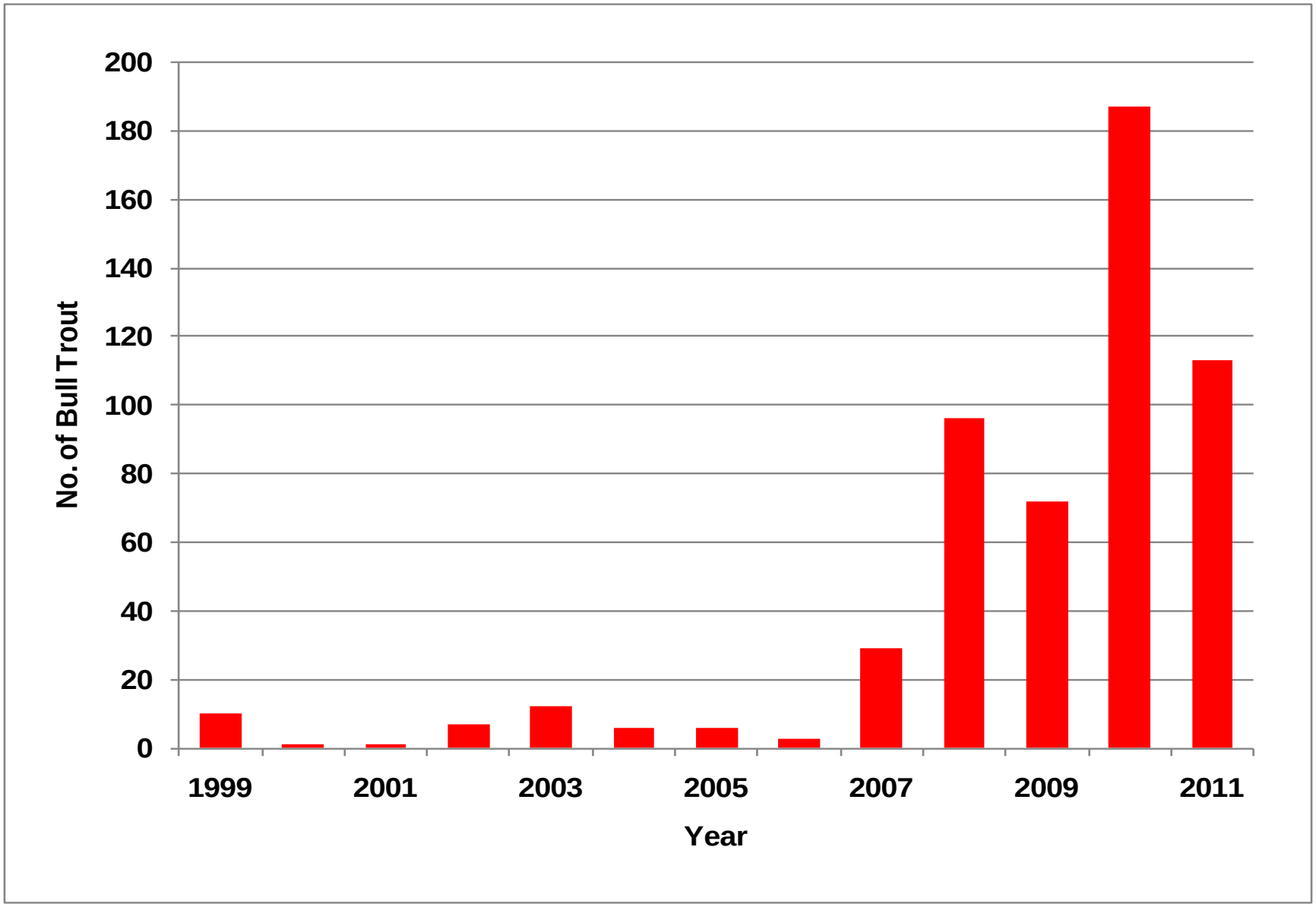

Figure 19. Number of bull trout encountered at the Redfish Lake Creek trap, 1999 to 2011.

SALMON REGION FISHERY MANAGEMENT 2011 ANNUAL REPORT

Lemhi River Drainage Bull Trout and Westslope Cutthroat Trout Tagging Study

ABSTRACT

Between 2006 and 2011, almost 1,500 bull trout and cutthroat trout received passive integrated responder (PIT) tags during rotary screw trap and electrofishing encounters in the Lemhi River subbasin in a collaborative venture of IDFG staff working under National Oceanic and Atmospheric Administration's (NOAA) Fisheries Service funding as the Intensively Monitored Watershed project. A total of 423 bull trout were implanted with PIT tags at three rotary screw traps and another 664 were tagged during electrofishing encounters in Lemhi River tributaries. A total of 199 westslope cutthroat trout were implanted with PIT tags at three screw traps and another 190 were tagged with PIT tags during tributary electrofishing encounters.

Four PIT tag arrays recorded 182 unique PIT tag detections of bull trout and cutthroat trout between September 2009 and January 8, 2012. Bull trout comprised 133 (73%) of the detections whereas cutthroat trout accounted for 49 (27%) detections. Preliminary analysis indicated that the Hayden Creek array recorded the most bull trout detections with 85 unique detections. The number of detections at the Hayden Creek array is likely due to the high number (n = 358) of bull trout tagged at the Hayden Creek screw trap and upstream during electrofishing surveys (n = 207). The number of unique cutthroat trout detections was evenly split between the Hayden Creek and lower Lemhi River arrays at 22 each. Future detections using tandem arrays should help define movement and timing patterns of bull trout and cutthroat trout in and out of tributaries and the mainstem Lemhi and Salmon rivers.

INTRODUCTION

The Lemhi River flows almost 97 km from its origin at the confluence of Texas and Eighteenmile creeks to where it enters the Salmon River at the city of Salmon, Idaho. Major tributaries include Big Timber, Big Eightmile, and Hayden creeks. Elevations in the drainage range from 3,029 m at the headwaters of Big Eightmile Creek to 1,196 m at the mouth of the Lemhi River. Fish species present in the drainage include bull trout, westslope cutthroat trout, rainbow trout, Chinook salmon, steelhead, mountain whitefish, northern pikeminnow, redside shiner, and various species of sculpin, dace, and sucker.

Agricultural development is an integral part of the hydrology of the Lemhi River watershed. With annual precipitation at less than 10 inches per year, irrigated crop production requires the diversion of water from the Lemhi River and its tributaries. Irrigation withdrawals in these tributaries often exceed their flows during the summer, resulting in complete dewatering in their lower reaches and loss of habitat connectivity between the tributaries and Lemhi River. Of 31 tributaries in the Lemhi River drainage, all but two have been functionally disconnected from the main stem during part or all of the irrigation season (usually April to November) since water development began in the valley over 100 years ago. Hayden Creek and Big Springs Creek are the only two streams that have remained connected. In some tributaries, water withdrawals may not entirely dewater the stream, but flows are reduced during certain periods of the irrigation season that effectively create a thermal or hydraulic barrier to certain life stages of fish. During these times, anadromous, resident, and fluvial salmonids are unable to access high quality habitat for spawning and rearing.

Intensive fish population monitoring in the Lemhi River drainage began in 2006 using Pacific Coastal Salmon Recovery Funds and support from the Bonneville Power Administration. The Lemhi River monitoring project expanded in 2008 with the Intensive Monitoring Watershed (IMW) project, funded by the NOAA Fisheries Service with matched funding from IDFG. The focus of the IMW project is to monitor and evaluate the effectiveness of tributary reconnects on fish production and productivity. The Integrated Status and Effectiveness Monitoring Program (ISEMP), also funded by NOAA, was merged with the IMW project starting in 2009.

The primary goal of the ISEMP is to identify and quantify the effects of habitat modifications on the productivity and survival of anadromous and resident salmonids within the Lemhi River watershed. Species targeted for improved productivity include Chinook salmon, steelhead, resident and fluvial bull trout, rainbow trout, and westslope cutthroat trout. The ISEMP focuses on monitoring and evaluating fish response to habitat restoration efforts, along with monitoring and evaluating habitat changes in the drainage. The project tracks the effectiveness of habitat conservation actions currently being implemented in Kenney Creek, Big Timber Creek, Canyon Creek, Little Springs Creek, and other tributaries needing permanent reconnects with the Lemhi River. Response measures being monitored include adequate flows for fish passage, amount of wetted area provided by the target flow, response of the riparian community, and changes in stream temperature. Fish response includes the distribution of anadromous and resident/fluvial fish, survival, size, and age distribution (mainly with resident and fluvial salmonids), and abundance.

STUDY AREA AND METHODS

Between 2006 and 2011, bull trout and westslope cutthroat trout collected during rotary screw trap operations were implanted with passive integrated responder (PIT) tags to document

seasonal movement and life histories in the Lemhi River drainage. Rotary screw traps were deployed in lower Hayden Creek and at two locations in the Lemhi River (Figure 20). Regional fishery staff checked the traps daily. Captured fish were anesthetized, scanned for the presence of PIT tags, measured to mm fork length (FL), and weighed (g). Fish were allowed to recover in fresh water before release. A sample of encountered bull and cutthroat trout were implanted with PIT tags funded by the U. S. Fish and Wildlife Service. Physical locations of screw traps are listed in Appendix F.

Bull trout and cutthroat trout were also sampled by electrofishing tributaries in the Lemhi River drainage from 2006 to 2011. Following standard stream survey protocol, netters attempted to catch all sizes of fish while moving upstream in transects 100 m and greater in length. A given stream transect was electrofished in one, two, or three passes. Most captured fish were handled using screw trap protocol outlined above. The exceptions to this protocol were mountain whitefish and other non-game fish. These fish were enumerated but not measured or weighed during electrofishing surveys. Fish were placed in holding pens after processing and monitored for recovery. Once electrofishing was completed, fish were released back into the surveyed stream reach.

The placement of implanted PIT tags varied among samples of bull trout and cutthroat trout encountered from 2006 to 2011. Prior to 2009, most bull and cutthroat trout were implanted with a PIT tag in the body cavity just posterior of the pectoral fins and just offset from the mid-ventral line. In 2009 and 2010, bull and cutthroat trout that were generally greater than 180 mm FL were “cheek-tagged,” wherein a PIT tag was inserted into soft tissue behind the opercle, in effort to increase tag retention rates in repeat spawning resident fish. The life history of bull and cutthroat trout in the Lemhi River drainage may include alternate year spawning, and fishery biologists theorized that PIT tag retention might be greater using opercle placement rather than the body cavity methodology where PIT tags may be lost during spawning (M. Biggs, IDFG, personal communication). A further refinement in 2011 for bull and cutthroat trout included PIT tagging in the dorsal sinus area (at the base of the dorsal fin on the left side) for those fish typically measuring longer than 140 mm FL since no harvest of these fish is allowed in the Lemhi River.

Genetic samples were taken from some PIT tagged bull trout for future analysis. Scale samples were taken on some cutthroat trout for future age and growth analysis. All samples were archived at the Salmon Region office.

PIT tag arrays represent one of the newest techniques in real-time detection and retrieval of PIT-tagged data. Arrays consist of single or multiple flat panel antennae placed perpendicular to stream flow on the creek bed. PIT-tagged fish were detected as they swim over the antenna panels. Date, time, unique PIT tag and antenna identifier (which determined upstream or downstream movement direction) were recorded on a data logger. The resulting site interrogation files were uploaded daily using an automated process to the PIT Tag Information System (PTAGIS) database. The first PIT tag array in the Lemhi River drainage was deployed in Hayden Creek in 2009 as part of the Salmon subbasin IMW project and ISEMP. Since that time, seven more arrays have been added to various Lemhi River tributaries to increase detection coverage. Arrays were operational year-round in Hayden Creek, Big Timber Creek, Canyon Creek, Kenney Creek, Bohannon Creek, Lower Lemhi River, upper Lemhi River, and Little Springs Creek. A map showing the location of the eight PIT tag arrays is shown in Figure 20. Physical array locations in the Lemhi subbasin are listed in Appendix F.

RESULTS AND DISCUSSION

Between 2006 and 2011, over 600 bull trout and cutthroat trout received PIT tags during encounters at three rotary screw traps operated by IDFG in the Lemhi River subbasin (Tables 30 and 31). These screw traps, located on Hayden Creek, on the Lemhi River upstream of the mouth of Hayden Creek, and in the lower Lemhi River near the town of Salmon, generally operate from March to November each year as water conditions allow. Additionally, 854 more bull and cutthroat trout received PIT tags during electro-fishing efforts in various Lemhi River tributaries between 2008 and 2011 (Tables 32 and 33).

Between September 2009 and January 8, 2012, PIT tag arrays recorded 182 unique tag detections, comprised of 133 (73%) bull trout and 49 (27%) cutthroat trout (Tables 34 and 35). Of the four arrays that detected fish, one was located in Hayden Creek, two in the Lemhi River, and one in Kenney Creek. Arrays in Big Timber, Bohannon, Canyon, and Little Springs creeks detected no bull or cutthroat trout through the end of 2011. Preliminary analysis indicated that the Hayden Creek array tracked the most bull trout detections with 85 unique detections (Figure 21). The number of detections at the Hayden Creek array is likely a result of the high number (n = 358) of bull trout tagged at the Hayden Creek screw trap and further upstream during electro-fishing surveys (n = 207). Even though directional movement of fish could not be interpolated from arrays until late 2011, bull trout tagged in Hayden Creek were detected at arrays in the mainstem Lemhi River both upstream and downstream of Hayden Creek (Table 34 and Figure 21), indicating downstream movement from Hayden Creek to the main stem. Future detections using tandem arrays should help define movement and timing of bull trout in and out of tributaries in the Lemhi River subbasin.

The number of unique cutthroat trout detections was evenly split between the Hayden Creek and lower Lemhi River arrays with 22 apiece (Table 35). The most detections of PIT tagged cutthroat followed the same pattern as bull trout. Fifteen cutthroat initially tagged at the Hayden Creek trap (n = 88) or in Hayden Creek tributaries (n = 18) were detected at the Hayden Creek array. Likewise, 13 cutthroat tagged at the L3A trap (n = 105) were detected at the Lower Lemhi River array, four km downstream (Table 35 and Figure 22).

MANAGEMENT RECOMMENDATIONS

Continue monitoring PIT tag arrays in the Lemhi River drainage to assess bull trout and cutthroat trout movement and timing within tributaries and the mainstem Lemhi River.

Increase PIT tagging efforts for bull trout and cutthroat trout to better assess movement patterns and timing, survival, and growth in tributaries of the Lemhi River subbasin.

Evaluate expanded movement patterns and timing of tagged bull trout and cutthroat trout at proposed upper mainstem Salmon River array sites.

Table 30. Summary of bull trout implanted with passive integrated responder (PIT) tags by year during electrofishing surveys at three rotary screw traps in the Lemhi River drainage.

Rotary screw trap	Year	Number of bull trout captured	Number of bull trout receiving PIT tags	Size range (Fork length mm)	Average fork length (mm)
Hayden Creek	2006	23	13	67-187	151
	2007	246	201	73-367	178
	2008	78	67	71-415	189
	2009	98	11	84-670	278
	2010	176	42	80-509	198
	2011	29	24	113-680	242
Lemhi Weir	2002	4	0	102-152	121
	2003	1	0	430	430
	2004	8	0	153-550	343
	2005	1	0	460	460
	2006	3	0	149-250	184
	2007	6	2	185-340	258
	2008	1	0	337	337
	2009	7	1	220-420	286
	2010	6	4	228-386	301
	2011	4	2	106-375	203
L3A	2006	4	0	177-310	256
	2007	20	12	145-370	228
	2008	28	21	222-455	305
	2009	20	2	209-560	294
	2010	12	10	204-422	262
	2011	12	11	228-455	300

Table 31. Summary of westslope cutthroat trout implanted with passive integrated responder (PIT) tags by year at three rotary screw traps in the Lemhi River drainage.

Rotary screw trap	Year	Number of westslope cutthroat trout encountered	Number of westslope cutthroat trout receiving PIT tags	Size range (Fork length mm)	Average fork length (mm)
Hayden Creek	2006	1	1	228	228
	2007	92	44	180-305	236
	2008	13	13	115-268	219
	2009	19	0	166-350	243
	2010	39	10	156-330	232
	2011	20	20	190-390	245
Lemhi Weir	2002	4	0	102-152	121
	2003	1	0	430	430
	2004	8	0	153-550	343
	2005	1	0	460	460
	2006	3	0	149-250	184
	2007	6	0	185-340	258
	2008	3	2	178-205	191
	2009	7	0	220-420	286
	2010	6	0	228-386	301
	2011	4	4	106-375	203
L3A	2004	11	0	180-430	268
	2005	17	0	--	--
	2006	13	0	220-272	239
	2007	54	31	185-330	256
	2008	61	56	95-349	244
	2009	20	0	188-330	247
	2010	20	6	120-340	241
	2011	16	12	185-280	230

Table 32. Summary of bull trout implanted with passive integrated responder (PIT) tags by year during electrofishing surveys in selected streams in the Lemhi River drainage.

Stream	Year	Total number of bull trout encountered	Number of bull trout receiving PIT tags	Size range (Fork length mm)	Average fork length (mm)
Agency	2011	4	3	161-290	206
Bear Valley	2009	87	26	60-550	186
	2010	7	7	157-358	204
	2011	49	36	71-650	204
Big Bear	2009	6	3	164-286	211
	2010	1	1	210	210
	2011	3	0	138-220	220
Big Eightmile	2009	189	43	50-268	131
	2010	6	6	154-220	185
Big Timber	2008	275	241	64-308	166
	2009	54	1	89-288	186
	2010	13	13	152-247	185
	2011	16	10	94-339	207
Bohannon	2011	68	33	59-251	149
Cruikshank	2011	7	2	103-204	138
East Fork Bohannon	2010	1	0	181	181
	2011	6	5	92-260	154
East Fork Hayden	2010	58	31	60-349	177
Flume	2011	1	1	218	218
Hawley	2009	7	1	60-208	94
	2010	2	2	92-143	118
	2011	3	3	138-220	188
Hayden	2009	84	29	68-700	189
	2010	6	6	194-300	242
	2011	93	7	59-370	193
Kenney	2008	26	26	81-222	169
	2011	60	17	138-332	216
Lemhi River	2009	3	4	170-236	209
	2010	2	2	180-215	198
	2011	6	5	205-380	281

Table 32. Continued.

Stream	Year	Total number of bull trout encountered	Number of bull trout receiving PIT tags	Size range (Fork length mm)	Average fork length (mm)
Little Eightmile	2010	3	1	188-202	194
Mill	2010	21	21	154-242	191
Pattee	2011	15	12	116-286	215
Wimpey	2009	2	1	114-190	152
Wright	2009	117	50	54-280	173
	2010	15	15	137-266	205

Table 33. Summary of westslope cutthroat trout implanted with passive integrated responder (PIT) tags by year during electro-fishing surveys in selected streams in the Lemhi River drainage.

Creek name	Year	Total number of westslope cutthroat trout encountered	Number of westslope cutthroat trout receiving PIT tags	Size range (Fork length mm)	Average fork length (mm)
Bear Valley	2011	1	1	197	197
Big Bear	2009	21	3	40-235	134
Big Timber	2008	66	60	64-310	168
	2009	5	0	134-196	154
	2011	3	2	178-220	206
Bohannon	2011	32	6	38-216	91
Canyon	2009	1	0	223	223
	2011	18	3	39-259	104
Cruikshank	2009	27	0	62-225	131
	2011	99	13	91-276	159
Flume	2011	17	4	34-230	146
Hawley	2011	7	1	150-220	181
Hayden	2011	23	17	37-350	171
Kenney	2008	80	59	52-248	133
	2009	1	0	142	142
	2011	84	19	31-267	124
Pattee	2011	42	2	62-225	131

Table 34. Summary of bull trout detections at three array locations by release site. Only arrays with bull trout detections are listed in the table.

	PIT Tag Array Location		
Release Site	Hayden Creek	Lower Lemhi River	Lemhi River Weir
Bear Valley Creek	7	1	3
East Fork Hayden Creek	1	0	0
Hayden Creek screw trap	58	13	9
Hayden Creek	10	3	2
Lemhi River	0	1	2
L3A screw trap	6	10	0
Lemhi River Weir screw trap	2	2	2
Wright Creek	1	0	0
Total	85	30	18

Table 35. Summary of cutthroat trout detections at four array locations by release site. Only arrays with cutthroat trout detections are listed in the table.

	PIT Tag Array Location			
Release Site	Hayden Creek	Lower Lemhi River	Lemhi River Weir	Kenney Creek
Hayden Creek screw trap	15	8	2	0
Hayden Creek	1	0	0	0
L3A screw trap	6	13	0	0
Lemhi River Weir screw trap	0	0	1	0
Kenney Creek	0	1	1	1
Total	22	22	4	1

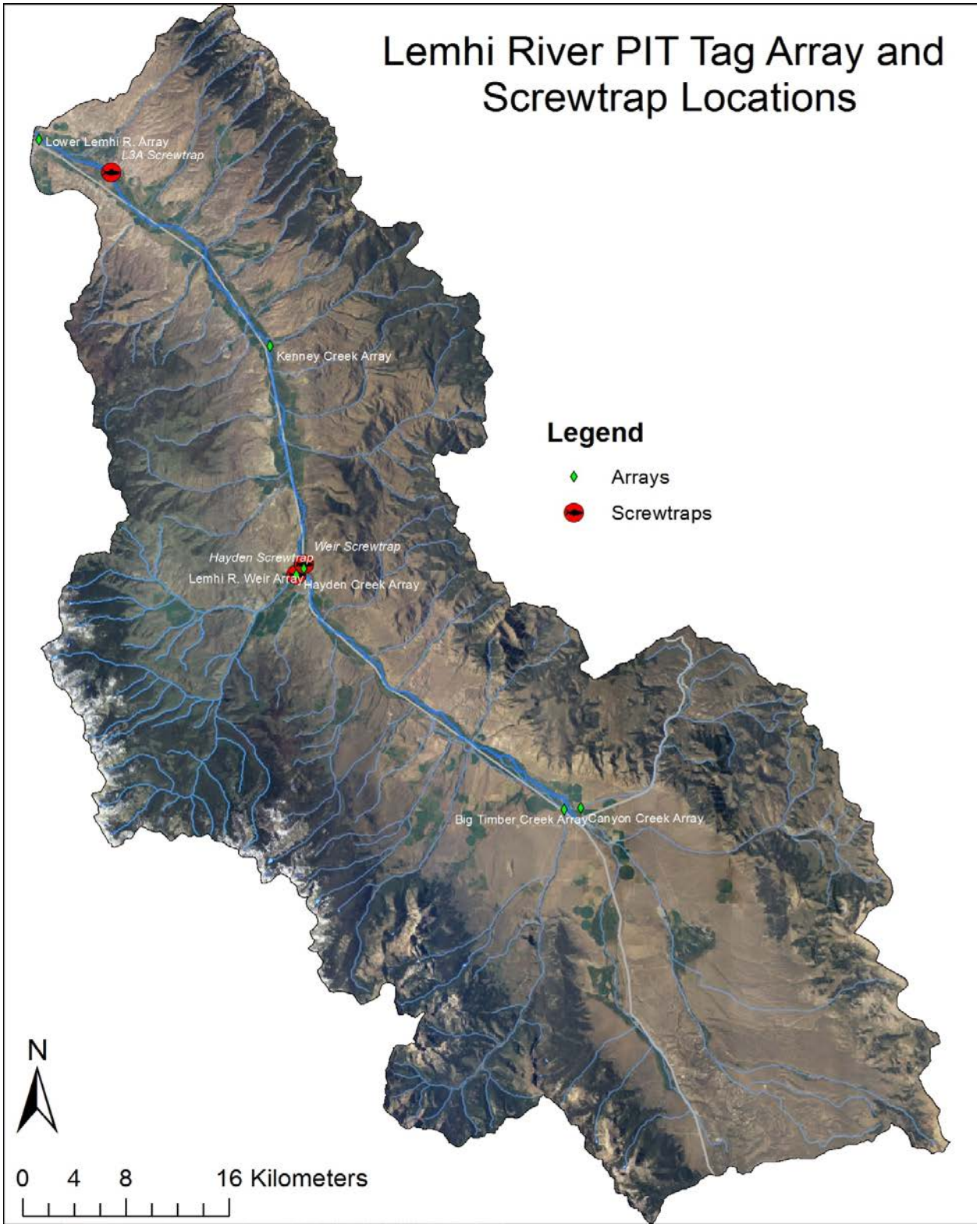

Figure 20. Rotary screw trap and passive integrated transponder (PIT) tag array locations in the Lemhi River drainage. Not shown are arrays deployed in Bohannon and Little Springs creeks.

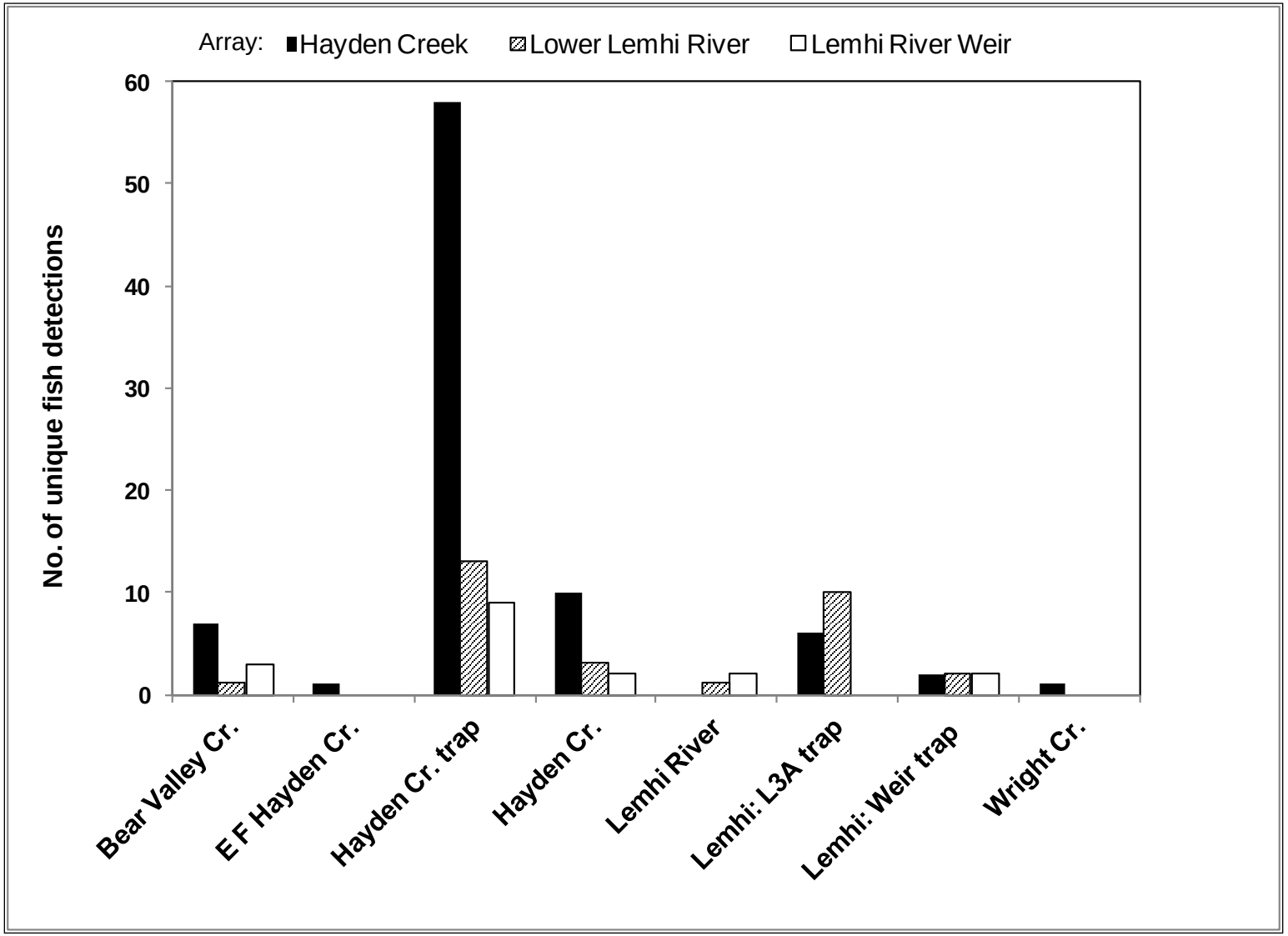

Figure 21. Summary of PIT-tagged bull trout detections at three array locations (Hayden Creek, Lower Lemhi River, and Lemhi River Weir) and grouped by their eight release sites.

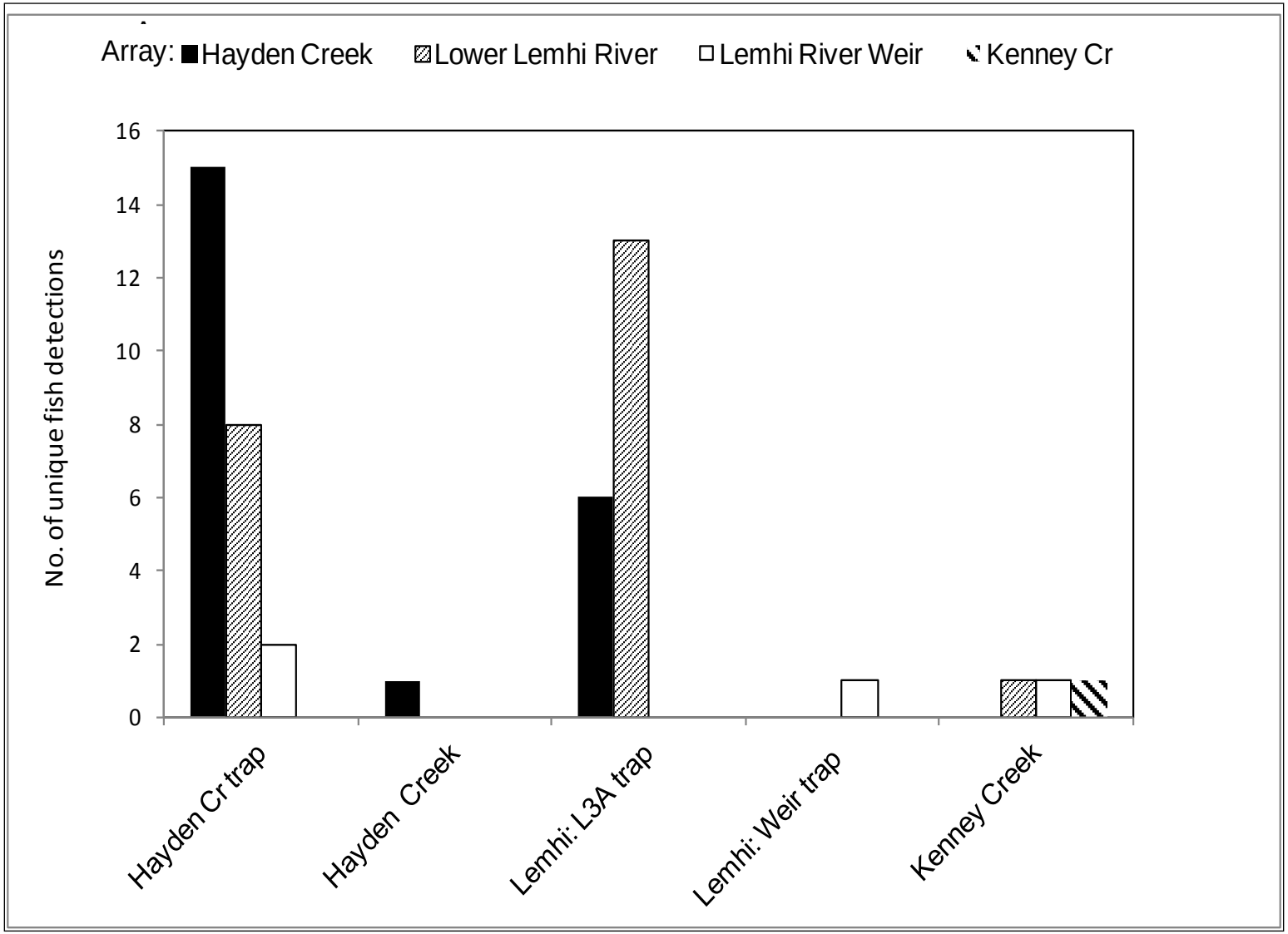

Figure 22. Summary of PIT-tagged cutthroat trout detections at four array locations (Hayden Creek, Lower Lemhi River, Lemhi River Weir, and Kenney Creek) and grouped by their five release sites.

SALMON REGION FISHERY MANAGEMENT 2011 ANNUAL REPORT

Middle Fork Salmon River Snorkeling Transects, Project Angling, and Tributary Surveys

ABSTRACT

During July and August 2011, IDFG personnel snorkeled 14 of 28 mainstem Middle Fork Salmon River (MFSR) transects to determine fish species composition, abundance, size, and density. For the 14 mainstem MFSR traditional transects surveyed in 2011, westslope cutthroat trout had an overall mean density of 2.4 fish/100 m^2, rainbow trout /steelhead were 1.0 fish/100 m^2, and juvenile Chinook salmon were 8.1 fish/100 m^2. By comparison, in 2010 westslope cutthroat trout had a mean density of 1.3 fish/100 m^2, rainbow trout /steelhead was 0.1 fish/100 m^2, and juvenile Chinook salmon was 0.3 fish/100 m^2.

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 23).

Primitive roads access Dagger Falls and Boundary Creek, 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 foot/horse trails.

The MFSR is a major recreational river offering a wide variety of outdoor and back-country experiences. The number of people floating the river has increased substantially in the past 50 years, from 625 in 1962 to 8,094 floaters in 2011. The U.S. Forest Service estimated total use days during the 2011 permit season (May 28-Sept. 3) to be 48,635 days, a 13% decrease from 54,945 use days calculated for 2010 (D. Leuzinger, USFS, 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 the early 1970's, IDFG initiated studies to monitor MFSR westslope cutthroat trout abundance and to evaluate catch-and-release regulations on the mainstem MFSR established by the Idaho Fish and Game Commission in 1972. The Commission adopted similar regulations for major MFSR tributaries in the early and mid-1980s.

A 1971 study established snorkeling transects to be surveyed periodically (Corley 1972; Jeppson and Ball 1977, 1979). In this report, these 1971-established transects are described as mainstem historical (Corley 1972) transects (n = 6). The IDFG then began additional studies within the MFSR drainage. In 1981, traditional mainstem steelhead transects were established and IDFG began evaluating wild steelhead trout populations on the MFSR (Thurow 1982, 1983, 1985). In 1985, the IDFG added additional snorkel sites to enumerate cutthroat trout and Chinook salmon, and began estimating 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). The snorkel sites established since 1981 are known in this report as mainstem (n = 28) or tributary (n = 10) traditional transects.

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.

Electrofish selected tributaries in the MFSR drainage to sample fish populations and collect genetic information.

STUDY AREA AND METHODS

Mainstem and Tributary Snorkeling Transects

MFSR transects were conducted using snorkeling techniques described by Thurow (1982). Snorkeling was conducted by two snorkelers floating downstream with the current remaining as motionless as possible along both sides of the river margin. The area surveyed was estimated by multiplying the length snorkeled by the visible corridor (i.e. visibility). Visibility was measured at each site by suspending a sighting object in the water column and allowing the snorkeler to drift downriver until the object was unidentifiable. The snorkeler then moved upriver until the object reappeared clearly. The measured distance (m) between the object and the observer's facemask was the visibility.

Historical transects on the mainstem MFSR were established prior to 1985 while traditional transects were established since 1985. Three of six MFSR historical (Corley 1972) transects and five of 10 traditional tributary transects were snorkeled in 2011. Physical information on mainstem and tributary snorkel sites surveyed in 2011 is located in Appendices G, H, and I detailing snorkel transects, locations, and transect measurements.

Project Angling

Project anglers used conventional fly-fishing and spin cast gear to collect fish species data on the mainstem MFSR from Boundary Creek, located 0.9 km downstream of Dagger Falls, to the mouth of the MFSR, 153.4 km downstream of Dagger Falls (Figure 15). Fish were identified by species, measured to the nearest 10 mm TL, and released. Genetic samples were taken from rainbow trout/steelhead, bull trout, and mountain whitefish before release.

Tributary Surveys

Seven tributaries in the MFSR drainage were electrofished and/or angled to capture fish and obtain genetic samples.

RESULTS AND DISCUSSION

Mainstem and Tributary Snorkeling Transects

From July 28 to August 3, 2011, IDFG personnel snorkeled 14 of 28 mainstem MFSR traditional transects. IDFG personnel counted a total of 2,127 salmonids, including 397 (19%) westslope cutthroat trout, 1,356 (64%) juvenile Chinook salmon (plus 3 adult Chinook salmon), 174 (8%) rainbow trout/steelhead, 190 (9%) mountain whitefish, and 7 (0.3%) bull trout (Table 36). Additionally, northern pikeminnow, sucker (various species), and pearlshell *Margaritifera falcata* (Freshwater clams) were observed but were not enumerated this year. In 2010, snorkelers counted 651 salmonids, comprised of 379 westslope cutthroat trout, 31 rainbow trout/steelhead, 86 juvenile Chinook salmon, 2 bull trout, and 153 mountain whitefish. In 2011, only half of the 28 mainstem transects were surveyed before microburst rain storms in Camas

and Loon creeks reduced water visibility to zero in the mainstem MFSR. In contrast, in 2010, IDFG fishery staff were able to snorkel 26 of 28 transects. This year's data and yearly summaries are reported in Tables 36-46 and Figures 24-32.

Average densities for cutthroat trout, rainbow trout, and Chinook salmon in mainstem MFSR transects increased this year when compared to 2010 (Table 37; Figures 24, 25, and 26). The cutthroat trout average density of 2.4 fish/100 m^2 in 2011 was almost double the average density of 1.3 fish/100 observed in 2010. The 2011 rainbow trout average density increased ten-fold from a year ago, from 0.1 fish/100 m^2 in 2009 to 1.0 fish/100 m^2 this year. The number of rainbow trout observed this year (*n* = 174) also represents the highest count recorded for this species in 22 sample years dating back to 1971 (Table 42). Juvenile Chinook salmon numbers showed the biggest gain in 2011, increasing from an average density of 0.3 fish/100 m^2 in 2010 to 8.1 fish/100 m^2 this year in mainstem transects.

Catch-and-release regulations on the mainstem MFSR have been in effect since 1972. As part of IDFG's monitoring of catch-and-release effects, snorkelers in mainstem transects counted the number of cutthroat trout greater than 300 mm TL. While the percent of cutthroat trout greater than 300 mm TL was calculated at 13% in 1971, the percent has ranged from 13% to 60% since that time. In 2011, 13% (n = 52) of the 397 cutthroat trout observed were greater than 300 mm in mainstem transects (Table 36; Figures 27 and 28).

Three of six historical transects on the mainstem MFSR were snorkeled in 2011 (Table 38). Westslope cutthroat trout densities in these transects ranged from 2.8 to 3.4 fish/100 m^2 and averaged 3.3 fish/100 m^2 in 2011 (Table 39). Rainbow trout densities ranged from 0.1 to 0.4 fish/100 m^2 and had an average density of 0.2 fish/100 m^2. Juvenile Chinook salmon were observed in one historical transect (White Creek Pack Bridge) during this year's snorkeling and had an average density of 2.3 fish/100 m^2. Mountain whitefish, northern pikeminnow, suckers, and pearlshell were observed in two historical transects (Table 38).

In five of ten MFSR tributary transects snorkeled in 2011, IDFG personnel counted 28 westslope cutthroat trout, 12 rainbow trout/steelhead, and 39 juvenile Chinook salmon (Table 40). Average densities of westslope cutthroat trout, rainbow trout/steelhead, and Chinook salmon in MFSR tributary transects in 2011 were 1.0, 0.4, and 1.3, respectively (Table 41). This compares with average densities of 1.9, 1.4, and 0.3 for westslope cutthroat trout, rainbow trout/steelhead, and juvenile Chinook salmon, respectively, in 2010 (Table 44).

Pearlshell clams were observed in 2 of 14 mainstem transects surveyed in 2011 along with 2 of 3 mainstem historical transects (Tables 36 and 38). Pearlshell presence observed in various snorkeling transects in 2011 is marked with a footnote reference in the "total fish column" (Tables 36 and 38). To date, the distribution of pearlshells range from Indian Creek to Ship Island Creek in the mainstem MFSR, based on data collected this year and 2010 (Curet et al. 2011). Likely, pearlshell distribution is more extensive than presently documented.

Summary tables of cutthroat trout, rainbow trout/steelhead, and Chinook salmon for snorkeling transects in the mainstem traditional MFSR transects, historical transects, and tributary transects are shown in Tables 42-44. These tables list the total numbers of each fish species observed and their average densities by year.

Snorkeling transects in the mainstem MFSR were selected in 1971 and 1981 (Corley 1972; Thurow 1982) and likely represent one of the longest term trend data sets on westslope

cutthroat trout. However, little has been done to evaluate what transects provide accurate trends in mimicking population abundance (High et al. 2008). Also, some transects are difficult and dangerous to snorkel during flow conditions over 2.5 on the Middle Fork Lodge gage. Survey counts conducted during high flows may represent inherent snorkeler bias since a snorkeler may not be able to accurately observe fish when challenged by difficult waters.

Project Angling

IDFG anglers caught 162 fish from the mainstem MFSR during the 2011 survey (Figure 29). Of the salmonids caught and released, westslope cutthroat trout comprised 67% (*n* = 109) while rainbow trout/steelhead accounted for another 29% (*n* = 47). Mountain whitefish accounted for the balance with 4% (*n* = 6) in Figure 29. Anglers caught a higher proportion of cutthroat trout than rainbow trout in 2011 when compared to 2010 (Figure 30). In 2010, cutthroat trout accounted for 52% and rainbow trout 34% of the angling catch. The remaining 4% and 13% for 2011 and 2010, respectively, were comprised of other salmonids, predominantly mountain whitefish. The 2011 average TL for westslope cutthroat trout and rainbow trout/steelhead was 258 mm and 188 mm, respectively (Figure 31). In 2010, average lengths for cutthroat trout and rainbow trout/steelhead caught by angling were 268 and 173 mm, respectively. Similar to 2010, no non-game fish were caught by hook and line in 2011. The 2011 angling information reflects reduced effort due to turbidity after day four of the seven-day float. A summary of fish caught by species during project angling for the past 10 sample periods is shown in Table 45.

During angling on the mainstem MFSR, genetic samples were taken from 20 rainbow trout/steelhead, 5 mountain whitefish, and 1 bull trout (Table 46). Samples were archived in the Salmon Regional office for future analysis.

Catch-and-release regulations have been in effect since 1972. Prior to 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 26% to 53% (Figure 32). In 2011, the proportion of westslope cutthroat trout larger than 300 mm TL caught by project anglers was 35% (*n* = 69). The yearly fluctuation is likely a difference in angler skill level, gear type, sample timing, flow, and water clarity.

Tributary Surveys

Seven MFSR tributaries were electrofished and/or angled in 2011 to survey their fish populations and collect genetic samples (Table 46). Genetics were collected from 172 salmonids during these surveys, including 104 rainbow trout/steelhead, 61 juvenile Chinook salmon, and 7 bull trout. Fish species collected by stream, the number of genetic samples taken, sample dates, and transect locations are identified in Table 46. Samples were archived in the IDFG Salmon Region office for future analysis.

MANAGEMENT RECOMMENDATIONS

Continue annual monitoring of westslope cutthroat trout, rainbow trout/steelhead, and juvenile Chinook salmon in all 28 mainstem sites, 10 tributary sites, and 6 historical mainstem MFSR sites by snorkeling between the second week of July and the third week of August.

Continue to observe and document locations of freshwater mussel species within the MFSR system.

Explore new technologies, such as stereo-video camera systems that could possibly be used in conjunction with visual surveys to improve accuracy and precision of collecting fish length data for long-term monitoring of population size structure of cutthroat trout in the MFSR.

Evaluate snorkeling detection probabilities in the mainstem MFSR through mark-resight.

Table 36. Numbers of fish counted in mainstem traditional snorkel transects, Middle Fork Salmon River, 2011.

Transect Name	Westslope Cutthroat Trout Total Length (mm) 75-150	150-230	230-300	>300	Total	Rainbow Trout/Steelhead Total Length (mm) 75-150	150-230	230-300	>300	Total	Chinook Salmon Age 0	Age 1	Total	Other Species[a] BU	MWF	NPM	SUC	RSS	Total Fish
Boundary	0	4	1	3	8	13	9	0	0	22	150	250	400	0	27	0	0	0	458[b]
Gardells Hole	1	2	2	8	13	0	0	0	0	0	150	0	150	0	0	0	0	0	163
Velvet	2	7	43	6	58	18	34	2	0	54	145	0	145	0	0	0	0	0	258[b]
Elkhorn	0	0	2	1	3	4	13	0	0	17	73	1	74	0	3	0	0	0	97
Sheepeater	0	1	2	0	3	5	4	0	0	9	69	0	69	0	6	0	0	0	87
Greyhound	0	5	6	1	12	1	1	0	0	2	372	0	372	0	5	0	0	0	391
Rapid River	2	13	23	6	44	14	5	0	0	19	15	0	15	1	20	0	0	0	100[b]
Indian Pool	2	8	52	2	64	18	6	1	0	25	0	0	0	2	22	0	P[c]	0	113[d]
Pungo	0	0	9	2	11	0	0	0	0	0	53	0	53	2	0	0	0	0	66
Marble Pool	15	0	58	5	78	2	0	2	0	4	5	0	5	1	56	0	0	0	144
Skijump	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lower Jackass	2	14	3	1	20	9	2	8	0	19	18	0	18	0	21	P	0	0	78[d]
Cougar	0	0	5	0	5	1	0	0	0	1	15	0	15	1	4	0	0	0	26
Whitie Cox	0	3	22	0	25	0	2	0	0	2	0	0	0	0	3	0	0	0	30
Rock Island	0	3	33	17	53	0	0	0	0	0	40	0	40	0	23	0	0	0	116
Hospital Pool	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hospital Run	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tappan Pool	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Flying B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Airstrip	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Survey	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Big Creek Bridge	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Love Bar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ship Island	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Little Ouzel	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Otter Bar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Goat Creek Pool	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Goat Creek Run	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	24	60	261	52	397	85	76	13	0	174	1,105	251	1,356	7	190	P	P	0	2,127

[a] BU = Bull trout, MWF = Mountain whitefish, NPM = Northern pikeminnow, SUC = Sucker (various species), RSS = Redside shiner.
[b] Total includes one adult Chinook salmon.
[c] P = Species present but not enumerated.
[d] Pearlshell (Freshwater clams) present.

Table 37. Densities of westslope cutthroat trout, rainbow trout/steelhead, and juvenile Chinook salmon in mainstem traditional snorkel transects, Middle Fork Salmon River, 2011.

			Densities (Fish/100 m^2)			
Transect Name	River km[a]	Transect Area (m^2)	Westslope Cutthroat Trout	Rainbow Trout/ Steelhead	Chinook Salmon	Other Fish[b]
Boundary	0.3	878.4	0.9	2.5	45.5	3.1
Gardells Hole	4.3	1,612.8	0.8	0.0	9.3	0.0
Velvet	8.8	473.6	12.3	11.4	30.6	0.2
Elkhorn	13.6	870.4	0.3	2.0	8.5	0.3
Sheepeater	21.3	1,305.6	0.2	0.7	5.3	0.5
Greyhound	24.5	1,227.6	1.0	0.2	30.3	0.4
Rapid River	29.6	917.6	4.8	2.1	1.6	2.3
Indian Pool	40.0	1,698.8	3.8	1.5	0.0	1.4
Pungo	44.3	954.8	1.2	0.0	5.6	0.2
Marble Pool	51.0	1,760.8	4.4	0.2	0.3	3.2
Skijump	52.3	--	--	--	--	--
Lower Jackass	60.6	1,509.6	1.3	1.3	1.2	1.4
Cougar	64.6	680.0	0.7	0.2	2.2	0.7
Whitie Cox	73.9	1,305.6	1.9	0.2	0.0	0.2
Rock Island	74.1	1,561.6	3.4	0.0	2.6	1.5
Hospital Pool	82.9	--	--	--	--	--
Hospital Run	84.3	--	--	--	--	--
Tappan Pool	92.6	--	--	--	--	--
Flying B	106.6	--	--	--	--	--
Airstrip	108.6	--	--	--	--	--
Survey	119.7	--	--	--	--	--
Big Creek Bridge	124.6	--	--	--	--	--
Love Bar	127.8	--	--	--	--	--
Ship Island	135.8	--	--	--	--	--
Little Ouzel	144.0	--	--	--	--	--
Otter Bar	144.6	--	--	--	--	--
Goat Creek Pool	151.5	--	--	--	--	--
Goat Creek Run	151.8	--	--	--	--	--
Total		16, 757.2	37.0	22.0	143.1	15.5
Average			2.4	1.0	8.1	1.2

[a] River km readings begin at Dagger Falls at 0.0 km.

[b] Includes bull trout, mountain whitefish, northern pikeminnow, sucker (various species), dace (various species), and redside shiner.

Table 38. Number of westslope cutthroat trout and rainbow trout/steelhead by length group (mm), Chinook salmon by age group, and other fish species counted in the mainstem historical (Corley) transects, Middle Fork Salmon River, 2011.

	Westslope Cutthroat Trout Total Length (mm)					Rainbow Trout/Steelhead Total Length (mm)					Chinook Salmon			Other Species[a]						
Transect Name	75-150	150-230	230-300	>300	Total	75-150	150-230	230-300	>300	Total	Age 0	Age 1	Total	BU	MWF	NPM	SUC	RSS	Total	Total Fish
Little Creek Guard Station	1	6	19	6	32	0	0	0	5	5	0	0	0	0	30	P[a]	P	0	30	67[c]
Mahoney Camp	6	5	7	1	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19
White Creek Pack Bridge	17	8	82	25	132	0	1	3	0	4	129	0	129	0	19	P	P	0	19	284[c]
Bernard Airstrip	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cliffside Rapids Hole	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hancock Rapids Hole	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	24	19	108	32	183	0	1	3	5	9	129	0	129	0	49	P	P	0	49	370

[a] BU = Bull trout, MWF = Mountain whitefish, NPM = Northern pikeminnow, SUC = Sucker (various species), and RSS = Redside shiner.

[b] P=Species present but not enumerated.

[c] Pearlshell (Freshwater clams) observed.

Table 39. Densities of westslope cutthroat trout, rainbow trout/steelhead, Chinook salmon, and other fish species observed in the mainstem historical (Corley) snorkel transects, Middle Fork Salmon River, 2011.

	Densities (Fish/100 m^2)			
Transect Name	Westslope Cutthroat Trout	Rainbow Trout/ Steelhead	Chinook Salmon	Other Species[a]
Little Creek Guard Station	2.8	0.4	0.0	2.6
Mahoney Camp	3.0	0.0	0.0	0.0
White Creek Pack Bridge	3.4	0.1	3.4	0.5
Bernard Airstrip	--	--	--	--
Cliffside Rapids Hole	--	--	--	--
Hancock Rapids Hole	--	--	--	--
Total	9.2	0.5	3.4	3.1
Average	3.3	0.2	2.3	0.9

[a] Includes bull trout, mountain whitefish, northern pikeminnow, sucker (various species), and redside shiner.

Table 40. Numbers of westslope cutthroat trout and rainbow trout/steelhead by length group (mm), juvenile Chinook salmon by age group, and other fish species counted in tributary snorkel transects, Middle Fork Salmon River, 2011.

	Westslope Cutthroat Trout					Rainbow Trout/Steelhead					Chinook Salmon			Other Species[a]						
Transect Name	75-150	150-230	230-300	>300	Total	75-150	150-230	230-300	>300	Total	Age 0	Age 1	Total	BU	MWF	NPM	SUC	RSS	Total	Total Fish
Pistol Creek Lower	1	0	12	6	19	3	2	0	0	5	24	0	24	0	6	0	0	0	6	54
Pistol Creek Upper	7	0	2	0	9	2	2	2	0	6	3	5	8	0	0	0	0	0	0	23
Indian Creek Lower	0	0	0	0	0	0	1	0	0	1	3	0	3	0	0	0	0	0	0	4
Indian Creek Upper	0	0	0	0	0	0	0	0	0	0	4	0	4	0	1	0	0	0	0	5
Marble Creek	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Loon Creek Lower	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Loon Creek Upper	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Camas Creek Lower	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Camas Creek Upper	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Big Creek	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	8	0	14	6	28	5	5	2	0	12	34	5	39	0	7	0	0	0	0	86

[a] BU = Bull trout, MWF = Mountain whitefish, NPM = Northern pikeminnow, SUC = sucker (various species), and RSS = Redside shiner.

Table 41. Densities of westslope cutthroat trout, rainbow trout/steelhead, Chinook salmon, and other fish species observed in tributary snorkel transects, Middle Fork Salmon River, 2011.

	Densities (Fish/100 m^2)			
Transect Name	Westslope Cutthroat Trout	Rainbow Trout/ Steelhead	Chinook Salmon	Other Species[a]
Pistol Creek Lower	5.3	1.4	6.7	1.7
Pistol Creek Upper	1.8	1.2	1.6	0.0
Indian Creek Lower	0.0	0.1	0.3	0.0
Indian Creek Upper	0.0	0.0	0.7	0.2
Marble Creek	0.0	0.0	0.0	0.0
Loon Creek Lower	--	--	--	--
Loon Creek Upper	--	--	--	--
Camas Creek Lower	--	--	--	--
Camas Creek Upper	--	--	--	--
Big Creek	--	--	--	--
Total	7.1	2.7	9.3	1.9
Average	1.0	0.4	1.3	0.2

[a] Includes bull trout, mountain whitefish, northern pikeminnow, sucker (various species), and redside shiner.

Table 42. Summary of westslope cutthroat trout, rainbow trout/steelhead, and Chinook salmon numbers and their average densities in mainstem traditional snorkel transects, Middle Fork Salmon River, 1971, 1978, 1984 to 1993, 1996, 1999, 2003 to 2005, and 2007 to 2011.

	Westslope Cutthroat Trout		Rainbow Trout/Steelhead		Chinook Salmon		
Year	No. of Fish	Average Density[a]	No. of Fish	Average Density	No. of Fish	Average Density	Total Transect Area (m^2)
1971	210	ND	ND	ND	ND	ND	ND
1978	575	ND	ND	ND	ND	ND	ND
1984	584	ND	67	ND	1,269	ND	ND
1985	120	0.4	97	0.3	3	0.0	31,079.0
1986	373	1.0	152	0.4	13	0.0	37,747.4
1987	375	1.0	98	0.3	4	0.0	39,679.7
1988	207	0.6	141	0.4	64	0.2	35,444.0
1989	244	1.4	53	0.3	340	1.9	17,762.0
1990	97	0.3	75	0.2	15	0.0	37,075.0
1991	153	0.8	83	0.4	10	0.1	19,665.0
1992	89	0.6	8	0.1	12	0.2	16,784.0
1993	156	0.5	29	0.1	1	0.0	30,523.0
1996	296	0.6	83	0.2	2	0.0	46,781.0
1999	304	1.4	141	0.6	470	2.2	21,846.0
2003	302	1.0	87	0.3	1,659	5.6	29,874.8
2004[b]	150	1.6	88	0.9	2,095	22.1	9,498.8
2005	344	1.1	132	0.4	127	0.4	31,954.8
2007	175	0.9	36	0.2	22	0.1	19,544.0
2008[c]	73	1.7	40	1.0	90	2.1	4,203.2
2009	297	1.1	120	0.4	203	0.7	28,182.0
2010[d]	379	1.3	31	0.1	86	0.3	29,445.0
2011[e]	397	2.4	174	1.0	1,357	8.1	16,757.2

[a] Expressed as the number of fish observed per $100m^2$.
[b] Upper 10 of 29 transects surveyed.
[c] Upper 6 of 29 transects surveyed.
[d] Includes 28 mainstem traditional transects as Tappan Run no longer exists.
[e] Upper 14 of 28 transects surveyed.

Table 43. Summary of westslope cutthroat trout, rainbow trout/steelhead, and Chinook salmon numbers and their average densities in mainstem historical (Corley) snorkel transects, Middle Fork Salmon River, 1996, 1999, 2003 to 2005, and 2007 to 2011.

	Westslope Cutthroat Trout		Rainbow Trout/Steelhead		Chinook Salmon		
Year	No. of Fish	Average Density[a]	No. of Fish	Average Density	No. of Fish	Average Density	Total Transect Area (m^2)
2003	92	0.9	22	0.2	141	1.4	10,069.2
2004	--	--	--	--	--	--	--
2005	112	4.6	0	--	0	--	5,308.0
2007	40	1.1	12	0.3	0	--	4,376.0
2008	--	--	--	--	--	--	--
2009	57	0.6	5	0.1	0	0.0	9,824.0
2010	107	1.7	1	0.02	0	0.0	10,656.0
2011[b]	183	3.3	9	0.2	129	2.3	5,636.0

[a] Expressed as the number of fish observed per 100m^2.
[b] Three of six transects surveyed in 2011.

Table 44. Summary of westslope cutthroat trout, rainbow trout/steelhead, and Chinook salmon numbers and their average densities in Middle Fork Salmon River tributary snorkel transects, 1985 to 1993, 1996, 1999, 2003 to 2005, and 2007 to 2011.

	Westslope Cutthroat Trout		Rainbow Trout/Steelhead		Chinook Salmon		
Year	No. of Fish	Average Density[a]	No. of Fish	Average Density	No. of Fish	Average Density	Total Transect Area (m^2)
1985	39	1.7	128	5.4	20	0.9	2,356.8
1986	37	1.5	179	7.3	56	2.3	2,455.3
1987	23	1.0	106	4.4	9	0.4	2,412.5
1988	27	1.0	128	4.6	33	1.2	2,782.0
1989	7	0.3	68	2.4	89	3.2	2,782.0
1990	34	1.2	140	5.0	16	0.6	2,792.0
1991	33	0.9	78	2.2	3	0.1	3,615.0
1992	17	0.5	52	1.7	9	0.3	3,149.0
1993	86	0.8	97	0.8	1	0.1	10,809.0
1996	95	0.9	113	1.0	1	0.0	10,985.0
1999	44	1.1	140	0.2	141	3.4	4,349.6
2003	85	1.8	102	2.2	412	8.8	4,704.0
2004[b]	68	2.2	69	1.9	673	23.1	3,742.9
2005	42	1.1	91	2.2	49	1.2	4,447.2
2007	27	0.1	28	0.1	29	0.1	4,073.2
2008	--	--	--	--	--	--	--
2009	65	1.3	36	0.7	52	1.1	4,901.2
2010	60	1.9	40	1.4	11	0.3	3,635.2
2011[c]	28	1.0	12	0.4	39	1.3	2,904.8

[a] Expressed as the number of fish per 100 m^2.
[b] Six of 10 transects surveyed in 2004.
[c] Five of 10 transects surveyed in 2011.

Table 45. Summary of fish caught and released during project angling in the mainstem Middle Fork Salmon River, 1996, 1999, 2003 to 2005, and 2007 to 2011.

Year	Total No. Fish	Species[a]									Total Hours Fished
		CT	RBT	BU	RBTxCT	CK	MWF	EBT	RSS	NPM	
1996	400	280	116	0	0	0	2	0	0	2	UNK[b]
1999	322	182	12	0	8	0	0	0	0	0	UNK
2003	260	167	91	0	0	1	0	0	1	0	UNK
2004	430	243	184	1	0	1	0	0	0	1	133.8
2005	401	226	157	7	0	0	2	0	0	5	69.3
2007	542	264	253	2	1	0	6	0	0	16	121.7
2008	155	64	90	0	1	0	0	0	0	0	26.9
2009	601	340	230	2	8	0	4	1	2	14	166.0
2010	334	174	115	8	3	11	21	2	0	0	116.2
2011	162	109	47	0	0	0	6	0	0	0	42.0

[a] CT = Westslope cutthroat trout, RBT = Rainbow trout/steelhead, BU = Bull trout, RBTxCT = apparent rainbow/cutthroat trout hybrid, CK = Chinook salmon, MWF = Mountain whitefish, EBT = Brook trout, RSS = Redside shiner, and NPM = Northern pikeminnow.

[b] UNK = Unknown.

Table 46. Salmonid genetic samples taken from the mainstem Middle Fork Salmon River (MFSR) and selected tributaries with their locations, July and August, 2011.

Stream/River	Sample Date	WGS84 Latitude	WGS84 Longitude	Species[a] and No. of Genetic Samples Taken BU	CK	MWF	RBT/SH
Elkhorn	7/29/2011	44.61560	-115.25714	1	--	--	20
Loon	8/1/2011	44.80788	-114.81194	1	10		6
MFSR[b] - mainstem from Boundary Cr. to Gardells Hole	7/28/2011	44.52831	-115.29286	--	--	--	--
MFSR - mainstem from Gardells Hole to Greyhound	7/29/2011	44.56658	-115.30079	1	--	--	4
MFSR – mainstem from Greyhound to Pungo Creek	7/30/2011	44.65089	-115.16636	--	--	1	5
MFSR - mainstem from Pungo Creek to Pine Flat	7/31/2011	44.76477	-115.07285	--	--	2	8
MFSR - mainstem from Pine Flat to Johnny Walker	8/1/2011	44.76496	-114.89416	--	--	2	3
Papoose	8/3/2011	45.17410	-114.72093	2	--	--	22
Pistol	7/18/2010	44.76697	-115.08873	--	32	--	14
Rapid River	7/30/2011	44.68002	-115.15263	--	7	--	1
Ship Island	8/3/2011	45.17567	-114.72394	1	--	--	5
Wilson	8/2/2011	45.03339	-114.72386	2	12	--	36

[a] BU = Bull trout, CK = Chinook salmon, RBT/SH = Rainbow trout/Steelhead, and MWF = Mountain whitefish.
[b] MFSR = Middle Fork Salmon River.

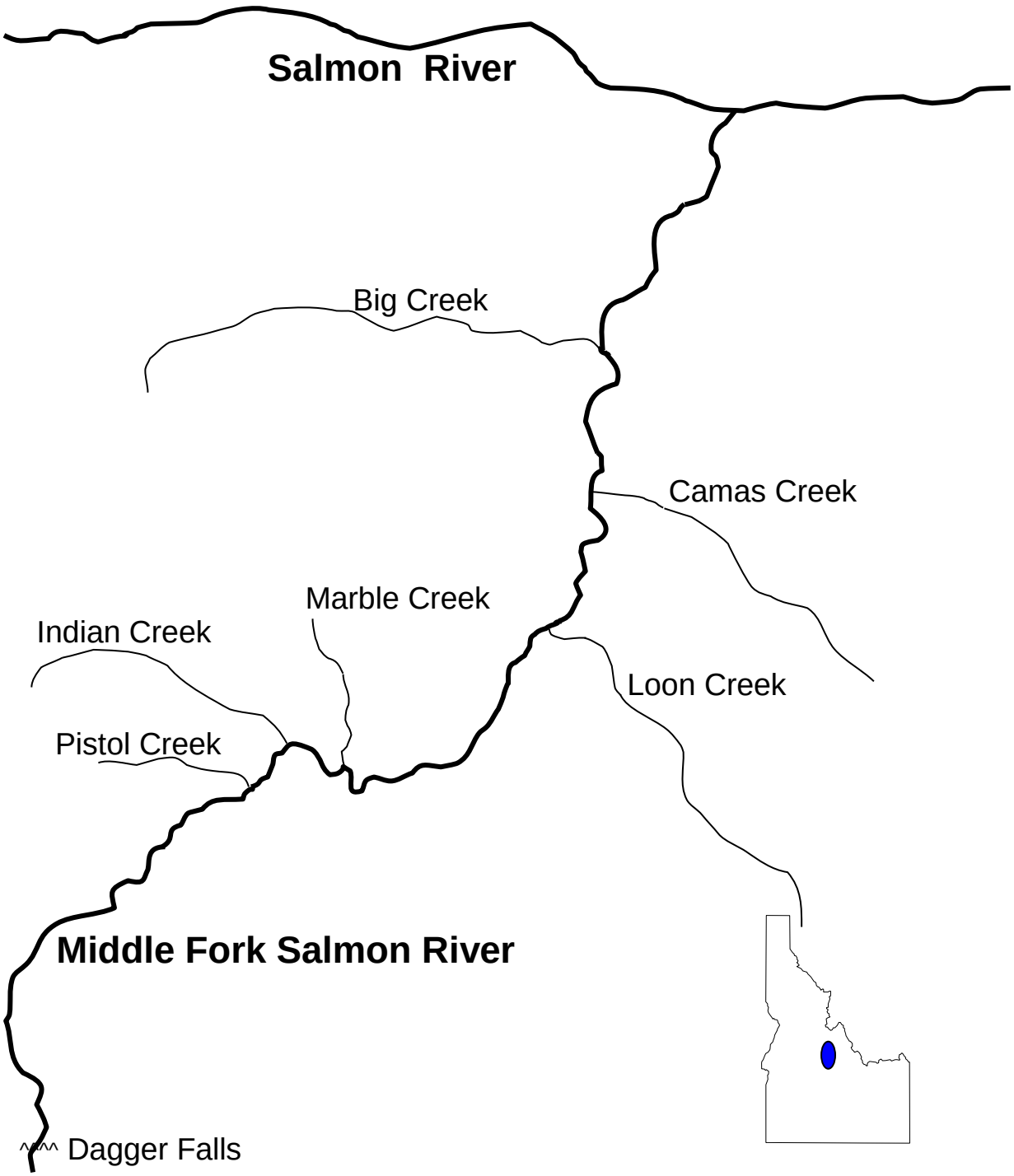

Figure 23. Map of the Middle Fork Salmon River and its major tributaries, Idaho.

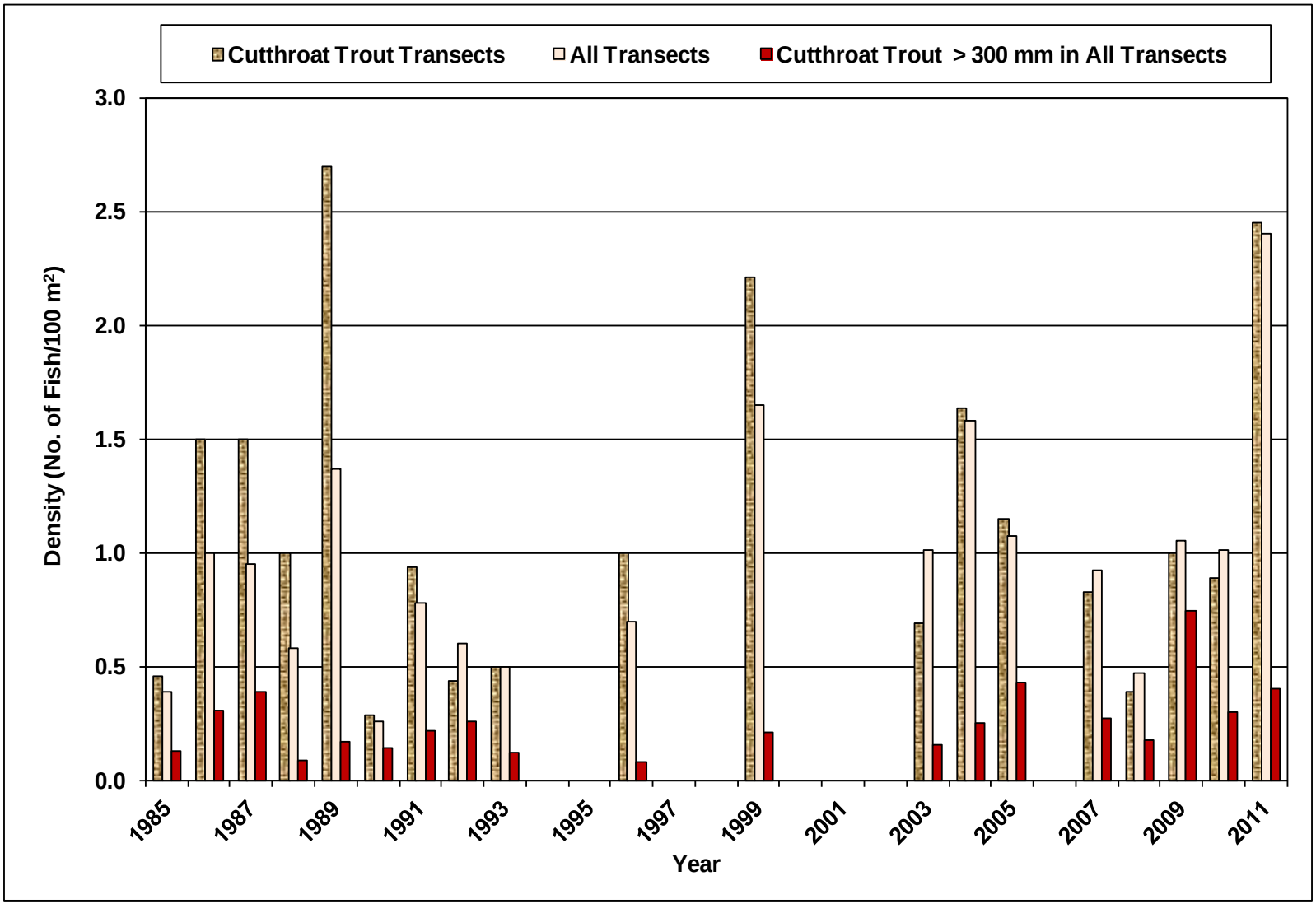

Figure 24. Densities of westslope cutthroat trout in westslope cutthroat trout-only transects (see Appendix G), in all transects, and densities of westslope cutthroat trout greater than 300 mm counted in all transects during mainstem Middle Fork Salmon River snorkel surveys, 1985 to 2011. Not all transects were sampled in all years.

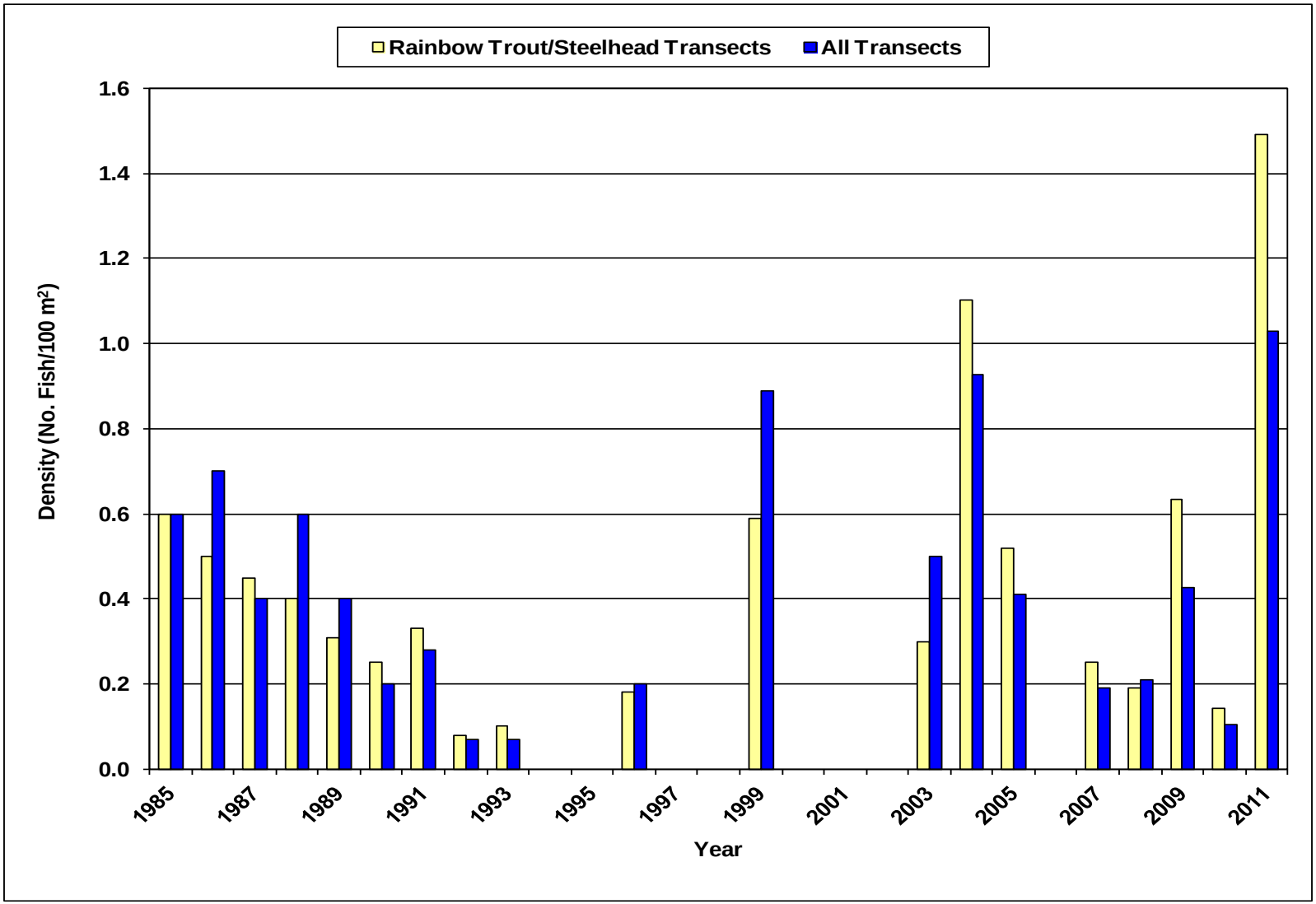

Figure 25. Densities of rainbow trout/steelhead in rainbow trout/steelhead-only transects (see Appendix G) and in all transects during mainstem Middle Fork Salmon River snorkel surveys in 1985 to 2011. Not all transects were sampled in all years.

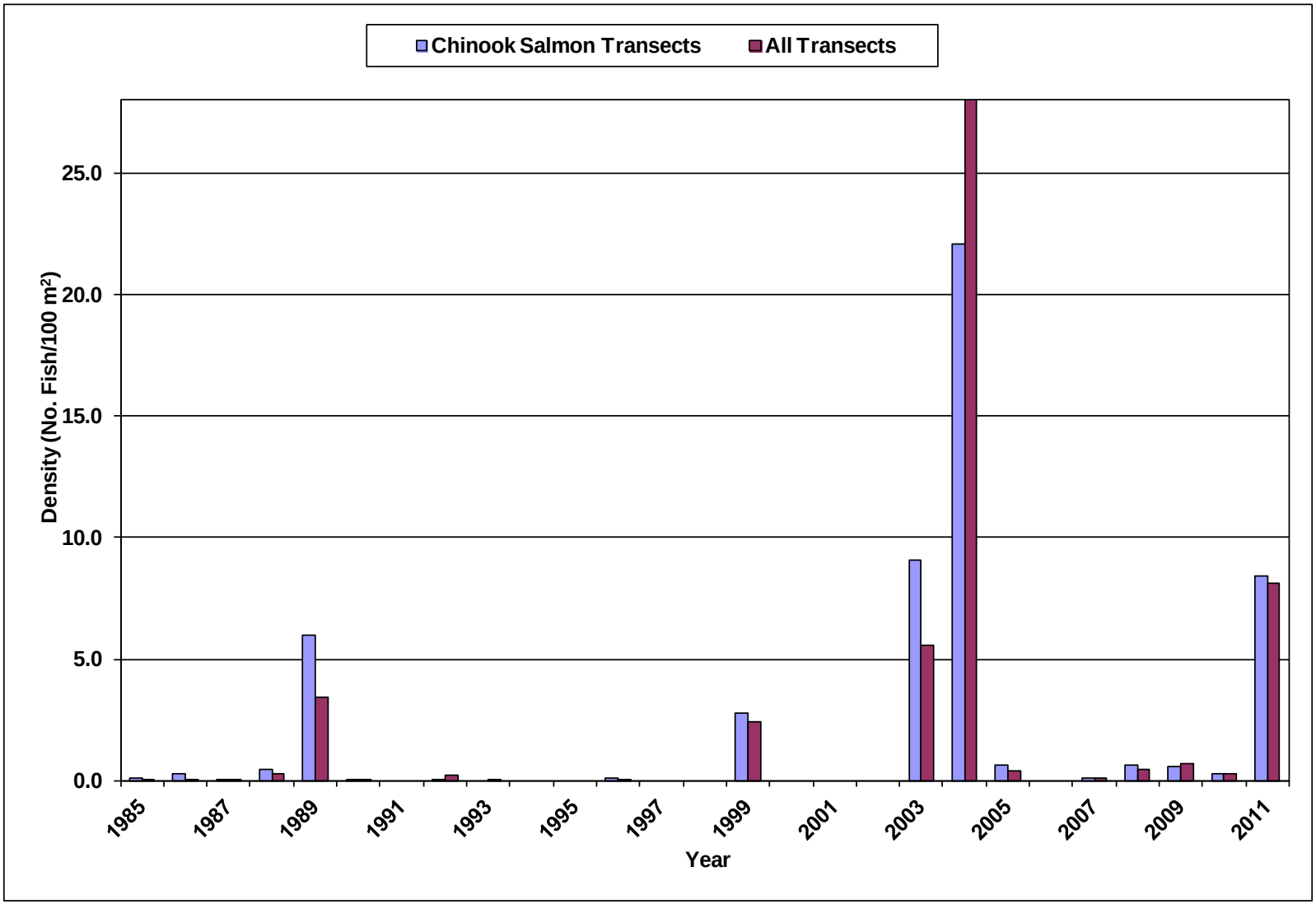

Figure 26. Densities of Chinook salmon in Chinook salmon-only transects (see Appendix G) and in all transects during mainstem Middle Fork Salmon River snorkel surveys, 1985 to 2011. Not all transects were sampled in all years.

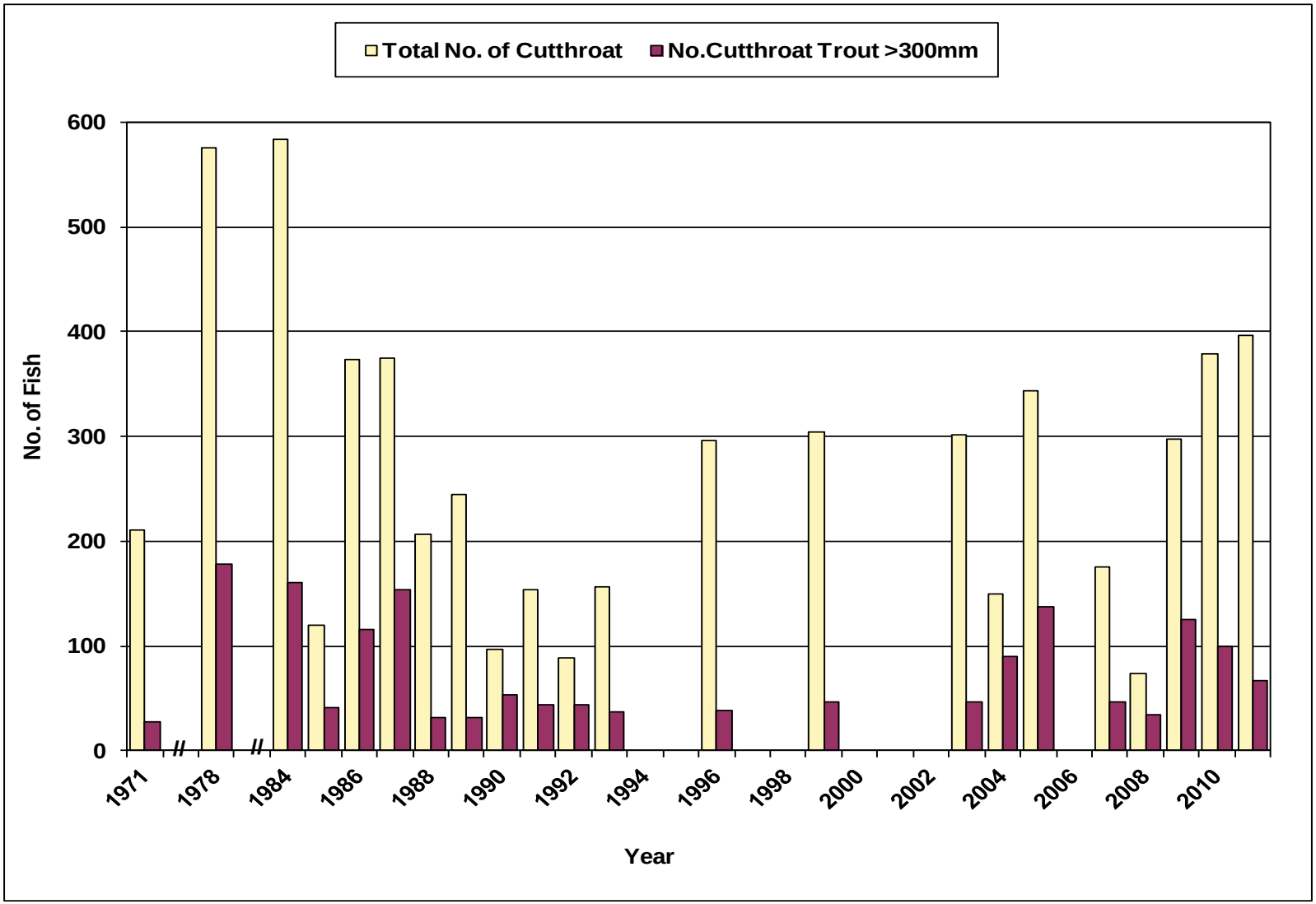

Figure 27. Number of westslope cutthroat trout counted in mainstem Middle Fork Salmon River snorkel transects, 1971, 1978, 1984 to 2011. Not all transects were sampled in all years.

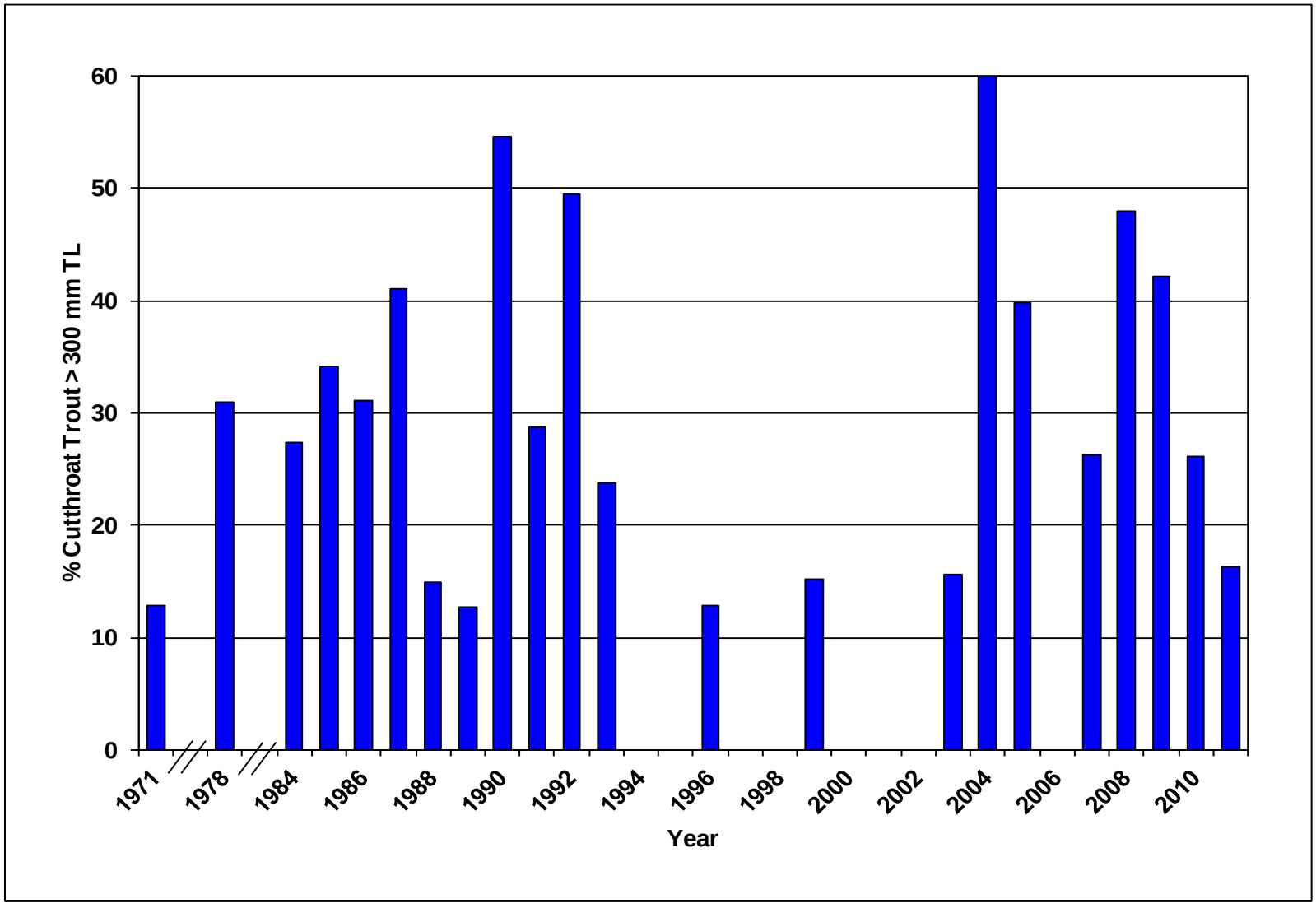

Figure 28. Percentage of westslope cutthroat trout larger than 300 mm total length (TL) sampled by snorkeling the mainstem Middle Fork Salmon River in 1971, 1978, 1984 to 2011. Not all transects were sampled in all years.

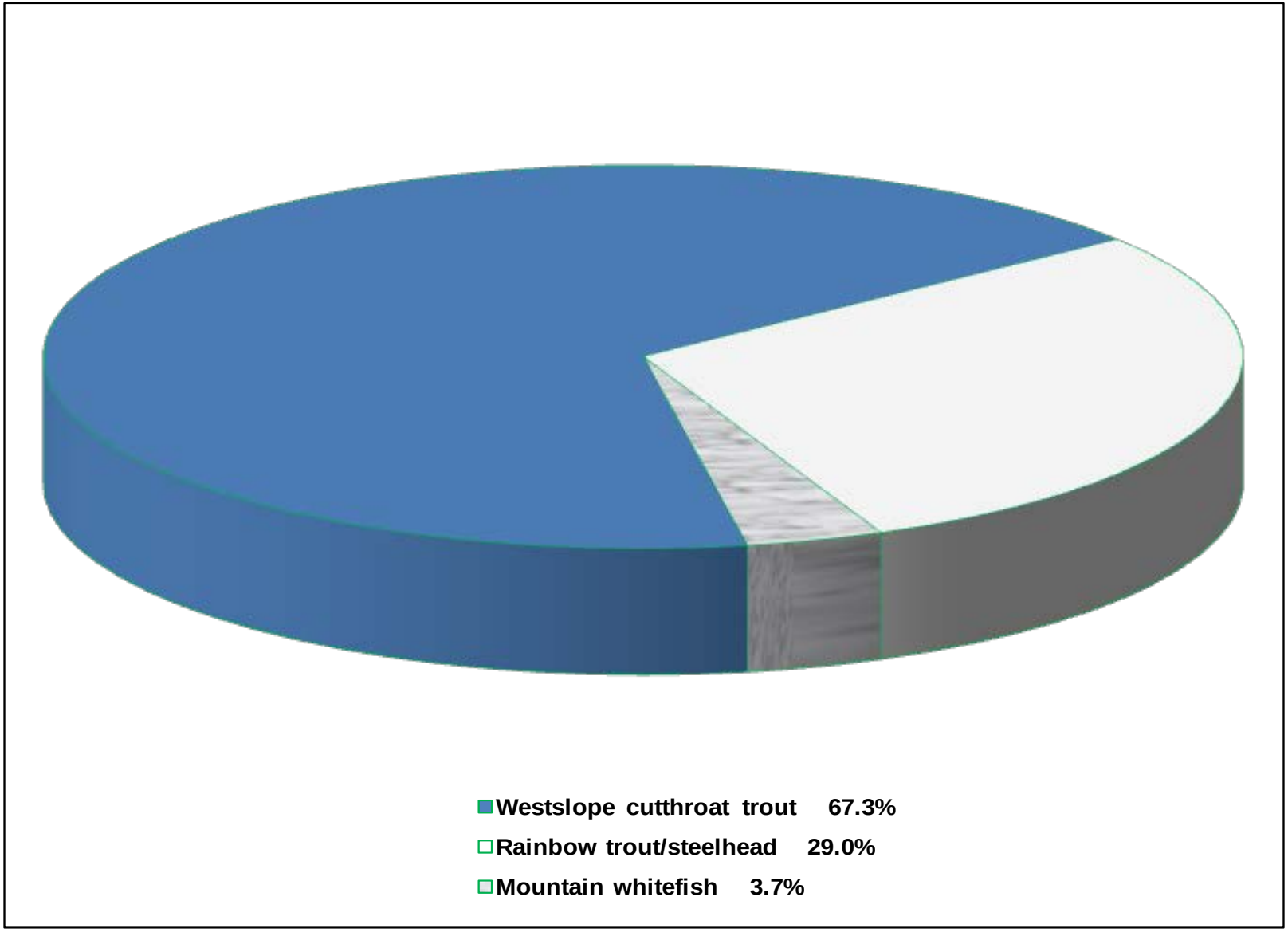

Figure 29. Species composition of fish (*n* = 162) caught by IDFG project anglers in the mainstem Middle Fork Salmon River, 2011.

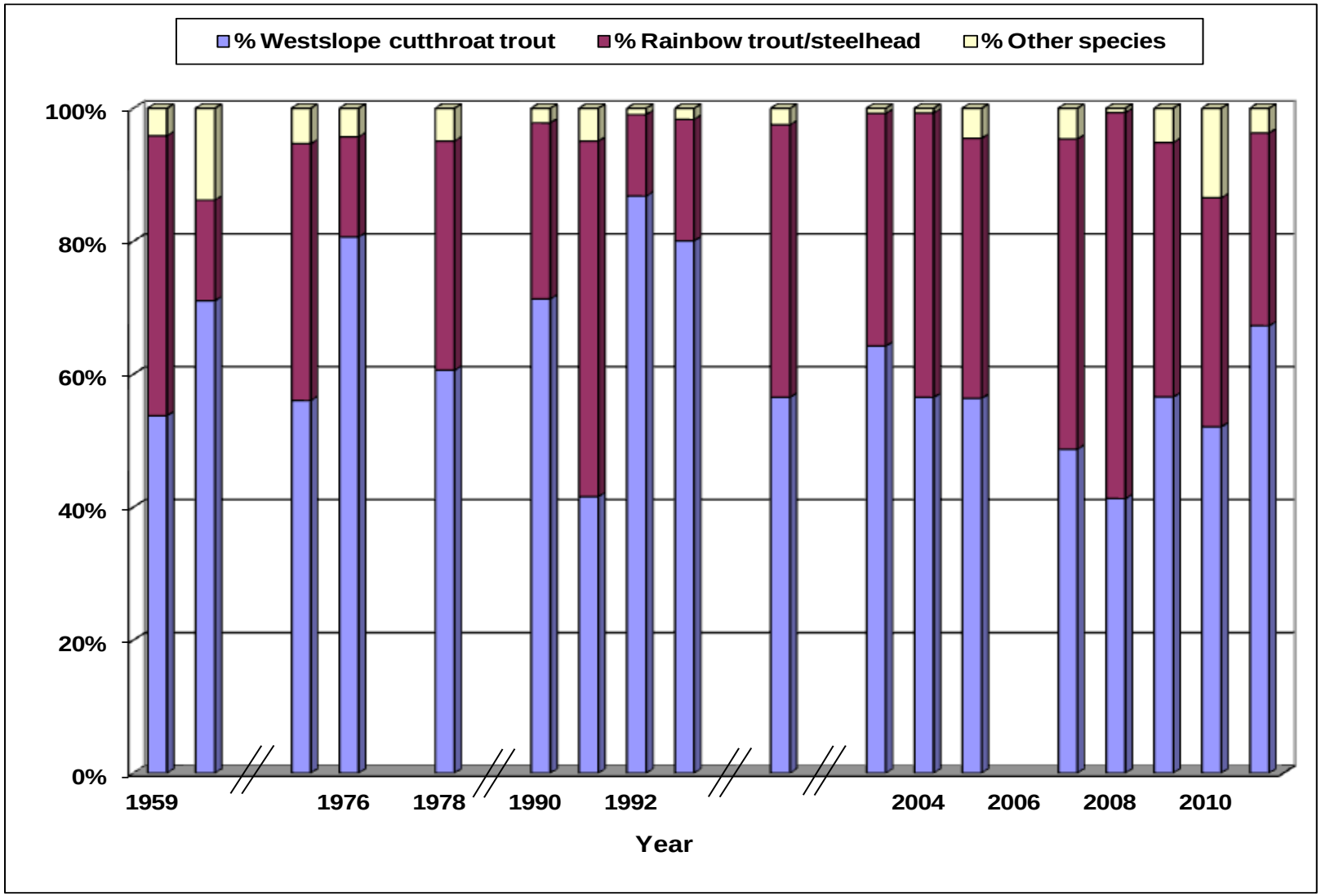

Figure 30. Proportions of species caught by project anglers in the Middle Fork Salmon River, 1959, 1960, 1975, 1976, 1978, 1990 to 1993, 1999, 2003 to 2011. Other species includes all fish species caught per year except westslope cutthroat trout and rainbow trout/steelhead.

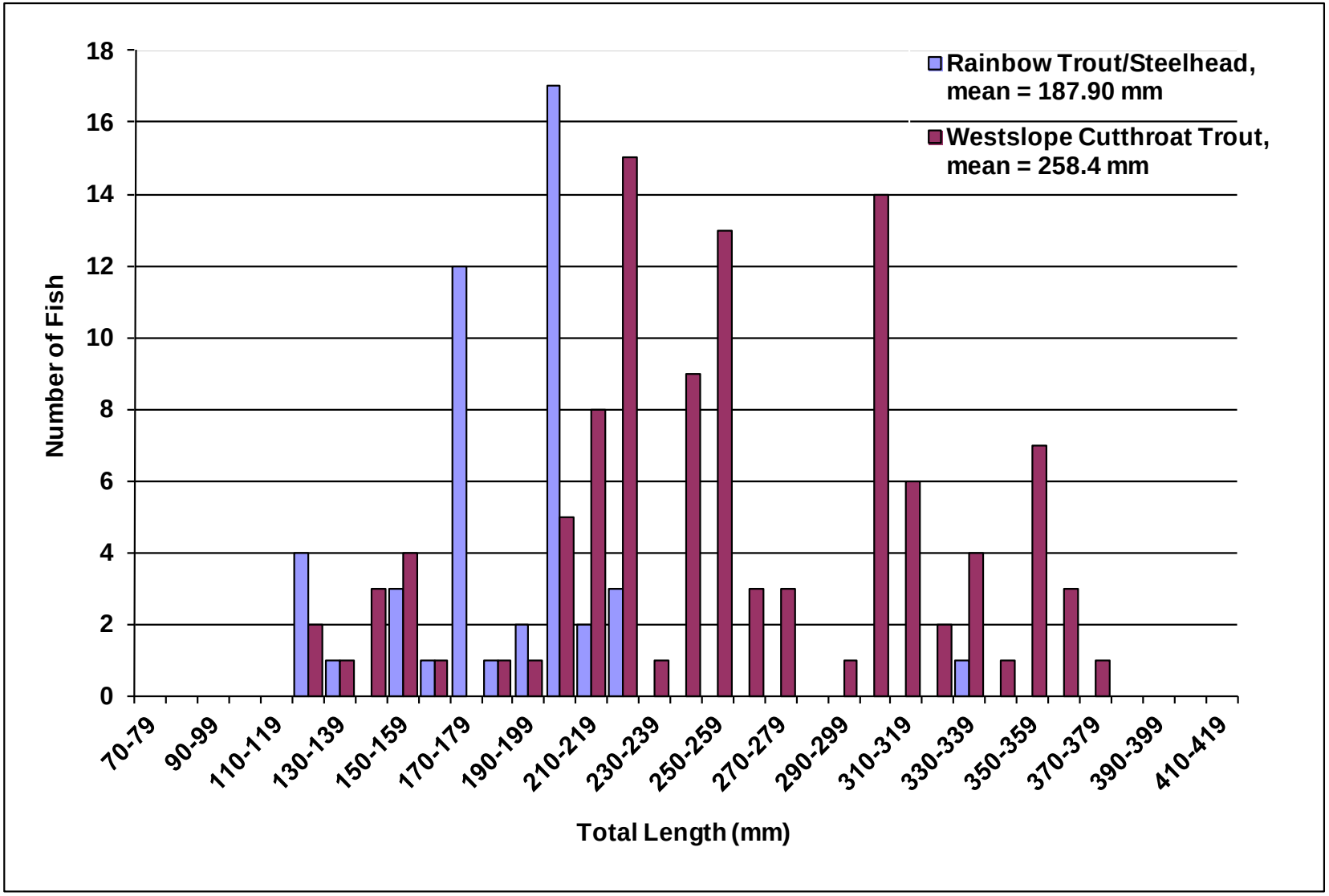

Figure 31. Length frequency of westslope cutthroat trout (*n* = 109) and rainbow trout/steelhead (*n* = 47) caught by project anglers in the Middle Fork Salmon River, 2011.

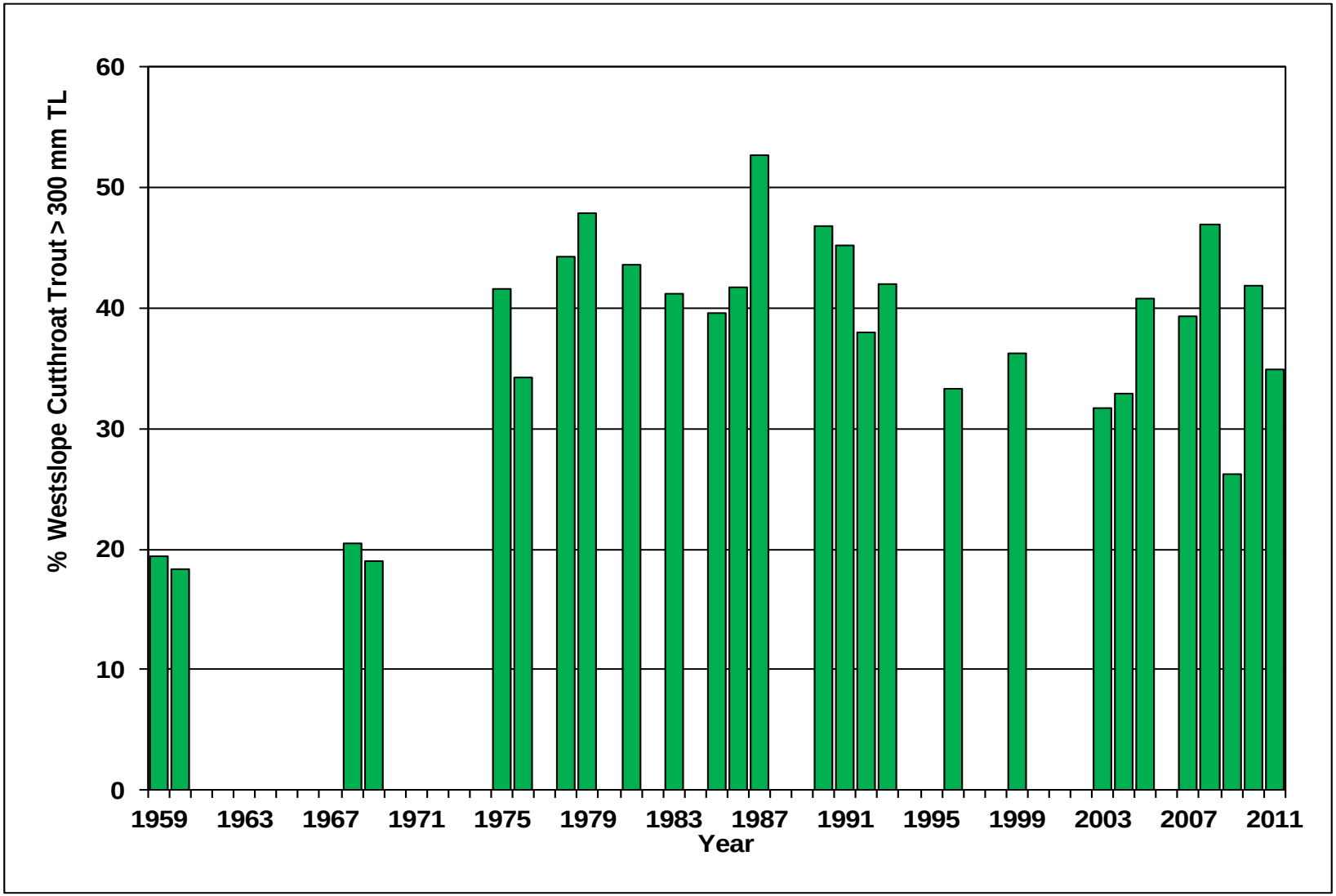

Figure 32. Percentage of westslope cutthroat trout larger than 300 mm total length (TL) sampled by project angling in the Middle Fork Salmon River, 1959 to 2011.

SALMON REGION FISHERY MANAGEMENT 2011 ANNUAL REPORT

Public Outreach – Technical Assistance, and Angler Recruitment and Retention

ABSTRACT

During 2011, project staff responded to numerous requests for technical assistance from state, federal and tribal entities, non-government organizations and private individuals. We submitted comments to agencies and private entities regarding a variety of projects with the potential to alter fisheries habitat.

To increase public awareness of the value of fisheries habitat and to increase and maintain participation in fishing, staff participated in angler informational meetings, "Trout in the Classroom" presentations, a Career Day Expo for students, and a week-long county fair display. Fishery staff also collaborated with resource partners in conducting ice fishing and Free Fishing Day fishing derbies. Our outreach efforts were attended by 2,292 anglers and regional residents. Regional staff also crafted press releases regarding Chinook salmon fishing, steelhead trout fishing, and ice fishing techniques and safety to assist the public in gaining a greater appreciation for their fishery resources.

To improve angler opportunity and to help recruit anglers to sport-fishing, regional fishery staff collaborated with the Engineering Bureau to deepen and enlarge the two Hayden Ponds near Lemhi, about 28 miles south of Salmon. Staff also worked with the City of Salmon, the IDFG Screen Program, and various citizens groups, civic groups, and businesses to enlarge and deepen Kids Creek Pond in the City of Salmon. Staff also continued to develop public access agreements with several ranches adjacent to the Lemhi River. Staff is also pursuing a new fishing access site in the lower Lemhi River with a property owned by The Nature Conservancy.

An estimated 45,000 anglers fished in the Salmon Region, of which approximately 90% live outside the area. Because these anglers are not familiar with regional waters, we responded to over 500 requests for basic information on fishing opportunities, techniques, regulations, and area specifics.

INTRODUCTION

Each year, the Salmon Region fishery management staff conducts an array of public outreach programs designed to initiate and involve the public in fishing and fishery-related matters. Additionally, we collaborate with state and federal agencies on fishery projects that encompass overlapping physical and jurisdictional boundaries, and respond to a multitude of informational requests from the public, county, state, and federal government offices, and other non-governmental and tribal entities.

OBJECTIVES

To provide technical assistance regarding fisheries related issues, concerns, and recommendations to state and federal governments, and private parties contemplating projects with the potential to affect fish and fish habitat.

To provide angler and aquatic education programs to the public to increase awareness of the value of habitat to the fisheries resource and to increase and maintain participation in fishing.

To provide angling opportunities to the public through fishing clinics and derbies targeted at young anglers, and by the maintenance and/or development of new fishing waters and angler access.

METHODS

We responded, as time permitted, to most requests for data, expertise, and recommendations from non-government organizations, private individuals, state, federal, and tribal entities. Project staff attended meetings, conducted field inspections, and generated responses as appropriate.

We conducted fishing clinics for experienced and first time anglers, presented fishery related topics at various public forums including Career Day Expo and a booth and display at the Lemhi County Fair. We also presented “Trout in the Classroom” programs in the Challis, Leadore, and Salmon school districts.

Regional fishery staff crafted news releases for radio and print media on various fisheries related topics, including fishing techniques, fish life histories, fish habitat, and fishing water restoration endeavors.

Regional staff helped negotiate the final access agreements on several ranches adjacent to the Lemhi River. Additionally, Regional staff are pursuing a new angler access site along the lower Lemhi River. The property is owned by The Nature Conservancy and is adjacent to the V. Don Olson Ranch.

RESULTS AND DISCUSSION

During 2011, we responded to numerous technical assistance requests on water, habitat, and fishery-related matters (Appendix J).

Project personnel usually contacted agencies and private landowners by telephone.

Commonly, we responded to projects requiring technical assistance by meeting with the applicant on-site, determining the nature of the situation, and sending written or verbal comments to the appropriate entity. Due to the remoteness of the Salmon Region, we were often the only government agency representative available to conduct on-site inspections that required adequate experience regarding fish populations, including species occupancy, trends, timing, and life stage use.

We responded to numerous inquiries from the public (via telephone, letter and in person) about when, where, and how to participate in regional fishing opportunities, ranging from steelhead and Chinook salmon angling to alpine lake fishing. IDFG staff also conducted three Free Fishing Day clinics: one in Salmon at Kids Creek Pond, Blue Mountain Pond in Challis, and one hosted by both enforcement staff and Sawtooth Hatchery personnel at Sawtooth Hatchery in the Stanley Basin. A total of 220 young anglers participated in the various events. Additionally, a total of 125 young anglers attended the 20th Annual Kids' Ice Fishing Derby on January 29, 2011 at Hyde Pond.

We presented fisheries related topics to approximately 550 junior high and high school attendees at Career Day Expo. We also presented "Trout in the Classroom" programs in the Challis, Leadore, and Salmon school districts to approximately 450 students ranging from 4th graders to high school seniors.

Fisheries staff also generated news releases regarding Chinook salmon and steelhead trout fishing, ice fishing techniques and safety, and the 2011 Chinook salmon fishery in the upper Salmon River.

Additionally, staff worked with The Nature Conservancy and the Beyeler ranches to finalize angler access agreements to portions of the Lemhi River. We hope that by spring 2012, anglers will have access to an additional two miles of fishing on the Lemhi River. Staff also worked with The Nature Conservancy to pursue the creation of a fishing access site adjacent to the V. Don Olson Ranch. Details and negotiations are on-going.

Regional fisheries and habitat staff provided technical assistance and guidance regarding various habitat protection and improvement efforts ongoing in the region.

MANAGEMENT RECOMMENDATIONS

Technical guidance on issues involving fishery resources in the Salmon Region should be continued to assist in maintaining and enhancing fishery resources in the region.

Because of the number of requests for technical guidance, the amount and complexity of proposed water right applications, and fisheries staff covering duties of the Regional Conservation Educator position, consideration should be given to adding staff to administer habitat and water rights, technical issues, and aquatic education.

Continue public presentations, press releases, and educational outreach to encourage an environmentally literate citizenry that takes an active role in natural resource stewardship.

Introduce more youth to fishing by continuing to offer fishing clinics and derbies, and developing public fishing waters and access throughout the Region.

SALMON REGION FISHERY MANAGEMENT 2011 ANNUAL REPORT

Upper Salmon River Chinook Salmon Fishery

ABSTRACT

A Chinook salmon fishery was conducted by IDFG on 107.5 km of the Salmon River between the towns of North Fork, Idaho and Ellis, Idaho, during the summer of 2011. Additionally, 11.4 km of the Salmon River was open to "jack" Chinook salmon fishing between the town of Stanley, Idaho, and the Sawtooth Fish Hatchery weir. The Salmon area fishery upstream of the town of Salmon opened on June 25, 2011 and closed August 10, 2011. The Salmon area fishery downstream of the town of Salmon opened on July 2, 2011 and closed August 10, 2011. The Stanley area fishery opened on July 9, 2011 and closed on July 17, 2011. Creel survey personnel interviewed 1,705 anglers during these three fisheries. Anglers harvested 844 adult Chinook salmon and 337 "jack" Chinook salmon in the Salmon area fishery and were 356 fish short of the 1,200 fish harvest share for IDFG. Creel personnel did not detect any harvest of "jack" Chinook salmon in the Stanley area fishery. Anglers released 321 non-adipose-fin-clipped Chinook salmon in the Salmon area fishery. Angler pressure consisted of 29,971 estimated hours of effort in the combined fisheries. The greatest amount of angler effort for the Salmon area fishery occurred during the week of July 25. Pahsimeroi Fish Hatchery and Sawtooth Fish Hatchery reported returns of 3,427 and 3,790 Chinook salmon, respectively, during 2011. The majority of Sawtooth Fish Hatchery returns (3,489 fish) were "jack" Chinook salmon. The fishery exploitation rate of Pahsimeroi Fish Hatchery Chinook salmon was approximately 25%. Apparently, high river flows influenced run timing and angler effort in the Salmon and Stanley areas fisheries. Approximately 19% of fish harvested in river Sections 16 and 17 during the Salmon area fishery were sampled for tags and marks. Creel personnel recovered 19 coded-wire tags from sampled fish. Trout anglers harvested and released approximately 79 and 169 hatchery rainbow trout, respectively, during the Chinook salmon fishery in the portion of river section 19 that was open to Chinook salmon fishing by Stanley.

INTRODUCTION

Authorization for an upper Salmon River Chinook salmon fishery occurred during spring of 2011 when the Commission authorized a season based on run strength predictions to the State of Idaho. The Commission approved regulations that allowed sport harvest to begin on June 25, 2011 on the portion of the Salmon River between the towns of Salmon and Ellis (River section 17), on July 2 between the towns of Salmon and North Fork (River section 16), on July 9 between town of Stanley and the Sawtooth Fish Hatchery weir (River section 19), and continue until harvestable shares of fish were reached by anglers (Figure 33). In the Salmon and Ellis areas, anglers were authorized to keep six Chinook salmon per day of which no more than two could be adults, and a possession limit of 18 Chinook salmon of which no more than six could be adults. In the Stanley area, anglers could only keep two "jack" Chinook salmon per day with a possession limit of six "jack" Chinook salmon because of low adult run numbers. Anglers were allowed to fish for Chinook salmon from 0500 hours to 2200 hours Mountain Standard Daylight time.

The pre-season Chinook salmon forecast for Pahsimeroi Fish Hatchery and Sawtooth Fish Hatchery was estimated to be a return of 3,675 and 502 adult fish, respectively (S. Sharr, IDFG, unpublished data). Final total hatchery rack returns (after harvest) for Pahsimeroi Fish Hatchery and Sawtooth Fish Hatchery were 3,427 and 3,790 Chinook salmon, respectively (Cassinelli et al. 2012). Of the fish returning to Sawtooth Fish Hatchery, 3,489 were "jack" Chinook salmon (Cassinelli et al. 2012). The final adjusted IDFG component of the harvest share for Pahsimeroi Fish Hatchery Chinook salmon returns was 1,200 fish.

Snow pack levels in the Salmon Region were approximately 160% above normal before the fishery occurred. Consequently, mainstem Salmon River daily flows by the town of Salmon occasionally exceeded 100-year flow level records during the early part of July. River flows did not begin to recede until mid-July (Figure 34). Apparently, unusually high river flows delayed the run timing of adult and "jack" hatchery and wild Chinook salmon to both the Salmon area and Stanley area fisheries. Concerns that a major landslide that occurred in spring of 2011 on the main stem Salmon River by Black Creek (below Corn Creek) contributed to late Chinook salmon run timing were never confirmed.

OBJECTIVES

Assist with the development and implementation of a Chinook salmon fishery for the upper Salmon River.

Create a monitoring plan for collecting catch and effort data from anglers.

Develop estimates of Chinook salmon harvested and released by anglers during the fishery.

Provide data and information to IDFG Boise Headquarters and the angling public as requested.

Provide enforcement personnel with information regarding possible violations.

Assist graduate students conducting fisheries field projects.

Report any observations by field personnel of aquatic invasive species.

STUDY AREA AND METHODS

Salmon River Sections

Section 16

The lower boundary of Salmon River section 16 was located approximately 2.1 km upstream of the confluence with the North Fork Salmon River and Salmon River by a crossing called Jenkins Bridge during the 2011 Chinook salmon fishery (Figure 33). The upper boundary of river section 16 was located approximately 137 m below Island Park in the town of Salmon at the USGS flow gage and cable car crossing. In section 16, approximately 34 km of mainstem Salmon River was open to Chinook salmon fishing.

A roving creel was conducted by two technicians between the hours of 0600 to 2200. Each day was split into two eight hour shifts with one technician working each shift. Each work week consisted of both weekend days and three randomly selected week days. Each technician was responsible for collecting angler effort and catch data, and conducting three randomly selected angler counts each work shift. Expanded angler effort and catch estimates were developed using the South Dakota Creel Entry Analysis Software (CAS). The same basic creel methodology was used for all river sections during the fishery.

Each Chinook salmon encountered by creel technicians was sexed, measured, and checked for coded-wire tags and marks. If anglers approved, snouts were collected from harvested fish with positive scans for coded wire tags. All sampled snouts were sent to IDFG's Nampa Research office for tag extraction and genetic sampling after the fishery closed.

Section 17

The lower fishery boundary for section 17 was a shared boundary with upper section 16 (at the USGS flow gage and cable car crossing). The upper fishery boundary extended to approximately 18 m above the confluence of the Pahsimeroi River and Salmon River by Ellis (Figure 33). Approximately 74.8 km of river was open to fishing in section 17.

Section 17 was stratified into two areas for the purpose of creel and developing catch estimates because of localized differences in angling effort. The majority of angling effort occurred between McKim Creek and the upper boundary of section 17. Therefore, data for the two sub-sections was analyzed separately and results were combined to create overall values for section 17. The decision to stratify section 17 for creel purposes was based on input IDFG received from University of Idaho personnel during discussions in spring of 2011 regarding ways to improve the accuracy and precision of creel estimates for anadromous fisheries.

A portion of hatchery Chinook salmon that returned to the Pahsimeroi Fish Hatchery fish trap that were deemed in excess of brood stock needs were "recycled" to the fishery. Fish were double tagged with Floy T-bar anchor tags, opercle punched, and released back into the fishery in the mainstem Salmon River at Colston Corner, approximately 10 km

downstream of the mouth of the Pahsimeroi River. Technicians recorded numbers from Floy tags they encountered on recycled fish during the creel. Additionally, they instructed anglers to provide tag and harvest information to the IDFG tag reporting portal on the IDFG website. A sample rate was calculated to develop a harvest estimate of recycled fish. The sample rate consisted of a summation of the number of Chinook salmon checked for marks during all work periods (when recycled fish were released) divided by the summation of estimated harvest during all work periods (when recycled fish were released). The numbers of summed Floy tags recovered during creel (only one per fish) were divided by the sample rate to produce an estimated harvest of Floy-tagged fish.

Josh McCormick, a graduate student from the University of Idaho, spent one weekend during the week of July 23 collecting angler catch-and-release data by the Ellis Hole for the purpose of comparing angler reported creel data to actual observations of catch data in the field.

Section 19

The lower boundary of section 19 began approximately 18 m upstream of the confluence of Valley Creek and the Salmon River by Stanley (Figure 33). The upper boundary of section 19 was approximately 91 m downstream of the Sawtooth Fish Hatchery weir. Fishing for “jack” Chinook salmon fishing was open on approximately 11.4 km of the mainstem Salmon River. IDFG personnel collected creel data for Chinook salmon and resident fish during the Chinook salmon fishery. A summary of resident trout catch and harvest information collected during the Chinook salmon fishery is presented in Table 49.

All field personnel were required to review instructional videos regarding safety issues they could possibly encounter in the field. Additionally, crews received reporting procedures and reviewed an instructional video regarding the identification of aquatic invasive species.

RESULTS AND DISCUSSION

Salmon River Sections

Section 16

Anglers did not contribute much effort until the week of July 11 (Figure 35). Raw data from the Chinook salmon fishery shows creel personnel conducted 210 angler interviews in section 16 (Table 47). Angler participation was low in section 16 compared to section 17. The majority of fish kept were caught by boat anglers. Bank and boat anglers harvested an estimated total of 43 Chinook salmon (Table 48). Catch per unit effort for hatchery fish caught (expressed as a proportion of hatchery fish caught and total hours fished) was 0.012. Approximately 33% of the fish caught were non-adipose fin clipped fish. However, the numbers of non-adipose fin clipped fish caught did not contribute significantly toward listed fish take values because of low angler participation. The fishery in river section 16 closed on August 10, which was the latest authorized date allowed by the federal permit.

The delayed fishery season opening date of July 2 for section 16 was set for 2011 because unpublished radio telemetry data of wild Lemhi River Chinook salmon collected

during 2009 and 2010 indicated that the majority of fish returning during those years entered the Lemhi River system by the end of June. However, radio telemetry data collected during 2011 of Lemhi River wild Chinook salmon showed the fish did not enter the fishery area until the month of July, possibly because of unusually high river flows (Mike Biggs, IDFG, personal communication). As a result, it was difficult to assess if the delayed season opening date for section 16 was an effective management tool to allow unimpeded escapement of wild Chinook salmon into the Lemhi River system.

Section 17

Consistent with the last several fisheries, the majority of anglers who participated in the fishery in the Salmon area congregated in upper section 17 by the Deer Gulch campground. Catch per unit effort for hatchery fish caught was 0.046 (Table 47). Of the 1,181 Chinook salmon estimated to have been harvested in the Salmon area fishery, 1,138 of the fish were harvested in section 17 (Table 48). The number of Chinook salmon harvested in the Salmon area fishery was 356 fish below the 1,200 fish harvest share for IDFG. The sample rate for fished checked for marks was 19.8%. The estimated fishery exploitation rate of Pahsimeroi Fish Hatchery Chinook salmon, based on combined harvest in sections 16 and 17, was approximately 25%. Creel personnel reported that it was difficult to obtain completed trip information from a number of boats that launched at Deer Gulch because they took-out at a private boat ramp upstream of Cronks Canyon. Several outfitters who floated the main Salmon River between Colston Corner and McKim Creek were quite successful. There were few reported complaints regarding jet boat use in the Ellis Hole area and anglers seemed to work through issues by themselves. Conservation Officers from Region 7 enforced the campground stay limit at Deer Gulch during the fishery because of complaints received from some campers during 2010 that sites were limited because of the stay length of unattended camper trailers.

Consistent with recent years, at least 500 Chinook salmon entered the fish trap at Pahsimeroi Fish Hatchery before appreciable amounts of angler effort occurred during 2011. Once again, high river flows during the early portion of recent fisheries apparently discouraged angler participation until flow levels subside to approximately 5,000 cubic feet per second (CFS) at the Salmon, Idaho gage (Figure 34). Additionally, it is important to update hatchery fish trap information to the IDFG website at short, regular intervals early in the fish run as anglers use the information to plan trips to the fishery.

Creel personnel recovered Floy tags from seven recycled Chinook salmon hatchery fish during the fishery. The majority of tags were recovered upstream of their Colston Corner release site. We estimated that approximately 42 of the recycled fish were harvested in the fishery.

Creel staff collected 19 Chinook salmon snouts that tested positive for coded wire tags during the fishery. Results returned from the IDFG coded wire tag laboratory at Nampa Research showed that 11 of 19 fish (unexpanded numbers) were originally released from the Pahsimeroi Fish Hatchery. The remaining eight fish were released from Sawtooth Fish Hatchery. For fishery purposes, two of the nine coded wire tagged recovered fish released from Sawtooth Fish Hatchery were 66 cm or greater in fork length and were classified as adults.

Section 19

Creel staff interviewed 101 anglers during the Stanley "jack" Chinook salmon fishery (Table 47). Anglers reported fishing 128 hours and were unsuccessful in catching or releasing Chinook salmon "jacks." Approximately 3,489 "jack" Chinook salmon returned to the Sawtooth Fish Hatchery after the season closed July 17 (Cassinelli et al. 2012). Regional fishery personnel developed the proposed section 19 fishery season's opening and closure dates based on nine years (2001-2010) of peak return data of "jack" Chinook salmon to Sawtooth Fish Hatchery. Apparently, unusually high river flows during June and July, 2011 delayed returns of "jack" Chinook salmon to the hatchery. Consequently, the substantial run of "jack" Chinook salmon that returned in 2011 to Sawtooth Fish Hatchery fell outside the season dates set by the Commission during their April meeting.

During the fishery, many anglers specifically targeted resident trout and harvested and released an estimated 79 and 169 hatchery rainbow trout, respectively, in the portion of the Salmon River open to Chinook salmon fishing. Additionally, trout anglers released an estimated 11 wild rainbow trout, 3 cutthroat trout, 4 bull trout greater than 30 cm TL, and 4 bull trout less than 30 cm TL. The majority of trout were caught below the Sawtooth Fish Hatchery in the vicinity of Buckhorn Bridge, approximately 1.2 km downstream of Sawtooth Fish Hatchery, on Highway 75.

MANAGEMENT RECOMMENDATIONS

Implement creel methodology recommended by the University of Idaho.

Encourage early and frequent reporting of hatchery trap data to the IDFG website.

Support further improvements with regards to run size estimation techniques, in-season run size monitoring, and communication regarding in-season harvest share adjustments.

Review in-season fish movement when hatchery trapping facilities are closed.

Table 47. Summary of raw angler creel data from the upper Salmon River Chinook salmon fisheries, 2011.

River Section	Access Type	Number Anglers	Hours Fished	Hrs/ Angler	Chinook Kept	Chinook Released		Total Catch	Checked for CWT[a]	CWT Sample Rate	Total Hatchery Caught	Hatchery CPUE[b]
						Hatch	Wild					
	Bank	131	375	2.9	2	0	2	4	2	--	2	0.005
16	Boat	79	378	4.8	7	0	2	9	6	--	7	0.019
	Total	210	753	3.6	9	0	4	13	8	0.186	9	0.012
	Bank	1,083	4,576	4.2	172	31	39	242	145	--	203	0.044
17	Boat	311	1,952	6.3	94	3	27	124	80	--	97	0.050
	Total	1,394	6,528	4.7	266	34	66	366	225	0.198	300	0.046
	Bank	101	128	1.3	0	0	0	0	0	--	0	0.000
19	Boat	0	0	-	0	0	0	0	0	--	0	0.000
	Total	101	128	1.3	0	0	0	0	0	0	0	0.000
Total		1,705	7,409	4.3	275	34	70	379	233	0.197	309	0.058

[a] CWT = Coded wire tags.
[b] CPUE = Catch per unit of effort

Table 48. Summary of estimated fish harvested, fish released, success rates, and angler effort by access type for three upper Salmon River Chinook salmon fisheries, 2011.

River Section	Estimated No. Chinook Kept			Total Released	Total Caught	Estimated No. Chinook Released				Estimated Angler Hours			Hours/Fish	
	Adults	Jacks	Total			Ad-clipped Adults	Ad-clipped Jacks	Non Ad-clipped Adults	Non Ad-clipped Jacks	Boat	Bank	Total	Caught	Kept
16	18	25	43	21	64	0	0	17	4	1659	1,275	2,934	46	68
17	826	312	1,138[a]	412	1,550	79	33	206	94	11,309	15,728	27,037	17	24
19	0	0	0	0	0	0	0	0	0	0	260	260	--	--
Total	844	337	1,181	433	1,614	79	33	223	98	12,968	17,003	29,971	19	25

[a] Includes seven recycled fish.

Table 49. Summary of resident trout estimated harvest information during the Chinook salmon fishery in Salmon River section 19 near Stanley, July 9 to July 17, 2011.

River Section	No. Anglers Interviewed	Effort (Hours)	Fish Species	Harvest Estimate	80% CI	Number Released	80% CI
19	101	283	Hatchery rainbow trout	79	19	169	44
			Wild rainbow trout	0	--	11	16
			Westslope cutthroat trout	0	--	3	3
			Bull trout less than 30cm	0	--	4	2
			Bull trout greater than 30cm	0	--	4	4
			Northern Pikeminnow	2	3	0	--

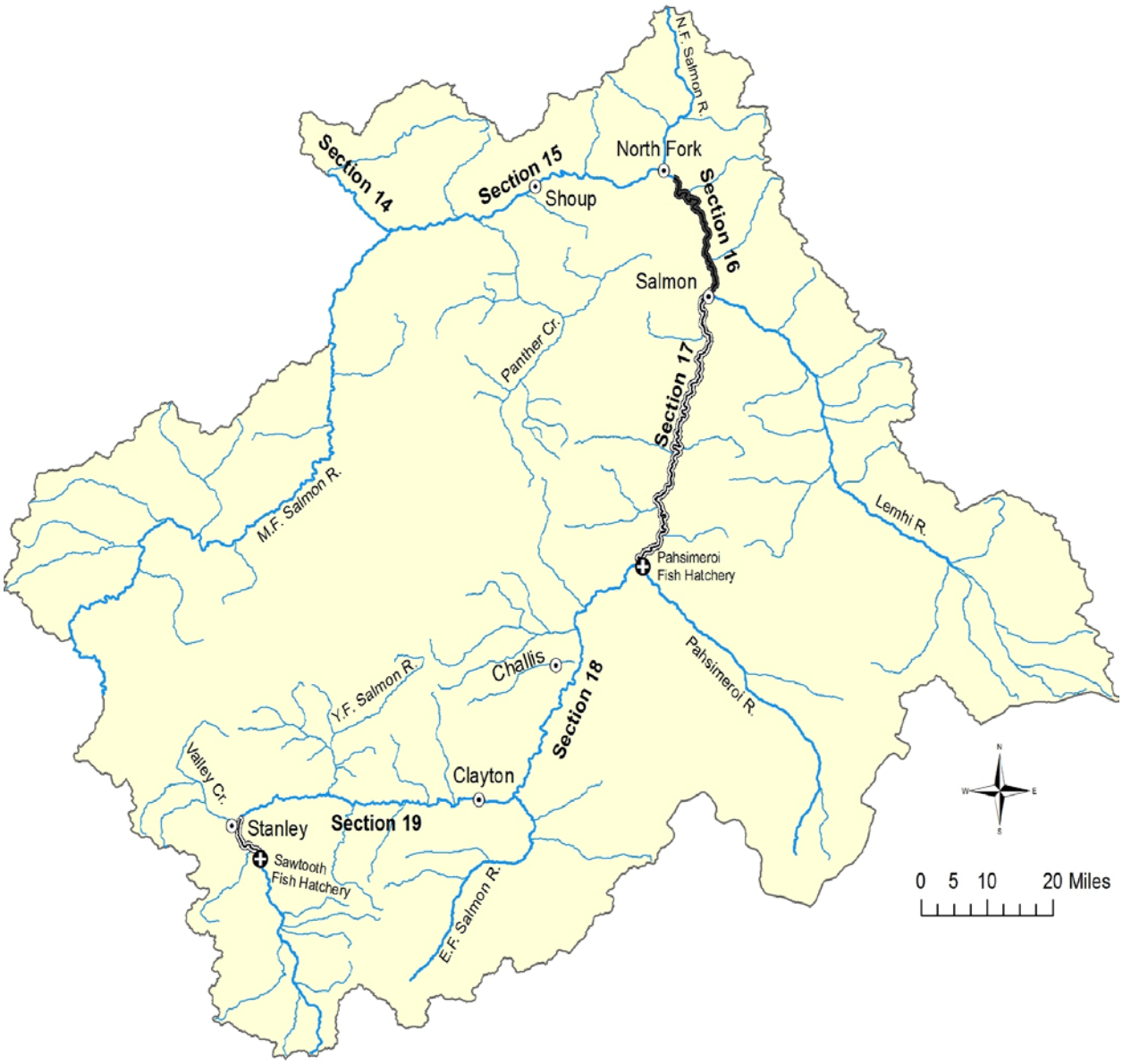

Figure 33. Map of the three upper Salmon River Chinook salmon fisheries in river sections 16, 17, and 19, 2011.

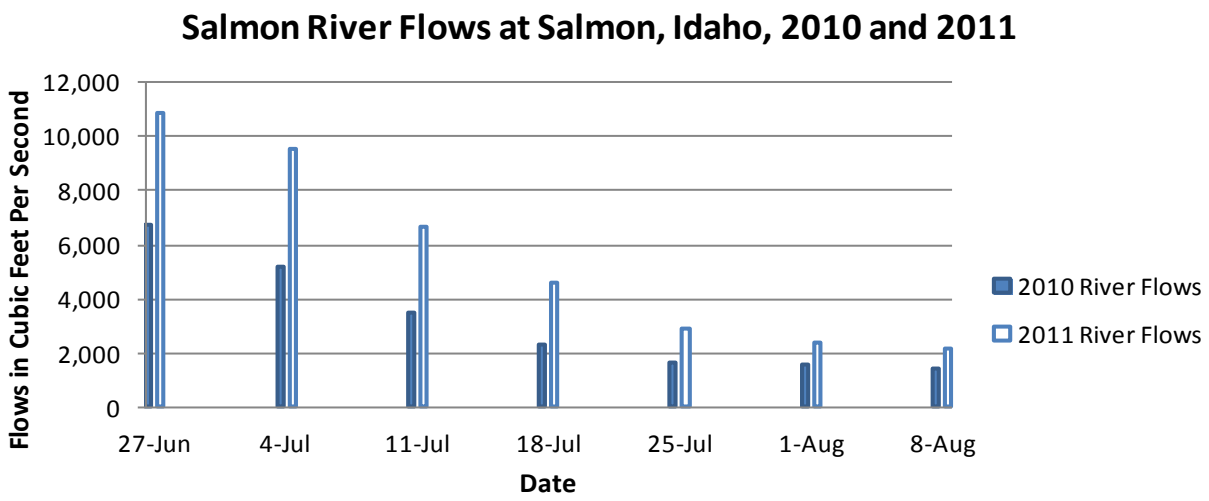

Figure 34. Salmon River flows at Salmon, Idaho, 2010 and 2011.

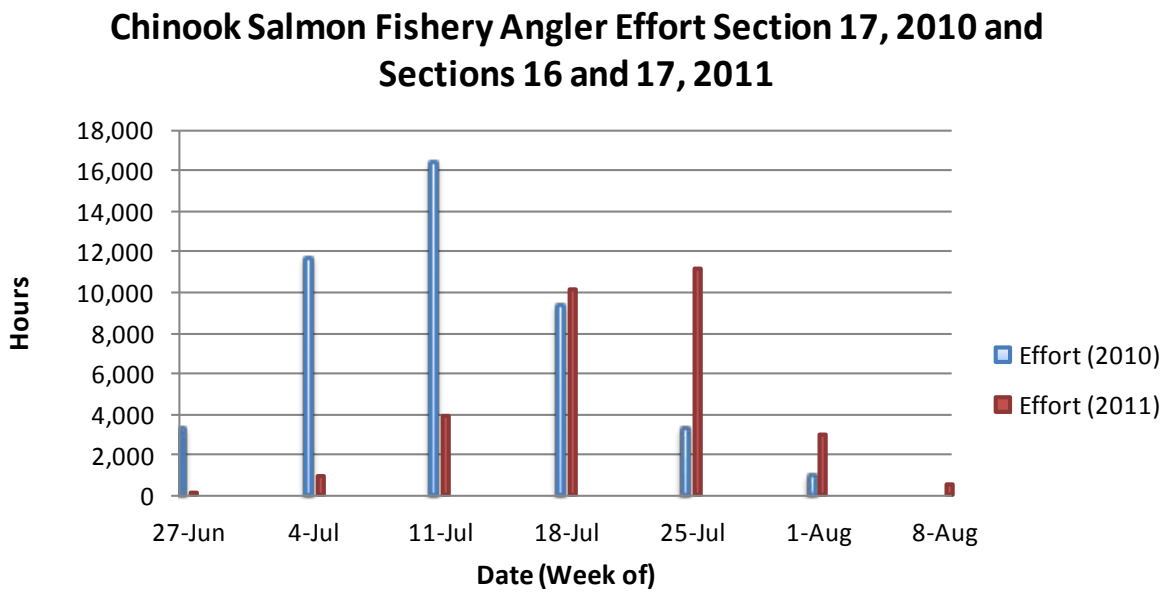

Figure 35. Angler effort (hours) for river sections 16 and 17 Chinook salmon fishery in 2011 compared to effort in section 17 in 2011.

SALMON REGION FISHERY MANAGEMENT 2011 ANNUAL REPORT

Upper Salmon River Steelhead Fishery, Fall 2010 and Spring 2011

ABSTRACT

The harvest portion of the Salmon River fall steelhead fishery opened September 1, 2010. The fishery remained open on the Salmon River until March 31, 2011 (from the Lake Creek Bridge in Section 13 to the confluence with Long Tom Creek in Section 15) and until May 15, 2011 upriver from Long Tom Creek. Angler pressure was minimal in sections 14 and 15 until the first part of October, 2010. As a result, angler interviews were not conducted until the first weekend in October. Survey and interview methods were similar in all river sections during the fall and spring steelhead seasons. Interviews were conducted to collect angler effort and catch information for the IDFG website and to recover steelhead snouts with positive detections for coded wire tags. Fish with non-clipped adipose fins dominated the section 14 fishery in both the fall and spring fishery based on angler observations and reported interview data. Unlike other sections, anglers released a greater number of steelhead compared to the number harvested in section 14 during the 2010 run year. Non-clipped adipose fin steelhead consisted of approximately 63% of the steelhead caught by anglers in section 14.

Section 15 experienced the greatest amount of angler use and pressure of all upper Salmon River sections where interview activities for steelhead were conducted during fall. Clerks interviewed 3,796 anglers who fished 14,630 hours in section 15 during the fall season. Anglers caught a total of 1,423 steelhead. Of the 1,423 fish caught, 792 were harvested and 192 fish with clipped adipose fins and 439 fish with non-clipped adipose fins were released. The catch rate was 10 hours per fish caught and 18 hours for each steelhead harvested. Section 15 had the second highest effort of river sections 14 through 19 during spring 2011. Clerks interviewed 1,907 anglers, who fished for 8,330 hours. Anglers caught a total of 1,355 steelhead. Of the 1,355 steelhead caught, 561 were kept and 457 fish with clipped adipose fins and 337 fish with non-clipped adipose fins were released. The number of hours fished per steelhead caught was six and the number of hours fished per steelhead harvested was 15.

Section 17 had the highest angling effort of any section in spring. The amount of angler pressure in section 17 during the spring season increased 100-fold compared to the fall season. In the spring, clerks interviewed 2,356 anglers who fished 9,985 hours of effort and caught 943 steelhead. Of the 943 steelhead caught, 510 were kept and 289 fish with clipped adipose fins and 144 fish with non-clipped adipose fins were released. The spring catch rate was 11 hours per fish caught and 20 hours per steelhead kept.

In section 18, the lack of public road access to the river hindered the ability of clerks to interview anglers fishing far from the road. The survey process in section 18 was further complicated because most anglers used drift boats. To compensate for this, survey time was concentrated at boat ramps. In section 19, the large difference between the average hours per steelhead caught versus hours per steelhead kept (19 hours per fish versus 4 hours per fish, respectively) was due to anglers releasing large numbers of steelhead in late April. By that time, many fish were in poor body condition. Additionally, anglers who targeted non-adipose fin clipped hatchery steelhead by the mouth of the Yankee Fork released much of their catch.

INTRODUCTION

The harvest portion of the Salmon River fall steelhead fishery opened on September 1, 2010. The fishery remained open on the Salmon River until March 31, 2011 (from the Lake Creek Bridge in section 13 to the confluence with Long Tom Creek in section 15) and until May 15, 2011 upriver from Long Tom Creek. Angler pressure was minimal in sections 14 and 15 until the first part of October, 2010. As a result, angler interviews were not conducted until the first weekend in October. After April 30, 2011 angler interviews were not conducted during the spring season because of low angler participation in the fishery and funding limitations. Angler participation was minimal or non-existent in river sections 14 through 17 for the catch-and-release portion of the steelhead fishery that began on August 1, 2010.

Survey and interview methods were similar in all river sections during the fall and spring steelhead seasons. Interviews were conducted to collect angler effort and fish caught information for the IDFG website and to recover steelhead snouts with positive detections for coded wire tags.

STUDY AREA AND METHODS

Salmon River Sections

Section 14

Salmon River section 14 begins at the mouth of the South Fork Salmon River and continues upstream to the mouth of the Middle Fork Salmon River (MFSR) (Figure 36). Road access is available only in the top 13 km from the mouth of the MFSR downstream to Corn Creek. Beyond Corn Creek, the majority of anglers use jet boats to access the road-less portion of this section. Vehicle travel time to the Corn Creek boat ramp from the town of Salmon is estimated at approximately 2 hours, depending on road conditions.

The popularity of jet boats within section 14 required a modification of survey methods used in other upper Salmon River sections. As in all upper Salmon River sections, the clerk drove up and down the road paralleling the river and conducted roving interviews of bank anglers and boats at take-outs. Additionally, in an effort to collect data from anglers fishing downriver of Corn Creek, a camper trailer was towed to the Corn Creek campground during the fall season to allow a clerk to stay on-site. This enabled the clerk to gather data from jet boat anglers that might have otherwise been missed during the roving survey because of work hour limitations. As with sections 15 through 19, angler counts were not conducted during the survey process. Consequently, expanded estimates of total effort and catch were not calculated for river sections 14 through 19.

One clerk stayed at Corn Creek from Thursday through Monday during October and November, 2010. The majority of jet boats returned to the ramp within the last two daylight hours. Additionally, the clerk conducted interviews of bank anglers in section 14 and the lower end of section 15 as far upriver as Colson Creek prior to evening hours.

During the 2011 spring fishery, survey efforts did not begin in section 14 until March due to dangerous road conditions. Because of poor road conditions, the camp trailer was not deployed during spring of 2012 and the survey consisted solely of the interviews as

described above within normal work hours. During April, section 14 and the lower end of section 15 (below Long Tom Creek) were closed to steelhead fishing to protect wild steelhead that returned to the MFSR.

A typical work shift was eight hours generally 0930 to 1800 during the months of October and November, but boat anglers who arrived at the ramp after 1800 were still interviewed (during fall). The work shift was 1100 to 1930 during the months of February and March. During each interview, the technician collected angler effort and catch trip data (not daily data). With the anglers' permission, all kept steelhead were checked for marks as well as scanned for the presence of coded wire tags (CWT). If CWT were found, the snouts were collected and sent to IDFG's Nampa Research office for tag extraction. The interview methodology, as described previously, was followed by all clerks, regardless of what river section they were working in.

Section 15

The lower boundary for river section 15 was at the confluence of the MFSR and mainstem Salmon River. The section's upper boundary was at the mainstem Salmon River confluence with North Fork Salmon River. Bank fishing access along section 15 follows the Salmon River Road downstream the entire length of the section. In addition to great shore accessibility, numerous boat ramps are located within the section, giving anglers various access points.

In section 15 during fall 2010, interviews were conducted from October through the end of November. In spring 2011, surveys were conducted from February through the beginning of April. During fall, one clerk performed a roving survey in the area between Deadwater Creek and Colson Creek. In spring, one clerk performed a roving survey in the area between Spring Creek and Colson Creek. The clerk followed the same interview process described in section 14 above. Areas of section 15 that were not surveyed by the lone clerk assigned to section 15 were surveyed by employees assigned to adjacent river sections.

The work week was Thursday through Monday. The work shifts were 0930 to 1800 and 0900 to 1730 during the months of October and November, respectively. The work shifts were 0930 to 1800, 1030 to 1900, and 1100 to 1930 during the months of February, March, and April, respectively. With the exception of personnel working in section 14, this same work schedule was followed by all clerks in each river section.

Section 16

River section 16 stretches from the confluence of the Salmon River and North Fork Salmon River to the confluence of the Salmon River and Lemhi River near the town of Salmon. It is a relatively short river section (approximately 34 km), but one of the most popular, especially with drift boat anglers during the fall and spring seasons. There are eight major boat launches within section 16 and numerous bank access points. The clerk responsible for conducting the angler survey in section 16 also conducted the survey in the upper end of section 15 and lower end of section 17 as described under the respective sub-headings.

Section 17

River section 17 extends from the mouth of the Lemhi River upstream to the mouth of the Pahsimeroi River. Its length is approximately 75 km, making it one of the longest upper Salmon River sections. Angling pressure in this section differs greatly between the fall and spring. Survey methods were altered between seasons in response to changes in angling pressure. One clerk conducted angler surveys in sections 16 and 17 during fall, 2010. This was possible because of minimal angler effort in section 17 during the fall. During spring, however, angler pressure increased noticeably and one clerk surveyed only section 17 during March and April. Additionally, at the peak of the spring fishery, the clerk from section 16 assisted with survey efforts in section 17 in an attempt to interview most anglers.

Section 18

River section 18 extends from the mouth of the Pahsimeroi River at Ellis upstream to the mouth of the East Fork Salmon River. Highway 93 does not follow the river as closely in this section as in others, limiting bank accessibility. As a result, more emphasis was placed on collecting boat angler data. Angler surveys were not conducted in section 18 during the fall season because of low angler effort and budget constraints. During spring 2011, one clerk conducted interviews from March through April in section 18 and the lower portion of section 19.

Section 19

Section 19 extends from the mouth of the East Fork Salmon River upstream to 91 meters below the weir at Sawtooth Fish Hatchery. The Yankee Fork Salmon River is a major tributary in this section. Angler interviews were not conducted in section 19 during the fall season because of limited angler effort and budget constraints. Angler interviews for the spring season were conducted from mid-March through April, 2011. One clerk conducted angler interviews solely in section 19 during the month of April. Additionally, at the peak of the spring fishery, the clerk from section 18 assisted with survey efforts in section 19 in an attempt to interview most anglers.

RESULTS AND DISCUSSION

Salmon River Sections

Section 14

During fall 2010, clerks interviewed 1,094 anglers who fished for a combined 6,264 hours of effort in section 14 (Table 50). Anglers reported a total catch of 823 steelhead. Of the 823 fish caught, 270 were harvested while 36 fish with clipped adipose fins and 517 fish with non-clipped adipose fins were released. The overall catch rate was eight hours per fish caught and 23 hours for each steelhead harvested.

Section 14 did not see the same amount of angling pressure during the spring of 2011 and had a corresponding drop in steelhead harvest. Clerks interviewed 224 anglers who fished for 1,069 hours of effort to catch 116 steelhead (Table 51). Of the 116 fish caught, 27 were harvested while 14 fish with clipped adipose fins and 75 fish with non-

clipped adipose fins were released. The number of hours fished per steelhead caught was 9 and the number of hours fished per steelhead harvested was 40.

The harvest estimate in section 14 for the 2010 run year (includes fall 2010 and spring 2011) was 3,210 steelhead (Table 52). The number of steelhead checked for CWTs was 259; 28 steelhead carried CWTs of which 27 were collected in fall 2010 (Table 53).

Similar to past years, the highest proportion of creel data in section 14 came from jet boat anglers traveling downriver from Corn Creek. Most of this jet boat data, as well as bank angler data, for section 14 originated in the fall. Weather during early spring 2011 made road conditions too dangerous to creel from the Salmon River below the MFSR. Very few anglers attempted to fish below the mouth of the MFSR until road conditions improved during March. Even then, fewer than expected anglers were interviewed by clerks, possibly due to poor hatchery catch rates in the section.

Fish with non-clipped adipose fins dominated the section 14 fishery in both the fall and spring fishery based on angler observations and reported interview data. Unlike other sections, anglers released a greater number of steelhead compared to the number harvested in section 14 during the 2010 run year. Non-clipped adipose fin steelhead consisted of approximately 63% of the steelhead caught by anglers in section 14. Likely, the MFRS wild-natural steelhead run played a part in catch composition differences between section 14 and the upriver sections. However, additional information is necessary to quantify how large an impact the MFSR run has on the fishery.

Section 15

Section 15 experienced the greatest amount of angler use and pressure of all upper Salmon River sections where interview activities for steelhead were conducted during fall. Clerks interviewed 3,796 anglers who fished 14,630 hours of effort in Section 15 during the fall season. Anglers caught a total of 1,423 steelhead. Of the 1,423 fish caught, 792 were harvested and 192 fish with clipped adipose fins and 439 fish with non-clipped adipose fins were released. The catch rate was 10 hours per fish caught and 18 hours per fish kept.

In the spring, angling pressure was lower when compared to the fall. However, section 15 had the second highest effort of river sections 14 through 19. Clerks interviewed 1,907 anglers, who fished for 8,330 hours of effort. Anglers caught a total of 1,355 steelhead. Of the 1,355 steelhead caught, 561 were kept and 457 fish with clipped adipose fins and 337 fish with non-clipped adipose fins were released. The number of hours fished per steelhead caught was six and the number of hours fished per steelhead harvested was 15.

The harvest estimate for section 15 for the 2010-2011 run year was 9,113 steelhead. The total number of steelhead snouts checked for CWT was 1,221 with 147 containing CWT. Clerks collected 81 CWT during the fall and 66 were collected during the spring.

Interview data suggested that fishing was average in section 15 compared to other river sections. The hours per steelhead caught did not differ substantially from previous years. Similar to past years, anglers continued to utilize the section very differently between the fall and the spring fisheries.

During the fall, the majority of bank anglers fished from Cove Creek to the Johnson Hole. Other anglers seemed to stay between North Fork and Pine Creek. The most popular boating stretches were Indianola to Spring Creek and Cove Creek to Poverty Flats. It was not unusual during the peak weekends to count about 15 drift boats in either stretch of river. During the spring, a dramatic spatial shift occurred with the anglers. Most bank anglers concentrated their effort to the "Narrows" between Pine and Panther creeks, while boat anglers shifted their pressure to upstream river sections.

Section 16

Section 16 had the most consistent catch rates during the 2010-2011 steelhead run. According to interview data for the fall, 1,116 anglers fished for a total of 4,703 hours of effort. Anglers caught a total of 607 steelhead. Of the 607 steelhead caught, 279 were kept while 118 fish with clipped adipose fins and 210 fish with non-clipped adipose fins were released. The number of hours per steelhead caught was eight and the number of hours per steelhead kept was 17. Interview data from spring 2011 did not vary much compared to the fall. A total of 954 anglers were interviewed in the spring who fished for a total of 4,081 hours. The total angler reported catch was 343 steelhead. Of the 343 steelhead caught, 153 were kept and 72 fish with clipped adipose fins and 118 fish with non-clipped adipose fins were released. The number of hours fished per steelhead caught was 12 and the number of hours per steelhead kept was 27.

An estimated 3,359 steelhead were harvested during the 2010 run year in section 16 based on the statewide harvest survey. The number of steelhead snouts checked for CWT was 408, of which 49 contained CWT. Thirty CWT were collected during the fall while 19 were collected during spring.

Clerks observed no large differences between seasons throughout both the fall and spring fisheries in section 16. Anglers utilized the fishery in similar ways during the fall and spring. The majority of angling pressure in this section came from boats. The two most popular stretches for drift boats were from Island Park to the Carmen Creek boat ramp and from the Tower Creek boat ramp to either Red Rock or Fourth of July Creek boat ramps.

The most interesting aspect of section 16 in recent years has been the increased fly fishing effort. During October, section 16 was dominated by fly fishermen and the use of this gear appears to be increasing. The Salmon River in this section is wider and contains numerous runs and riffles that are relatively shallow. Fly fishermen have the ability to wade and access more fishing holes than they can in other sections.

Section 17

Clerks interviewed 206 anglers in section 17 during the fall of 2010. Anglers reported fishing 550 hours of effort. Interview data shows anglers caught 69 steelhead in the fall. Of the 69 steelhead caught, 32 were kept and 17 fish with clipped adipose fins and 20 fish with non-clipped adipose fins were released. The fall catch rate was eight hours per fish caught and 17 hours for each steelhead harvested.

The amount of angler pressure in section 17 during the spring season increased 100-fold compared to the fall season. In the spring, clerks interviewed 2,356 anglers who fished 9,985 hours of effort and caught 943 steelhead. Of the 943 steelhead caught, 510 were kept and 289 fish with clipped adipose fins and 144 fish with non-clipped adipose fins

were released. The spring catch rate was 11 hours per fish caught and 20 hours per steelhead kept.

The harvest estimate in section 17 for the 2010 run year was 3,639 steelhead. The number of steelhead snouts checked for CWT was 508, of which, 48 had CWT. The number of CWT collected in the fall and spring was 4 and 44, respectively.

Low angler pressure in section 17 during the fall resulted in limited interview information. In October, the clerk checked 10 steelhead and in November very few anglers fished upstream of Section 16. Due to the low angling pressure in the fall, clerks usually did not conduct surveys upriver of the Eleven Mile boat ramp.

In contrast to the fall, section 17 had the highest angling effort of any section in spring. Most anglers targeted the Ellis Hole immediately downstream of the Pahsimeroi River. In early March, a large portion of angling pressure was upstream of the town of Salmon between Island Park and Shoup Bridge. However, later in the month, angler pressure shifted upriver.

Section 18

Clerks interviewed 939 anglers in section 18 during the spring of 2011. Anglers fished 4,382 hours of effort in section 18. Anglers caught a total of 413 steelhead. Of the 413 steelhead caught, 146 were kept and 155 fish with clipped adipose fins and 112 fish with non-clipped adipose fins were released. The spring catch rate was 11 hours per fish caught and 30 hours per steelhead kept.

The harvest estimate was 1,246 for section 18 for the 2010 run year. The number of steelhead snouts checked for CWT was 140, of which 24 were found to contain CWT. Tags were only collected during the spring fishery.

The lack of public road access to the river hindered the ability of clerks to interview anglers fishing far from the road in section 18. The survey process was further complicated in section 18 because most anglers used drift boats. To compensate for this, survey time was concentrated at boat ramps. McNabb's Point and Pennal Gulch were the most popular boat ramps used in the spring. Bank anglers were mostly limited to fishing at Bayhorse Bridge, the Flume Hole, and Deadman's Hole.

Section 19

Clerks interviewed 1,539 anglers in section 19 during spring 2011. Anglers fished a total of 6,636 hours of effort and caught 1,710 steelhead. Of the 1,710 fish caught, 358 steelhead were kept and 412 fish with clipped adipose fins and 940 fish with non-clipped adipose fins were released. The spring catch rate was 4 hours per fish caught and 19 hours per steelhead kept.

The harvest estimate was 2,935 fish for section 19 for the 2010 run year. The number of steelhead snouts checked for CWT was 335, of which, 40 had CWT and 38 were collected.

Catch rates in section 19 did not exceed six hours per fish caught. The large difference between the average hours per steelhead caught versus hours per steelhead

kept was due to anglers releasing large numbers of steelhead in late April. By that time, many fish were in poor body condition. Additionally, anglers who targeted non-adipose fin clipped hatchery steelhead by the mouth of the Yankee Fork released much of their catch.

MANAGEMENT RECOMMENDATIONS

Strengthen working relationships with guides and outfitters to improve data collection from section 14.

Maintain similar sample rates in all river sections.

Develop and maintain catch-per-unit-effort trend information for all river sections.

Develop and implement creel strategies for expanded estimates of effort, fish released, and fish harvested for steelhead and resident fish for various river sections.

Table 50. Summary of fall 2010 steelhead creel data (unexpanded) for Salmon River sections 14 through 17.

Section	Anglers	Hours	Hrs/ Angler	Steelhead Kept	Steelhead Released		Total Fish	Hrs/ Caught	Hrs/ Kept	Total Hatchery CPUE[b]
					Hatchery	Wild[a]				
14	1,094	6,264	5.7	270	36	517	823	8	23	0.049
15	3,796	14,630	3.9	792	192	439	1423	10	18	0.067
16	1,116	4,703	4.2	279	118	210	607	8	17	0.084
17	206	550	2.7	32	17	20	69	8	17	0.089
Total	6,212	26,147	4.2	1373	363	1,186	2,922	9	19	0.066

[a] Includes hatchery-produced steelhead with intact adipose fins.
[b] Catch per unit of effort.

Table 51. Summary of spring 2011 steelhead creel data (unexpanded) for Salmon River sections 14 through 19.

Section	Anglers	Hours	Hrs/ Angler	Steelhead Kept	Steelhead Released		Total Fish	Hrs/ Caught	Hrs/ Kept	Total Hatchery CPUE[b]
					Hatchery	Wild[a]				
14	224	1,068	4.8	27	14	75	116	9	40	0.038
15	1,907	8,330	4.4	561	457	337	1,355	6	15	0.122
16	954	4,081	4.3	153	72	118	343	12	27	0.055
17	2,356	9,984	4.2	510	289	144	943	11	20	0.080
18	939	4,382	4.7	146	155	112	413	11	30	0.069
19	1,539	6,636	4.3	358	412	940	1,710	4	19	0.116
Total	7,919	34,481	4.4	1,755	1,399	1,726	4,880	7	20	0.091

[a] Includes hatchery-produced steelhead with intact adipose fins
[b] Catch per unit of effort

Table 52. Statewide steelhead harvest estimates and sample rates by river section and month for the 2010-2011 upper Salmon River steelhead run.

River Section	Statistics	Fishery Statistics By Month								
		Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Total
14	Fish Checked for CWT[a]	--	95	139	--	--	1	24	--	259
	Statewide Harvest Est.	0	767	1,231	18	99	107	828	160	3,210
	Sample Rate	--	0.124	0.113	--	--	0.009	0.029	--	0.081
15	Fish Checked for CWT	--	265	409	--	--	18	486	43	1,221
	Statewide Harvest Est.	63	3,180	2,256	168	288	205	2734	219	9,113
	Sample Rate	--	0.083	0.181	--	--	0.088	0.178	0.196	0.134
16	Fish Checked for CWT	--	150	111	--	--	4	129	14	408
	Statewide Harvest Est.	32	898	863	244	0	202	913	207	3,359
	Sample Rate	--	0.167	0.129	--	--	0.020	0.141	0.068	0.121
17	Fish Checked for CWT	--	10	20	--	--	6	155	317	508
	Statewide Harvest Est.	63	452	346	63	129	397	1,061	1,128	3,639
	Sample Rate	--	0.022	0.058	--	--	0.015	0.146	0.281	0.140
18	Fish Checked for CWT	--	--	--	--	--	--	72	68	140
	Statewide Harvest Est.	0	47	111	0	0	25	434	629	1,246
	Sample Rate	--	--	--	--	--	--	0.166	0.108	0.112
19	Fish Checked for CWT	--	--	--	--	--	--	1	334	335
	Statewide Harvest Est.	0	0	0	0	0	0	1,009	1,926	2,935
	Sample Rate	--	--	--	--	--	--	0.001	0.173	0.114

[a] CWT = Coded wire tag.

Table 53. Summary of steelhead run year interview data (unexpanded) from the Upper Salmon River (fall 2010 and spring 2011).

Section	Anglers	Hours	Hrs/ Angler	Steelhead Kept	Steelhead Released		Total Catch	No. Snouts in Creel			Hrs/ Caught	Hrs/ Kept	Total Hatchery CPUE[c]
					Hatchery	Wild[a]		Checked for CWT[b]	Taken	Not Taken			
14	1,318	7,332	5.6	297	50	592	939	256	28	0	8	25	0.047
15	5,703	22,960	4.0	1,353	649	776	2,778	1,232	147	4	8	17	0.087
16	2,070	8,784	4.2	432	190	328	950	400	100	2	9	20	0.071
17	2,562	10,534	4.1	542	306	164	1,012	507	48	1	10	19	0.080
18	939	4,382	4.7	146	155	112	413	140	24	0	11	30	0.069
19	1,539	6,636	4.3	358	412	940	1,710	335	38	2	4	19	0.116
Total	14,131	60,628	4.3	3,128	1,762	2,912	7,802	2,870	385	9	8	19	0.081

[a] Includes hatchery-produced steelhead with intact adipose fins.
[b] CWT=Coded Wire Tags.
[c] CPUE= Catch per Unit Effort.

Figure 36. Map of upper Salmon River steelhead fisheries, fall 2010 and spring 2011.

APPENDICES

Appendix A. Updated Salmon Region mountain lakes stocked using Rotations A, B, and C.

Lake Name	IDFG Catalog No.	Land Area[a]	Species[b]	No. Fish Stocked
Rotation A:				
Big Frog #2	0700001385.00	SNRA	C2	1,000
Cache Creek #1	0700000843.00	SCNF	C2	250
Cache Creek #3	0700000845.00	SCNF	GR	250
Cache Creek #5	0700000848.00	SCNF	GR	375
Castle	0700001420.00	SNRA	C2	650
Castle #1	0700000835.00	SCNF	C2	125
Castle View	0700001440.00	SNRA	C2	250
Challis Creek #2	0700001333.00	SCNF	C2	750
Challis Creek #3	0700001335.00	SCNF	C2	950
Chamberlain #7	0700001439.00	SNRA	C2	500
China #3	0700000885.00	SCNF	GN	400
Cirque	0700001369.00	SNRA	C2	1,150
Cove	0700001364.00	SNRA	C2	1,100
Crater	0700001460.00	SNRA	C2	875
Drift	0700001424.00	SNRA	C2	375
East Basin Creek#1	0700001514.00	SCNF	C2	475
Elk	0700001479.00	SNRA	C2	675
Feldspar	0700001380.00	SNRA	GR	550
Fourth of July	0700001685.00	SNRA	C2	725
Garland #1	0700001468.00	SNRA	C2	500
Garland #2	0700001469.00	SNRA	C2	500
Garland #3	0700001470.00	SNRA	C2	350
Gentian	0700001370.00	SNRA	TT	325
Goat	0700001375.00	SNRA	C2	1,150
Gunsight	0700001350.00	SNRA	C2	450
Hindman #1	0700001495.00	SCNF	C2	500
Honey	0700001433.00	SNRA	C2	200
Hoodoo	0700001463.00	SNRA	C2	250
Hope	0700001430.00	SNRA	GR	650
Iron #1	0700001279.00	SCNF	C2	5,100
Liberty #1	0700000830.00	SCNF	TT	150
Liberty #2	0700000833.00	SCNF	TT	200
Lightning	0700001680.00	SNRA	C2	275
Little Redfish	0700001347.00	SNRA	C2	250
MacRae	0700001450.00	SNRA	GR	600
Martendale #1	0700000815.00	SCNF	GR	250
Martendale #2	0700000816.00	SCNF	C2	200
Meadow Creek	0700001274.00	SCNF	C2	4,200
Mystery #3	0700000879.00	SNRA	C2	75
Nelson #2	0700000873.00	SCNF	GR	500
Ocalkens #1	0700001464.00	SNRA	C2	500
Ocalkens #2	0700001465.00	SNRA	C2	750
Phyllis	0700001683.00	SNRA	C2	375
Pipe	0700001732.00	SNRA	C2	200

Appendix A. Continued.

Lake Name	IDFG Catalog No.	Land Area[a]	Species[b]	No. Fish Stocked
Pole	0700000834.00	SCNF	TT	175
Rainbow	0700001727.00	SNRA	C2	200
Rock #1	0700000863.00	SCNF	TT	125
Rock #2	0700000864.00	SCNF	TT	550
Sapphire	0700001367.00	SNRA	C2	1,250
Sheep	0700001356.00	SNRA	C2	500
	0700001672.00	SNRA	C2	475
	0700001363.00	SNRA	C2	275
Snow	0700001374.00	SNRA	C2	375
Swimm	0700001467.00	SNRA	C2	875
Thunder	0700001679.00	SNRA	C2	225
Tin Cup	0700001349.00	SNRA	GR	1,350
Twin Creek #2	0700001319.00	SCNF	TT	125
West Fork Bear Creek #1	0700001328.00	SCNF	C2	200
West Fork Camas Creek #1	0700000818.00	SCNF	C2	1,200
West Fork Camas Creek #3	0700000820.00	SCNF	C2	750
West Fork Camas Creek #5	0700000824.00	SCNF	C2	500
Washington #2	0700001444.00	SNRA	C2	750
Wallace	0700001218.00	SCNF	C2	1,800
Yellowjacket #2	0700000805.00	SCNF	C2	6,000
Rotation A Total				47,625
Rotation B:				
Alpine	0700001540.00	SWA	GN	3,850
Alpine Creek #2	0700001784.00	SWA	C2	375
Alpine Creek #4	0700001787.00	SWA	GR	2,375
Alpine Creek #5	0700001788.00	SWA	TT	125
Alpine Creek #6	0700001789.00	SWA	C2	300
Alpine Creek #7	0700001790.00	SWA	C2	350
Alpine Creek #11	0700001797.00	SWA	TT	425
Alpine Creek #12	0700001798.00	SWA	C2	50
Alpine Creek #13	0700001800.00	SWA	GR	1,250
Alpine Creek #14	0700001802.00	SWA	GR	400
Alpine Creek #15	0700001804.00	SWA	GR	925
Baldwin Creek	0700001007.00	SWA	C2	350
Bear Creek #1	0700001137.00	SCNF	C2	200
Cliff Creek #1	0700001144.00	SCNF	C2	150
Cliff Creek #4	0700001146.00	SCNF	C2	75
Collie Creek #1	0700001111.00	SCNF	C2	1,075
Decker Creek #1	0700001659.00	SWA	C2	575
Elizabeth	0700001570.00	SCNF	C2	500
Elk	0700001163.00	SCNF	C2	675
Fishhook Creek #2	0700001607.00	SWA	C2	75
Fishhook Creek #3	0700001610.00	SWA	C2	75
Goat #1	0700001530.00	SWA	C2	2,225
Goat #4	0700001535.00	SWA	C2	425

Appendix A. Continued.

Lake Name	IDFG Catalog No.	Land Area[a]	Species[b]	No. Fish Stocked
Goat #5	0700001536.00	SWA	C2	50
Hanson #1	0700001555.00	SWA	C2	225
Hanson #3	0700001558.00	SWA	C2	725
Hanson #5	0700001561.00	SWA	C2	125
Harlan Creek #1	0700000980.00	SCNF	C2	300
	0700000983.00	SCNF	C2	250
Hasbrook #1	0700000992.00	SCNF	C2	375
Helldiver	0700000989.00	SCNF	C2	550
Hidden	0700001573.00	SCNF	C2	250
Hindman #1	0700001495.00	SCNF	C2	500
Imogene #1	0700001713.00	SWA	TT	1,850
Imogene #2	0700001714.00	SWA	C2	200
Imogene #3	0700001715.00	SWA	C2	625
Imogene #4	0700001717.00	SWA	C2	100
Imogene #6	0700001719.00	SWA	C2	525
Iris #1	0700001074.00	SCNF	C2	225
Iris #3	0700001077.00	SCNF	C2	350
Iron Creek #6	0700001547.00	SWA	TT	75
Iron Creek #7	0700001548.00	SWA	TT	75
Iron #1	0700001279.00	SCNF	C2	5,100
Island	0700001127.00	SNRA	TT	1,575
Kidney #2	0700001033.00	SCNF	C2	150
Langer #1	0700001133.00	SCNF	TT	1,000
Lost	0700000988.00	SCNF	C2	200
Lower Island	0700001129.00	SCNF	C2	550
Lower Valley Creek	0700001584.00	SNRA	C2	550
Lucille	0700001708.00	SWA	C2	775
Marshall #2	0700001525.00	SWA	C2	500
Martha	0700001569.00	SCNF	C2	200
McGowan #3	0700001565.00	SWA	C2	250
Meadow Creek	0700001274.00	SCNF	C2	4,200
Muskeg #1	0700001043.00	SCNF	TT	500
Muskeg #3	0700001046.00	SCNF	TT	500
P 38	0700001160.00	SCNF	C2	325
Parks Peak #1	0700001745.00	SWA	C2	500
Profile	0700001710.00	SWA	C2	775
Rainbow	0700001153.00	SCNF	GR	250
Ruffneck	0700001130.00	SCNF	TT	1,250
Saddleback #1	0700001618.00	SWA	C2	775
Saddleback #2	0700001619.00	SWA	C2	325
Seafoam #6	0700001005.00	SCNF	GR	600
Soldier #4	0700001050.00	SCNF	C2	975
Soldier #7	0700001055.00	SCNF	C2	250
Soldier #8	0700001057.00	SCNF	C2	250
Soldier #10	0700001059.00	SCNF	C2	250
Soldier #11	0700001060.00	SCNF	C2	250
Thompson Cirque	0700001604.00	SWA	C2	900

Appendix A. Continued.

Lake Name	IDFG Catalog No.	Land Area[a]	Species[b]	No. Fish Stocked
Upper Cramer	0700001657.00	SWA	C2	500
Upper Hell Roaring #1	0700001687.00	SWA	C2	275
Upper Hell Roaring #2	0700001688.00	SWA	C2	275
Upper Redfish #1	0700001634.00	SWA	GR	725
Upper Redfish #2	0700001635.00	SWA	C2	425
Upper Redfish #3	0700001636.00	SWA	C2	625
Valley Creek #2	0700001587.00	SCNF	C2	400
Vanity #1	0700001009.00	SCNF	TT	300
Vanity #4	0700001014.00	SCNF	TT	250
Vanity #5	0700001015.00	SCNF	C2	125
Vanity #7	0700001017.00	SCNF	TT	200
Vanity #13	0700001027.00	SCNF	GR	250
Wallace	0700001218.00	SCNF	C2	1,800
Yellowjacket #2	0700000805.00	SCNF	C2	6,000
Rotation B Total				58,975
Rotation C:				
Basin Creek #5	0700001237.00	SCNF	C2	1,000
Bear Valley #3	0700001245.00	SCNF	C2	150
Birdbill	0700001197.00	SCNF	C2	500
Broncho	0700000566.00	SCNF	C2	725
Buck Creek #4	0700001242.00	SCNF	GR	225
Cabin Creek #3	0700001503.00	SCNF	C2	100
Cabin Creek #4	0700001504.00	SCNF	C2	600
Cabin Creek #7	0700001508.00	SCNF	C2	200
Cabin Creek Peak #1	0700001487.00	SCNF	C2	150
Crater	0700001185.00	SCNF	GN	700
Devils	0700001260.00	SCNF	C2	350
Everson	0700001257.00	SCNF	C2	1,500
Finger #3	0700001094.00	SCNF	C2	475
Glacier	0700001189.00	SCNF	GN	275
Golden Trout	0700001201.00	SCNF	GN	950
Gooseneck	0700001187.00	SCNF	GN	200
Harbor	0700000796.00	SCNF	C2	3,000
Heart	0700000793.00	SCNF	C2	1,675
Hidden	0600000616.00	BNF	C2	1,125
Hindman #1	0700001495.00	SCNF	C2	500
Iron #1	0700001279.00	SCNF	C2	5,100
Knapp #7	0700001169.00	SCNF	C2	200
Knapp #14	0700001179.00	SCNF	GR	250
Line	0600000603.00	BNF	C2	350
Lola #2	0700001148.00	SCNF	C2	500
Lola #3	0700001149.00	SCNF	C2	500
Loon Creek #3	0700000904.00	SCNF	C2	150
Loon Creek #11	0700000917.00	SCNF	C2	175

Appendix A. Continued.

Lake Name	IDFG Catalog No.	Land Area[a]	Species[b]	No. Fish Stocked
Loon Creek #13	0700000919.00	SCNF	C2	225
Loon Creek #15	0700000923.00	SCNF	C2	175
Lost Packer	0700000564.00	SCNF	TT	1,000
Meadow Creek	0700001274.00	SCNF	C2	4,200
Middle Fork Hat Creek #2	0700001288.00	SCNF	GR	500
Middle Fork Hat Creek #3	0700001289.00	SCNF	TT	1,000
Middle Fork Hat Creek #4	0700001290.00	SCNF	TT	300
Middle Fork Hat Creek #5	0700001293.00	SCNF	TT	1,075
McNutt	0700001236.00	SCNF	C2	350
North Fork East Fork Reynolds #2	0700000575.00	SCNF	C2	1,325
North Fork East Fork Reynolds #4	0700000578.00	SCNF	C2	1,000
Nez Perce	0700001273.00	SCNF	GR	250
Paragon	0700000756.00	SCNF	C2	275
Park Fork Creek	0700001261.00	SCNF	C2	150
Pass	0700001307.00	SCNF	GN	350
Patterson Creek #1	0700001258.00	SCNF	C2	125
Patterson Creek #2	0700001259.00	SCNF	C2	200
Puddin Mountain #1	0700000764.00	SCNF	TT	500
Puddin Mountain #2	0700000766.00	SCNF	TT	500
Puddin Mountain #5	0700000770.00	SCNF	TT	1,000
Puddin Mountain #6	0700000773.00	SCNF	TT	1,000
Puddin Mountain #10	0700000778.00	SCNF	C2	275
Puddin Mountain #15	0700000787.00	SCNF	C2	675
Right Fork Big Eightmile	0700001264.00	SCNF	C2	150
Ramshorn	0700000755.00	SCNF	C2	350
Rocky	0700001135.00	SCNF	C2	450
South Fork Moyer Creek	0700001205.00	SCNF	GR	275
Ship Island #5	0700000618.00	SCNF	C2	1,000
Ship Island #7	0700000620.00	SCNF	C2	325
Tango #4	0700000893.00	SCNF	C2	675
Tango #5	0700000894.00	SCNF	C2	250
Tango #6	0700000895.00	SCNF	C2	900
U P	0700001220.00	SCNF	C2	1,000
Wallace	0700001218.00	SCNF	C2	1,800
Welcome	0700000790.00	SCNF	C2	1,225
Wilson	0700000794.00	SCNF	C2	1,000
Yellowjacket #2	0700000805.00	SCNF	C2	6,000
Rotation C Total				53,475

[a] SNRA = Sawtooth National Recreation Area, SCNF = Salmon-Challis National Forest, SWA = Sawtooth Wilderness Area, and BNF = Bitterroot National Forest.

[b] C2 = Westslope cutthroat trout, GR = Arctic grayling, GN = Golden trout, and TT = Troutlodge triploid rainbow trout.

Appendix B. Mountain lake locations in the Salmon Region for stocking rotations A, B, and C using WGS84 datum, and latitude and longitude decimal degree coordinates.

Lake Name	LLID[a]	Location in WGS84 Decimal Degrees Latitude °N	Longitude °W
Rotation A:			
Big Frog #2	1145459440792	44.07925	-114.54581
Cache Creek #1	1147060447696	44.77519	-114.68877
Cache Creek #3	1146887447754	44.77490	-114.69730
Cache Creek #5	1146975447750	44.76954	-114.70607
Castle	1145764440463	44.04621	-114.57640
Castle #1	1143719448008	44.80260	-114.37293
Castle View	1145949440206	44.02078	-114.59486
Challis Creek #2	1145181445498	44.55194	-114.51875
Challis Creek #3	1145208445520	44.55344	-114.52182
Chamberlain #7	1145928440269	44.02655	-114.59303
China #3	1147857444767	44.47724	-114.78585
Cirque	1146208441064	44.10650	-114.62095
Cove	1146086441013	44.10136	-114.61163
Crater	1146082441415	44.14432	-114.60979
Drift	1145991440632	44.06538	-114.60023
East Basin Creek#1	1147924443262	44.33356	-114.79403
Elk	1147476442291	44.23096	-114.74874
Feldspar	1145904440905	44.09032	-114.59042
Fourth of July	1146313440433	44.04505	-114.63216
Garland #1	1147832441610	44.16268	-114.78395
Garland #2	1147932441657	44.16742	-114.79421
Garland #3	1148012441759	44.17767	-114.80196
Gentian	1146122440972	44.09890	-114.61311
Goat	1145813440983	44.09977	-114.58104
Gunsight	1146076441271	44.12724	-114.60790
Hindman #1	1149217443864	44.38472	-114.92212
Honey	1146054440368	44.03671	-114.60517
Hoodoo	1146418441669	44.16883	-114.64272
Hope	1146102440386	44.03862	-114.61013
Iron #1	1141832449129	44.90662	-114.19505
Liberty #1	1146502447588	44.76059	-114.65108
Liberty #2	1146485447545	44.75634	-114.64936
Lightning	1146643440160	44.01601	-114.66419
Little Redfish	1145361441038	44.10561	-114.53697
MacRae	1146294439391	43.94057	-114.63004
Martendale #1	1146159448298	44.83008	-114.61594
Martendale #2	1146208448312	44.83124	-114.62061
Meadow Creek	1133155444320	44.43224	-113.31592
Mystery #3	1147985444939	44.49383	-114.79855
Nelson #2	1148143445060	44.50565	-114.81396
Ocalkens #1	1146360441277	44.12943	-114.63709
Ocalkens #2	1146412441245	44.12606	-114.64130
Phyllis	1146491440230	44.02290	-114.64895

Appendix B. Continued.

Lake Name	LLID[a]	Location in WGS84 Decimal Degrees Latitude °N	Longitude °W
Pipe	1146638440043	44.00190	-114.65640
Pole	1146578447652	44.76517	-114.65772
Rainbow	1152303443363	43.98592	-114.72216
Rock #1	1146696447553	44.75698	-114.67047
Rock #2	1146718447535	44.75531	-114.67266
Sapphire	1146152441033	44.10294	-114.61518
Sheep	1146111441133	44.11324	-114.61120
Six #1	1146766440245	44.02890	-114.67804
Slide	1146198441124	44.11410	-114.62057
Snow	1146138440957	44.09574	-114.61406
Swimm	1146675441491	44.14698	-114.66780
Thunder	1146605440221	44.02224	-114.66052
Tin Cup	1146095441228	44.12465	-114.61047
Twin Creek #2	1144768445832	44.58320	-114.47685
Wallace	1140063452461	45.24614	-114.00615
West Fork Bear Creek #1	1144874445667	44.56676	-114.48765
West Fork Camas Creek #1	1146492448005	44.80228	-114.65012
West Fork Camas Creek #3	1146624447965	44.80184	-114.65930
West Fork Camas Creek #5	1146689447976	44.79862	-114.66245
Washington #2	1146211440319	44.03372	-114.62199
Yellowjacket #2	1145535450671	45.06890	-114.55434
<u>Rotation B</u>:			
Alpine	1150532441816	44.17869	-115.05515
Alpine Creek #2	1146242450685	45.06828	-114.62418
Alpine Creek #4	1149726439072	43.90737	-114.97360
Alpine Creek #5	1149815439052	43.90509	-114.98187
Alpine Creek #6	1149828439107	43.91085	-114.98285
Alpine Creek #7	1149925439093	43.90906	-114.99277
Alpine Creek #11	1149701439146	43.91504	-114.96888
Alpine Creek #12	1149699439196	43.91990	-114.97061
Alpine Creek #13	1149734439270	43.92818	-114.97220
Alpine Creek #14	1149599439213	43.91997	-114.95877
Alpine Creek #15	1149715439307	43.93059	-114.97169
Baldwin Creek	1151123444950	44.49531	-115.11254
Bear Creek #1	1150941444859	44.48584	-115.09418
Cliff Creek #1	1150329444797	44.47941	-115.03307
Cliff Creek #4	1150439444816	44.48155	-115.04370
Collie Creek #1	1152261444092	44.40881	-115.22541
Decker Creek #1	1149344440479	44.04955	-114.93535
Elizabeth	1151514442658	44.26758	-115.15233
Elk	1150395444121	44.41244	-115.03845
Fishhook Creek #2	1149823441139	44.11579	-114.98307
Fishhook Creek #3	1149877441107	44.11061	-114.98761
Goat #1	1150196441721	44.17401	-115.02008
Goat #4	1150154441600	44.16100	-115.01520
Goat #5	1150183441535	44.15845	-115.01762

Appendix B. Continued.

Lake Name	LLID[a]	Location in WGS84 Decimal Degrees Latitude °N	Longitude °W
Hanson #1	1151172442217	44.22342	-115.11841
Hanson #3	1151171442093	44.20939	-115.11718
Hanson #5	1151174441998	44.19971	-115.11754
Harlan Creek #1	1151400445303	44.53028	-115.14022
Harlan Creek #2	1151481445220	44.52185	-115.14804
Hasbrook #1	1151786445219	44.52178	-115.17858
Helldiver	1151724445350	44.53484	-115.17217
Hidden	1151174442952	44.29554	-115.11644
Hindman #1	1149217443864	44.38472	-114.92212
Imogene #1	1149513439966	43.99631	-114.95119
Imogene #2	1149601439991	44.00110	-114.96111
Imogene #3	1149639439897	44.88833	-114.93243
Imogene #4	1149672439895	43.99167	-114.96502
Imogene #6	1149730439892	44.88921	-114.94127
Iris #1	1151940445113	44.51111	-115.19269
Iris #3	1152023445170	44.51751	-115.20132
Iron Creek #6	1150367441642	44.16405	-115.03666
Iron Creek #7	1150434441672	44.16708	-115.04336
Iron #1	1141832449129	44.90662	-114.19505
Island	1151425444755	44.47764	-115.14403
Kidney #2	1149724445226	44.52244	-114.97227
Langer #1	1151347444803	44.48228	-115.13572
Lost	1151596445294	44.53062	-115.15817
Lower Island	1151399444776	44.47229	-115.13659
Lower Valley Creek	1150375443726	44.37281	-115.03789
Lucille	1149687440054	44.00517	-114.96835
Marshall #2	1149960441553	44.15520	-114.99604
Martha	1150956442871	44.28575	-115.09613
McGown #3	1150760441778	44.17958	-115.07673
Meadow Creek	1133155444320	44.43224	-113.31592
Muskeg #1	1152100445438	44.54426	-115.20971
Muskeg #3	1152187445407	44.54057	-115.21991
P 38	1150727443980	44.42239	-115.08412
Parks Peak #1	1149425439593	43.96081	-114.94360
Profile	1149737440151	44.01390	-114.97367
Rainbow	1152303443363	44.33560	-115.26710
Ruffneck	1151473444730	44.47510	-115.14771
Seafoam #6	1151322445041	44.50407	-115.13228
Soldier #4	1151941445301	44.53024	-115.19434
Soldier #7	1151989445294	44.53004	-115.19855
Soldier #8	1152017445263	44.52745	-115.20248
Soldier #10	1152020445293	44.52926	-115.20198
Soldier #11	1152032445309	44.53082	-115.20336
Thompson Cirque	1150019441447	44.14641	-115.00321
Upper Cramer	1149873440296	44.03002	-114.98970
Upper Hell Roaring #1	1149516440275	44.02751	-114.95190
Upper Hell Roaring #2	1149599440307	44.03064	-114.96008

Appendix B. Continued.

Lake Name	LLID[a]	Location in WGS84 Decimal Degrees Latitude °N	Longitude °W
Upper Redfish #1	1150339440494	44.04723	-115.03618
Upper Redfish #2	1150360440459	44.04518	-115.03680
Upper Redfish #3	1150363440398	44.03831	-115.03539
Valley Creek #2	1149534443724	44.37420	-114.95413
Vanity #1	1150528444936	44.49344	-115.05297
Vanity #4	1150493444883	44.48815	-115.04923
Vanity #5	1150560444885	44.48849	-115.05599
Vanity #7	1150648444848	44.48483	-115.06491
Vanity #13	1150796444774	44.47721	-115.07963
Wallace	1140063452461	45.24614	-114.00615
Yellowjacket #2	1145535450671	45.06890	-114.55434
Rotation C:			
Basin Creek #5	1138550448415	44.84145	-113.85536
Bear Valley #3	1138585448175	44.81730	-113.85856
Birdbill	1145875451504	45.15255	-114.58801
Broncho	1146536454675	45.46751	-114.65358
Buck #4	1138529447819	44.78248	-113.85286
Cabin Creek #3	1149032444206	44.41909	-114.90180
Cabin Creek #4	1148916444210	44.42016	-114.89059
Cabin Creek #7	1148889444145	44.41496	-114.88969
Cabin Creek Peak #1	1149156444024	44.40208	-114.91479
Crater	1145787451632	44.14432	-114.60979
Devils	1135400446019	44.60342	-113.54079
Everson	1136134446256	44.62742	-113.61512
Finger #3	1151499444898	44.48951	-115.14975
Glacier	1145853451684	45.17030	-114.58697
Golden Trout	1145218451119	45.11373	-114.52246
Gooseneck	1145820451649	45.16717	-114.58337
Harbor	1145917451426	45.14446	-114.59352
Heart	1145949451353	45.13725	-114.59571
Hidden	1146759454772	45.47708	-114.67560
Hindman #1	1149217443864	44.38472	-114.92212
Iron #1	1141832449129	44.90662	-114.19505
Knapp #7	1149238444228	44.42225	-114.92367
Knapp #14	1149411444341	44.43341	-114.93996
Line	1145750455726	45.57215	-114.57350
Lola #2	1152248443910	44.39115	-115.22577
Lola #3	1152402443907	44.39132	-115.23997
Loon Creek #3	1149282444426	44.44245	-114.92812
Loon Creek #11	1149496444671	44.46694	-114.94871
Loon Creek #13	1149456444909	44.49265	-114.94664
Loon Creek #15	1149426444965	44.49837	-114.94357
Lost Packer	1147777454716	45.47156	-114.77733
Middle Fork Hat Creek #2	1142104448747	44.87496	-114.20906
Middle Fork Hat Creek #3	1142044448775	44.87611	-114.20441
Middle Fork Hat Creek #4	1142040448793	44.85778	-113.44562

Appendix B. Continued.

Lake Name	LLID[a]	Location in WGS84 Decimal Degrees Latitude °N	Longitude °W
Middle Fork Hat Creek #5	1142101448782	44.87941	-114.20992
McNutt	1138488448272	44.82698	-113.84794
Meadow Creek	1133155444320	44.43224	-113.31592
North Fork East Fork Reynolds #2	1145482455479	45.54757	-114.54794
North Fork East Fork Reynolds #4	1145447455576	45.55739	-114.54489
Nez Perce	1133908445099	44.50919	-113.39022
Paragon	1146198450829	45.08494	-114.62064
Park Fork Creek	1135408445340	44.53403	-113.54035
Pass	1137575440901	44.09029	-113.75723
Patterson Creek #1	1136694445994	44.63733	-113.65478
Patterson Creek #2	1136561446259	44.62776	-113.65704
Puddin Mountain #1	1145954450977	45.09959	-114.59641
Puddin Mountain #2	1145991450982	45.09998	-114.60019
Puddin Mountain #5	1146043451058	45.10735	-114.60488
Puddin Mountain #6	1146045451006	45.10243	-114.60522
Puddin Mountain #10	1146131451117	45.11351	-114.61418
Puddin Mountain #15	1146087451196	45.11961	-114.60880
Right Fork Big Eightmile	1136089445899	44.59168	-113.60992
Ramshorn	1146133450851	45.08700	-114.61424
Rocky	1151353444863	44.48829	-115.13586
South Fork Moyer Creek	1142310448846	44.88418	-114.22993
Ship Island #5	1145991451563	45.15682	-114.60120
Ship Island #7	1146037451501	45.15110	-114.60327
Tango #4	1148984444467	44.44851	-114.89875
Tango #5	1148931444432	44.44411	-114.89286
Tango #6	1148967444401	44.44083	-114.89579
U P	1140147452354	45.23706	-114.01507
Wallace	1140063452461	45.24614	-114.00615
Welcome	1145911451288	45.13060	-114.59208
Wilson	1145865451439	45.14559	-114.58780
Yellowjacket #2	1145535450671	45.06890	-114.55434

[a] LLID = Concatenated latitude and longitude in decimal degrees for centroid of lake.

Appendix C. Locations and physical characteristics of Salmon Region mountain lakes surveyed in 2011.

Lake Name	Location in Datum WGS84 Decimal Degrees Latitude °N	Longitude °W	Aspect	Spawning Potential	Bahls (1992) Impact Rating
Baker Lake	44.05639	-114.56408	NE	Adequate	Low
Island Lake	44.09487	-114.59446	NE	Fair	Low
Noisy Lake	44.05816	-114.58388	N	Fair	Low
Quiet Lake	44.05522	-114.59316	N	Adequate	Low
Scree Lake	44.06233	-114.59448	SE	Fair	Low
Shallow Lake	44.06333	-114.59922	SE	None	Low
Tin Cup Lake	44.12284	-114.60966	NE	Adequate	None

Appendix D. Angler responses to management questions posed during Stanley Lake creel interviews, 2011.

Question 1. Were you fishing for a specific species of fish?

Yes	58
No	218
Total	274

Question 2. If yes, what species of fish were you targeting?

Kokanee	5
Rainbow trout	65
Cutthroat trout	1
Lake trout	6
Total	77

Question 3. How important is fish size to you?

Not important	103
Somewhat important	142
Very important	20
Total	265

Question 4. How often do you fish Stanley Lake?

Occasionally	243
Regularly	27
Extremely often	7
Total	277

Question 5. What do you fish for?

One species	60
More than one species	3
Anything	209
Total	272

Question 6. When do you fish Stanley Lake?

Spring only	2
Spring and summer	6
Summer only	227
Summer and fall	8
Fall only	21
All year	7
Total	271

Question 7. Do you fish other lakes in Idaho?

Yes	148
No	121
Total	269

Question 8. How far have you travelled/where are you from?

Idaho counties:	
Ada	59
Adams	--
Bannock	1
Bear Lake	--
Benewah	--
Bingham	--
Blaine	10
Boise	7
Bonner	--
Bonneville	5
Boundary	--
Butte	--
Camas	--
Canyon	14
Caribou	--
Cassia	--
Clark	--
Clearwater	--
Custer	8
Elmore	--
Franklin	4
Fremont	1
Gem	2
Gooding	--
Idaho	--
Jefferson	1
Jerome	1
Kootenai	--
Latah	--
Lemhi	--

Appendix D. Continued.

Idaho counties:	
Lewis	--
Lincoln	--
Madison	--
Minidoka	1
Nez Perce	--
Oneida	--
Owyhee	--
Payette	1
Power	--
Shoshone	--
Teton	--
Twin Falls	15
Valley	--
Washington	--
Idaho unknown	60
Idaho subtotal	191
Non-resident states:	
Arizona	2
California	14
Colorado	1
Connecticut	1
Indiana	1
Maryland	1
Massachusetts	1
Michigan	1
Montana	1
Nevada	3
New Hampshire	1
Oregon	6
Tennessee	1
Texas	3
Utah	17
Washington	8
Wisconsin	2
Unknown state	21
Non-resident states subtotal:	85
Foreign country:	
Canada	1
Germany	1
Foreign country subtotal	2
Total	278

Appendix E. Site characteristics of stream transects surveyed by electro-fishing in the upper Salmon River in 2011.

Stream	Tran-sect[a]	Sample Date	Water Temp. (C°)	Transect Length (m)	Transect Mean Width (m)	Transect Area (m^2)	Sub-basin	Location in WGS84 Latitude Longitude Decimal Degrees	
Agency	M	07/12/2011	11.0	120.0	--	--	Lemhi River	44.97431	-113.52011
Agency	M	07/13/2011	13.0	120.0	--	--	Lemhi River	44.95501	-113.55062
Agency	M	07/15/2011	5.0	160.0	--	--	Lemhi River	44.97172	-113.52728
Agency	M	08/04/2011	10.7	120.0	--	--	Lemhi River	44.95906	-113.54374
Allan	L	07/14/2011	10.0	37.0	1.9	68.5	North Fork Salmon River	45.51933	-114.03261
Bear Valley	L	07/25/2011	8.1	120.0	--		Lemhi River	44.78589	-113.76376
Bear Valley	M	07/27/2011	6.9	200.0	--	--	Lemhi River	44.78194	-113.75090
Bear Valley	M	08/02/2011	7.6	160.0	--	--	Lemhi River	44.78589	-113.76376
Big Springs	U	10/13/2011	--	--	--	--	Lemhi River	44.69654	-113.38039
Big Timber	L	07/26/2011	9.0	120.0	--	--	Lemhi River	44.66202	-113.37629
Big Timber	L	07/29/2011	11.0	160.0	--	--	Lemhi River	44.69047	-113.37197
Bohannon	L	07/21/2011	10.0	120.0	--	--	Lemhi River	45.11298	-113.74361
Bohannon	M	09/26/2011	11.6	480.0	--	--	Lemhi River	45.14174	-113.71404
Bohannon	U	07/22/2011	6.5	120.0	--	--	Lemhi River	45.19126	-113.68981
Ditch	L	07/14/2011	12.0	90.0	4.1	366.0	North Fork Salmon River	45.51185	-113.99536
Duck	M	06/21/2011	12.0	100.0	4.8	483.5	Pahsimeroi River	44.60085	-113.94776
Duck	M	06/22/2011	15.0	100.0	4.7	466.9	Pahsimeroi River	44.59550	-113.94297
East Fork Bohannon	M	07/19/2011	9.3	120.0	--	--	Lemhi River	45.16558	-113.67971
Elkhorn	L	07/29/2011	14.0	--	--	--	Middle Fork Salmon River	44.61557	-115.25784
Flume	L	07/14/2011	9.0	120.0	--	--	Lemhi River	44.97969	-113.50273
4th of July[d]	L	08/10/2011	12	100.0	5.3	530.0	North Fork to Headwaters	44.02722	-114.81488
4th of July	M	08/10/2011	8	100.0	5.7	574.0	North Fork to Headwaters	44.03702	-114.78038
4th of July	M	08/09/2011	10	100.0	5.2	526.0	North Fork to Headwaters	44.03999	-114.76289
4th of July	U	08/09/2011	8	100.0	4.9	490.0	North Fork to Headwaters	44.04332	-114.74326
Fourth of July[e]	L	07/06/2011	12.0	100.0	2.5	254.0	Horse Creek to North Fork	44.98911	-114.35583
Hayden	M	08/11/2011	7.0	200.0	--	--	Lemhi River	44.73935	-113.71218
Hayden	M	08/15/2011	8.0	200.0	--	--	Lemhi River	44.73935	-113.71218
Hughes	L	07/21/2011	--	111.0	6.8	749.3	North Fork Salmon River	45.47624	-113.99059
Hughes	L	07/21/2011	--	100.0	6.4	647.0	North Fork Salmon River	45.49101	-113.98877
Hughes	L	07/21/2011	--	100.0	5.2	527.0	North Fork Salmon River	45.50349	-113.99965

Appendix E. Continued.

Stream	Tran-sect[a]	Sample Date	Water Temp. (C°)	Transect Length (m)	Transect Mean Width (m)	Transect Area (m^2)	Sub-basin	Location in WGS84 Latitude Longitude Decimal Degrees	
Iron	L	07/27/2011	11.0	100.0	6.8	680.0	North Fork to Headwaters	44.88961	-113.97457
Iron	L	08/15/2011	13.0	--	--	--	North Fork to Headwaters	44.88961	-113.97457
Iron	L	07/27/2011	11.0	170.0	5.4	925.0	North Fork to Headwaters	44.89889	-113.99846
Iron	L	08/15/2011	11.0	100.0	5.9	597.0	North Fork to Headwaters	44.90526	-114.01339
Kenney	L	07/18/2011	7.0	120.0	--	--	Lemhi River	45.05578	-113.59530
Kenney	M	07/28/2011	9.0	120.0	--	--	Lemhi River	45.02918	-113.64794
Kenney	M	08/08/2011	7.5	160.0	--	--	Lemhi River	45.06121	-113.58539
Little Pahsimeroi River	M	08/16/2011	15.0	100.0	--	--	Pahsimeroi River	44.55160	-113.88028
Little Springs	M	07/12/2011	12.5	160.0	--	--	Lemhi River	44.76983	-113.52110
Loon	L	08/01/2011	15.0	--	--	--	Middle Fork Salmon River	44.80810	-114.81203
Pahsimeroi River	M	08/16/2011	14.0	100.0	6.4	640.0	Pahsimeroi River	44.54838	-113.88279
Pahsimeroi River	M	08/16/2011	--[b]	--	--	--	Pahsimeroi River	44.54862	-113.88334
Pahsimeroi River	M	08/16/2011	13.0	100.0	--	--	Pahsimeroi River	44.53025	-113.85368
Papoose	L	08/03/2011	--	--	--	--	Middle Fork Salmon River	44.54468	-114.18343
Pennal Slough	L	01/19/2011	--	--	--	--	North Fork to Headwaters	44.54468	-114.18343
Pistol	L	07/30/2011	14.0	--	--	--	Middle Fork Salmon River	44.72352	-115.15021
Porphyry	L	07/05/2011	12.0	117.0	2.9	339.3	Horse Creek to North Fork	45.00393	-114.33430
Porphyry	L	07/06/2011	10.0	91.0	3.8	349.2	Horse Creek to North Fork	45.01213	-114.35247
Rapid River	L	07/30/2011	10.0	--	--	--	Middle Fork Salmon River	44.67948	-115.15319
Ship Island	L	08/03/2011	--	--	--	--	Middle Fork Salmon River	45.17556	-114.72022
South Fork Iron	L	06/29/2011	--	107.0	2.4	253.1	North Fork to Headwaters	44.89698	-114.11278
South Fork Iron	L	06/29/2011	--	100.0	3.8	387.0	North Fork to Headwaters	44.88550	-114.11569
Sheep	L	08/04/2011	9	100.0	6.3	634.0	North Fork Salmon River	45.49981	-113.94851
Sheep	L	08/04/2011	9	100.0	6.8	685.0	North Fork Salmon River	45.49898	-113.29914
West Fork Iron	L	07/12/2011	8	100.0	4.1	411.0	North Fork to Headwaters	44.92320	-114.12708
Wilson	L	08/02/2011	15.0	--	--	--	Middle Fork Salmon River	45.03350	-114.72310
Wimpey	L	07/20/2011	8.5	120.0	--	--	Lemhi River	45.10932	-113.69345

[a] L = transect's lower reach, M = middle reach, and U = upper reach.
[b] Transect de-watered.

Appendix F. Location of three rotary screw traps and four passive integrated transponder (PIT) tag arrays deployed in the Lemhi River drainage.

Site Name	WGS84 Datum in Decimal Degrees	
	Latitude	Longitude
Rotary screw traps:		
Hayden Creek trap	44.86159	-113.63222
Lemhi Weir trap	44.86931	-113.62506
L3A trap	45.15260	-113.81350
PIT[a] tag arrays:		
Hayden Creek.	44.86159	-113.63215
Lemhi Weir	44.86612	-113.62475
Kenney Creek	45.02703	-113.65801
Lower Lemhi River	45.17560	-113.88353
Bohannon Creek	45.11777	-113.74130
Little Springs Creek	44.77865	-113.54208
Big Timber Creek	44.69110	-113.37107
Canyon Creek	44.69197	-113.35468

[a] PIT = passive integrated transponder.

Appendix G. Locations and dimensions of mainstem traditional transects, Middle Fork Salmon River, surveyed in 2011.

Transect Name	River km[a]	Transect Length (m)	Visibility (m)	Visibility Corridor (m)	Transect Area (m^2)	Traditional Species[b]
Boundary	0.9	61.0	3.6	14.4	878.4	SB
Gardells Hole	4.6	126.0	3.2	12.8	1,612.8	C2, CK
Velvet	8.8	37.0	3.2	12.8	473.6	C2, CK
Elkhorn	14.1	68.0	3.2	12.8	870.4	SB
Sheepeater	21.3	102.0	3.2	12.8	1,305.6	SB
Greyhound	25.8	99.0	3.1	12.4	1,227.6	C2, CK
Rapid River	29.6	74.0	3.1	12.4	917.6	SB
Indian	40.8	137.0	3.1	12.4	1,698.8	SB
Pungo	45.1	77.0	3.1	12.4	954.8	C2, CK
Marble Pool	51.7	142.0	3.1	12.4	1,760.8	C2, CK
Skijump	52.3	155.0	--	--	--	SB
Lower Jackass	60.9	111.0	3.4	13.6	1,509.6	C2, CK
Cougar	65.9	50.0	3.4	13.6	680.0	SB
Whitie Cox	74.9	102.0	3.2	12.8	1,305.6	C2, CK
Rock Island	75.2	122.0	3.2	12.8	1,561.6	SB
Hospital Pool	82.9	80.0	--	--	--	C2, CK
Hospital Run	84.3	66.0	--	--	--	SB
Tappan Pool	94.9	137.0	--	--	--	C2, CK
Flying B	106.6	75.0	--	--	--	C2, CK
Airstrip	108.6	110.0	--	--	--	SB
Survey	119.0	75.0	--	--	--	SB
Big Creek Bridge	124.6	185.0	--	--	--	C2, CK
Love Bar	127.0	100.0	--	--	--	SB
Ship Island	134.6	126.0	--	--	--	C2, CK
Little Ouzel	143.2	87.0	--	--	--	SB
Otter Bar	144.0	143.0	--	--	--	C2, CK
Goat Creek Pool	151.5	134.0	--	--	--	C2, CK
Goat Creek Run	151.8	122.0	--	--	--	SB

[a] River km readings start at Dagger Falls.

[b] Traditional steelhead transects established in 1981: SB = Steelhead B-run. Traditional cutthroat trout (C2) and Chinook salmon (CK) transects established in 1985:

Appendix H. Locations and dimensions of mainstem Middle Fork Salmon River historical (Corley 1972) transects surveyed in 2011.

Transect Name	River Location[a] (km)	Transect Length (m)	Visibility (m)	Visibility Corridor (m)	Transect Area (m^2)	Traditional Species[a]
Little Creek Guard Station	57.6	85.0	3.4	13.6	1,156.0	C2, CK
Mahoney Camp	67.4	50.0	3.2	12.8	640.0	SB,C2, CK
White Creek Pack Bridge	78.1	300.0	3.2	12.8	3,840.0	SB,C2, CK
Bernard Airstrip	109.4	100.0	--	--	--	SB,C2
Cliffside Rapids Hole	141.3	300.0	--	--	--	SB,C2
Hancock Rapids Hole	147.0	120.0	--	--	--	C2

[a] River km reading begins at Dagger Falls.
[b] SB = Steelhead B-run, C2 = Westslope cutthroat trout, and CK = Chinook salmon.

Appendix I. Locations and dimensions of Middle Fork Salmon River tributary transects surveyed in 2011.

Transect Name	Transect Location	Transect Length (m)	Visibility (m)	Visibility Corridor (m)	Transect Area (m^2)	Traditional Species[a]
Pistol Creek Lower	125 m above pack bridge	28.0	3.2	12.8	358.4	SB,C2, CK
Pistol Creek Upper	100 m above lower site	40.0	3.1	12.4	496.0	SB,C2, CK
Indian Creek Lower	75 m above mouth	76.0	2.9	11.6	881.6	SB,C2, CK
Indian Creek Upper	300 m above mouth	50.0	2.9	11.6	580.0	SB,C2, CK
Marble Creek	Above pack bridge	64.0	2.3	9.2	588.8	SB,C2, CK
Loon Creek Lower[c]	Below pack bridge	52.0	--	--	--	SB,C2, CK
Loon Creek Upper[c]	360 m above pack bridge	36.0	--	--	--	SB,C2, CK
Camas Creek Lower	Below pack bridge	75.0	--	--	--	SB,C2
Camas Creek Upper	Above pack bridge	37.0	--	--	--	SB,C2, CK
Big Creek	360 m above mouth		--	--	--	SB,C2

[a] SB = Steelhead B-run, C2 = Westslope cutthroat trout, and CK = Chinook salmon.

Appendix J. Summary of entities requesting technical assistance on water and fishery-related subjects to the Salmon Region during 2011.

Entity
U.S. Army Corps of Engineers
Idaho Department of Water Resources
Idaho Department of Lands
U.S.D.A. Forest Service
Idaho Department of Environmental Quality
U.S. Fish and Wildlife Service
Idaho Governor's Office of Species Conservation
N.O.A.A. (N.M.F.S.)
Shoshone-Bannock Indian Tribe
The Nature Conservancy
U,S, Bureau of Reclamation
Private consultants
Idaho Outfitters and Guides Licensing Board
Mining Companies
Idaho Department of Transportation
City of Salmon
Freedom of Information Act
Attorney General's Office
Lemhi County
Custer County
Bureau of Land Management
Upper Salmon Basin Model Watershed Project
Northwest Power Planning Council
Private landowners

LITERATURE CITED

Bahls, P. 1992. A Survey Methodology for High Mountain Lakes, High Lake Fisheries Project 1991. Nez Perce National Forest, U. S. Forest Service, Grangeville, Idaho, and Idaho Fish and Game, Boise, Idaho.

Ball, K., V. Moore, and J. Curran. 1982. Federal Aid in Fish and Wildlife Restoration, Regional Fishery Management Investigations, F-71-R-6, Job Performance Report, Idaho Department of Fish and Game, Boise.

Brimmer, A., T. Curet, B. Esselman, and K. Andrews. 2006. Federal Aid in Fish Restoration, Regional Fishery Management Investigations, Salmon Region 2003. F-71-R-25, Job Performance Report, Idaho Department of Fish and Game, Boise.

Cassinelli, J., S. Rosenberger, and F. Bohlen. 2011. 2011 Calendar Year Hatchery Chinook Salmon Report: IPC and LSRCP Monitoring and Evaluation Programs In The State Of Idaho. Report Number 12-02. Idaho Department of Fish and Game, Boise.

Chapman, D. G. 1948. A mathematical study of confidence limits of salmon populations calculated by sample tag ratios. International Pacific Salmon Fishery Commission, Bulletin 2: 67-85.

Corley, D. R. 1972. Snorkel trend counts of fish in the Middle Fork Salmon River – 1971. Completion report. Idaho Department of Fish and Game, Boise.

Curet, T., B. Esselman, A. Brimmer, M. White, and M. Green. 2009a. Fishery Management Investigations, Salmon Region 2007. Idaho Department of Fish and Game, Boise.

Curet, T., B. Esselman, and M. White. 2010. Fishery Management Investigations, Salmon Region 2009. Idaho Department of Fish and Game, Boise.

Curet, T., B. Esselman, M. White, J. Hansen, B. Buechel. 2011. Fishery Management Investigations, Salmon Region 2010. Idaho Department of Fish and Game, Boise.

Davis, J. A., J. R. Lukens, and W. C. Schrader. 1992. Federal Aid in Fish Restoration, Regional Fishery Management Investigations, F-71-R-14, Job Performance Report, Idaho Department of Fish and Game, Boise.

Esselman, B., K. Andrews, T. Curet, and A. Brimmer. 2008. Federal Aid in Fish Restoration, Regional Fishery Management Investigations, Salmon Region 2004. F-71-R-29, Job Performance Report, Idaho Department of Fish and Game, Boise.

High, B., K. A. Meyer, D. J. Schill, and E. R. J. Mamer. 2008. Distribution, abundance, and population trends of bull trout in Idaho. North American Journal of Fisheries Management 28:1687-1701.

Idaho Department of Fish and Game. 2007. Fisheries Management Plan 2007 – 2012. Boise, ID.

Jeppson, P. and K. Ball. 1977. Federal Aid to Fish and Wildlife Restoration, Regional Fishery Management Investigations, Project F-71-R-1, Job 6, Job Performance Report, Idaho Department of Fish and Game, Boise.

Jeppson, P. and K. Ball. 1979. Federal Aid to Fish and Wildlife Restoration, Regional Fishery Management Investigations, Job Performance Report, Project F-71-R-3, Idaho Department of Fish and Game, Boise. (1975 Stanley L work cite)

Lamperth, J., C. Claire, and J. Lutch. 2007. Fluvial bull trout migratory dynamics and life history in the Lemhi River sub-basin, Idaho. Idaho Department of Fish and Game, Boise.

Liter, M. and J. R. Lukens. 1994. Federal Aid in Fish Restoration, Regional Fishery Management Investigations,Job Performance Report, Project F-71-R-16, Idaho Department of Fish and Game, Boise.

Lukens, J. R. and J. A. Davis. 1989. Federal Aid to Fish and Wildlife Restoration, Regional Fishery Management Investigations, Project F-71-R-13, Job 6 (SAL), Job Performance Report, Idaho Department of Fish and Game, Boise.

Mallet, Jerry. 1960. Middle Fork of Salmon River Trout Fishery Investigations. Federal Aid in Fish Restoration, Annual Progress Report, Project F-37-R1, Idaho Department of Fish and Game, Boise.

Mallet, Jerry. 1961. Middle Fork of Salmon River Trout Fisheries Investigations. Federal Aid in Fish Restoration, Completion Report, Project F-37-R2, Idaho Department of Fish and Game, Boise.

Murphy, Brian R., David W. Willis, and Timothy A. Springer. 1991. The relative weight index in fisheries management: Status and needs. Fisheries 16:30-38.

Peterson, M., K. Plaster, K. Kruse, K. McBaine, and J. Heindel. In press. Snake River Sockeye Salmon Captive Broodstock Program, 2011 Annual Progress Report, Idaho Department of Fish and Game, Boise.

Reingold, M. and J. Davis. 1987a. Regional Fishery Management Investigations. Federal Aid in Fish Restoration F-71-R-11, Job 6 (SAL), Job Performance Report, Idaho Department of Fish and Game, Boise.

Reingold, M. and J. Davis. 1987b. Regional Fishery Management Investigations. Federal Aid in Fish Restoration F-71-R-11, Job 6 (SAL), Job Performance Report, Idaho Department of Fish and Game, Boise.

Reingold, M. and J. Davis. 1988. Regional Fishery Management Investigations. Federal Aid in Fish Restoration F-71-R-12, Job 6 (SAL), Job Performance Report, Idaho Department of Fish and Game, Boise.

Ricker, W. E. 1975. Computation and Interpretation of Biological Statistics of Fish Populations. Fisheries Research Board of Canada, Bulletin 191. Ottawa, Canada.

Schrader, W. C., and J. R. Lukens. 1992. Regional Fishery Management Investigations. Federal Aid in Fish Restoration F-71-R-15, Job 6 (SAL), Job Performance Report, Idaho Department of Fish and Game, Boise.

Teuscher, David and Doug Taki. 1995. Snake River sockeye salmon habitat and limnological research, Annual report 1994. Project No. 91-71. U. S. Department of Energy, Bonneville Power Administration, Portland, Oregon.

Teuscher, David. 1999. Federal Aid in Fish Restoration. Grant F-73-R-21, Hatchery trout evaluations, Job Performance Report, Subproject #2: Zooplankton quality index. Idaho Department of Fish and Game, Boise.

Thurow, R. 1982. Middle Fork Salmon River fisheries investigations. Federal Aid in Fish Restoration F73-R-4, Job Performance Report, Idaho Department of Fish and Game, Boise.

Thurow, R. 1983. Middle Fork Salmon River fisheries investigations. Federal Aid in Fish Restoration F73-R-5, Job Performance Report, Idaho Department of Fish and Game, Boise.

Thurow, R. 1985. Middle Fork Salmon River fisheries investigations. Federal Aid in Fish Restoration F73-R-6, Job Performance Report, Idaho Department of Fish and Game, Boise.

Van Deventer, J. S. and W. S. Platts. 1986. Microfish© ver. 2.2 software system for generating population statistics from electrofishing data . General Technical Report: INT 254. U. S. Department of Agriculture, U. S. Forest Service, Intermountain Research Station, Boise, Idaho.

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