FISHERY MANAGEMENT INVESTIGATIONS

IDAHO DEPARTMENT OF FISH AND GAME

FISHERY MANAGEMENT ANNUAL REPORT

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SALMON REGION
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SALMON REGION FISHERY MANAGEMENT 2010 ANNUAL REPORT

Mountain Lake Stocking, Surveys, and Management Plan

ABSTRACT

The Idaho Department of Fish and Game (IDFG) stocked 38 mountain lakes in the Salmon-Challis National Forest (SCNF) in 2010. Twenty-seven lakes were stocked with 23, 733 westslope cutthroat trout *Oncorhynchus clarkii lewisi* fry. Seven lakes were stocked with 8,125 Troutlodge triploid rainbow trout *O. mykiss* fry and four lakes received 1,226 Arctic grayling *Thymallus arcticus* fry this year.

IDFG personnel surveyed 38 mountain lakes during 2010 by backpacking in the SCNF. Survey crews observed fish in 16 (42%) of the 38 lakes; westslope cutthroat trout was the primary fish species caught in 12 of the 16 lakes with fish. Bull trout *Salvelinus confluentus*, brook trout *S. fontinalis*, and rainbow trout were observed in one lake each. Survey crews observed but could not identify fish in one additional lake. Amphibians were detected in 23 (61%) of the 38 lakes surveyed this year. Over 970 adult and juvenile Columbia spotted frogs *Rana luteiventris* and Western long-toed salamanders *Ambystoma macrodactylum* were detected during amphibian surveys.

INTRODUCTION

The Salmon Region of IDFG has approximately one thousand mountain lakes within its borders. Of these 1,000 lakes, 201 are requested to be stocked on a three-year rotation with westslope cutthroat trout, triploid rainbow trout, Arctic grayling, and golden trout *O. aquabonita* fry. These yearly stockings provide diverse mountain lake fishing opportunities to the public. Stocking rotation A includes 60 mountain lakes, rotation B is comprised of 96 lakes, and rotation C has 45 lakes. A list of lakes and the number of fish and species stocked per lake were identified in the region's 2009 annual report (Curet et al, in press). Years of stocking for rotations A, B, and C for 2010 through 2019 are shown in Table 1.

In recent years, the Salmon Region has prioritized conducting mountain lake surveys. 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 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 (draft stage) 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 IDFG 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 SCNF were stocked with Arctic grayling, rainbow trout, and westslope cutthroat trout fry by Mackay Fish Hatchery personnel and Sawtooth Flying Service using a Cessna – 185 fixed-wing aircraft in September 2010.

Regional stocking of fry into mountain lakes follows a three-year rotation with each lake in the stocking list usually receiving fish once every three years. Salmon Region fisheries biologists use the nomenclature rotations A, B, and C to describe which lakes are stocked each year. Mountain lakes included in rotations A, B, and C were listed in the 2009 Salmon Region annual report (Curet et al, in press), including each lake's IDFG catalog number, the lake's location on national forest, national recreation land, or in the wilderness area, and the species and number of fish stocked.

Mountain Lake Surveys

Regional and retired IDFG personnel conducted surveys by backpacking into 38 mountain lakes in the SCNF. We documented fish presence and species by visual observation, angling, and gill netting. Fish were identified by species, measured to the nearest mm total length (TL), and weighed (g) except in the Bray Lakes drainage where surveys were done without a portable weight scale. 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. Shoreline 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 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 A. Data sheets were archived at the IDFG Salmon Region office.

Mountain Lake Management Plan

As part of the development of a statewide management plan. IDFG staff created a 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), current surveys (1999-2010), a list of unsurveyed lakes, and geo-referenced information was appended into the database and cursorily analyzed. 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

Mackay Fish Hatchery personnel stocked 38 mountain lakes by aircraft in the SCNF on September 3 and 15, 2010. Four lakes were stocked with 1,226 Arctic grayling fry, seven lakes were stocked with 8,125 Troutlodge triploid rainbow trout fry, and 27 lakes were stocked with 23,733 cutthroat trout fry. At the time of stocking, rainbow trout fry averaged 31 mm TL, Arctic grayling averaged 28 mm TL, and cutthroat trout fry averaged 29 mm TL. Two lakes (Devils and Iron #1) were inadvertently missed on the cutthroat stocking run this year. The 2010 total

flight time was 11.1 hrs at a cost of $5,287, or an average of $139.13 per lake. By comparison, in 2009, 13 lakes were stocked during one hr of flight time at a cost of $1,606.00, or an average of $94.97 per lake. Higher costs were encountered this year when Mackay Fish Hatchery personnel flew the first stocking run on August 30, but could not stock lakes due to dense cloud cover. Stocking was completed during two additional flights on September 3 and 15, 2010. Golden trout fry were not stocked per schedule in five lakes in 2010 due to a disease risk of receiving golden trout eggs from California.

Mountain Lake Surveys

Surveys of 38 mountain lakes were conducted during June through September 2010 (Table 3). IDFG personnel observed fish in 16 (42%) of the 38 lakes surveyed. Westslope cutthroat trout were detected in 12 of the 16 lakes with fish (Table 3). Bull trout and brook trout were detected in one lake each. Rainbow trout were found in six lakes (including five lakes with other species). In one additional lake, Puddin Mountain Lake #1, the survey crew observed fish rising, but could not identify them to species. Likely, these fish were rainbow trout as the lake receives 500 rainbow trout fry in stocking rotation C.

The 2010 surveys produced a few interesting findings. Three previously stocked lakes, Bray Lake #2, Puddin Mountain Lake #9, and Ship Island Lake #6, were found to have naturally reproducing cutthroat trout populations. An angling survey in Bray Lake #2 produced cutthroat trout averaging 295 mm TL while surveys in Puddin Mountain Lake #9 and Ship Island Lake #6 found robust populations of cutthroats up to 382 mm TL and 314 mm TL, respectively. Kidney Lake #1 was last stocked with rainbow trout in 1996; no fish were detected during this year's lake survey. One lake, Opal Lake, was found to have a species present other than the species stocked by IDFG. Opal Lake was stocked with cutthroat and rainbow-cutthroat hybrids in 1977 and 1980, respectively. However, bull trout was the only species (n=30) caught by the 2010 survey crew. Bull trout presence may be the result of natural recruitment or a past error in department stocking. The composition of fish species changed in four lakes surveyed this year. Puddin Mountain Lakes #5 and #6 are stocked on a three-year rotation with rainbow trout, yet cutthroat trout was the most numerous species detected by angling. Rainbows were also caught by hook and line in lesser numbers in both lakes. South Fork Fall Creek Lake #3 was stocked with rainbow trout in 1997, but the lake is now populated by brook trout. Likely, these brook trout are descendants of a 1949 brook trout stocking, according to stocking cards archived at the Salmon Region office. Almost 80 brook trout were caught using two survey methods in 2010: 25 by angling and 52 by gill netting. Bray Lake #6 has never been stocked with brook trout, according to archived regional stocking cards and IDFG on-line stocking records dating back to 1967. This year westslope cutthroat trout were observed in the lake. We suspect the presence of cutthroats in Bray #6 is the result of natural recruitment within the drainage as Bray #2 was stocked with a total of 2,500 cutthroat fry from 1986 to 1998. Stocking should continue in eight of the previously stocked lakes in the Puddin Mountain and Ship Island Creek drainages. Kidney Lake #1 should not be considered for re-stocking as numerous adult and juvenile Columbia spotted frogs and long-toed salamanders were observed in 2010. Its nearby lake, Kidney #2, is currently stocked; therefore Kidney #1 should remain fishless as refugia for amphibians.

Amphibians were observed in 23 (61%) of 38 amphibian surveys conducted in 2010 (Table 3). Over 970 Columbia spotted frogs and Western long-toed salamanders were detected in 23 mountain lakes. A total of 678 Columbia spotted frogs were observed, consisting of 127 adults and 551 juveniles. Long-toed salamander observations totaled 293 and included 87 adults and 206 juveniles. Kidney Lake #3 had the top count of 251 amphibians among the 23

lakes where amphibians were detected. Also of note this year were the results from South Fork Fall Creek Lake #4 where the survey crew observed 40 adult and 5 juvenile long-toed salamanders in 45 minutes (22.5 minutes per surveyor). The crew estimated they had covered only 20% of the lake shore perimeter when they stopped the survey. However, they noted that after stopping the survey, they continued to encounter salamanders "everywhere without even looking for them" (B. Buechler, IDFG, personal communication). Amphibians were not detected during surveys at 15 lakes in 2010.

The percentage of surveyed lakes where amphibians were detected but fish were not detected was 36.8 (n=14) in 2010 (Table 4). The percent of lakes that had both fish and amphibians detected was 23.7 (n=9) while the percent of lakes with fish but no amphibians was 18.4 (n=7). The percent of lakes that had no amphibians and no fish detections was 21.1% (n=8). A comparison table of the 2010 percentages with a similar exercise of the region's mountain lake fish and amphibian presence/absence data for years 1999 through 2007 is shown in Table 4. This year's survey indicated a high percentage of lakes where amphibians were detected but no fish were observed (36.8%) when compared to the 1999-2007 average of 25.7% for Salmon Region mountain lakes. Pilliod and Peterson (2001) asserted that the abundance of long-toed salamanders and Columbia spotted frogs were significantly lower in lakes with fish compared to lakes without fish. The 23.7% of lakes where both fish and amphibians were observed this year appeared much higher than the 12.4% observed in 72 Salmon Region lakes in the 1999-2007 dataset (Table 4). An unseasonably wet spring and summer in the Salmon area during 2010 may have contributed to an increase in amphibian reproductive habitat and subsequent juvenile amphibian observations among the mountain lake survey sites.

Mountain Lake Management Plan

Salmon Region fishery staff worked closely with other IDFG fishery managers and IDFG's Information Systems (IS) staff to assimilate and verify historic and current mountain lake survey data in the geo-referenced statewide database. McCall Fishery Manager Dale Allen and IS staff developed and printed a notebook of geo-referenced maps detailed to the hydrologic unit code (HUC) 6 level for each IDFG region with mountain lakes. Each HUC 6 entry contains summary information on the number of lakes, the number of lakes surveyed and not surveyed, total area (ha) of surveyed and unsurveyed lakes, fish and amphibian presence by species and lake, and stocking data by species and lake.

MANAGEMENT RECOMMENDATIONS

1. Continue stocking mountain lakes using Rotation C in 2011.
2. Stock all Arctic grayling and golden trout lakes in 2011 that were not stocked in 2007, through 2010.
3. Coordinate with the IDFG's Fisheries Bureau to find a reliable, consistent source of Arctic grayling, westslope cutthroat trout, and golden trout fry.
4. Continue surveys of mountain lakes to update the status of fish and amphibian populations, human use, and the success of current stocking strategies.
5. Continue to work with affected managers to draft the written portion of a Mountain Lake Management Plan.

Table 1. Salmon Region stocking rotations A,B,and C by year, 2010 through 2019.

	Stocking Rotation		
	A	B	C
Year of Stocking			2010
	2011	2012	2013
	2014	2015	2016
	2017	2018	2019

Table 2. Bahls total campsite impact rating for lakes.

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

Table 3. Salmon Region mountain lakes (n=38) surveyed in 2010.

LLID[a]	IDFG Catalog No.	Lake Name	Survey Date	Primary Fish Species Observed	Amphibian Species Observed
1138550448415	7-1237	Basin Creek Lake #5	7/8/2010	Westslope cutthroat trout	None
1138148446742	0	Bray Lake #1	8/25/2010	Fishless	None
1138162446756	7-1247	Bray Lake #2	8/25/2010	Westslope cutthroat trout	None
1138211446807	0	Bray Lake #3	8/25/2010	Fishless	None
0	0	Bray Lake #4	8/25/2010	Fishless	None
0	0	Bray Lake #5	8/25/2010	Fishless	None
0	0	Bray Lake #6	8/26/2010	Westslope cutthroat trout	None
0	0	Bray Lake #8	8/26/2010	Fishless	None
0	0	Bray Lake #9	8/26/2010	Fishless	None
1149732445262	7-1030	Kidney Lake #1	9/15/2010	Fishless	Columbia spotted frog
0	7-1030A	Kidney Lake #1A	9/15/2010	Fishless	None
1149724445226	7-1033	Kidney Lake #2	9/15/2010	Westslope cutthroat trout	Columbia spotted frog and Western long-toed salamander
1149729445197	7-1034	Kidney Lake #3	9/15/2010	Fishless	Columbia spotted frog
1142819448993	7-1208	Opal Lake	6/27-28/2010	Bull trout	None
1145954450977	7-0764	Puddin Mountain Lake #1	8/12/2010	UNK[b]	Columbia spotted frog
1145991450982	7-0766	Puddin Mountain Lake #2	8/13/2010	Rainbow trout	Columbia spotted frog
1145998450998	7-0768	Puddin Mountain Lake #3	8/13/2010	Fishless	Columbia spotted frog and Western long-toed salamander
1146014451056	7-0768	Puddin Mountain Lake #4	8/12/2010	Fishless	Western long-toed salamander
1146011451028	7-0768A	Puddin Mountain Lake #4A	8/12/2010	Fishless	Columbia spotted frog and Western long-toed salamander
1146043451058	7-0770	Puddin Mountain Lake #5	8/12/2010	Westslope cutthroat trout	Western long-toed salamander
1146045451006	7-0773	Puddin Mountain Lake #6	8/12/2010	Westslope cutthroat trout	None
1146083451005	7-0774	Puddin Mountain Lake #7	8/12/2010	Fishless	Western long-toed salamander
1146094451014	7-0775	Puddin Mountain Lake #8	8/12/2010	Fishless	Columbia spotted frog and Western long-toed salamander

Table 3. Continued.

LLID[a]	IDFG Catalog No.	Lake Name	Survey Date	Primary Fish Species Observed	Amphibian Species Observed
1146087451088	7-0777	Puddin Mountain Lake #9	8/11/2010	Westslope cutthroat trout	Western long-toed salamander
1146131451117	7-0778	Puddin Mountain Lake #10	8/11/2010	Westslope cutthroat trout	Western long-toed salamander
1145997451140	7-0783	Puddin Mountain Lake #12	8/13/2010	Fishless	Columbia spotted frog and Western long-toed salamander
1146039451114	7-0784	Puddin Mountain Lake #13	8/13/2010	Fishless	Columbia spotted frog
1146072451166	7-0785	Puddin Mountain Lake #14	8/11/2010	Fishless	Columbia spotted frog and Western long-toed salamander
1146087451196	7-0787	Puddin Mountain Lake #15	8/11/2010	Westslope cutthroat trout	Western long-toed salamander
1145991451563	7-0618	Ship Island Lake #5	8/15/2010	Westslope cutthroat trout	Columbia spotted frog
1146022451530	7-0619	Ship Island Lake #6	8/14/2010	Westslope cutthroat trout	None
1146037451501	7-0620	Ship Island Lake #7	8/14/2010	Westslope cutthroat trout	None
1146003451528	7-0624	Ship Island Lake #8	8/14/2010	Fishless	Columbia spotted frog
1151679444717	7-1085	South Fork Fall Creek Lake #1	9/14/2010	Fishless	Columbia spotted frog and Western long-toed salamander
0	7-1085A	South Fork Fall Creek Lake #1A	9/14/2010	Fishless	Columbia spotted frog
1151635444688	7-1087	South Fork Fall Creek Lake #2	9/14/2010	Fishless	Western long-toed salamander
1151701444594	7-1088	South Fork Fall Creek Lake #3	9/15/2010	Brook trout	None
1151800444577	7-1089	South Fork Fall Creek Lake #4	9/13/2010	Fishless	Western long-toed salamander

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

[a] UNK=Unknown; fish present but not identified.

Table 4. Fish and amphibian presence/absence observations and percents for mountain lakes surveyed in 2010 compared to a Salmon region-wide summary of mountain lakes surveyed from 1999 through 2007.

	2010		1999-2007	
Fish and Amphibian Presence/Absence Criteria	No. Lakes	Percent	No. Lakes	Percent
No. of lakes with fish and with amphibians	9	23.7	72	12.4
No. of lakes with no fish and with amphibians	14	36.8	149	25.7
No. of lakes with fish and no amphibians	7	18.4	165	28.5
No. of lakes with no fish and no amphibians	8	21.1	193	33.3
Total	38		579	

SALMON REGION FISHERY MANAGEMENT 2010 ANNUAL REPORT

Surveys and Inventories - Lowland Lakes

ABSTRACT

Regional fishery staff sampled fish populations in selected lowland lakes to assess population size structures, relative weights, and relative changes in zooplankton abundance and forage availability in 2010. A gill net set in Alturas Lake captured 678 fish, of which salmonids comprised 17% of the catch. In Herd Lake, survey results were used in a continuing effort to determine the effectiveness of tiger muskellunge (northern pike *Esox lucius* x muskellunge *E. masquinongy*) introductions to improve the size structure of fish populations. Average relative weights (Wr) increased slightly for rainbow trout, from 77.1 in 2010 compared to 76.6 in 2009. Average Wr from the past four sample periods in Herd Lake are all higher when compared to the relative weight values observed before tiger muskellunge introduction. Rainbow trout sampled by gill nets in Jimmy Smith Lake showed a decrease in average weight, catch-per-unit-effort (CPUE), and average Wr in 2010. Results of the past three sample years in Jimmy Smith Lake showed lower catch rates, an overall decrease in average length and average weight of rainbow trout, and lower Wr values. A gill net set in Stanley Lake resulted in capturing 83 fish, comprised of 46 kokanee *O. nerka*, 18 lake trout *S. namaycush*, 16 brook trout, and 3 hatchery rainbow trout. Nine lake trout received numbered, non-reward spaghetti tags before release to monitor lake trout growth during future sampling. The 2010 gill net set in Williams Lake produced a total catch of 201 fish, comprised of 168 rainbow trout and 33 bull trout. This year's ratio of 84% rainbow trout and 16% bull trout showed a return to expected proportions from the skewed 38% rainbow trout and:62% bull trout ratio recorded in the 2009 gill net effort. In 2010, we determined the average zooplankton quality index (ZQI) for Williams Lake to be 0.23, the lowest value calculated for eight sample periods from 2000 to 2010. An over-night gill net effort in Yellowbelly Lake resulted in 176 fish encountered. Salmonids comprised 9% of the catch while sucker *Catastomus sp.* and northern pikeminnow *Ptychocheilus oregonensis* made up the other 91%. In a continuing effort to establish a cutthroat trout fishery in Yellowbelly Lake, 38,160 cutthroat fry were released in 2010. Management has requested that approximately 30,000 cutthroat fingerlings be released for three more years in Yellowbelly Lake as part of a five-year release program.

INTRODUCTION

The Salmon Region contains 23 lowland lakes, 2 reservoirs, and 11 public ponds (Curet et al, in press). Regional fishery staff defines its 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 IDFG Fisheries Management Plan, 2007 - 2012.

OBJECTIVES

Alturas Lake

Survey the fish population in Alturas Lake to determine fish composition and size structure.

Herd Lake

Assess the effects of a tiger muskellunge introduction to control the localized, self sustaining rainbow trout population.

Jimmy Smith Lake

Monitor Jimmy Smith Lake's rainbow trout population to determine whether management action is necessary to improve the trout population's size structure.

Merriam Lake

Survey the fish populations in Merriam Lake to assess the effects of tiger muskellunge introductions on the resident brook trout populations.

Spruce Gulch Lake

Survey the fish populations in Spruce Gulch Lake to assess the effects of tiger muskellunge introductions on the resident brook trout populations.

Stanley Lake

Survey the fish population in Stanley Lake. Continue a non-reward tagging study initiated in 2007 to monitor lake trout growth in subsequent sample years.

Williams Lake

Survey the rainbow and bull trout populations in Williams Lake to determine whether 2009 findings of a skewed proportion of rainbow and bull trout indicate a change in the lake's population dynamics.

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

Spawn rainbow trout collected from Lake Creek, the inlet tributary to Williams Lake, and release progeny back into Lake Creek to alleviate public pressure to stock Williams Lake from a hatchery source.

Yellowbelly Lake

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

STUDY AREA AND METHODS

Alturas Lake

Alturas Lake is a highly oligotrohic lake located in southern Custer County sitting at 2,138 m elevation and at datum WGS84, decimal degree coordinates of 43.91518°N and 114.85916°W. The lake has a surface area of 338.2 ha and 7.9 km of shoreline. Its outlet and inlet are both Alturas Lake Creek. The inlet is on the southwest end of the lake and the outlet is on the northeast end. The lake supports a population of bull trout, along with kokanee, mountain whitefish *Prosopium williamsoni*, suckers, northern pikeminnow, and hatchery rainbow trout.

Regional fishery staff sampled Alturas Lake on June 24 - 25, 2010 using eight experimental, variable mesh gill nets comprise of two floating and six sinking nets. The nets were set in the evening of June 24 and pulled and reset every 1-2 hrs to minimize bull trout mortalities. Nets were removed between 0230 and 0456 hrs on June 25. Fish captured were identified to species and measured in total length (mm). Fish from nets five through eight were additionally weighed (g). Fish length and weight data were used to calculate Wr using formulas developed by Murphy et al. 1991. Genetic samples and otoliths were taken from a representative number of captured bull trout. Stomach contents of bull trout were also identified and recorded at the time of otolith extractions.

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°N, 114.17364°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 lake's rainbow trout population, 72 tiger muskellunge were stocked in 2006.

Regional fishery staff sampled Herd Lake on May 25-26, 2010 using four experimental variable mesh gill nets. The nets were set in the afternoon of May 25, fished overnight, checked, and removed the following afternoon. Fish captured were identified to species, measured in total length (mm), and weighed (g). Wr values were calculated using methods described above.

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 Mackay Fish Hatchery between 1927 and 1938. The lake has not been stocked since that time.

Two floating and two sinking experimental, variable mesh gill nets were used May 25-26, 2010 to sample the rainbow trout population of Jimmy Smith Lake. The nets were set in the afternoon of May 25, fished overnight, checked, and removed the following morning. Captured fish were identified to species, measured for total length (mm), and weighed (g). Rainbow trout Wr values were calculated using methods described above.

Merriam Lake

Merriam Lake, also called Marion or Merrian Lake, has 3.0 ha of surface area and located at on the east side of the Lost River Range and southeast of Borah Peak (WGS84 datum, latitude and longitude decimal degree coordinates of 44.11545°N, 113.75458°W). Situated at 2,927 m in elevation, the lake has one inlet. The outlet flows northeast into the West Fork Pahsimeroi River. Access to the lake is by a pack trail off the West Fork Pahsimeroi River road.

According to IDFG stocking cards at the Salmon Region office, Merriam Lake was stocked with brook trout in 1949. A 2005 gill net survey of the lake resulted in 37 brook trout caught during 73.3 net hrs for a 0.5 fish/hr catch rate (Esselman et al 2007). In an effort to reduce the brook trout population and improve the size and condition of remaining brook trout, 107 tiger muskellunge were introduced into the lake in June 2007 (Koenig 2010). Merriam Lake has been sampled yearly following the introduction of tiger muskellunge.

Two Swedish backpack nets, comprised of experimental, variable multifilament mesh, were used August 12 - 13, 2010 to sample the brook trout population of Merriam Lake (Koenig in press). The nets were set at 1700 hrs August 12, fished overnight, and pulled at 0745 hrs the next morning. IDFG research staff also angled the lake to collect additional samples of brook trout and tiger muskellunge with a variety of flies and lures. All fish were identified to species and measured for total length (mm). Net-captured fish were also weighed (g).

Spruce Gulch Lake

Spruce Gulch Lake, residing at the head of Spruce Gulch Creek, is located approximately 20 km northwest of the town of Challis, Idaho (WGS84 datum, latitude and longitude decimal degree coordinates of 44.60563°N, 114.45298°W). The lake has 4.4 ha of surface area and is at 2,700 m in elevation. The lake has one inlet and the outlet flows into Bear Creek, a tributary of Challis Creek. Access to the lake is by a 4-wheel drive road off White Valley Creek, another tributary of Challis Creek.

The lake has a stocking history dating back to 1937, according to IDFG stocking cards at the Salmon Region office. Brook trout were stocked in 1937, 1941, and 1949. Cutthroat trout were added in 1948, 1959, and 1964. The first survey of Spruce Gulch Lake, done in June 2005 by a crew from the U. S. Forest Service (USFS) Lost River Ranger District, resulted in

finding only brook trout in the lake, with many age classes observed. Angling by the USFS crew produced a catch rate of 5.0 fish/hr. The second survey was conducted in late September 2005 by IDFG research staff from Nampa to document baseline data prior to tiger muskellunge introduction. The IDFG survey resulted in capturing 63 brook trout during 65.5 gill net hrs for a catch rate of 1.0 fish/hr. In an effort to reduce the brook trout population and improve the size and condition of remaining brook trout, 439 tiger muskellunge were introduced into the lake in June 2007 (Koenig 2010). Merriam Lake has been sampled yearly following the introduction of tiger muskellunge.

Spruce Gulch Lake was surveyed on August 25-26, 2010 following the same methods described above for Merriam Lake (Koenig, in press). Times differed slightly with the two nets being set at 1850 and 1905 hrs, respectively, on August 25, fished overnight, and pulled at 0715 and 0730 hrs, respectively, the next morning.

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^{o}N, 115.05603^{o}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. The outlet stream begins on the east end of the lake and includes a barrier that was constructed 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, 15,219 lake trout fingerlings (averaging 89 mm TL) were stocked to help reduce the number of stunted kokanee (Jeppson and Ball 1979). Three years following the introduction of lake trout, Jeppson and Ball (1979) collected three lake trout averaging 222 mm in length. In May 1981, IDFG lake surveys reported 14 lake trout were caught, averaging approximately 365 mm total length (Ball, Moore, and Curran 1982). Reingold and Davis (1987b) captured 12 lake trout averaging 650 mm total length in 1986. In 1993, Teuscher (1999) reported a wide range of lake trout lengths, measuring approximately 200 to 680 mm total length. The shorter lengths of lake trout identified by Teuscher in 1983 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/hr for Teuscher's June and September 1993 surveys, respectively. Brook trout, rainbow trout, and kokanee were also reported in the 1993 surveys. The lake was surveyed using gill nets again in 2007. Lake trout averaged 651.2 mm TL during 165.4 hrs of gill netting (Curet et al, 2009a). Brook trout, hatchery rainbow trout, kokanee, and redside shiner *Richardsonius balteatus* were also captured during the 2007 effort, resulting in an overall catch rate of 0.4 fish/hr. Recently, the lake has become one of the trophy fisheries within the Stanley Basin and the Salmon Region.

Regional fishery staff sampled Stanley Lake on June 28 - 29, 2010 using eight experimental, variable mesh gill nets. The nets (2 floating, 6 sinking) were set the evening of June 28, fished for approximately 14 hrs per net, and then removed in the next morning. Fish captured were identified to species, measured in total length (mm), and weighed (g). Wr values were calculated using methods described above. Otoliths were taken from a small number of lake trout. Total length, weight, gender, degree of sexual maturity and stomach contents were also identified and recorded at the time of otolith extractions. A representative sample of lake trout also received a 30.5 mm dark green spaghetti tag looped and tied through the fish under the dorsal fin. These non-reward tags, each stamped with IDFG and a five-digit number, will be used to monitor lake trout growth during subsequent sampling.

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°N, 113.97619°W) at 1,600 m elevation. The lake has a surface area of 72.8 ha, a maximum depth of 58 m, and a mean depth of 23 m. The principle in-flow is provided by Lake Creek, with other water sources originating from springs and intermittent streams. The lake supports a naturally reproducing rainbow trout population that includes trophy sized fish. Bull trout is the only other fish species recorded inhabiting the lake. A posted boundary sign at the mouth of Lake Creek limits fishing in Lake Creek during rainbow trout spawning season prior to the fishing season opener for the creek on July 1.

On the afternoon of October 12, 2010, five experimental variable mesh gill nets were set to monitor the trout populations in Williams Lake. Nets were checked every hr to reduce the number of bull trout mortalities. Crews were instructed to pull nets once 15 bull trout mortalities had been counted. If the number of mortalities stayed within guidelines (<15 mortalities), crews could continue fishing the nets until daylight at approximately 0715 hrs. IDFG personnel pulled and removed the nets in the early morning hrs on October 13 for an average of 9.6 hrs of fishing-time-per-net. All fish were identified to species, measured for total length (mm), and weighed (g). Genetic samples were taken from all bull trout. Live bull trout were released following measurement.

Zooplankton samples were taken from three locations, near the inlet, mid-lake, and near the outlet of Williams Lake, on the afternoon of August 31, 2010 following methods outlined by Teuscher (1999). Samples were stored in 100% ethyl alcohol for 11 days, at which time ZQI values were analyzed using methodology developed by Yule and Teuscher.

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

Dissolved oxygen (DO) levels have been sampled at Williams Lake during the winter months for seven of the past eleven years. On February 11, 2010, a regional fishery biologist and an IDFG cooperator drilled a hole in the ice at the approximate location of the lake's deepest point (Zmax) to perform 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 m in depth. One water temperature reading was also recorded at the water surface.

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°N, 114.87677°W. The principle in-flow is provided by Yellowbelly Lake Creek. Yellowbelly Lake is managed as a catch-and-release westslope cutthroat trout fishery. Documented fish species in the lake are brook trout, westslope cutthroat trout, rainbow trout, bull trout, northern pikeminnow, and suckers. 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 Sawtooth National Recreation Area personnel to reestablish connectivity with the main-stem Salmon River.

Eight experimental, variable mesh gill nets, four floating and four sinking, were used from June 2-3, 2010 to sample the fish population of Yellowbelly Lake. The nets were set in the early afternoon, fished overnight, then checked and removed the following morning and early afternoon. Captured fish were identified to species, measured for total length (mm), and weighed (g). Genetic samples were collected from bull trout and stored in individually labeled vials at IDFG's Salmon Regional office.

RESULTS AND DISCUSSION

Alturas Lake

The gill net survey at Alturas Lake captured a total of 678 fish in 2010 (Table 5). The catch was comprised of 75 bull trout, 22 hatchery rainbow trout, 17 mountain whitefish, 279 largescale sucker *Catastomus macrocheilus*, and 285 northern pikeminnow. Bull trout made up 11% of the catch, hatchery rainbow trout and mountain whitefish each added 3%, while sucker and northern pikeminnow took up the remaining 83%. Salmonids comprised 17% of the total catch in 2010 compared to 51% in 2007 (Table 5). Although the methods were similar for both surveys, the 2007 effort focused on capturing salmonid samples for mercury testing and was not a standard overnight gill net set. Therefore, the two datasets are not directly comparable. The two surveys (2007 and 2010) are the only gill net data recorded for Alturas Lake in the last twenty years. Eight gill nets were used this year while seven were used in 2007. Of the eight nets used this year, two were floating and six were sinking while the 2007 survey used two floating and five sinking nets. Gill nets were fished almost twice as many hrs this year, 70.1 total hrs versus 36.9 in 2007. In 2010, each net was fished an average of 8.8 hrs in the overnight set. By comparison, the 2007 nets were fished an average of 5.3 hrs each only during daylight hrs.

Herd Lake

A gill net set on May 25 - 26, 2010 resulted in a total catch of 358 wild rainbow trout (Table 6). Results of this year's survey showed a small decrease in average total length and average fish weight compared to 2009. In 2010, rainbow trout ranged in size from 113 - 315 mm TL (Figure 1) and had a mean total length of 224 mm compared to 230 mm in 2009. Average rainbow trout weight in 2010 was 106 g compared to 119 g in 2009 (Table 6). The average relative weight of 77.1 this year showed an increase when compared to the average value of 76.6 for 2009. This year's value also represents the fourth highest average Wr calculated during the past six sampling periods. Additionally, the past four most recent values were all higher when compared to the Wr values of 73.8 and 71.8 observed in the pre-tiger muskellunge introduction samples in 2005 and 2003, respectively (Table 6). The decrease in both average total length and average weight of Herd Lake rainbow trout sampled in 2010 coincided with a higher average Wr value. The overall catch rate for nets this year represents the second highest CPUE for Herd Lake for the past 10 sample years (Table 6). The 2010 catch rate of 4.5 fish/hr was exceeded numerically only by the 2008 rate of 10.0 fish/hr. It should be noted, however, that the 2008 rate was derived from a hook-and-line sample, making the 2008 value not comparable to the other nine values derived from gill net sets.

Changes in the rainbow trout size structure resulting from the 2006 tiger muskellunge introduction would have been expected to be observed in this year's survey. However, no dramatic changes were detected. Tiger muskellunge have not been encountered in gill nets, angling surveys, nor reported by anglers, and the lack of response in CPUE's, Wr, and average size of rainbow trout suggest it is likely the introduction was unsuccessful. Restocking the lake with additional tiger muskellunge and the liberalization of the bag limit from 6 fish to 25 fish in the 2011 - 2012 fishing rules should have a positive impact on the size structure of the rainbow trout population.

Jimmy Smith Lake

Regional fishery staff captured 591 rainbow trout during 71.7 gill net hrs in 2010 (Table 7). Rainbow trout had a size range of 100 - 295 mm total length with an average of 205 mm (Figure 2). The 2010 catch rate of 8.2 fish per hr was slightly lower than the 2008 and 2009 rates of 10.1 and 9.9 fish per hr, respectively (Table 7). Mean average weight of rainbow trout dropped to 80.5 g in 2010 compared to 100 g and 84 g in 2008 and 2009, respectively. Mean Wr decreased this year in the rainbow trout sample, dropping to 75.5 in 2010, compared to 77.7 and 80.1 for the two previous years. Lower catch rates, decreased average lengths and average weights of rainbow trout, and lower Wr values for the past three sample years suggest an increased population size. Increased competition for available food resources may also be occurring in Jimmy Smith Lake. Although no ZQI sampling was done in 2010, ZQI values for the past three sample periods (2007 to 2009) have been <= 0.02 (Curet el al, in press). Teuscher's (1999) ZQI rating table showed that the three 2007 to 2009 values of <= 0.02 suggests that forage resources in the lake may be limiting. ZQI values in Jimmy Smith Lake have varied little, with values of 0.00 to 0.17, over the years the lake has been surveyed. However, based on the recent decrease in average lengths, weights, and Wr of sampled rainbow trout in 2008 to 2010, zooplankton abundance in the lake likely should be monitored in 2011. Further, the new fishing rules of 2011-2012 increase the bag limit from 6 fish to 25 fish. This management action should have a positive impact on the size structure of this population.

Merriam Lake

A total of 38 brook trout were captured from gill net and hook and line efforts in Merriam Lake in 2010 (Koenig, in press). Nine brook trout, ranging in size from 235 - 275 mm TL, were captured during 4.25 hrs of angling. Another 29 brook trout that ranged in size from 98 - 225 mm TL were caught during 29.5 gill net hrs. No tiger muskellunge were observed during this year's survey. More complete results and comparisons of this year's results with past efforts at Merriam Lake can be found in Koenig's (in press) report on use of tiger muskellunge to remove brook trout.

Spruce Gulch Lake

Seventeen brook trout were captured by gill net and hook-and-line at Spruce Gulch Lake in 2010 (Koenig, in press). Four brook trout and one tiger muskellunge were caught during 1.3 hrs of angling. The tiger muskellunge was released after a measurement of 737 mm TL was taken. The four brook trout ranged in size from 315 - 385 mm TL. An additional 12 brook trout were captured during 24.8 gill net hrs. These 12 fish ranged in size from 239 - 352 mm TL. The crew observed 10 other tiger muskellunge in the lake that ranged from approximately 356-762 mm TL. More complete results and comparisons of this year's results with past efforts at Merriam Lake can be found in Koenig's (in press) report on use of tiger muskellunge to remove brook trout.

Stanley Lake

Regional fishery staff captured 83 fish in Stanley Lake in 2010. Fish composition consisted of 46 (55%) kokanee, 18 (22%) lake trout, 16 (19%) brook trout, and 3 (4%) hatchery rainbow trout (Table 8). In 2007, by comparison, gill net efforts resulted in capturing 20 (28%) kokanee, 43 (60%) lake trout, 3 (4%) brook trout, and 5 (7%) hatchery rainbow trout (Table 8). The kokanee captured in 2010 had an average TL of 215 mm and ranged in size from 188 - 271 mm. Brook trout mean size was 219 mm with a range of 165 - 310 mm. Lake trout averaged 689 mm and had the widest range of lengths, from 269 - 915 mm TL. The hatchery rainbow trout average length was 190 mm with the three-fish sample ranging in size from 155 - 260 mm. Eight gill nets were fished a total of 111.5 hrs for an average CPUE of 0.7 fish/hr (Table 8).

Nine lake trout received IDFG numbered spaghetti tags in 2010 and were placed back into Stanley Lake. Otoliths were extracted from eight lake trout in 2010 and are archived in the Salmon Region office. Additional data collected on these eight fish, including mm total length, weight, sex, sexual maturity classification, and stomach contents, are shown in Table 9.

Williams Lake

An overnight gill net set on October 12, 2010 at Williams Lake produced a catch of 168 rainbow trout and 33 bull trout (Table 10). Rainbow trout ranged in size from 157-459 mm TL and averaged 307 mm in this year's sample. While the size range of rainbow trout this year closely followed results found in 2009, average TL increased 13 mm from 295 mm in 2009.

The number of bull trout captured this year (n=33) represents the largest number of this species sampled to date. The protocol of checking gill nets approximately every hr may have contributed to the increased number of encounters. While 19 bull trout were gill net mortalities, 14 others were released after being measured, weighed, and having a genetic sample taken. In 2010, bull trout had a size range of 132 - 396 mm TL and averaged 257 mm (Table 10). Weights on the 33-fish sample ranged from 48 - 508 g and averaged 173 g. This year's length range appeared to include younger-aged bull trout when compared to the 2009 sample. Eight fish measured <200 mm TL in 2010 and the shortest bull trout measured 132 mm TL. In 2009, there was no bull trout sampled less than 200 mm TL and the shortest was 230 mm TL. Bull trout Wr for were calculated for the first time in 2010 for Williams Lake fish. The average bull trout Wr in 2010 was a remarkable 115.3 for the 33-fish sample. A value of 100 is considered average for a population.

In 2010, gill net sampling covered one over-night set while in 2007 and 2009, the sampling period was an evening set. Limits on bull trout mortality during the 2007 and 2009 samples inhibited the standard over-night gill net set protocol. CPUE results of 7.8 in 2007 were dramatically greater than previous surveys. An unusually skewed ratio of rainbow trout to bull trout (38% rainbows, 62% bull trout) in 2009 increased regional concerns about the rainbow trout population. However, given the changes in gill net protocol in 2007 and 2009, it was hard to draw solid conclusions. An attempt in 2010 to more closely follow the standard gill net protocols, with the exception of releasing live bull trout from the nets approximately every hr, resulted in CPUE, numbers and a ratio of rainbow trout and bull trout more similar to pre-2007 surveys (Table 10).

Zooplankton sampling produced a ZQI average value of 0.23 in 2010 (Table 11), suggesting that competition for food may be occurring using Teuscher's (1999) ratings in Table 12. This year's value is the lowest of the eight sample periods. We cannot explain why the

mean ZQI value is so low this year when the average Wr of sampled rainbow trout and bull trout this year suggest a healthy fish population. Teuscher indicated that zooplankton productivity may not be the problem as much as likely an overall reduction in bottom-up influences i.e. nutrient loading (D. Teuscher, personal communication). Prior to 2010, ZQI values have averaged greater than 0.50 for all years sampled (Table 11; Figure 3). The average zooplankton ratio (ZPR) value for Williams Lake was calculated at 0.62 in 2010, up from a value of 0.51 in 2009 (Table 11; Figure 3).

On May 3, 2010, 11 female and 11 male rainbow trout were collected and spawned, followed by an additional 12 pairs of rainbow trout collected and spawned on May 10, 2010. Two IDFG cooperators tended the fertilized eggs until "button up." Approximately 45,000 fry were released into Lake Creek on June 22, 2010.

On February 11, 2010, DO sampling at the deepest point of Williams Lake indicated acceptable DO levels in the first two meters of depth below the ice (Table 13). DO readings of 11.13 parts mg/L at one m and 4.67 mg/L at two m were recorded, respectively. From three m to ten m, DO levels decreased from 3.68 mg/L to 1.41 mg/L, respectively. This sampling profile is one which has repeated itself during most winter DO samplings of the lake (Table 14; Figure 5) and indicates that habitable space is limited during the winter months at Williams Lake.

Yellowbelly Lake

Regional fishery staff captured a total of 176 fish during 161.4 gill net hrs in 2010 (Table 14). Salmonids comprised 9% of the catch and non-game species added the remaining 92%. The catch consisted of 7 bull trout, 5 westslope cutthroat trout, 3 brook trout, 119 largescale suckers and 42 northern pikeminnow. Sampled bull trout had an average total length of 339.9 mm, westslope cutthroat trout 388.6 mm, brook trout 204.7 mm, largescale sucker 334.8 mm, and northern pikeminnow 248.8 mm. The 2010 CPUE of 1.1 fish/hr represents the third lowest catch rate recorded for the nine Yellowbelly Lake gill net sampling efforts (Table 14).

The 2010 results in Table 14 indicated a slight decrease in the number of salmonids (9%) compared to 2009 (12%). The proportion of salmonids in Yellowbelly Lake has remained depressed since 2001 when the salmonid proportion was calculated at 59%. Seven bull trout were counted in this year's sample while eight bull trout were encountered in the 2009 survey (Table 14). Westslope cutthroat trout samples remain in the single digits with five recorded this year compared to two fish in 2009. Three brook trout were observed in this year's gill net sample, mirroring last year's sample of three brook trout. No rainbow trout or 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 main-stem Salmon River. Yellowbelly Lake gill net surveys from 2004 to 2010 indicate the continued dominance of non-game species, particularly sucker species.

From 2002 to 2006, between 1,200 and 6,600 westslope cutthroat trout fry were stocked in Yellowbelly Lake, annually. Apparently these stockings were unsuccessful in establishing a 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. The goal of establishing a westslope cutthroat fishery in a drainage and lake system dominated by non-salmonids and exotic salmonids (brook trout) continues to challenge regional fishery staff. In 2008, cutthroat stocking was increased to 11,000 fry and upped again in 2009 with 19,044 cutthroat fingerlings and 12,500 cutthroat fry stocked. The IDFG stocking request database

was updated in 2009 to reflect the region's desire for 30,000 cutthroat fingerlings per year for five years. In 2010, 38,160 westslope cutthroat fry were stocked into Yellowbelly Lake.

Genetic samples from seven bull trout taken during the 2010 survey in Yellowbelly Lake were archived in the Salmon Regional office.

MANAGEMENT RECOMMENDATIONS

Alturas Lake

Explore the opportunity to enhance angling opportunity through stocking sterile westslope cutthroat trout once a consistent source of fish is identified. The recommendation must be consistent with sockeye salmon recovery strategies.

Explore the opportunity for limited bull trout harvest.

Herd Lake

In 2011, reintroduce 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

Continue to monitor ZQI in 2011.

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

Merriam Lake

Staff from IDFG's Nampa Research Office will sample the lake in 2011 to evaluate changes in brook trout populations and longevity of tiger muskellunge. Sampling in 2011 will also indicate any continued presence of young brook trout (Koenig, in press).

Spruce Gulch Lake

Staff from IDFG's Nampa Research Office will sample the lake in 2011 to evaluate changes in brook trout populations and longevity of tiger muskellunge. Sampling in 2011 will also indicate any continued presence of young brook trout (Koenig, in press).

Stanley Lake

Inventory Stanley Lake to determine the status of the lake trout population relative to growth rates, abundance estimates, and size structure to help guide future discussions concerning the proposed barrier removal at the lake's outlet.

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 gill net sets. A consistent sample methodology would allow a more accurate evaluation of rainbow trout and bull trout populations.

As funds and personnel are available, continue to monitor DO level and water temperature at a 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.

Adjust ZQI sampling timeframe to mid-August rather than late August on recommendation of Dave Teuscher.

Continue rainbow trout trapping and spawning operations in Lake Creek. Continue utilizing 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.

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 fish 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. The increased level of westslope cutthroat trout stocking is an attempt to improve fishing. Likely, the goal of a quality westslope cutthroat fishery may need modification.

Table 5. Summary of gill net sampling efforts in Alturas Lake, 2007 and 2010.

		Salmonid Species[a]				Other species[b]			Total	
Survey Dates	Total Catch	BU	HRBT	MWF	Total Salmonids (%)	LSS	NPM	No. Gillnets	Gill-net Hours	Fish/ Hour
06/12/2007	207	31	64	11	106 (51)	63	38	7	36.9	5.6
06/24-25/2010	678	75	22	17	114 (17)	279	285	8	70.1	9.6

[a] Salmonids: HRBT = hatchery rainbow trout, CT = westslope cutthroat trout, EBT = brook trout, BU = bull trout, and MWF = mountain whitefish.

[b] Other species: LSS = largescale sucker and NPM = northern pikeminnow.

Table 6. Summary of rainbow trout sampling efforts in Herd Lake for 1994, 1996, 2001 to 2003, 2005, 2006, and 2008 to 2010.

Survey Dates	Sample Size	Size Range (Total Length mm)	Mean Total Length (mm)	Mean Weight (g)	No. Gill Nets	Total Gillnet Hours	Fish/Net Hour (CPUE[a])	Mean 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

[a] CPUE=Catch per unit effort.

[b] Tiger muskellunge introduction year.

[c] Sampled by angling.

[d] Reported as fish/angling hour.

Table 7. Summary of rainbow trout sampling efforts in Jimmy Smith Lake for 1964,1996, 2001, 2003, 2005, 2006, and 2008 to 2010.

Survey Date	Sample Size	Size Range (Total length mm)	Mean Total Length (mm)	Mean Weight (g)	No. Gill Nets	Total Gillnet Hours	Fish/Net Hour (CPUE[a])	Mean Relative Weight
12/15/1964	ND[b]	130-380	233	ND	ND	Creel sample	ND	ND
06/11/1996	157	155-332	213	ND	1	15.0	10.5	ND
06/21-22/2001	113	110-370	203	ND	1	16.5	6.8	ND
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

[a] CPUE=Catch per unit effort.
[b] ND = No data.

Table 8. Summary of gill net efforts in Stanley Lake, 1978, 1981, 1986, 2007, and 2010.

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

[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.
[b] ND=No data.

Table 9. Summary of lake trout otolith data from gill net efforts in Stanley Lake, 2010.

Species	Total Length (mm)	Weight (kg)	Sex	Sexual Maturity Classification	Stomach Contents
Lake trout	260	0.1	Unknown	Immature	Unknown (likely redside shiner)
Lake trout	272	0.1	Male	Immature	Mosquito pupae
Lake trout	555	1.7	Female	Immature	Empty
Lake trout	617	2.2	Female	Immature	Empty
Lake trout	725	3.6	Male	Mature	254 mm kokanee
Lake trout	730	4.1	Female	Mature	Empty
Lake trout	750	4.8	Female	Mature	Empty
Lake trout	888	7.3	Female	Mature	Unknown salmonid (likely rainbow trout or kokanee)

Table 10. Summary of rainbow trout and bull trout gill net sampling in Williams Lake, 1992, 1993, 1996, 2000, 2003, 2007, 2009 and 2010.

Sample Date	Species[a] and No. Fish Encountered				Total No. Fish	RBT Total Length (mm) Size Range	RBT Total Length (mm) Mean	BU Total Length (mm) Size Range	BU Total Length (mm) Mean	Total Gill-net Hours	Fish/ Hour (CPUE[b])	RBT Relative Weight
06/09/1992	RBT	180	BU	13	193	140-470	303.0	170-340	255.0	94.4	2.0	--
06/24/1993	RBT	48	BU	9	57	160-440	323.8	225-355	289.4	55.8	1.0	--
06/14/1996	RBT	42	BU	4	46	140-500	271.0	205-455	295.0	26.3	1.7	--
10/23/2000	RBT	10	BU	1	11	180-430	314.5	378	378.0	7.0	1.2	--
09/16-17/2003	RBT	78	BU	15	93	164-480	279.9	180-400	268.6	77.8	1.2	88.6
09/27/2007	RBT	183	BU	17	200	145-420	310.6	230-335	279.1	25.7	7.8	79.9
10/01/2009	RBT	20	BU	32	52	145-430	294.6	230-455	342.5	22.9	2.3	94.6
10/12-13/2010	RBT	168	BU	33	201	157-459	307.6	132-396	257.3	48.2	4.2	99.6

[a] RBT = Rainbow trout, BU = Bull trout.
[b] CPUE = Catch per unit effort.

Table 11. Zooplankton quality index (ZQI) values and average zooplankton ratio (ZPR) values at Williams Lake, 2000 to 2003, 2005, and 2008 to 2010.

Sample Date	ZQI[a].Sample Location			ZQI Average	ZPR[b].Sample Location			ZPR Average
	Inlet	Mid-lake	Outlet		Inlet	Mid-lake	Outlet	
August 2000	ND[c]	ND	ND	0.67	ND	ND	ND	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	ND	ND	ND	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

[a] ZQI = Zooplankton quality index.
[b] ZPR = Zooplankton ratio.
[c] ND = No data.

Table 12. 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 13 Summary of dissolved oxygen samplings taken at Williams Lake, 2000, 2002 to 2006, and 2010.

Year	Sample Date	Dissolved Oxygen Measurements (mg/L) Taken at 1 Meter Depth Increments											Water Temp. (°C)
		Surface	1 m	2 m	3 m	4 m	5 m	6 m	7 m	8 m	9 m	10 m	
2000	06/20	--[a]	9.6	--	--	--	--	--	9.4	8.5	--	4.9	--
2002	03/06	9.80	8.00	6.00	4.20	3.70	3.40	3.20	3.00	1.90	0.50	0.40	0.0
2003	03/19	--	1.88	1.75	1.73	1.74	1.76	1.77	1.78	1.79	1.79	1.80	4.0
2004	02/06	9.40	8.80	8.20	7.60	6.90	6.30	5.70	5.10	4.40	3.80	3.20	0.0
2005	02/15	6.20	4.40	3.20	2.40	2.20	2.10	2.10	1.90	1.90	1.70	1.20	--
2006	01/20	12.80	10.80	10.10	10.00	10.00	9.70	9.40	9.20	9.00	8.60	8.20	--
2010	02/11	13.09	11.13	4.67	3.68	3.20	2.98	2.68	2.27	1.97	1.67	1.41	0.2

[a] No measurement taken.

Table 14. Summary of Yellowbelly Lake gill netting efforts, 1961, 1978, 2001, 2004 to 2007, 2009, and 2010.

Sample Date	Total Catch	Salmonid Species[a]					Total Salmonids (%)	Other species[b]		Total Gill-net Hours	Fish/ Hour
		HRBT	CT	EBT	BU	MWF		SUC	NPM		
Year 1961	57	0	0	0	2	3	5 (3.0)	43	9	ND[c]	--
10/04/1978	58	0	1	4	0	0	5 (9.0)	50	1	ND	--
06/23/1986	86	0	0	11	0	0	11 (12.7)	75	0	ND	--
06/12-13/2001	96	0	1	56	0	0	57 (59.0)	39	0	70.4	1.4
07/01-02/2004	376	9	4	36	0	0	49 (14.0)	296	27	123.5	3.0
06/16-17/2005	240	0	5	20	12	0	37 (16.0)	166	35	141.8	1.7
06/21-22/2006	157	0	3	6	0	0	9 (6.0)	129	19	160.7	1.0
06/13/2007	163	3	5	8	1	0	17 (10.4)	127	19	64.9	2.5
06/04-05/2009	106	0	2	3	8	0	13 (12.3)	72	21	123.5	0.9
06/02-03/2010	176	0	5	3	7	0	15 (8.5)	119	42	161.4	1.1

[a] Salmonids: RBT = rainbow trout, CT = westslope cutthroat trout, EBT = brook trout, and BU = bull trout, and MWF = mountain whitefish.

[b] Other species: SUC = sucker (var. species) and NPM = northern pikeminnow.

[c] ND=No data.

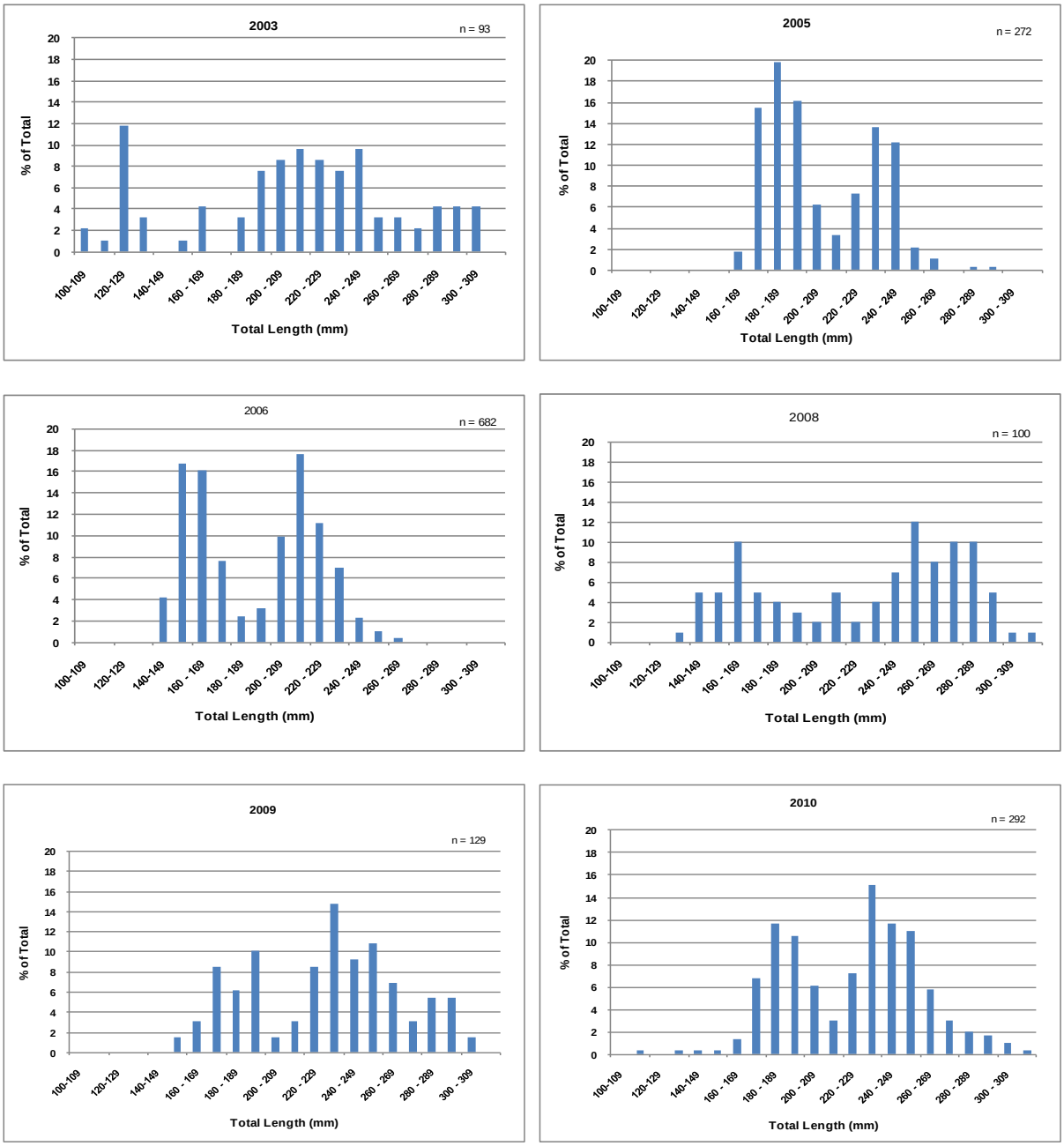

Figure 1. Comparison of rainbow trout length frequency percentages from gill net efforts in Herd Lake, 2003, 2005, 2006, and 2008 to 2010.

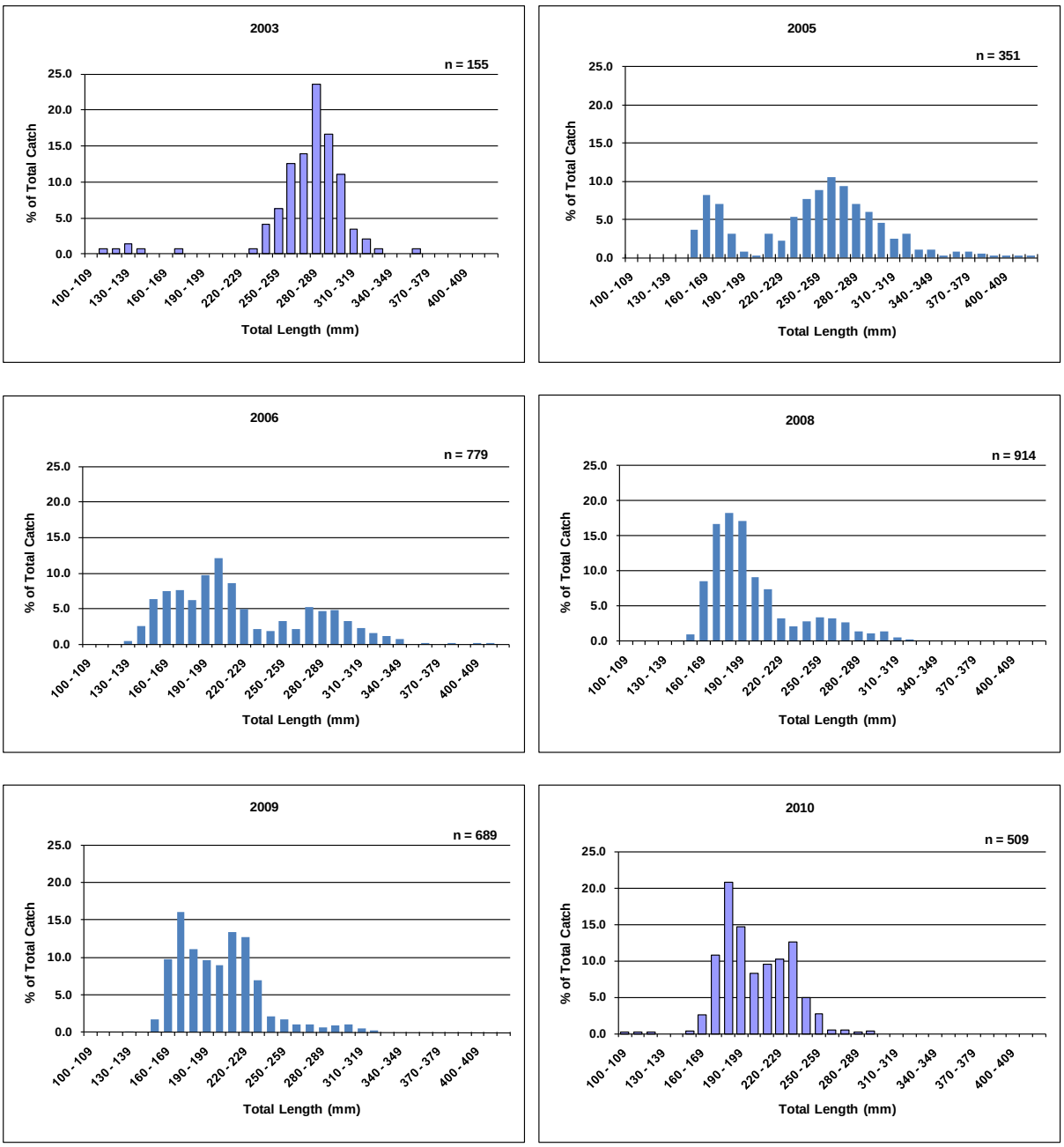

Figure 2. Comparison of rainbow trout length frequency percentages from gill net efforts in Jimmy Smith Lake, 2003, 2005, 2006, and 2008 to 2010.

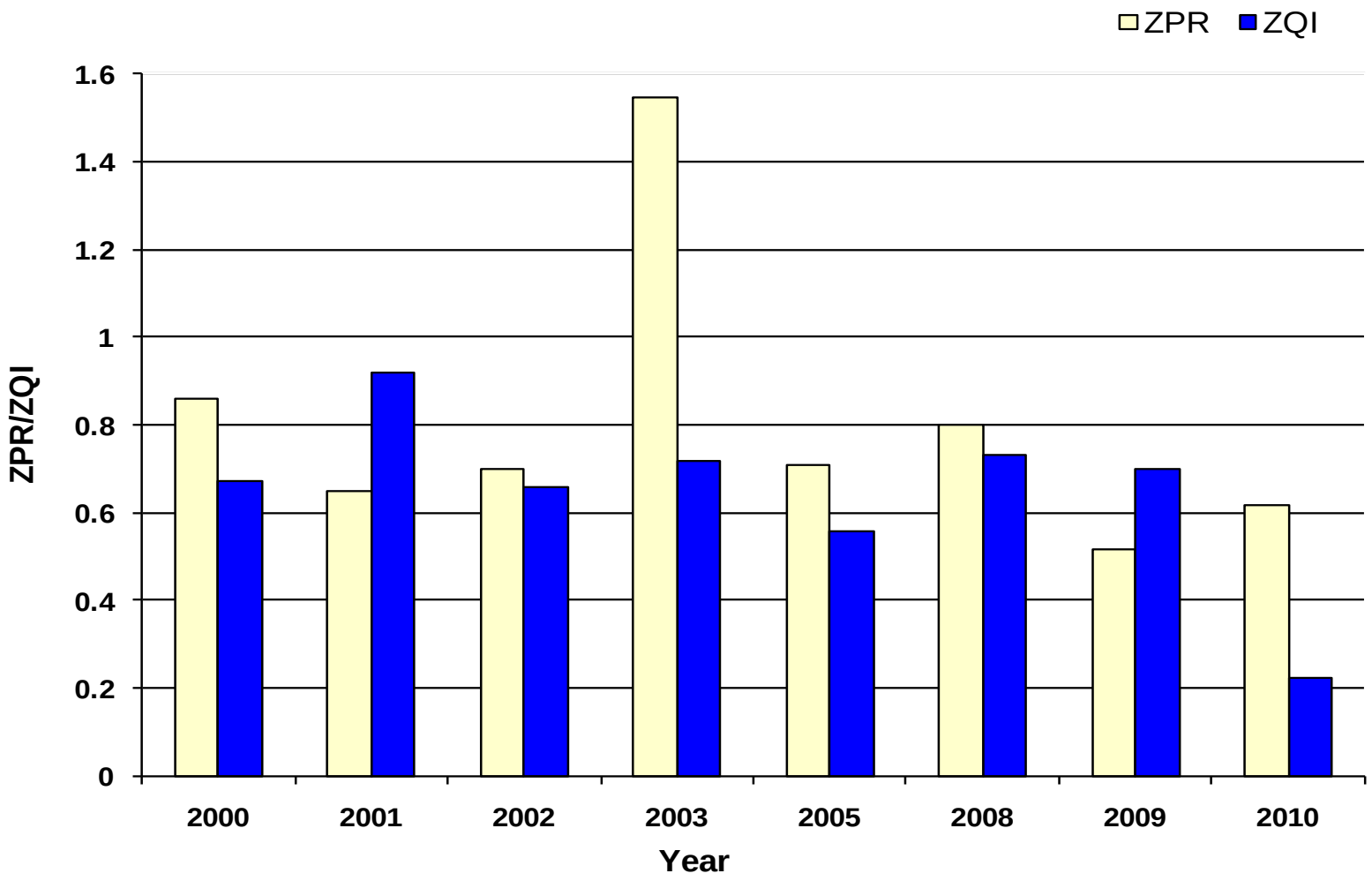

Figure 3. Average zooplankton ratio (ZPR) and zooplankton quality index (ZQI) values at Williams Lake, 2000 to 2003, 2005, and 2008 to 2010.

SALMON REGION FISHERY MANAGEMENT 2010 ANNUAL REPORT

River and Stream Surveys - Wild Trout Population Monitoring

ABSTRACT

During the summer and fall of 2010, IDFG personnel sampled 17 streams of the upper Salmon River basin to determine fish species composition, relative abundance, and size distribution. Of the 17 creeks surveyed, 16 had salmonid or non-salmonid fish species present. Rainbow trout/steelhead were found in 81% of the 16 fish-bearing streams surveyed and had total lengths ranging from 60 to 395 mm. Bull trout were found in 38% of the fish-bearing streams and had total lengths ranging from 50 to 356 mm. Brook trout were found in 31% of the surveyed streams with fish present and had total lengths ranging from 45 to 255 mm. Juvenile Chinook salmon *O. tshawytscha* were found in 50% of surveyed streams with fish present. Westslope cutthroat trout were found in 25% of the fish-bearing streams surveyed and had total lengths ranging from 65 to 145 mm. Apparent cutthroat/rainbow hybrid trout were found in 13% of streams where fish were detected and had total lengths ranging from 75 to 195 mm.

Other species recorded during 2010 stream surveys included sculpin *Cottus sp.,* which were found in 81% of the 16 fish-bearing streams, and dace (including longnose dace *Rhinichthys cataractae* and speckled dace *R. osculus*), found in 38% of the fish-bearing creeks. Redside shiners were found in 25% while mountain whitefish and suckers were each found in one (6%) of the 16 fish-bearing streams.

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 207 rainbow trout redds were counted in three survey transects in the upper Lemhi River and Big Springs Creek. The number of rainbow trout/redband redd counts in these transects has moderately increased during the last three years. Additionally, regional fishery staff counted 29 bull trout redds in a new trend transect of upper Hayden Creek. Big Timber Creek had a total of 21 bull trout redds observed. Four bull trout transects in the upper Salmon River drainage near Stanley were surveyed in 2010. In 2010, 77 redds were counted compared to 95 bull trout redds counted in 2009.

Fish hatchery personnel in the Salmon Region collected data on resident salmonid species encountered at their respective weirs. Resident fish counted at the Idaho Power Company's Pahsimeroi Fish Hatchery rack during 2010 included 144 rainbow trout, 5 mountain whitefish, and 1 bull trout. Fish encountered at the East Fork Satellite Facility included 209 bull trout, 6 rainbow trout, 2 westslope cutthroat trout, 1 wild/natural steelhead, 2 sockeye salmon, and 224 mountain whitefish. Seventy-six bull trout, 13 westslope cutthroat trout, 24 rainbow trout, 71 mountain whitefish, and 741 suckers were encountered at the Sawtooth Fish Hatchery weir. The Redfish Lake Creek trap encountered 187 bull trout, 652 sockeye salmon, 4 Chinook salmon, 1 mountain whitefish, 368 suckers, and 111 northern pikeminnow in 2010.

Sampling for quagga mussel veligers in the main-stem Salmon River at Salmon tested negative.

INTRODUCTION

Wild Trout Population Surveys

During the summer and fall of 2010, 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 to Redfish Lake) in the upper Salmon River drainage to monitor long-term bull trout spawning trends. These transects were established by 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 area surveyed in Bear Valley Creek is located within a relatively low gradient meadow formed by a historic landslide. The trend 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 redd on Big Springs Creek, a tributary to the upper Lemhi River near Leadore. By 1997, regional fishery staff had established three transect areas to monitor long-term resident rainbow trout population trends: two transects on Big Springs Creek, and one on the upper Lemhi River. The annual monitoring effort on Big Springs Creek and a portion of the Lemhi River is conducted to identify trends in the number of redds observed. Fishing rule changes on the Lemhi River were implemented in 1994 so that only rainbow trout 356 mm (14 inches) and greater could be harvested. Theoretically, rule changes, habitat improvement projects, and tributary reconnect projects 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, in 2007. These surveys were established to determine bull trout distribution and abundance. In 2008 and 2010, transect sections in Big Timber Creek and one of its tributaries, Rocky Creek, were further refined to monitor fish population responses to 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 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 main-stem Salmon River, 23.4 km south of Stanley, in the SNRA. The survey transect starts approximately 6.8 km upstream from the mouth of Fourth of July Creek and ends approximately 5.8 km upstream from the start of the transect.

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, Redfish Lake Creek, and Sawtooth Weirs and Traps

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

OBJECTIVES

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

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

Evaluate the number of bull trout redds in Bear Valley, 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 are moving towards identifying trend transects.

Sample the main-stem Salmon River using a plankton tow for the presence of quagga mussel veligers.

STUDY AREA AND METHODS

Wild Trout Population Surveys

Between May 7 and August 18, 2010, 17 streams of the Salmon River basin were surveyed for fish composition, relative abundance, and size distribution. Stream characteristics, including temperature, transect length, width, and area sampled, were typically recorded for each of the electro-fishing transects surveyed in 2010. 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 unit (a Smith Root, Inc. Model 15 or 15D). Samplers attempted to catch all sizes of fish while moving upstream in transects that ranged from 60 to 825 m in length following one of two stream survey protocols. For a standard stream survey, the most commonly used survey method in 2010, a given transect was sampled one, two, three, or four times. Captured fish were measured in total length (mm), placed in holding pens, and monitored for recovery. Once electro-fishing was completed, fish were released back into the surveyed reach. Genetic samples were taken on some game fish for analysis. Mountain whitefish and non-game fish were enumerated and, at times, measured depending on the collecting agency. The second survey type used was presence and absence sampling whereby a stream section of unmeasured length and width was sampled to determine if fish could be detected. The deviation between sampling methods was a result of varying agency objectives and needs at sampling locations.

Where applicable, density estimates were expressed as the number of fish per 100 m^2. Population estimates were calculated using Microfish© population software (Van Deventer and Platts, 1986). Population estimates for all species of salmonids were calculated for two-, three-, and four-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 that resulted from population estimate calculations were noted 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). 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 WGS84 datum, latitude and longitude coordinates in decimal degrees for the Alpine Creek survey transect

started at 43.90685°N, 11493049°W, and ended at 43.90509°N, 11493806°W. Coordinates for the Fishhook Creek trend transect started at 44.13666°N, 114.96846°W, and ended at 44.13962°N, 11497864°W. Coordinates for the second, recently established (2008) Fishhook Creek transect began at 44.13695°N, 114.96793°W and ended at 44.13456°N, 114.97396°W. Redd counts were conducted by IDFG research personnel on Alpine Creek, the Fishhook Creek trend transect, and the second transect on Fishhook Creek on August 31 and September 13, 2010.

Bear Valley Creek

Fluvial and resident bull trout redd counts on Bear Valley Creek were conducted September 10, 16, and 28, 2010 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. 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 (Rosgen 1996). 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). This transect, located above the trend transect site in Bear Valley Creek, was surveyed on September 24, 2010 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 (Latitude and longitude decimal degrees start: 44.70896°N, 11339917°W and end: 44.72855°N, 11343430°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 m 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, 2010.

Big Timber Creek

Resident bull trout redd counts in Big Timber Creek drainage were conducted September 22, and October 6 and 7, 2010 using visual ground count methods. Coordinates of the likely trend transect in Rocky Creek, a tributary to Big Timber Creek, started at 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 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 trend counts on East Fork Hayden Creek were conducted September 10, 16, and 28, 2010 using visual ground count methods. The transect started at 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 (Rosgen 1996).

Fourth of July Creek

Salmon Region fishery staff conducted the Fourth of July Creek bull trout redd count on September 9, 2010 using visual ground count methods. Coordinates for the Fourth of July Creek survey, in 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 has produced single digit bull trout redd counts each year for the past four years. 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 begins in a meadow near a rock slide located 4.6 km upstream from Tobias Creek. From the rock slide, the new transect extends 2.7 km upstream to the confluence of Hayden and West Fork Hayden creeks. Latitude and longitude decimal degree coordinates for the 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, two 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. Due to limited manpower and time in 2010, one count was conducted in the new trend transect on September 20.

Pahsimeroi, East Fork, Redfish Lake Creek, and Sawtooth Weirs and Traps

Pahsimeroi, East Fork, Sawtooth Fish Hatchery, and 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.

Quagga Mussel Sampling

The main-stem Salmon River at Salmon was sampled for quagga mussel veligers using a plankton net (simple, conical net with 63µ pore size and 0.25 m diameter net opening with a removable cod-end piece). The sample, taken September 1, 2010 while standing on the Island Park Bridge, was from the west river channel with a tow depth directly below the water surface for 60 seconds. Latitude and longitude decimal degree coordinates for the sample location was 45.17738°N, 113.89868°W. After taking the sample, excess water was drained from the cod-

end piece at the bottom of the net. Clean tap water (not river water) was then poured into the bottom of the net and top of cup to flush remaining matter into the collection piece. Contents were then poured into a 500 ml bottle and an equal liquid amount of 95% denatured ethyl alcohol was added to the sample contents. The bottle was then sealed and provided to the Idaho State Department of Agriculture for analysis.

RESULTS AND DISCUSSION

Wild Trout Population Surveys

Salmonids and non-game fish were found in 16 (94%) of 17 streams surveyed in the Salmon Region during 2010 (Tables 15-17). Rainbow trout (n = 291) was the most abundant salmonid species observed during this year's investigations. Rainbow trout were found in 13 (81%) of the 16 fish-bearing streams and ranged in size from 60 to 395 mm total length (Tables 15 and 16). The highest densities of rainbow trout were found in two transects of Castle Creek with densities of 10.2 and 13.9 fish/100m^2, respectively. Brook trout (n = 191) were found in 5 (31%) fish-bearing streams and had total lengths ranging from 45 to 255 mm. The highest densities of brook trout were found in the Little Pahsimeroi River and Muddy Springs Creek with 8.4 and 9.3 fish/100m^2, respectively. Bull trout (n = 119) were observed in 6 (38%) fish-bearing streams and had total lengths ranging from 50 to 356 mm. The highest densities of bull trout occurred in two transects of Castle Creek with 6.1 and 12.6 fish/100m^2, respectively. Juvenile Chinook salmon (n = 51) were found in 8 (50%) fish-bearing streams. Two transects on Alder Creek had the highest densities of juvenile Chinook salmon with 1.2 and 1.4 fish/100m^2, respectively. Westslope cutthroat trout (n = 41) were found in four (25%) fish-bearing streams and had total lengths ranging from 65 to 145 mm. Density calculations could not be done on any of the four streams where westslope cutthroat trout were observed; therefore, no two streams could be identified with the highest densities. Apparent cutthroat/rainbow hybrid trout (n = 4) were found in two (13%) of the 16 fish-bearing tributary streams. Apparent cutthroat/rainbow hybrid trout lengths ranged from 75 to 195 mm total length. Cache and Soldier creeks were the only two streams with the apparent cutthroat/rainbow hybrid trout present. Even though density calculations couldn't be done on both streams, the two streams had the highest numbers of the species found in 2010. Fish were not detected in one (Weasel Creek) of the 17 streams surveyed during 2010.

Mountain whitefish, sculpin species, longnose dace and speckled dace redside shiner, and sucker species were also recorded during 2010 surveys (Table 17). Sculpin were detected and counted in 13 (81%) tributaries surveyed with fish present. The highest densities of sculpin enumerated during surveys were found in two transects of Duck Creek. The number of sculpin (n = 603) shown in Table 17 should be considered slightly low as they were not enumerated on one survey in Indian Creek. Dace, including both longnose and speckled dace (n = 447), were encountered in six (38%) streams surveyed with fish present. Redside shiners were detected in four (25%) fish-bearing streams and totaled 111 fish. Sucker (various species) were observed in one (6%) fish-bearing stream and totaled 16 fish. Mountain whitefish (n = 3) were identified in one (6%) stream surveyed with fish present. In future surveys, cooperating agencies and consultants will be asked to enumerate and account for mountain whitefish and other non-game fish.

Standard stream survey protocol was followed on nine streams in 2010. The remaining eight streams were sampled for presence and absence. More detailed information on stream survey sites is located in Appendix B, which lists stream transects, sampling dates, transect measurements, sub-basin locations, and WGS84 datum, latitude and longitude coordinates.

It should be noted that Salmon Region fish survey data from cooperating federal agencies, including the USFS and Bureau of Land Management, is no longer reported in the Region's annual report. 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 2010, mirroring results of zero redds in 2008 and 2009 (Table 18, Figure 4). Bull trout were observed spawning below the trend transect in Alpine Creek in 2009 and again in 2010. Although a passage barrier has not been determined, a new trend transect downstream of the original location will be identified in 2011 (M. Peterson, IDFG, personal communication).

Eleven redds were observed in the trend transect in Fishhook Creek in 2010, compared to 33 redds counted in 2009 (Table 19, Figure 5). The second bull trout spawning transect, located downstream of the original trend transect site in Fishhook Creek, produced 10 redds in 2010 compared to 12 redds counted in 2009 (Table 20, Figure 6).

Bear Valley Creek

Regional fishery staff counted 37 fluvial bull trout redds in the Bear Valley Creek trend transect in 2010, compared with 42 bull trout redds observed in 2009 (Table 21, Figure 7). The trend of bull trout redds counted in this transect has been generally increasing compared to previous seasons.

Big Springs Creek and Lemhi River

We observed a total of 207 rainbow trout redds in two Big Springs Creek transects and one transect in the upper Lemhi River (Table 22, Figure 8). One hundred thirty-two redds were counted in the historic Neibaur Ranch transect while 57 redds were observed in the current Tyler Ranch transect (Table 22). Eighteen redds were counted in the current Beyeler Ranch transect in the upper Lemhi River. This year's total count increased by 43 from the 164 redds counted in 2009.

Reviewing redd counts from the three survey reaches over time suggests a generally increasing trend. Additionally, our previous theory of alternate year spawning in this rainbow trout population is unlikely. The total number of redd counts has fluctuated annually and may indicate variable factors are affecting the rainbow trout spawning population. These sites will continue to be monitored annually and redd count trends will be evaluated. Habitat changes resulting from riparian protection will be monitored to document improvements in the riparian habitat.

Big Timber Creek

Bull trout redds counted in the Big Timber Creek drainage totaled 21 in 2010. This includes two transects in Big Timber Creek and one transect in Rocky Creek. Although not directly comparable because of continued exploratory development of transects, the 2010 total relates to 16 redds in 2008 and 25 redds counted in 2007.

East Fork Hayden Creek

A total of 55 bull trout redds were observed in East Fork Hayden Creek trend transect in 2010 compared to 54 found in 2009 (Table 21, Figure 9). Bull trout redd counts in this transect have been fairly steady for the last five years with 12 redds separating the highest and lowest counts to date. Sixty-one redds were observed in this trend transect in 2008 while the lowest number of redds observed, 49 redds, was counted in 2006 (Table 21). Of the three days that counts were conducted in 2010, IDFG fishery staff concluded that the first two counts were done too early. Nine redds were observed on September 10, followed by 49 redds on September 16. Fishery staff noted that many adult bull trout were observed during the September 16 count but they deduced that spawning was not yet complete (B. Esselman, IDFG, personal communication). The final count on September 28 produced 55 total redds with many adult bull trout observed. During the third and final count, the survey crew noted that fish were not observed on redds and appeared to be finished spawning.

This population appears to be a resident population with individuals being appreciably smaller in size than the fluvial bull trout population in Bear Valley Creek (Esselman et al. 2008; Lamperth 2007). Genetic evaluation of this population and other Lemhi River bull trout populations confirmed that this population, while predominantly a resident population, has significant genetic diversity. This diversity may be due to connectivity with main-stem Hayden Creek during high water years, due to East Fork Hayden Creek's large population size, or both (Kozfkay et al. 2008).

Fourth of July Creek

Fifty-six completed bull trout redds were counted in the Fourth of July Creek trend transect in 2010, a six-redd increase from 2009 (Table 24, Figure 10). Since counts were initiated in 2003, there has been a general upward trend in redd counts. This population is likely responding to improved passage conditions within the watershed, including screening facilities on irrigation ditches that protect juvenile salmonids and increased flows during fall migration of adults. A wildfire immediately after the 2005 survey changed the characteristics of the watershed. Long-term impacts to the bull trout population are yet to be determined. It should be noted that redd count conditions in 2010 were harsh as the survey was performed during a blizzard that possibly impacted visibility.

Hayden Creek

Twenty-nine bull trout redds were counted in the new Hayden Creek trend site in 2010 while 22 bull trout redds were counted in 2009 (Table 21). However, the two counts are not directly comparable due to the change in the site location in 2010. Hayden Creek redd counts have been variable in location and scope since 2006 as determinations of distribution, abundance, and timing have been investigated. In subsequent years, the trend transect, as determined in 2010, will be counted every year.

Both resident and fluvial-sized bull trout were observed spawning in Hayden Creek in 2010, marking the sixth consecutive year of these differing life histories being observed. Similar spawning behavior has also been observed in Bear Valley and Big Timber creeks in the Lemhi River drainage.

A recent genetic study of the Hayden Creek population confirmed that drainage size and connectivity have sustained high levels of genetic diversity (Kofzkay et al. 2008). Further,

Kofzkay et al. noted that Hayden Creek and Bear Valley Creek populations experienced this highest degree of genetic cross-assignment of 14 Lemhi River drainages studied, and are not genetically differentiated from one another, suggesting high gene flow between these two tributaries.

Pahsimeroi, East Fork, Sawtooth, and Redfish Lake Creek Weirs and Traps

In the last 11 years, the trend in the number of resident rainbow trout migrating past the Pahsimeroi Fish Hatchery weir is increasing (Table 25; Figure 11). One hundred and forty-four resident rainbow trout were encountered in 2010. This is the highest number of rainbow trout trapped since 1991 (Table 25). The male to female sex ratio continues to consistently favor females over the recorded period. This year, 70% of the rainbow trout encountered at the Pahsimeroi trap were female. Picket spacing at the Pahsimeroi weir possibly favors passage of resident male rainbow trout upriver through the weir while inhibiting female movement. Five mountain whitefish and one bull trout were also encountered during the 2010 spring trapping period.

Trapping at the East Fork Satellite Facility resulted in 209 bull trout, 6 rainbow trout (including one apparent cutthroat/rainbow hybrid trout), 2 westslope cutthroat trout, 2 sockeye salmon, 1 wild/natural steelhead, and 225 mountain whitefish counted in 2010 (Table 26). Generally, bull trout numbers appear to be increasing during the last seven years (Figure 12). Westslope cutthroat and rainbows are relatively stable but numbering in single digits since 2004 (Table 26). Mountain whitefish show a two-fold increase since 2009, representing the second highest number for this species in the last nine years.

Sawtooth Fish Hatchery weir encountered 76 bull trout, 13 westslope cutthroat trout, 24 rainbow trout, 71 mountain whitefish, and 741 suckers (Table 27). Trapping operations in 2010 were suspended during a high flow event on the Salmon River. Weir panels were pulled June 26 and reinstalled on July 8, 2010. The number of bull trout encountered at the Sawtooth trap this year was the highest since 1984 while the numbers of rainbow and cutthroat trout remained stable (Figure 13). Counts of resident salmonids have generally increased in the past six years. In 2010, rainbow trout counts at Sawtooth Fish Hatchery were differentiated with 21 of 24 fish classified as wild/natural and the remaining three fish classified as being of hatchery origin.

The Redfish Lake Creek trap resulted in 187 bull trout, 652 sockeye salmon, 4 Chinook salmon, 1 mountain whitefish, 111 northern pikeminnow, and 368 suckers encountered during the 2010 trapping season (Table 28). The overall salmonid count increased in 2010 when compared to 2009. Bull trout numbers increased by a multiplier of 2.6 when compared to 2009. This represents the most bull trout encountered to date at this trap.

Quagga Mussel Sampling

The sample collected for quagga mussel veligers in the main-stem Salmon River tested negative.

Table 15. Combined salmonid (excluding mountain whitefish) population estimates (including fry) with 95% confidence intervals (CI), and species composition for selected streams in the upper Salmon River basin, 2010.

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	CTx RBT	EBT	CK	BUx EBT
Alder	L	06/14/2010	561.0	8	--	1.4						100	
Alder	M	06/15/2010	570.0	10	--	1.8		20				80	
Alder	M	06/15/2010	513.0	4	4 (2, 6)	0.8						100	
Alder	M	06/17/2010	697.6	12	8 (1, 15)	1.7		57				43	
Cache	L	07/19/2010	ND[c]	20	--	--	17	44	17	17	5		
Castle	L	08/11/2010	520.0	41	46 (27, 65)	7.9		75	6			19	
Castle	L	08/10/2010	614.8	59	73 (41, 105)	9.6		84	16				
Castle	L	08/10/2010	588.3	84	96 (81, 111)	14.3		79	21				
Castle	L	08/11/2010	480.0	45	51 (40, 62)	9.4		40	60				
Castle	M	08/18/2010	421.4	68	65 (55, 75)	16.1		10	90				
Duck	L	06/16/2010	420.0	19	--[d]	4.5					89	11	
Duck	U	06/03/2010	490.0	34	40 (24, 56)	6.9					100		
Elkhorn	L	07/16/2010	ND	9	--	--		89	11				
Garden	L	05/13/2010	ND	17	--	--		94				6	
Garden[e]	L	07/18/2010	ND	60	--	--	50	50					
Indian	L	07/18/2010	ND	11	--	--		9				91	
Little Pahsimeroi River	M	07/29/2010	480.0	3	--	0.6					100		
Little Pahsimeroi River	U	07/28/2010	380.7	32	35 (27, 43)	8.4					100		
Muddy Springs	L	07/13/2010	480.0	40	--	8.3		15			67	18	
Muddy Springs	M	07/12/2010	561.6	54	78 (39, 117)	9.6		4			96		
Pahsimeroi River	M	08/03/2010	246.5	10	12 (3, 21)	4.1					90	10	
Pahsimeroi River	M	07/28/2010	572.0	15	15 (13, 17)	2.6					100		
Pahsimeroi River	M	07/26/2010	494.0	1	--	0.2					100		
Pahsimeroi River	M	07/26/2010	594.5	0	--	--							
Papoose	L	07/21/2010	ND	19	--	--		84	16				
Pungo	L	07/19/2010	ND	7	--	--		72	14			14	
Sheep	L	07/20/2010	ND	25	--	--	28	72					

Table 15. 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	CTx RBT	EBT	CK	BUx EBT
Soldier	L	07/20/2010	ND	14	--	--	8	71	14	7			
Weasel	L	05/07/2010	139.0	0	--	--							
Wilson	L	07/20/2010	ND	1	--	--		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/rainbow hybrid trout, EBT = Brook trout, CK = Chinook salmon, and BUxEBT = Apparent bull trout x brook trout hybrid.

[c] ND = No data.

[d] Population estimate calculation returned a negative value at the 95% confidence interval and was not reported.

[e] Middle Fork Salmon River tributary.

Table 16. Salmonid species (excluding mountain whitefish), number of fish observed, average total length (mm), and size range (total length mm) for electrofished streams in the upper Salmon River basin, 2010.

Stream	No. Fish Observed	Salmonid Species[a]	Mean Total Length (mm)	Size Range (Total Length mm)
Alder	22	CK	76.3	70-90
Alder	6	RBT	208.3	120-325
Alder	6	YOY	34.2	30-45
Cache	3	BU	160.7	152-165
Cache	3	CT	113.3	65-145
Cache	3	CTxRBT	141.7	75-195
Cache	1	EBT	203.0	203
Cache	8	RBT	141.1	105-191
Cache	2	YOY	80.0	75-85
Castle	109	BU	140.2	50-255
Castle	7	CK	65.7	60-70
Castle	164	RBT	119.3	60-240
Castle	17	YOY	39.4	25-45
Duck	2	CK	80.0	75-85
Duck	51	EBT	83.6	45-180
Elkhorn	1	BU	254.0	254
Elkhorn	8	RBT	--	ND[c]
Garden	1	CK	104.0	104
Garden	16	RBT	105.8	82-140
Garden[b]	30	CT	--	ND[c]
Garden[b]	30	RBT	--	ND
Little Pahsimeroi River	35	EBT	115.9	70-220
Indian	10	CK	--	ND
Indian	1	RBT	--	ND
Muddy Springs	7	CK	92.9	75-120
Muddy Springs	79	EBT	95.3	50-230
Muddy Springs	8	RBT	199.4	135-395
Pahsimeroi River	1	CK	90.0	90
Pahsimeroi River	25	EBT	157.8	75-255
Papoose	3	BU	245.7	178-356
Papoose	16	RBT	150.0	64-254
Pungo	1	BU	165.0	165
Pungo	1	CK	--	ND
Pungo	5	RBT	101.8	76-127
Sheep	7	CT	--	ND
Sheep	18	RBT	--	ND
Soldier	2	BU	216.0	127-305
Soldier	1	CT	--	ND
Soldier	1	CTxRBT	152.0	152

Table 16. Continued.

Stream	No. Fish Observed	Salmonid Species[b]	Mean Total Length (mm)	Size Range (Total Length mm)
Soldier	10	RBT	--	ND
Wilson	1	RBT	102.0	102

[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, RBT = Rainbow trout, and YOY = Young of year (trout fry).

[b] Middle Fork Salmon River tributary.

[c] ND=No data.

Table 17. Combined mountain whitefish and non-game fish samples, population densities, and species composition for electro-fished streams surveyed in the upper Salmon River basin, 2010. Amphibian presence by stream noted in footnotes.

						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
Alder	L	06/14/2010	561.0	307	54.7	<1	85	7	1	4	3
Alder	M	06/15/2010	570.0	18	3.2		67			28	5
Alder	M[c]	06/15/2010	513.0	123	24.0		90				10
Alder	M[c]	06/17/2010	697.6	8	1.1	88	12				
Duck	L[c]	06/16/2010	420.0	232	55.2	100					
Duck	U	06/03/2010	490.0	154	31.4	100					
Elkhorn	L[d]	07/16/2010	ND[e]	35	--	57	43				
Garden	L	05/13/2010	ND	8	--	100					
Garden	L[d]	07/18/2010	ND	35	--	71	29				
Indian	L[d]	07/18/2010	ND	ND	--	P[d]					
Little Pahsimeroi River	M	07/29/2010	480.0	20	4.2	45					55
Little Pahsimeroi River	U	07/28/2010	380.7	17	4.4	100					
Muddy Springs	L	07/13/2010	480.0	82	17.1	39	6				55
Muddy Springs	M	07/12/2010	561.6	1	0.2						100
Pahsimeroi River	M	08/03/2010	246.5	9	3.7	89					11
Pahsimeroi River	M	07/28/2010	572.0	19	3.3				5		95
Pahsimeroi River	M	07/26/2010	494.0	14	2.8						100
Papoose	L	07/21/2010	ND	28	--	71	29				
Pungo	L[d]	07/18/2010	ND	0	--						
Sheep	L	07/20/2010	ND	33	--	76	24				
Soldier	L[d]	07/20/2010	ND	25	--	100					
Sulphur	L[c]	07/20/2010	ND	0	--						
Wilson	L	07/20/2010	ND	28	--	71	29				

[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 (var. sp.), and RSS = Redside shiner.

[c] Columbia spotted frogs observed.

[d] Tailed frogs observed.

[e] ND = No data.

Table 18. Bull trout redd counts observed in trend survey sections of Alpine Creek, 1998 to 2010.

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

[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 19. Bull trout redd counts observed in the trend survey section of Fishhook Creek, 1998 to 2010.

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

[a] Counts done independently, not cumulatively.

Table 20. Bull trout redd counts observed in the second survey section of Fishhook Creek, 2008 through 2010.

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

Table 21. Bull trout redd count summary in the Hayden Creek drainage, 2002 through 2010. 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

[a] Includes transects in variable locations.

Table 22. Number of resident rainbow trout redds counted in the Lemhi River and Big Springs Creek, 1994 to 2010.

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

Table 22. Continued.

Date	Lemhi River (Beyeler Ranch)	Big Springs Creek (Neibaur Ranch)	Big Springs Creek (Tyler Ranch)	Total No. Rainbow Trout Redds
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

[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 23. Big Timber Creek drainage bull trout redd counts, 2007, 2008, and 2010.

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

Table 24. Fluvial bull trout redd counts observed in trend survey sections of Fourth of July Creek, 2003 to 2010.

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

Table 25. Summary of resident trout encountered at the Pahsimeroi Fish Hatchery during spring steelhead trapping, 1991 to 2010.

Year	Trapping Dates	No. Resident Rainbow Trout			No. Bull Trout	Other Salmonids[a]
		Males	Females	Total		
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

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

[b] Encountered outside range of steelhead trapping dates.

Table 26. Salmonid and non-game species encountered during steelhead and Chinook salmon trapping dates at the East Fork Satellite Facility, 1984 to 2010.

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 26. 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]

[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 thought to be an apparent cutthroat/rainbow hybrid trout.

[f] Total includes two sockeye salmon and one wild/natural steelhead encountered during Chinook salmon trapping season.

Table 27. Salmonid and non-game fish encountered during steelhead and Chinook salmon trapping dates at Sawtooth Fish Hatchery, 1984 to 2010.

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

Table 27. Continued.

Year	Trapping Dates	Salmonid and Non-game Species[a] BU	CT	RBT	EBT	MWF	SUC	Total
2006	03/27-05/01, 06/19-09-15	25	3	18	0	35	0	81
2007	03/15-05/01, 05/25-09/11	72	13	27	0	8	189	309
2008	03/19-05/06, 06/11-09/17	18	10	10	0	20	1,089	1,147
2009	03/19-05/07, 06/24-10/16	24	10[e]	8	0	6	170	218
2010	03/23-05/04, 05/27-09/16	76	13	24	0	71	741	927[f]

[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] Includes 2 fish thought to be apparent cutthroat/rainbow hybrid trout.
[f] Total includes 2 wild/natural Chinook salmon smolts encountered during steelhead trapping season.

Table 28. Salmonid and non-game fish encountered during sockeye salmon trapping at Redfish Lake Creek temporary weir, 1999 to 2010.

Year	Trapping Dates	Salmonid and Non-game Species[a] 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

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

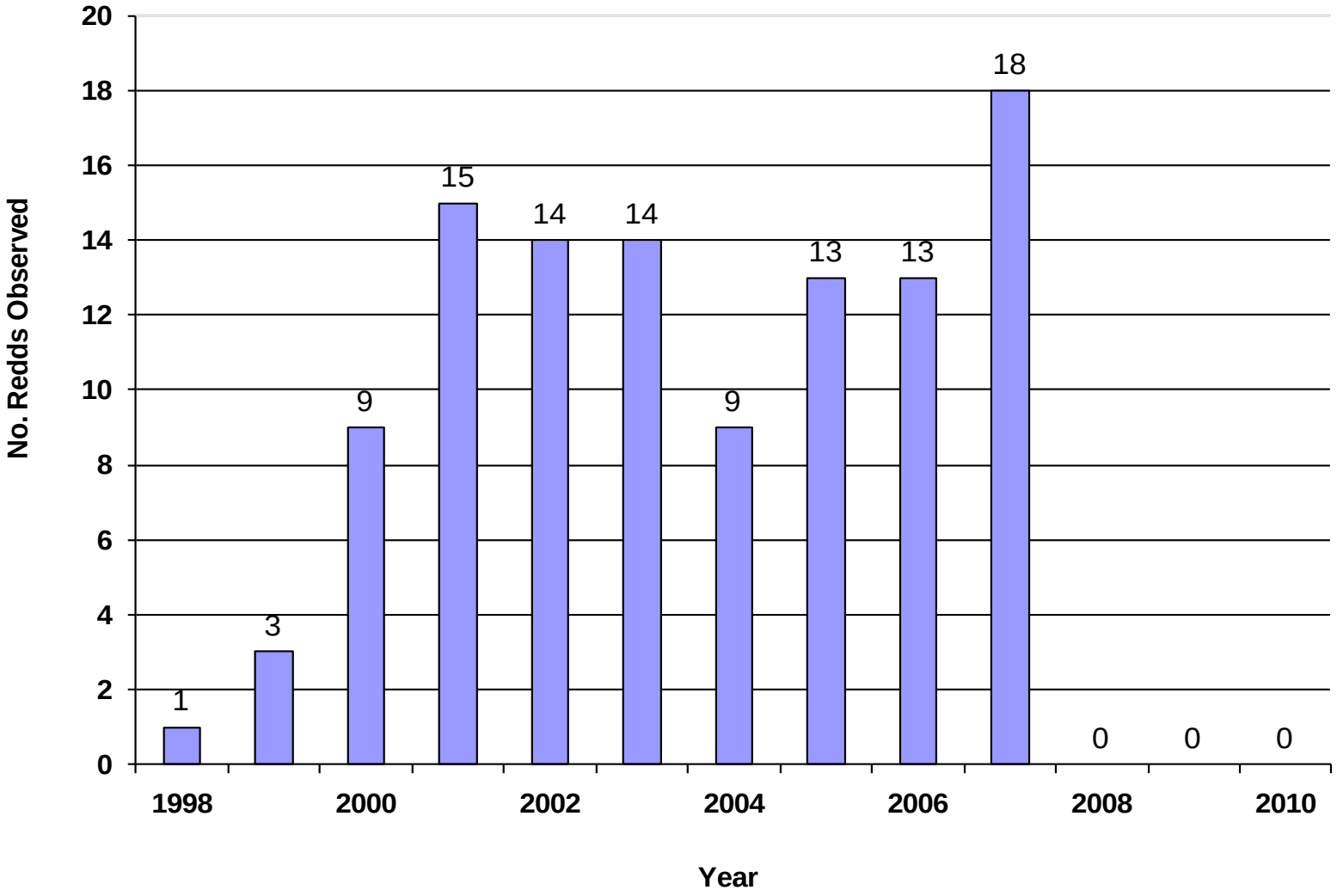

Figure 4. Bull trout redd counts in Alpine Creek, 1998 to 2010.

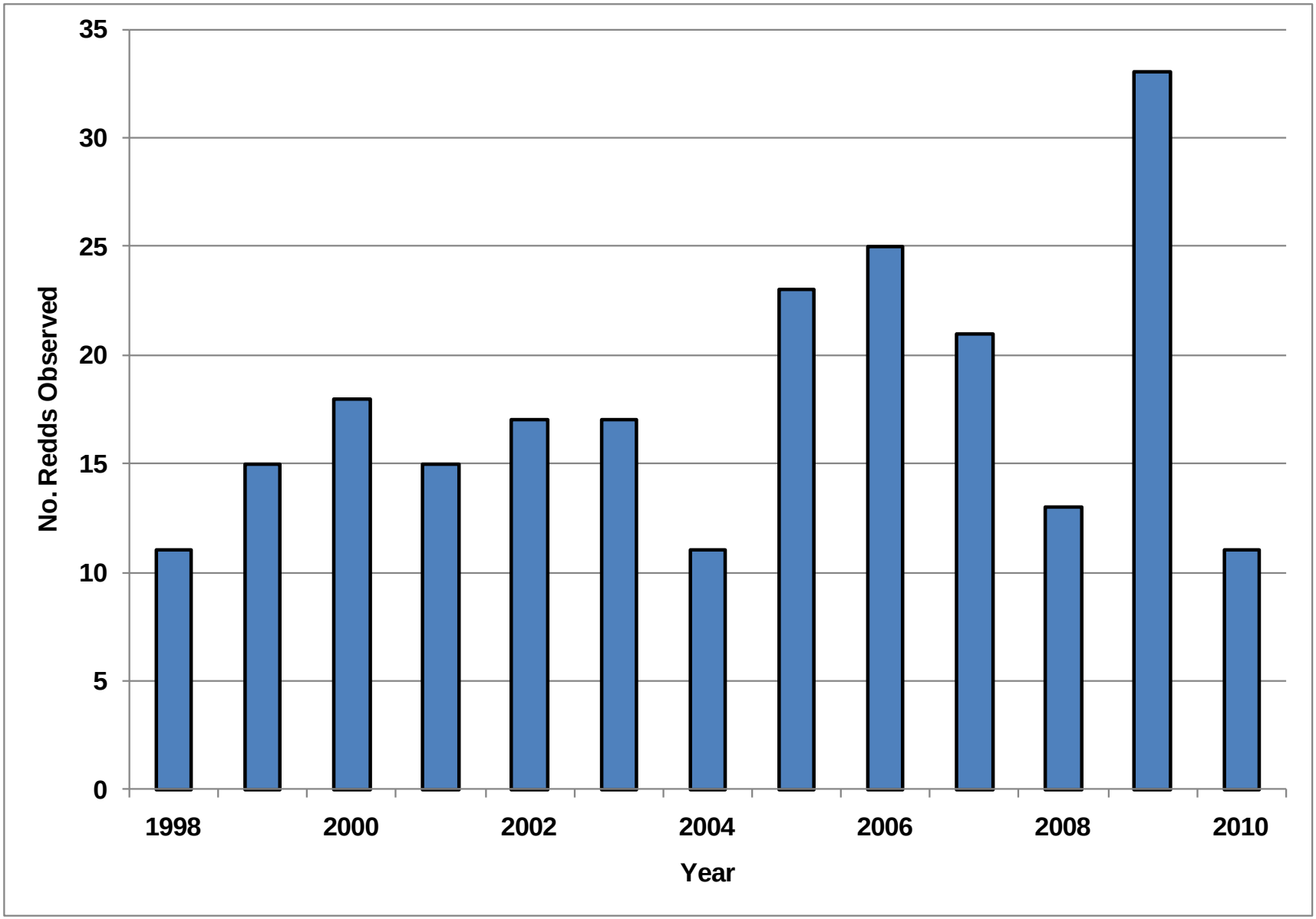

Figure 5. Bull trout redd counts observed in the trend transect of Fishhook Creek, 1998 to 2010.

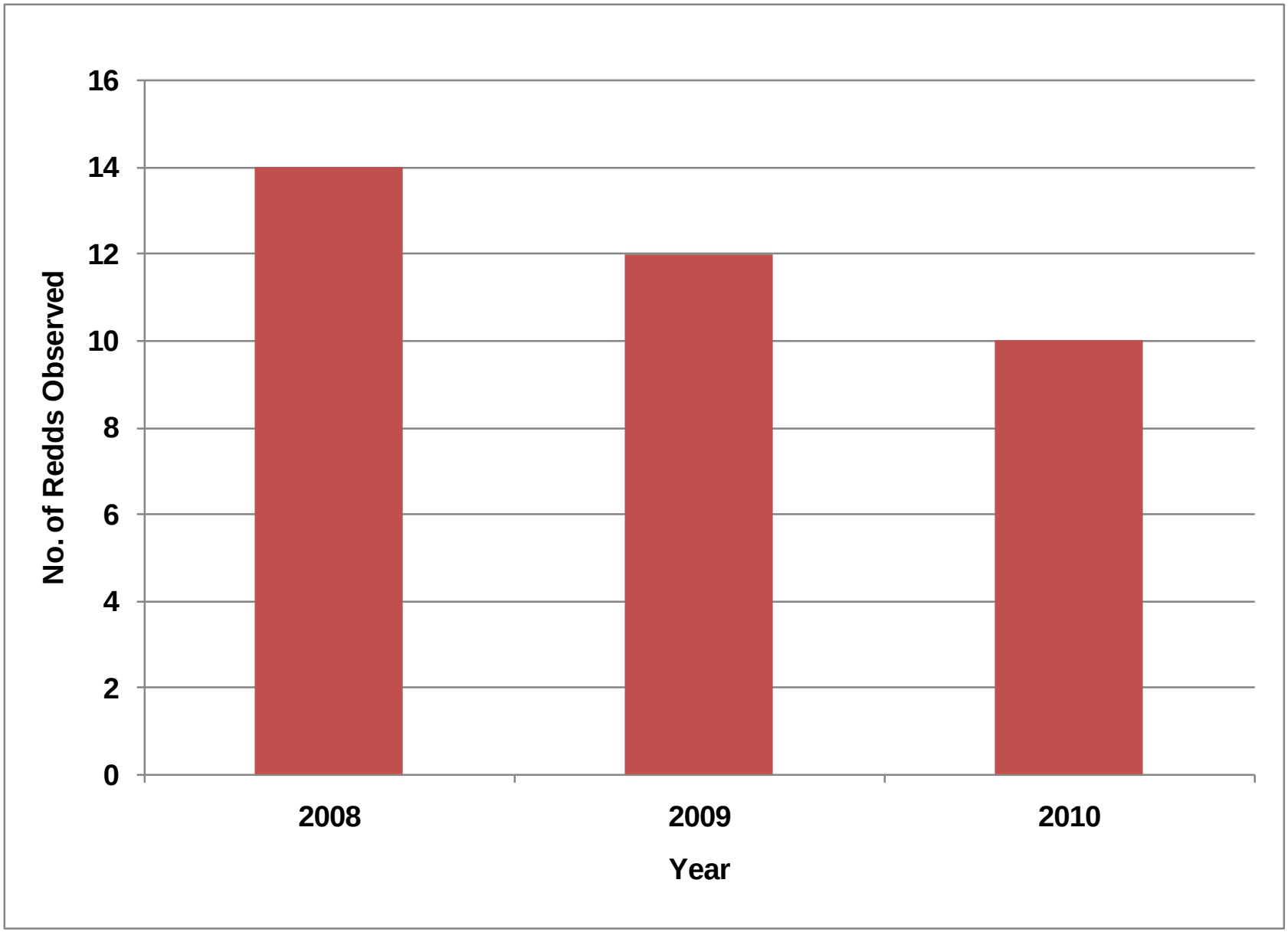

Figure 6. Bull trout redd counts observed in the second transect of Fishhook Creek, 2008 to 2010.

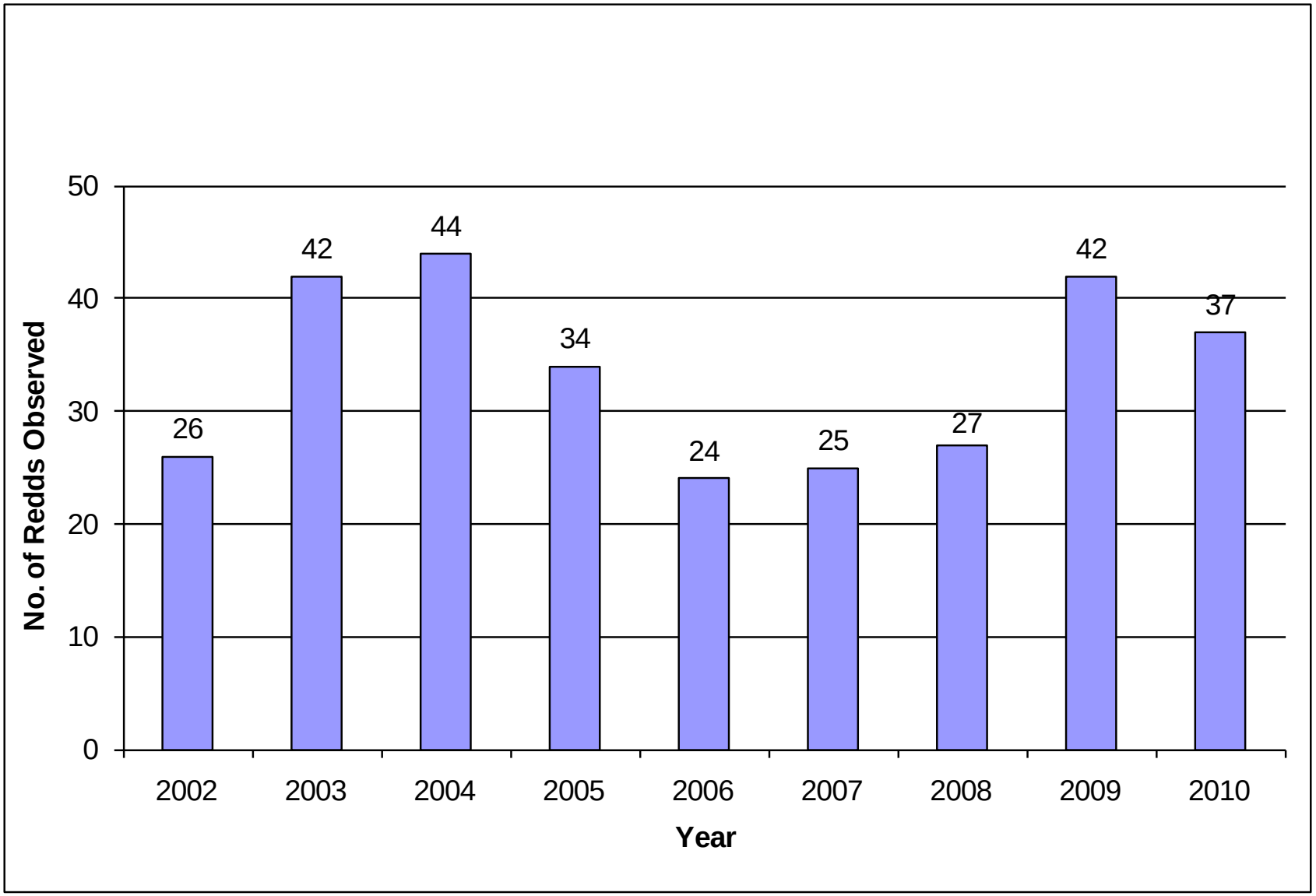

Figure 7. Fluvial bull trout redd counts in the trend transect on Bear Valley Creek, 2002 to 2010.

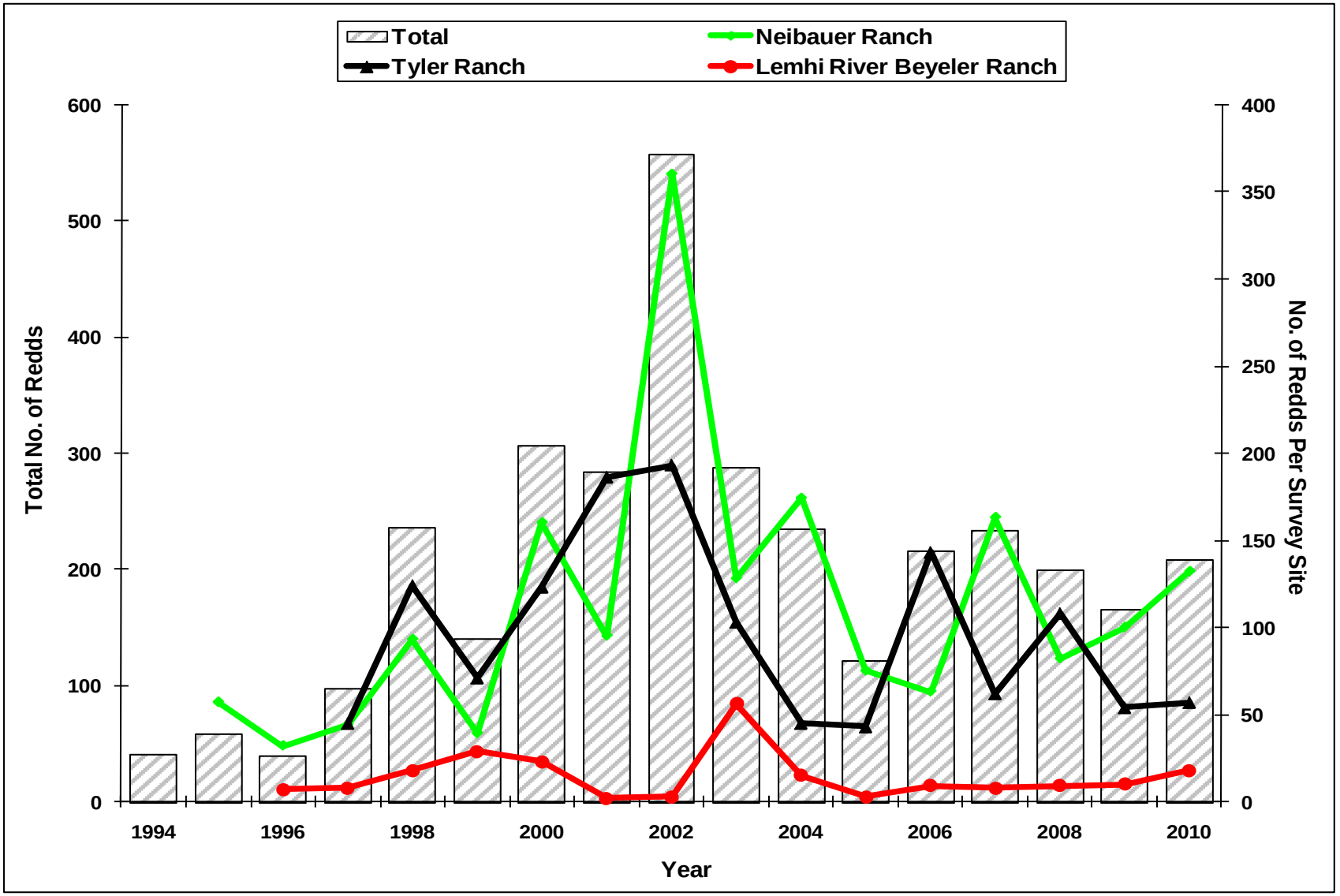

Figure 8. Resident rainbow trout spawning redds counted during ground surveys in the upper Lemhi River (Beyeler Ranch) and Big Springs Creek (Neibaur and Tyler ranches), 1994 to 2010.

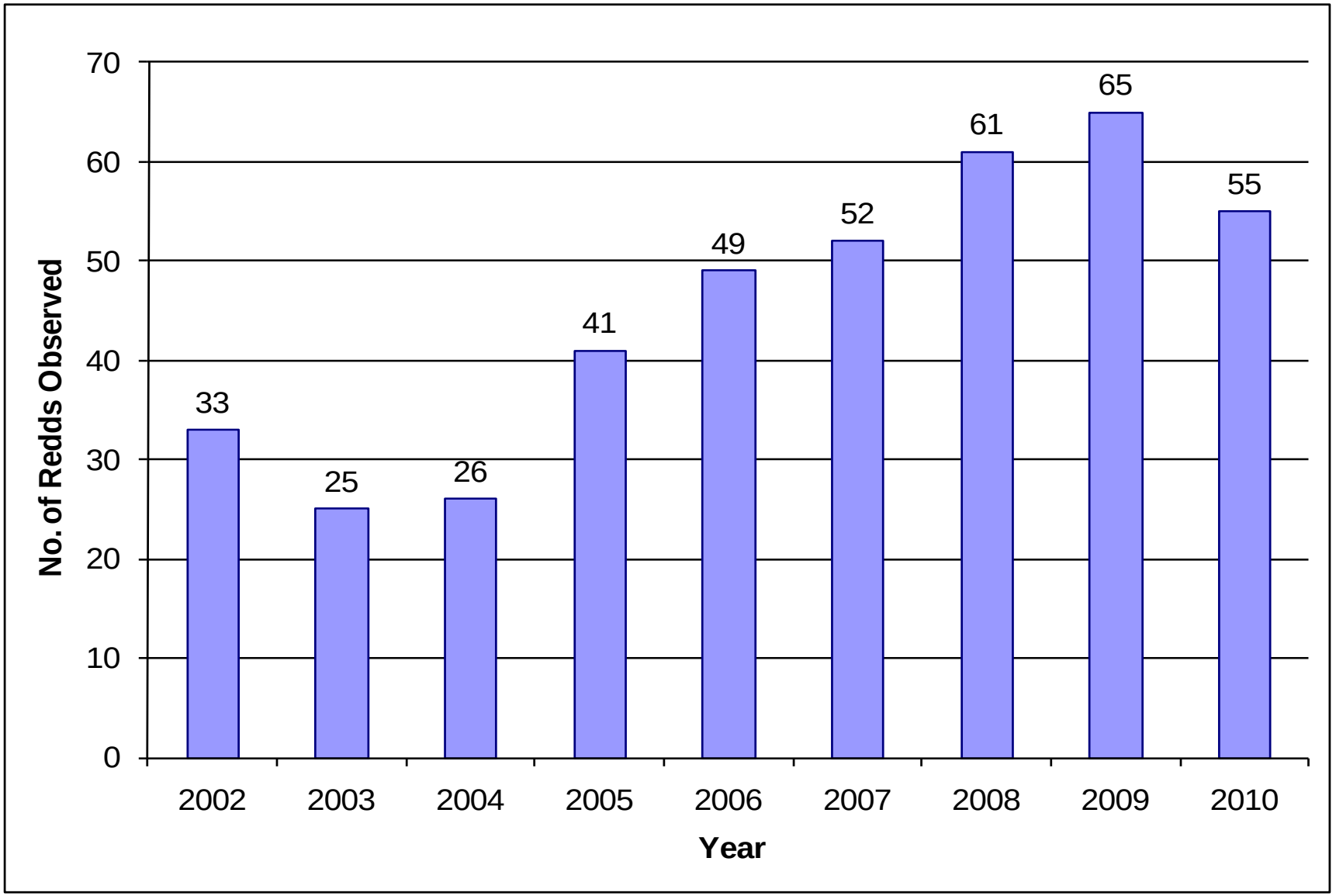

Figure 9. Resident bull trout redd counts in East Fork Hayden Creek, 2002 to 2010.

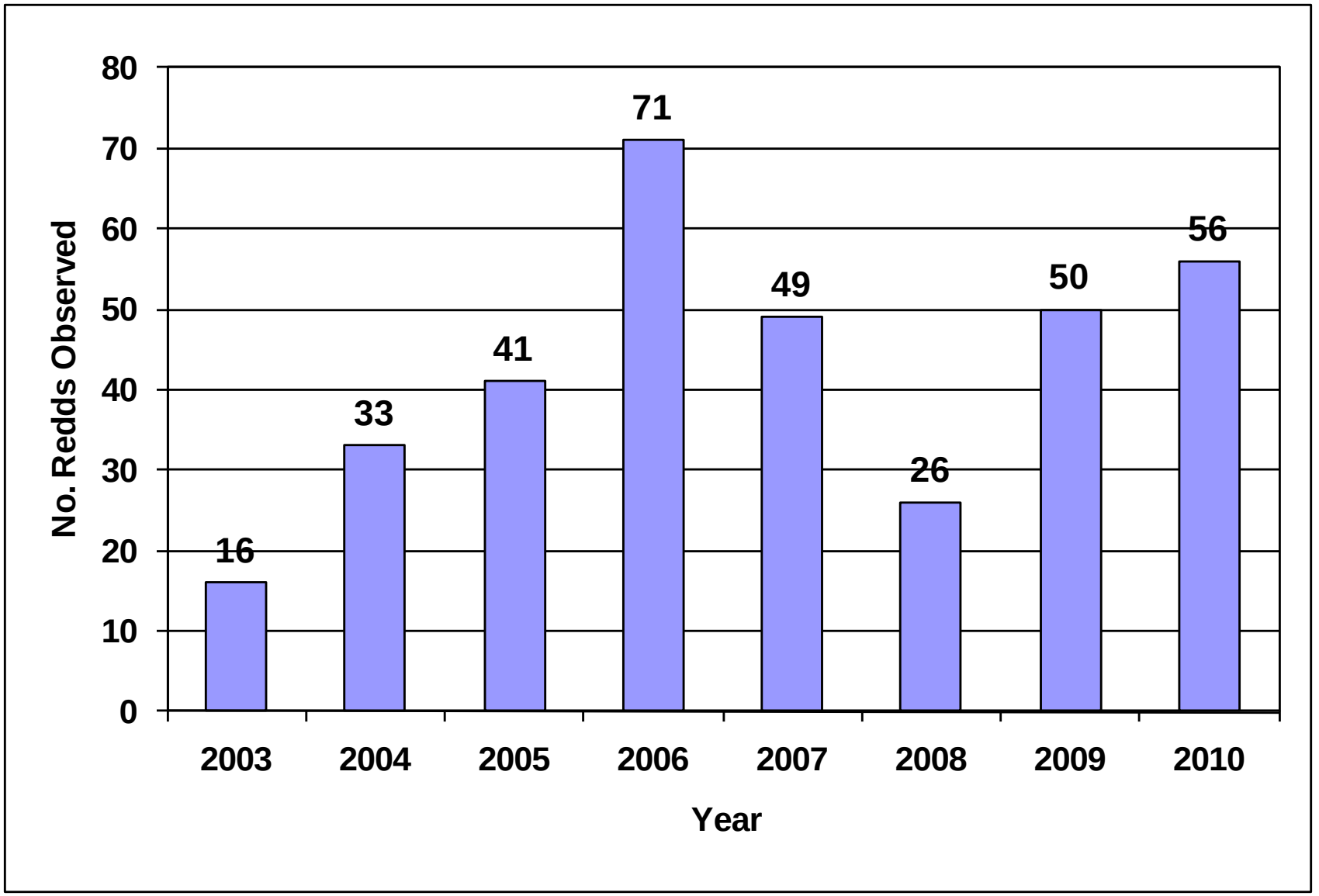

Figure 10. Fluvial bull trout redd counts in Fourth of July Creek (SNRA), 2003 to 2010.

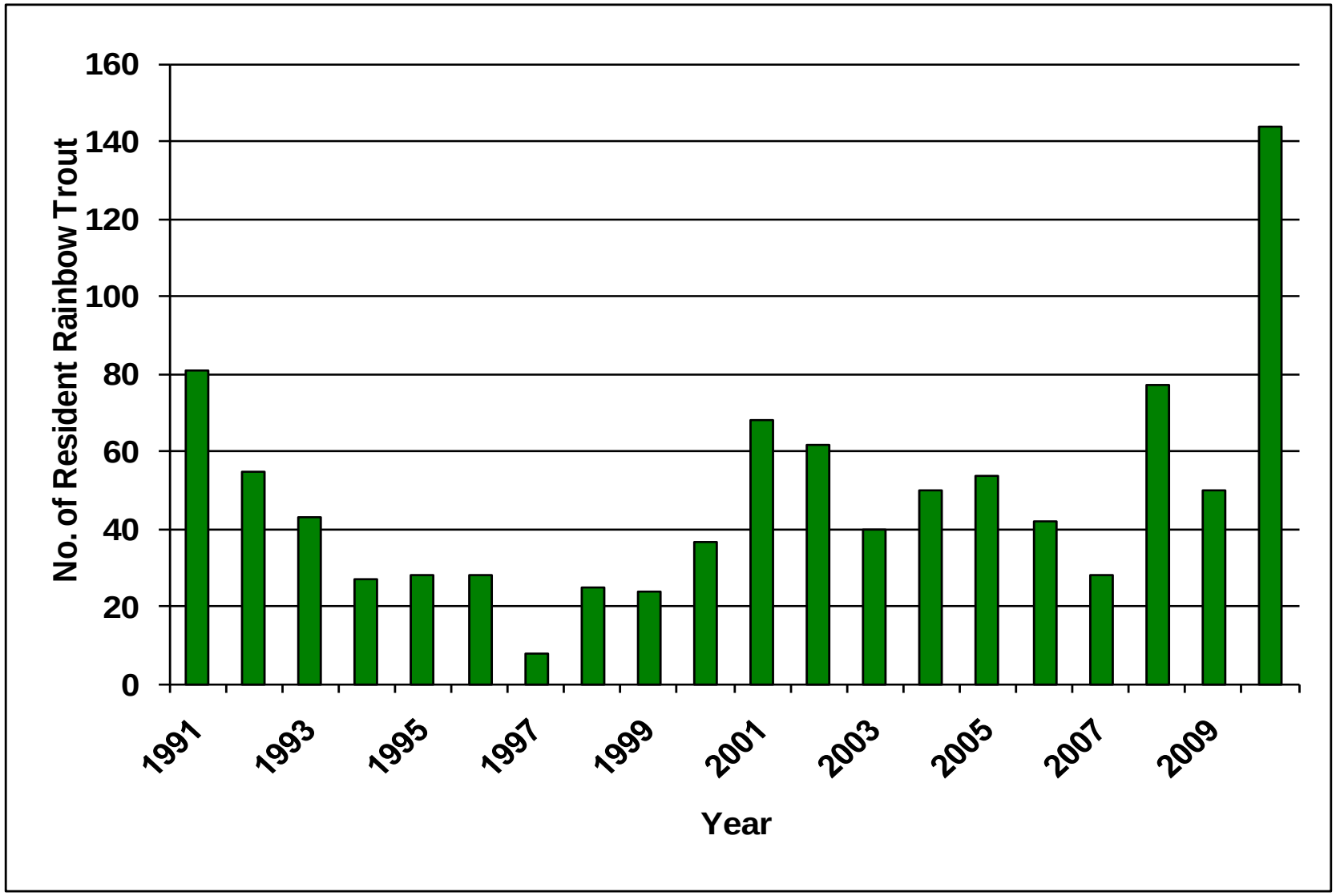

Figure 11. Annual count of resident rainbow trout trapped at the Pahsimeroi Fish Hatchery, 1991 to 2010.

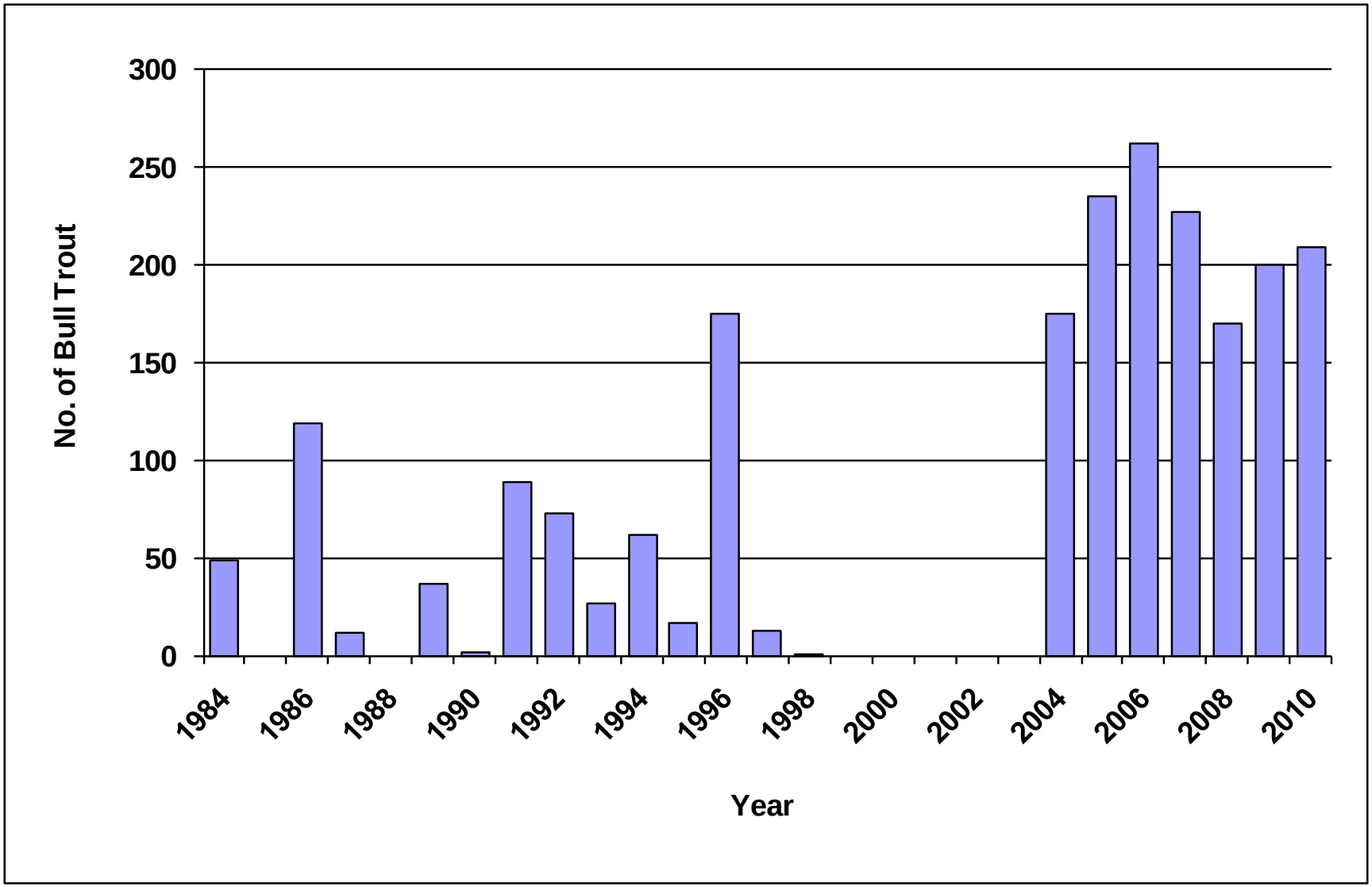

Figure 12. Annual count of bull trout trapped at East Fork Satellite Facility, 1984 to 2010.

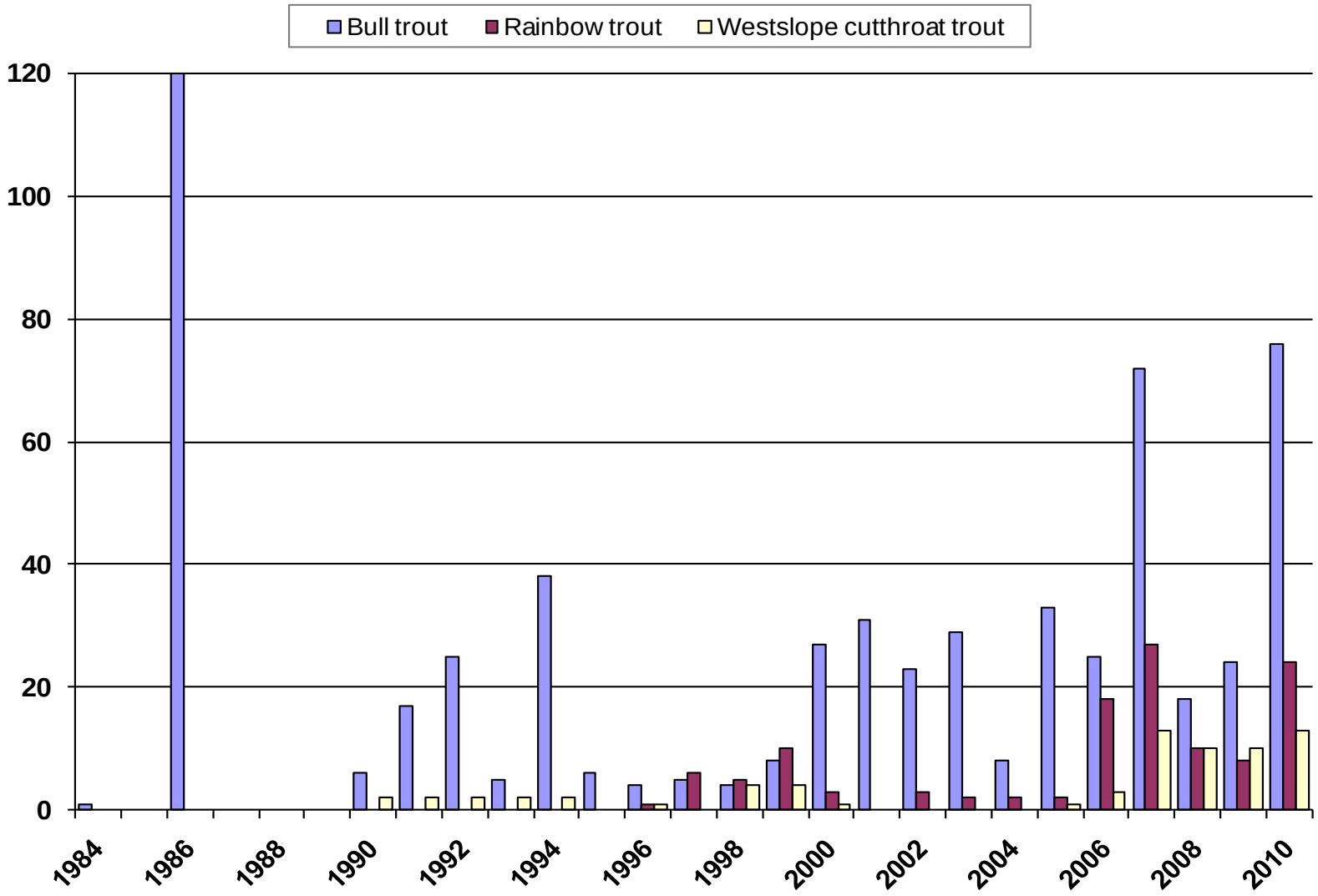

Figure 13. Annual count of selected resident salmonids trapped at Sawtooth Fish Hatchery, 1984 to 2010.

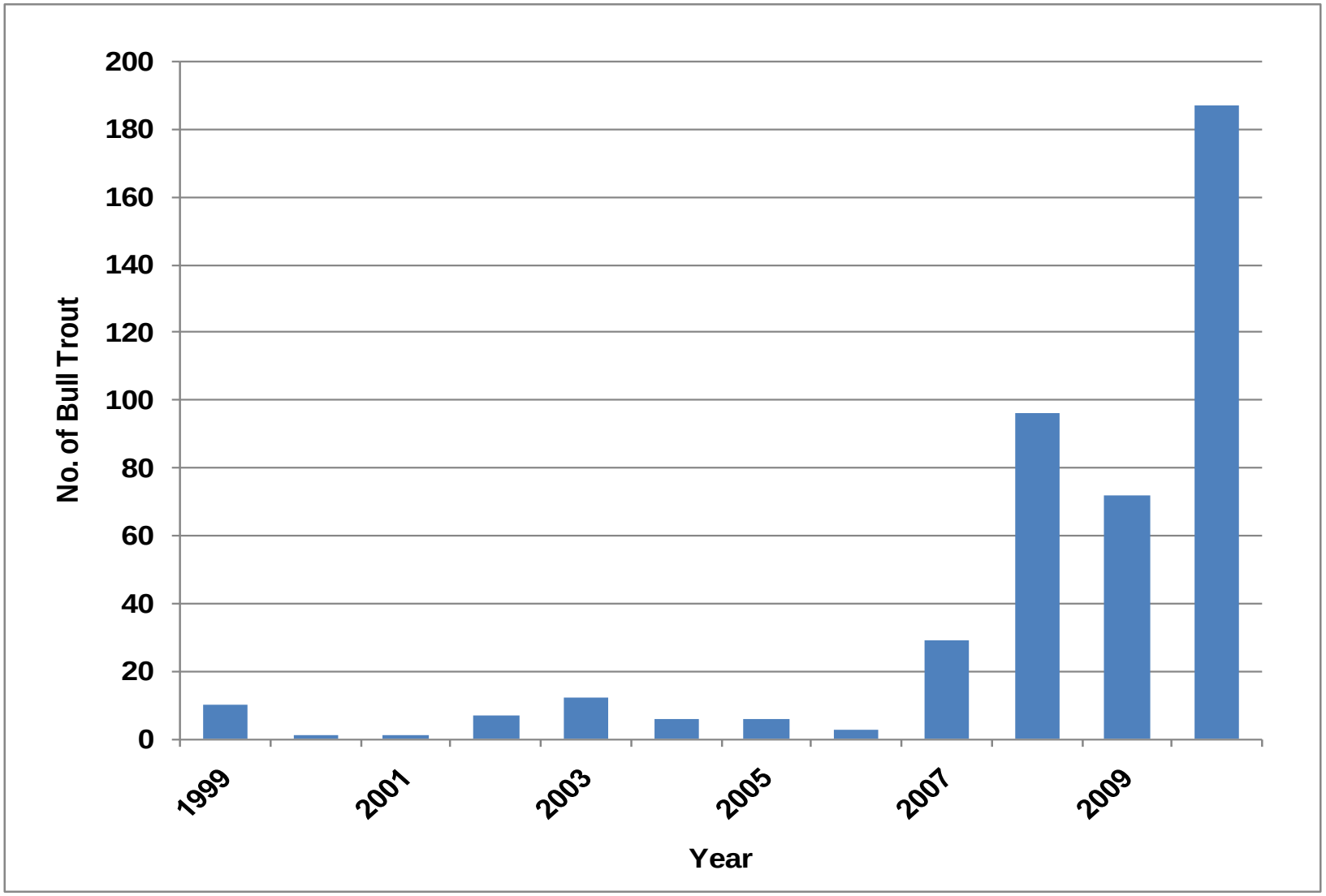

Figure 14. Number of bull trout encountered at the Redfish Lake Creek trap, 1999 to 2010.

SALMON REGION FISHERY MANAGEMENT 2010 ANNUAL REPORT

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

ABSTRACT

During July 2010, IDFG personnel snorkeled 26 of 28 main-stem Middle Fork Salmon River (MFSR) transects to sample fish species, abundance, size and density. For the 26 main-stem MFSR traditional transects surveyed in 2010, westslope cutthroat trout had an overall mean density of 1.3 fish/100 m^2, rainbow trout /steelhead were 0.1 fish/100 m^2, and juvenile Chinook salmon were 0.3 fish/100 m^2. By comparison, in 2009 westslope cutthroat trout had a mean density of 1.1 fish/100 m^2, rainbow trout/steelhead was 0.4 fish/100 m^2, and juvenile Chinook salmon was 0.7 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 15).

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 horse/foot 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 48 years, from 625 in 1962 to 9,117 floaters in 2010. USFS estimated total use days during the 2010 permit season, May 28-Sept. 3, to be 54,945 days, an 8% increase from 54,510 use days calculated for 2009 (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 established by the IDFG 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 main-stem historical (Corley) transects (n=6). IDFG then began additional studies within the MFSR drainage. In 1981, traditional main-stem steelhead transects were established and IDFG began evaluating wild steelhead trout populations on the MFSR (Thurow 1982, 1983, 1985). In 1985, the Department added additional snorkel sites to enumerate cutthroat trout and Chinook salmon, and began calculating 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 main-stem (n=29) or tributary (n=10) traditional transects.

This report, a continuation of the 1985 study, presents data collected in July 2010 on fish densities in the MFSR drainage.

OBJECTIVES

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

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

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

METHODS

Main-stem and Tributary Snorkeling Transects

From July 15 - 22, 2010, IDFG personnel snorkeled 26 of 28 main-stem MFSR transects using snorkeling techniques described by Thurow (1982). The Tappan Run transect was dropped from the list of traditional main-stem MFSR transects after the 2009 survey as the snorkel site no longer exists due to a "blow out" of Cove Creek in 2008. Historical transects on the main-stem MFSR were established prior to 1985 while traditional transects were established since 1985. All six MFSR historical (Corley) transects and seven of 10 traditional tributary transects were snorkeled in 2010. Physical information on main-stem and tributary snorkel sites surveyed in 2010 is located in Appendices C, D, and E, which detail snorkeling transects, locations, and transect measurements.

Project Angling

Project anglers used conventional fly-fishing and spin cast gear to collect fish species data on the main-stem MFSR from Boundary Creek, located 0.9 km downstream of Dagger Falls, to the mouth of the Middle Fork, 153.4 km downstream of Dagger Falls (Figure 15). Fish were identified by species, measured to the nearest 10 mm total length, and released. Genetic samples were taken from bull trout, Chinook salmon, rainbow trout/steelhead, and mountain whitefish before release. One Columbia spotted frog genetic sample was collected from shore.

Tributary Surveys

Eleven tributaries in the MFSR drainage were electro-fished to sample fish and amphibian populations and obtain genetic information.

RESULTS AND DISCUSSION

Main-stem and Tributary Snorkeling Transects

In main-stem MFSR traditional snorkel transects surveyed in 2010, IDFG personnel counted a total of 651 salmonids, including 379 (58%) westslope cutthroat trout, 86 (13%) juvenile Chinook salmon, 31 (5%) rainbow trout/steelhead, 2 (0.3%) bull trout, and 153 (24%) mountain whitefish (Table 29). The 379 cutthroat trout observed this year represented the third largest number of cutthroat counted in main-stem snorkel transects for the 20 survey periods dating back to 1971 (Figure 16). Additionally, northern pikeminnow, and sucker were observed but were not enumerated this year. In 2009, snorkelers counted 823 salmonids, of which 297 were westslope cutthroat trout, 120 rainbow trout/steelhead, 203 juvenile Chinook salmon, 1 bull trout, and 202 mountain whitefish in the same transects (Curet et al, in press). In 2010, 26 of 28 transects were snorkeled while 26 of 29 transects were surveyed in 2009. This year's data and yearly summaries are reported in Tables 29-39 and Figures 15-24.

Average densities for cutthroat, rainbow, and Chinook salmon in main-stem MFSR transects dropped slightly in two out of three cases this year when compared to 2009 (Table 30; Figures 17, 18, and 19). The average cutthroat trout density of 1.3 fish/100 m^2 in 2009 increased slightly from the 1.1 fish/100 m^2 finding in 2009. The rainbow trout density dropped

from 0.4 fish/100 m^2 in 2009 to 0.1 fish/100 m^2 this year. The Chinook salmon number also decreased in 2010 with an average density of 0.3 fish/100 m^2 in 2009 compared to 0.7 fish/100 m^2 in 2009.

Catch-and-release regulations on the main-stem have been in effect since 1972. As part of IDFG's monitoring of catch-and-release effects, snorkelers in main-stem transects counted the number of cutthroat trout greater than 300 mm TL. While the percent of cutthroat greater than 300 mm TL was calculated at 13% in 1971, since that time the percent has ranged from 13% to 55% (Figure 20). In 2010, 26% of the 379 cutthroat observed were greater than 300 mm in main-stem transects.

All six historical (Corley) sites on the main-stem MFSR were snorkeled in 2010 (Table 31). Westslope cutthroat trout densities in these transects ranged from 0.1 to 4.8 fish/100 m^2 and averaged 1.7 fish/100 m^2 in 2010 (Table 32). Rainbow trout were observed in only one (Bernard Airstrip) historical transect in 2010. Densities ranged from 0.0 to 0.1 fish/100 m^2 and had an average density of 0.02 fish/100 m^2 (Table 32). No juvenile Chinook salmon were observed in the historical transects during this year's snorkeling surveys.

Seven of ten tributary transects in the MFSR were snorkeled in 2010. IDFG personnel counted 60 westslope cutthroat trout, 40 rainbow trout/steelhead, and 11 juvenile Chinook salmon in these transects (Table 33). Average densities of westslope cutthroat trout, rainbow trout/steelhead, and Chinook salmon in MFSR tributary transects in 2010 were 1.9, 1.4, and 0.3 respectively (Table 34). This compares with average densities of 1.5, 0.8, and 1.0 for westslope cutthroat trout, rainbow trout/steelhead, and juvenile Chinook salmon, respectively, in 2009 (Curet et al, in press).

Native freshwater mussels were observed in 8 of 28 main-stem transects in 2010, along with 2 of 6 main-stem historical (Corley) transects (Tables 29 and 31). Mussel presence observed in various snorkeling transects in 2010 is marked with a footnote reference in Tables 29 and 31. Although fishery personnel were not able to identify mussels to species, post-survey communication within the department indicated that they were likely Western pearlshell mussel *Margaritifera falcate* or possibly Rocky Mountain ridged mussel *Gonidea angulata* (T. Copeland, IDFG, personal communication). Future surveys will attempt to key mussel samples to species as well as document their location, distribution, and estimated abundance.

Summary tables of cutthroat, rainbow trout/steelhead, and Chinook salmon densities for the snorkeling transects in the main-stem traditional MFSR transects, the historical (Corley) transects, and tributary transects are shown in Tables 35 - 37.

Snorkeling transects in the main-stem 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 due to high flow conditions. Instances with high flows may represent inherent snorkeler bias since a snorkeler may not be able to accurately observe fish as they navigate the difficult waters. An evaluation of the all transects currently conducted in the MFSR needs to be done to determine what transects are critical to monitoring long-term population trends and what transects can be snorkeled in a safe and unbiased manner. Snorkeling efficiency models also needed to be developed in the system to validate snorkel counts (Thurow et al. 2006).

Currently, MFSR surveys are conducted using underwater visual survey techniques (i.e. snorkeling). As in all visual survey methods, obtaining an unbiased sample of fish length is difficult due to the potential for observer bias (St. John et al. 1990). Technologies such as stereo-video camera systems may be used in conjunction with visual surveys to improve accuracy and precision of the fish length for long-term monitoring of population size structure of cutthroat trout in MFSR (Bower et al. 2011, in press). Although such a method may require a substantial time commitment to manually process imagery to accurate obtain fish lengths, technologies such as stereo-video need to be considered as a means to improve or supplement current surveys methods.

Project Angling

IDFG anglers caught 334 fish from the main-stem MFSR during the 2010 survey (Figure 21). Of the salmonids caught and released, westslope cutthroat trout comprised 52% (n=174) while rainbow trout/steelhead accounted for another 34.4% (n=115). Mountain whitefish added 6% (n=21) to the catch, Chinook salmon totaled 3% (n=11), bull trout another 2% (n=8), apparent cutthroat/rainbow hybrid trout 1% (n=3), and brook trout accounted for the balance with 1% (n=2) in Figure 21. This year's ratio of cutthroat trout and rainbow trout caught by anglers closely followed 2009 (Figure 22). This year, cutthroats accounted for 52% and rainbows were 34% of the angling catch. In 2009, cutthroats accounted for 57% and rainbows 38% of the angling catch. The remaining 13% and 5%.for 2010 and 2009, respectively, were comprised of other salmonids. The 2010 average TL for westslope cutthroat trout and rainbow trout/steelhead was 268.1 mm and 172.5 mm, respectively (Figure 23). In 2009, average lengths for cutthroat trout and rainbow trout/steelhead caught by angling were 248.8 and 183.5 mm, respectively. No non-game fish were caught by hook and line this year. A summary of fish caught by species during project angling for the last nine years is shown in Table 38.

During angling on the main-stem MFSR, genetic samples were taken from 23 rainbow trout/steelhead, 17 mountain whitefish, 10 Chinook salmon 6 bull trout, and 1 Columbia spotted frog (Table 39).

Catch-and-release regulations have been in effect since 1972. Before this date, approximately 20% of the westslope cutthroat trout caught by project anglers were over 300 mm TL. Since the regulation change, this proportion has fluctuated yearly, ranging from 25% to 53% (Figure 24). In 2010, the proportion of westslope cutthroat trout larger than 300 mm caught by project anglers was 40% (n=69).

Tributary Surveys

Eleven MFSR tributaries were electro-fished in 2010 to survey their fish and amphibian populations and collect genetic samples (Table 39). Genetics were collected from 86 salmonids and 25 amphibians during electrofishing surveys, comprised of 49 Chinook salmon, 17 rainbow trout/steelhead, 10 bull trout, 10 mountain whitefish, 22 tailed frogs *Ascaphus truei*, and 3 Columbia spotted frogs. Fish and amphibian species collected by stream, the number of genetic samples taken, sample dates, and transect locations are identified in Table 39.

MANAGEMENT RECOMMENDATIONS

1. Continue monitoring westslope cutthroat trout, rainbow trout/steelhead, and juvenile Chinook salmon in all 28 main-stem sites, 10 tributary sites, and six historical main-stem MFSR sites by snorkeling between the second week of July and the third week of August annually. This information portrays population trends over time. The main-stem westslope cutthroat trout snorkel counts on the Middle Fork Salmon, St. Joe, Coeur d'Alene, and Selway rivers, along with the General Parr Monitoring snorkel counts for westslope cutthroat trout, likely comprise the best trend dataset for a salmonid subspecies in America (D. Schill, IDFG, personal communication).

2. Collect voucher samples of unique freshwater mussels observed in the MFSR drainage in future surveys for species identification.

Table 29. Numbers of fish counted in main-stem traditional snorkel transects, Middle Fork Salmon River, 2010.

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	6	1	4	11	1	1	0	0	2	8	0	8	0	15	0	0	0	36
Gardells Hole	3	21	1	6	31	0	2	0	0	2	12	5	17	0	2	0	P[b]	0	52
Velvet	1	18	0	8	27	0	7	1	4	12	0	0	0	0	0	0	P	0	39
Elkhorn	0	6	2	5	13	0	0	0	0	0	0	0	0	0	2	0	0	0	15
Sheepeater	1	1	2	2	6	0	0	0	1	1	6	0	6	0	4	0	0	0	17
Greyhound	4	2	1	0	7	0	0	0	0	0	10	0	10	0	5	0	0	0	22
Rapid River	0	17	2	7	26	0	1	2	0	3	23	0	23	0	12	0	0	0	64
Indian Pool[c]	0	10	3	12	25	0	0	0	0	0	0	0	0	0	16	0	P	0	41
Pungo[c]	0	2	2	3	7	0	0	0	0	0	1	0	1	1	5	0	0	0	14
Marble Pool	0	34	0	13	47	0	0	1	0	1	0	0	0	1	22	0	0	0	71
Skijump	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lower Jackass[c]	0	0	2	4	6	0	0	0	0	0	7	0	7	0	1	0	P	0	14
Cougar	0	1	0	0	1	0	0	0	0	0	0	0	0	0	7	0	0	0	8
Whitie Cox[c]	0	41	4	8	53	0	1	0	0	1	0	0	0	0	16	P	P	0	70
Rock Island[c]	3	19	9	3	34	0	1	0	0	1	0	0	0	0	12	0	0	0	47
Hospital Pool	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	2
Hospital Run	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tappan Pool[c]	0	4	10	2	16	0	0	0	0	0	11	0	11	0	4	0	0	0	31
Tappan Run[d]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Flying B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	9
Airstrip[c]	0	3	0	2	5	5	1	1	0	7	3	0	3	0	1	0	P	0	16
Survey	0	3	3	1	7	0	1	0	0	1	0	0	0	0	1	0	P	0	9
Big Creek Bridge	0	7	2	4	13	0	0	0	0	0	0	0	0	0	3	P	P	0	16
Love Bar	2	5	3	3	13	0	0	0	0	0	0	0	0	0	1	P	P	0	14
Ship Island[c]	0	1	8	3	12	0	0	0	0	0	0	0	0	0	6	P	P	0	18
Little Ouzel	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Otter Bar	0	1	1	3	5	0	0	0	0	0	0	0	0	0	4	0	P	0	9
Goat Creek Pool	0	1	3	4	8	0	0	0	0	0	0	0	0	0	2	0	P	0	10
Goat Creek Run	0	2	2	1	5	0	0	0	0	0	0	0	0	0	2	P	P	0	7
Total	14	205	61	99	379	6	15	5	5	31	81	5	86	2	153	P	P	0	651

[a] BU=Bull trout, MWF=Mountain whitefish, NPM=Northern pikeminnow, SUC=all Sucker species, RSS=Redside shiner.
[b] P = Species present but not enumerated.
[c] Freshwater mussels present in this transect.
[d] Site no longer exists due to river blow-out.

Table 30. Densities of westslope cutthroat trout, rainbow trout/steelhead, and juvenile Chinook salmon in main-stem traditional snorkel transects, Middle Fork Salmon River, 2009.

Transect Name	River km[a]	Transect Area (m^2)	Densities (Fish/100 m^2) Westslope Cutthroat Trout	Rainbow Trout/ Steelhead	Chinook Salmon	Other Fish[b]
Boundary	0.3	780.2	1.4	0.3	1.0	1.9
Gardells Hole	4.3	1,461.6	2.1	0.1	1.2	0.1
Velvet	8.8	473.2	5.7	2.5	0.0	0.0
Elkhorn	13.6	788.8	1.7	0.0	0.0	0.3
Sheepeater	21.3	1,101.6	0.5	0.1	0.5	0.4
Greyhound	24.5	1,227.6	0.6	0.0	0.8	0.4
Rapid River	29.6	888.0	2.9	0.3	2.6	1.4
Indian Pool	40.0	1,479.6	1.7	0.0	0.0	1.1
Pungo	44.3	800.8	0.9	0.0	0.1	0.6
Marble Pool	51.0	1,647.2	2.9	0.1	0.0	1.3
Skijump	52.3	--[c]				
Lower Jackass	60.6	1,376.4	0.4	0.0	0.5	0.1
Cougar	64.6	540.0	0.2	0.0	0.0	1.3
Whitie Cox	73.9	1,183.2	4.5	0.1	0.0	1.4
Rock Island	74.1	1,415.2	2.4	0.1	0.0	0.9
Hospital Pool	82.9	864.0	0.1	0.0	0.0	0.1
Hospital Run	84.3	712.8	0.0	0.0	0.0	0.0
Tappan Pool	92.6	1,698.8	0.9	0.0	0.7	0.2
Tappan Run	--[d]					
Flying B	106.6	870.0	0.0	0.0	0.0	1.0
Airstrip	108.6	1,160.0	0.4	0.6	0.3	0.1
Survey	119.7	720.0	1.0	0.1	0.0	0.1
Big Creek Bridge	124.6	1,924.0	0.7	0.0	0.0	0.1
Love Bar	127.8	1,040.0	1.3	0.0	0.0	0.1
Ship Island	135.8	1,310.4	0.9	0.0	0.0	0.5
Little Ouzel	144.0	--[c]				
Otter Bar	144.6	1,372.8	0.4	0.0	0.0	0.3
Goat Creek Pool	151.5	1,340.0	0.6	0.0	0.0	0.2
Goat Creek Run	151.8	1,268.8	0.4	0.0	0.0	0.2
Total		29,445.0	34.2	4.3	7.7	13.9
Average			1.3	0.1	0.3	0.5

[a] River km readings begin at Dagger Falls at 0.0 km.
[b] Includes bull trout, mountain whitefish, northern pikeminnow, sucker (var. species), dace (var. sp.), and redside shiner.
[c] Not surveyed.
[d] Transect no longer exists due to river blow-out.

Table 31. 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 main-stem historical (Corley) transects, Middle Fork Salmon River, 2010.

	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	0	3	5	6	14	0	0	0	0	0	0	0	0	0	19	P[c]	P	0	19	33
Mahoney Camp	0	11	2	13	26	0	0	0	0	0	0	0	0	0	2	0	P	0	2	28
White Creek Pack Bridge[d]	0	9	10	4	23	0	0	0	0	0	0	0	0	0	8	0	P	0	8	31
Bernard Airstrip[d]	0	0	1	0	1	0	0	0	1	1	0	0	0	0	2	P	P	0	2	4
Cliffside Rapids Hole	0	1	2	5	8	0	0	0	0	0	0	0	0	0	3	0	P	0	3	11
Hancock Rapids Hole	0	14	12	9	35	0	0	0	0	0	0	0	0	0	1	0	P	0	1	36
Total	0	38	32	37	107	0	0	0	1	1	0	0	0	0	35	0	P	0	35	143

[a] BU=Bull trout, MWF=Mountain whitefish, NPM=Northern pikeminnow, SUC= Sucker (various species), and RSS=Redside shiner.
[b] Density expressed as the number of fish/100 m^2.
[c] P = Species present but not enumerated.
[d] Freshwater mussels observed in this transect.

Table 32. Densities of westslope cutthroat trout, rainbow trout/steelhead, Chinook salmon, and other fish species observed in the six main-stem historical (Corley) snorkel transects, Middle Fork Salmon River, 2010.

	Densities (Fish/100 m^2)			
Transect Name	Westslope Cutthroat Trout	Rainbow Trout/ Steelhead	Chinook Salmon	Other Species[a]
Little Creek Guard Station	1.4	0.0	0.0	1.8
Mahoney Camp	4.8	0.0	0.0	0.4
White Creek Pack Bridge	0.6	0.0	0.0	0.2
Bernard Airstrip	0.1	0.1	0.0	0.2
Cliffside Rapids Hole	0.3	0.0	0.0	0.1
Hancock Rapids Hole	3.0	0.0	0.0	0.1
Total	10.2	0.1	0.0	2.8
Average	1.7	0.02	--	0.5

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

Table 33. 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, 2010.

	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	3	5	5	4	17	0	0	1	0	1	0	0	0	0	4	0	0	0	4	22
Pistol Creek Upper	0	2	2	1	5	0	0	0	0	0	2	1	3	0	5	0	0	0	5	13
Indian Creek Lower	1	6	0	3	10	1	0	0	0	1	4	0	4	0	4	0	0	0	4	19
Indian Creek Upper	1	6	1	2	10	5	1	1	0	7	4	0	4	0	6	0	0	0	6	27
Marble Creek	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	2
Loon Creek Lower[c]																				
Loon Creek Upper[c]																				
Camas Creek Lower	3	5	4	1	13	0	6	0	0	6	0	0	0	1	28	0	P[b]	0	29	48
Camas Creek Upper	1	2	1	1	5	13	10	0	0	23	0	0	0	0	6	0	0	0	6	34
Big Creek[c]																				
Total	9	26	13	12	60	19	19	2	0	40	10	1	11	1	53	0	P	0	54	165

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

[b] P = Species present but not enumerated.

[c] Not surveyed in 2010.

Table 34. Densities of westslope cutthroat trout, rainbow trout/steelhead, Chinook salmon, and other fish species observed in tributary snorkel transects, Middle Fork Salmon River, 2010.

	Densities (Fish/100 m^2)			
Transect Name	Westslope Cutthroat Trout	Rainbow Trout/ Steelhead	Chinook Salmon	Other Species[a]
Pistol Creek Lower	5.6	0.3	0.0	1.3
Pistol Creek Upper	1.2	0.0	0.7	1.2
Indian Creek Lower	1.4	0.1	0.6	0.6
Indian Creek Upper	1.9	1.4	0.8	1.2
Marble Creek	0.0	0.0	0.0	0.0
Loon Creek Lower[b]				
Loon Creek Upper[b]				
Camas Creek Lower	2.0	0.9	0.0	4.2
Camas Creek Upper	1.5	7.1	0.0	1.8
Big Creek[b]				
Total	13.6	9.8	2.1	10.3
Average	1.9	1.4	0.3	1.5

[a] Includes bull trout, mountain whitefish, northern pikeminnow, sucker species, and redside shiner.
[b] Not surveyed in 2010.

Table 35. Summary of westslope cutthroat trout, rainbow trout/steelhead, and Chinook salmon numbers and their average densities in main-stem traditional snorkel transects, Middle Fork Salmon River, 1971, 1978, 1984 to 1993, 1996, 1999, 2003 to 2005, and 2007 to 2010.

	Westslope Cutthroat Trout		Rainbow Trout/Steelhead		Chinook Salmon		Total
Year	No. of Fish	Average Density[a]	No. of Fish	Average Density	No. of Fish	Average Density	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

[a] Expressed as the number of fish observed per $100m^2$.
[b] Only upper 10 of 29 total transects surveyed.
[c] Only upper 6 of 29 total transects surveyed.
[d] Includes 28 main-stem traditional transects as Tappan Run no longer exists.

Table 36. Summary of westslope cutthroat trout, rainbow trout/steelhead, and Chinook salmon numbers and their average densities in main-stem historical (Corley) snorkel transects, Middle Fork Salmon River, 1996, 1999, 2003 to 2005, and 2007 to 2010.

	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[b]	--	--	--	--	--	--	--
2005	112	4.6	0	--	0	--	5,308.0
2007	40	1.1	12	0.3	0	--	4,376.0
2008[b]	--	--	--	--	--	--	--
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

[a] Expressed as the number of fish observed per 100m^2.

Table 37. 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 2010.

	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[c]	--	--	--	--	--	--	--
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

[a] Expressed as the number of fish per 100 m^2.
[b] Only upper 10 of 29 total transects surveyed.
[c] Not surveyed.

Table 38. Summary of fish caught and released during project angling in the main-stem Middle Fork Salmon River, 1996, 1999, 2003 to 2005, and 2007 to 2010.

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

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

[b] UNK = Unknown.

Table 39. Salmonid and amphibian genetic samples taken from the main-stem Middle Fork Salmon River (MFSR) and selected tributaries with their locations, July 2010.

Stream/River	Sample Date	WGS84 Datum Decimal Degrees Latitude	Longitude	Species[a] and No. of Genetic Samples Taken BU	CK	RBT/ SH	MWF	Tailed frog	CSF
Big	7/21/2010	45.09443	114.73412			1	5		
Cache	7/18/2010	44.78099	114.80399	3		8			
Elkhorn	7/16/2010	44.60734	115.24935	1				1	
Garden	7/18/2010	44.73422	115.12903					7	
Indian	7/17/2010	44.76951	115.09085		10	1		2	
Loon	7/18/2010	44.80788	114.81194				1		
MFSR[b] - mainstem from Boundary Cr. to Gardells Hole	7/15/2010	44.52831	115.29286		10	4			1
MFSR - mainstem from Gardells Hole to Dome Hole	7/16/2010	44.56658	115.30079			4			
MFSR – mainstem from Dome Hole to Pungo Creek	7/17/2010	44.65089	115.16636			9			
MFSR - mainstem from Pungo Creek to Pine Flat	7/18/2010	44.76477	115.07285	4		3	11		
MFSR - mainstem from Pine Flat to Johnny Walker	7/19/2010	44.76496	114.89416	2		2	5		
MFSR - mainstem from Johnny Walker to Survey Creek	7/20/2010	44.02306	114.72749			1	1		
Papoose	7/21/2010	45.17410	114.72119	3		1			
Pungo	7/18/2010	44.76697	115.08873	1	1	6		11	
Soldier	7/20/2010	45.02870	114.72689	2				1	
Sulphur	7/20/2010	44.55318	115.30106		38		3		3
Wilson	7/20/2010	45.03339	114.72386				1		

[a] BU = Bull trout, CK = Chinook salmon, RBT/SH = Rainbow trout/Steelhead, MWF = Mountain whitefish, and CSF = Columbia spotted frog.

[b] MFSR = Middle Fork Salmon River.

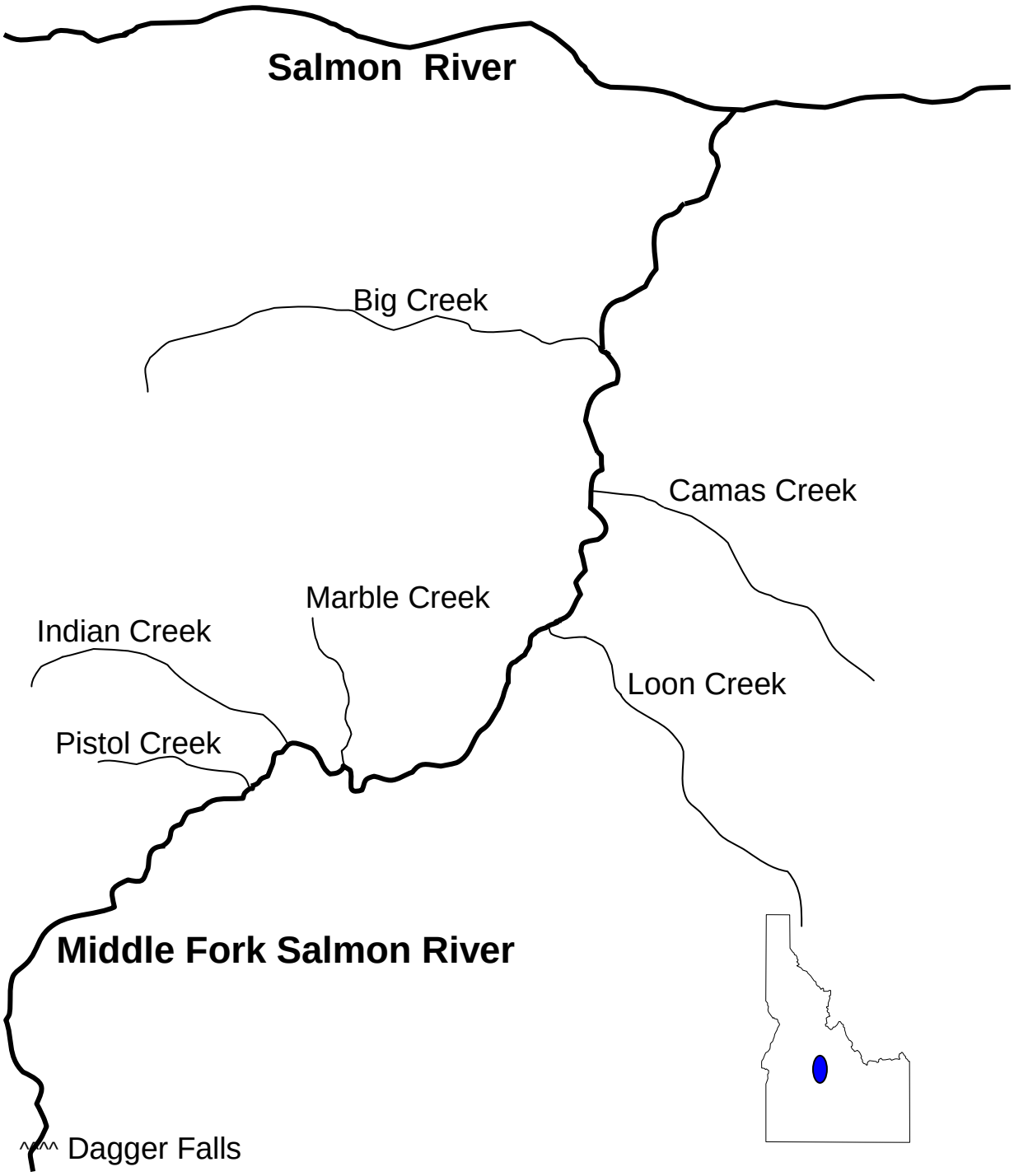

Figure 15. Map of the Middle Fork Salmon River and its major tributaries, Idaho.

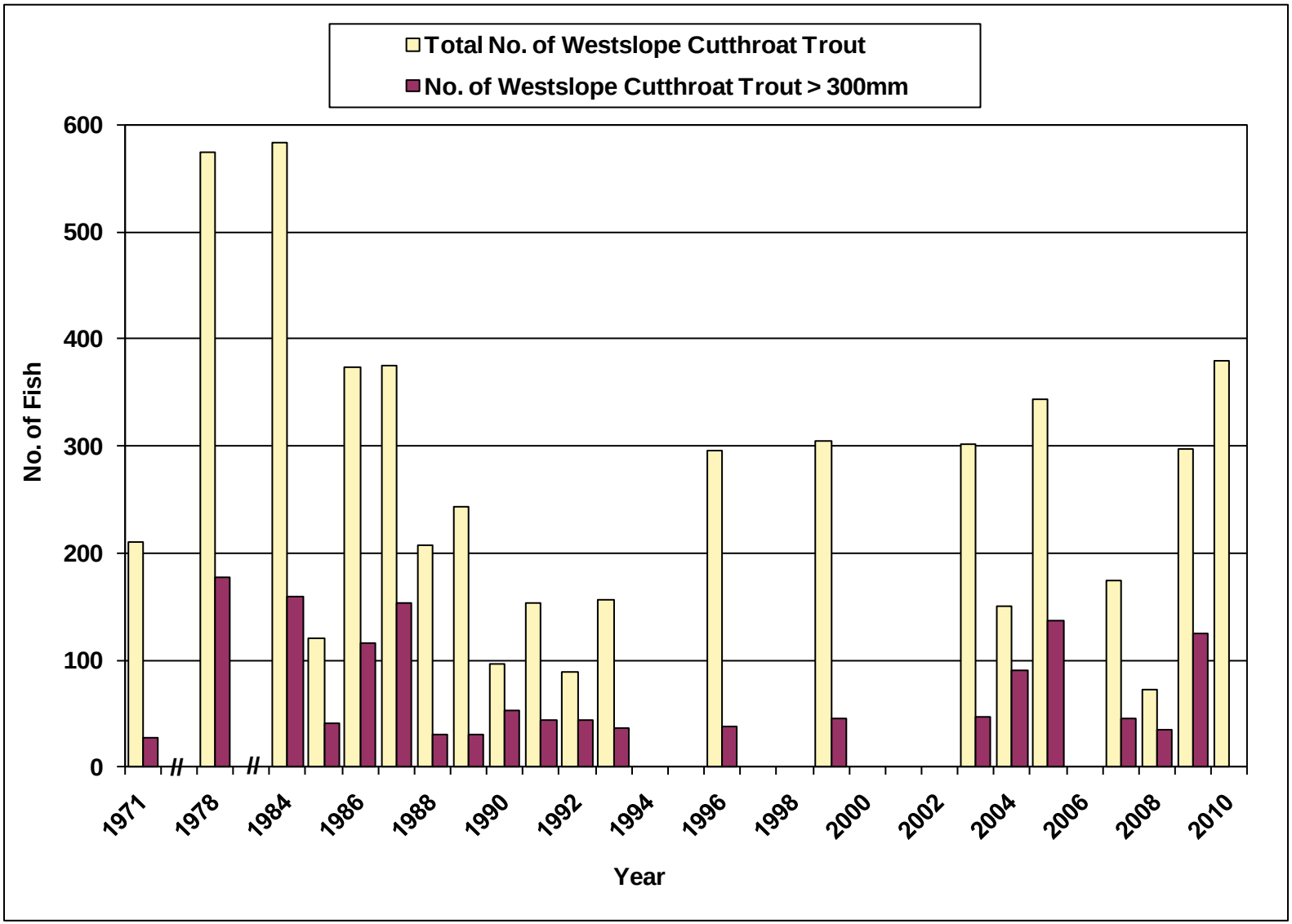

Figure 16. Number of westslope cutthroat trout counted in main-stem Middle Fork Salmon River snorkeling transects, 1971, 1978, 1984 to 1993, 1996, 1999, 2003 to 2005, and 2007 to 2010. Not all transects were sampled in all years.

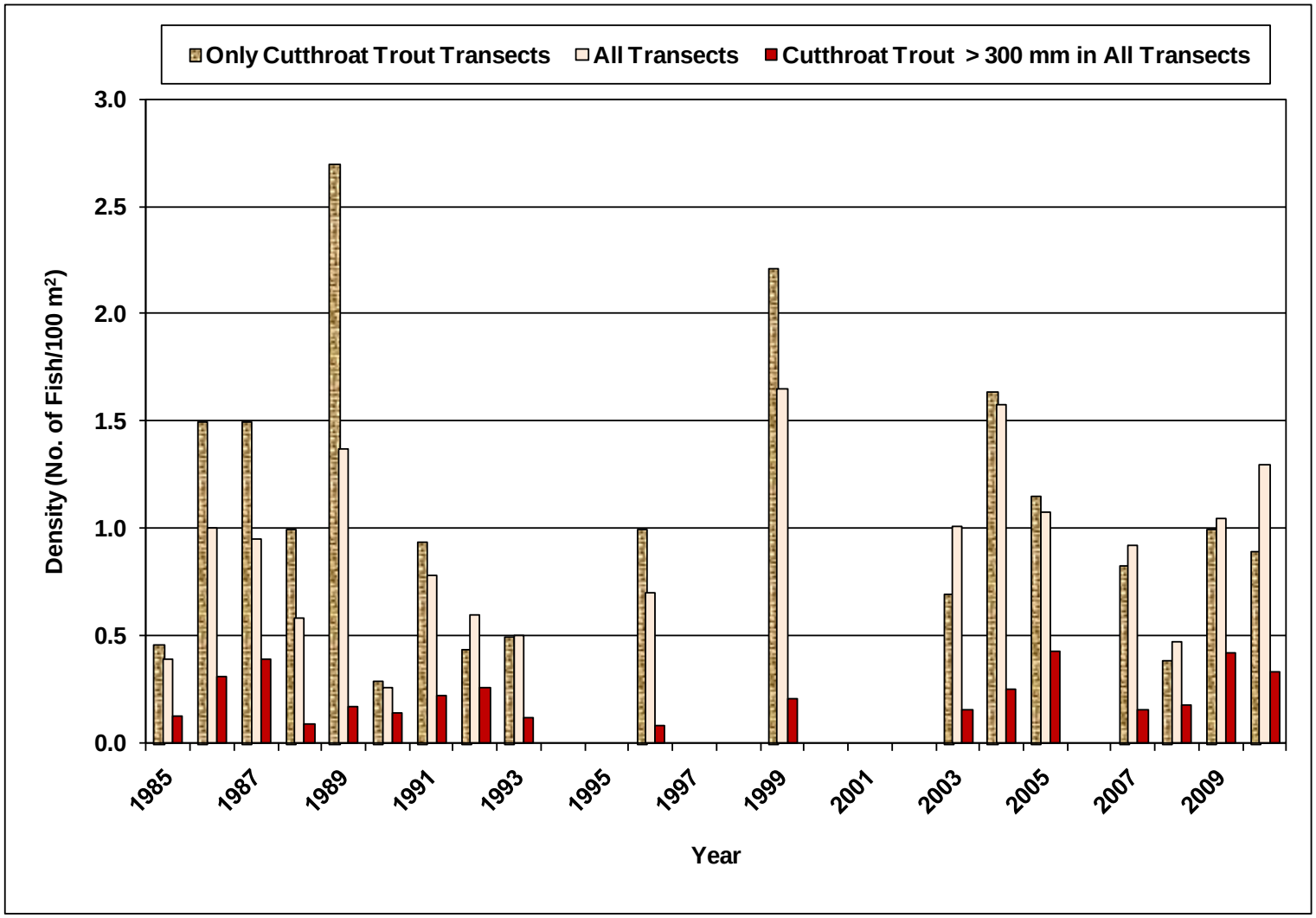

Figure 17. Densities of westslope cutthroat trout counted in westslope cutthroat trout-only transects (see Appendix C), in all transects, and densities of westslope cutthroat trout greater than 300 mm counted in all transects during main-stem Middle Fork Salmon River snorkeling surveys, 1985 to 1993, 1996, 1999, 2003 to 2005, and 2007 to 2010. Not all transects were sampled in all years.

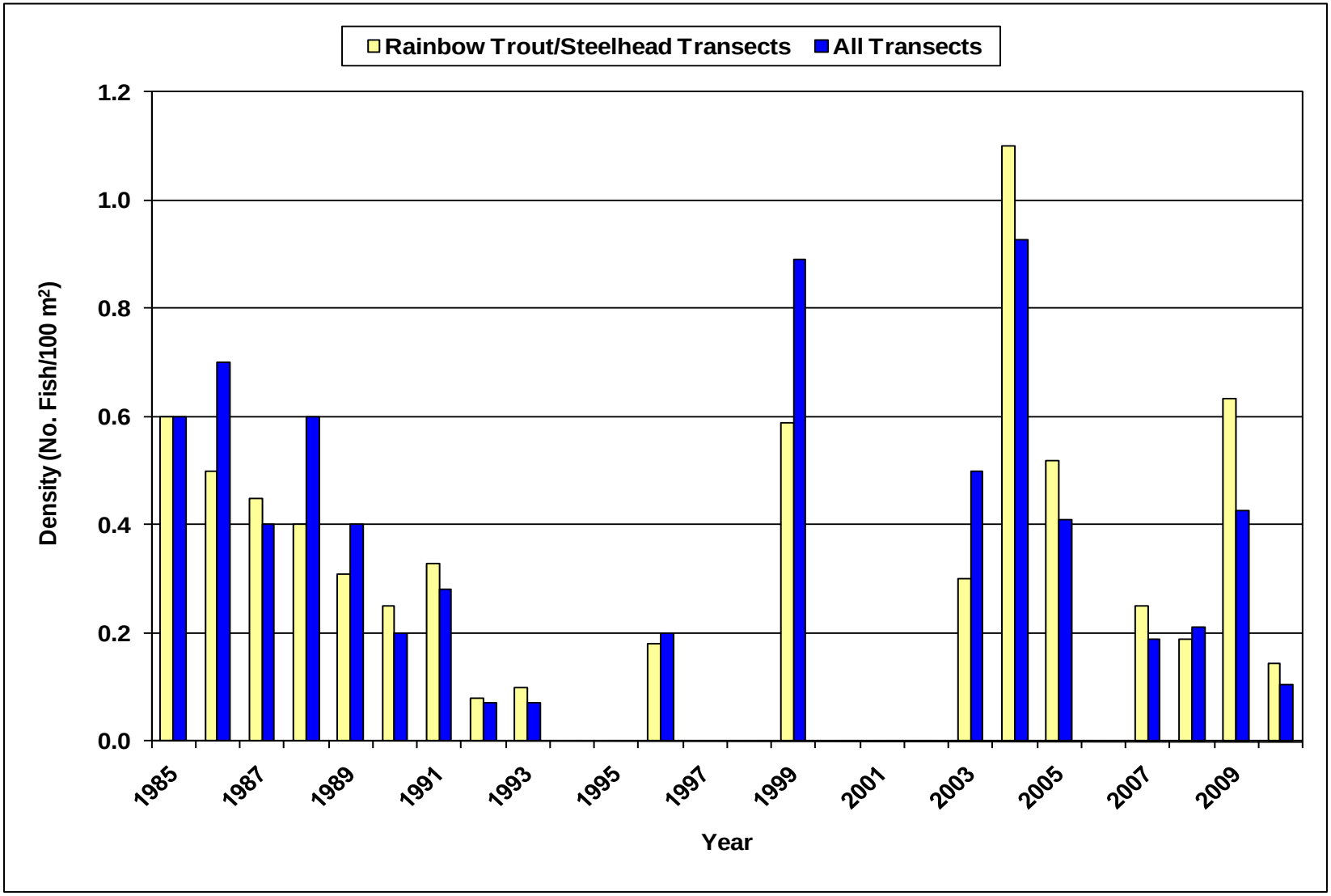

Figure 18. Densities of rainbow trout/steelhead counted in rainbow trout/steelhead-only transects (see Appendix C) and in all transects during main-stem Middle Fork Salmon River snorkeling surveys in 1985 to1993, 1996, 1999, 2003 to 2005, and 2007 to 2010. Not all transects were sampled in all years.

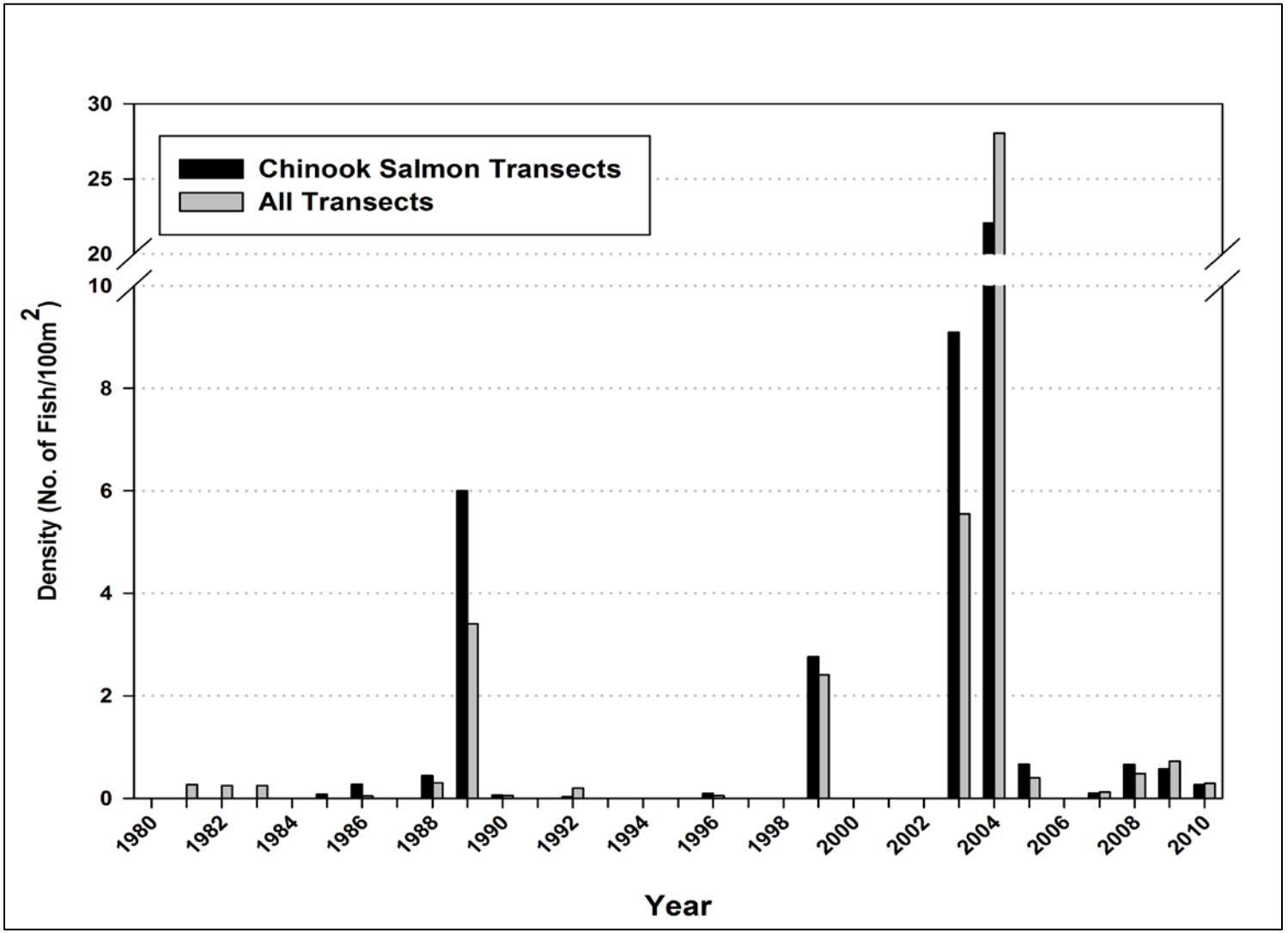

Figure 19. Densities of Chinook salmon in Chinook salmon-only transects (see Appendix C) and in all transects during main-stem Middle Fork Salmon River snorkeling surveys, 1985 to1993, 1996,1999 , 2003 to 2005, and 2007 to 2010. Not all transects were sampled in all years.

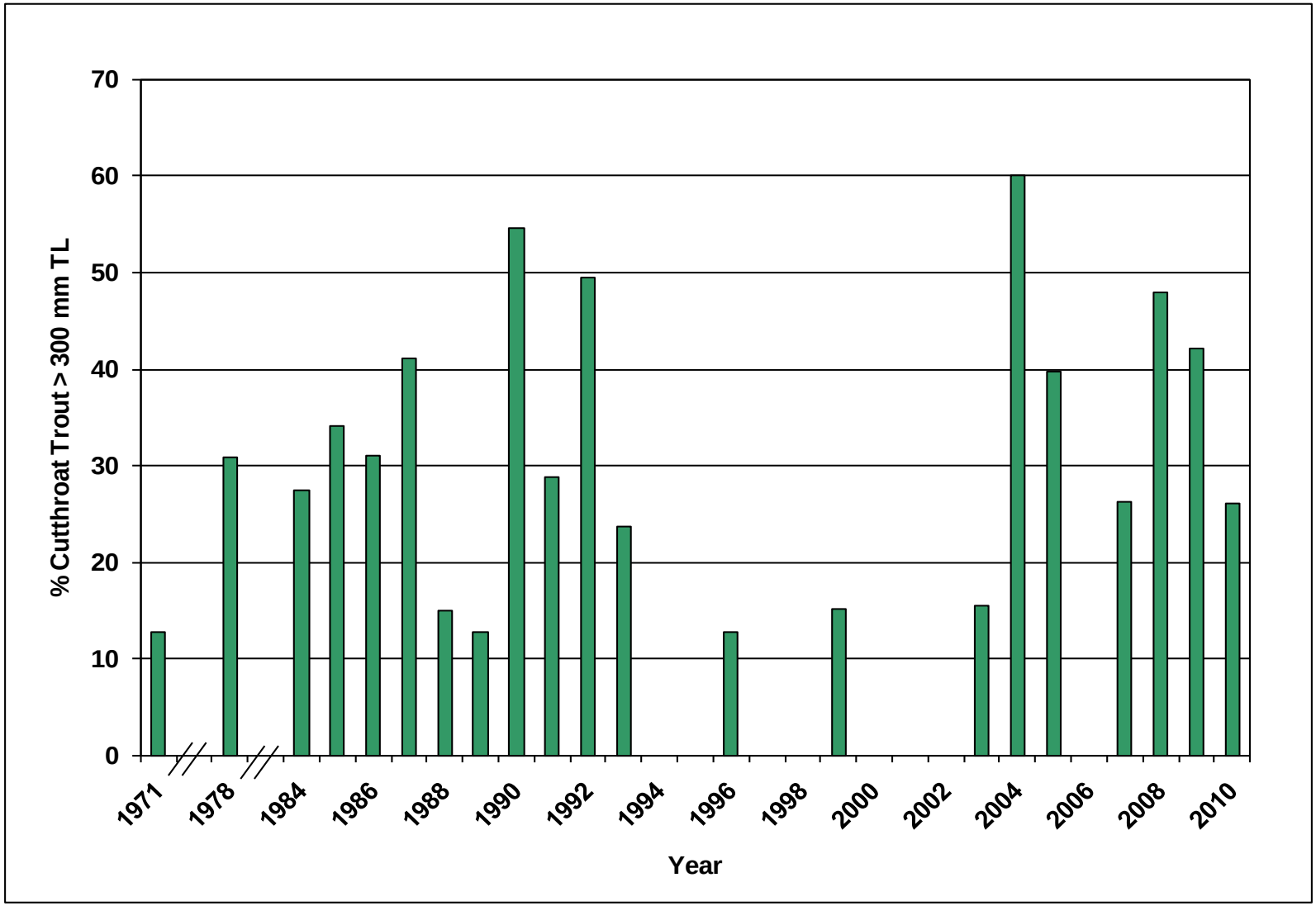

Figure 20. Percentage of westslope cutthroat trout larger than 300 mm total length (TL) sampled by snorkeling the main-stem Middle Fork Salmon River in 1971, 1978, 1984 to 1993, 1996, 1999, 2003 to 2005, and 2007 to 2010. Not all transects were sampled in all years.

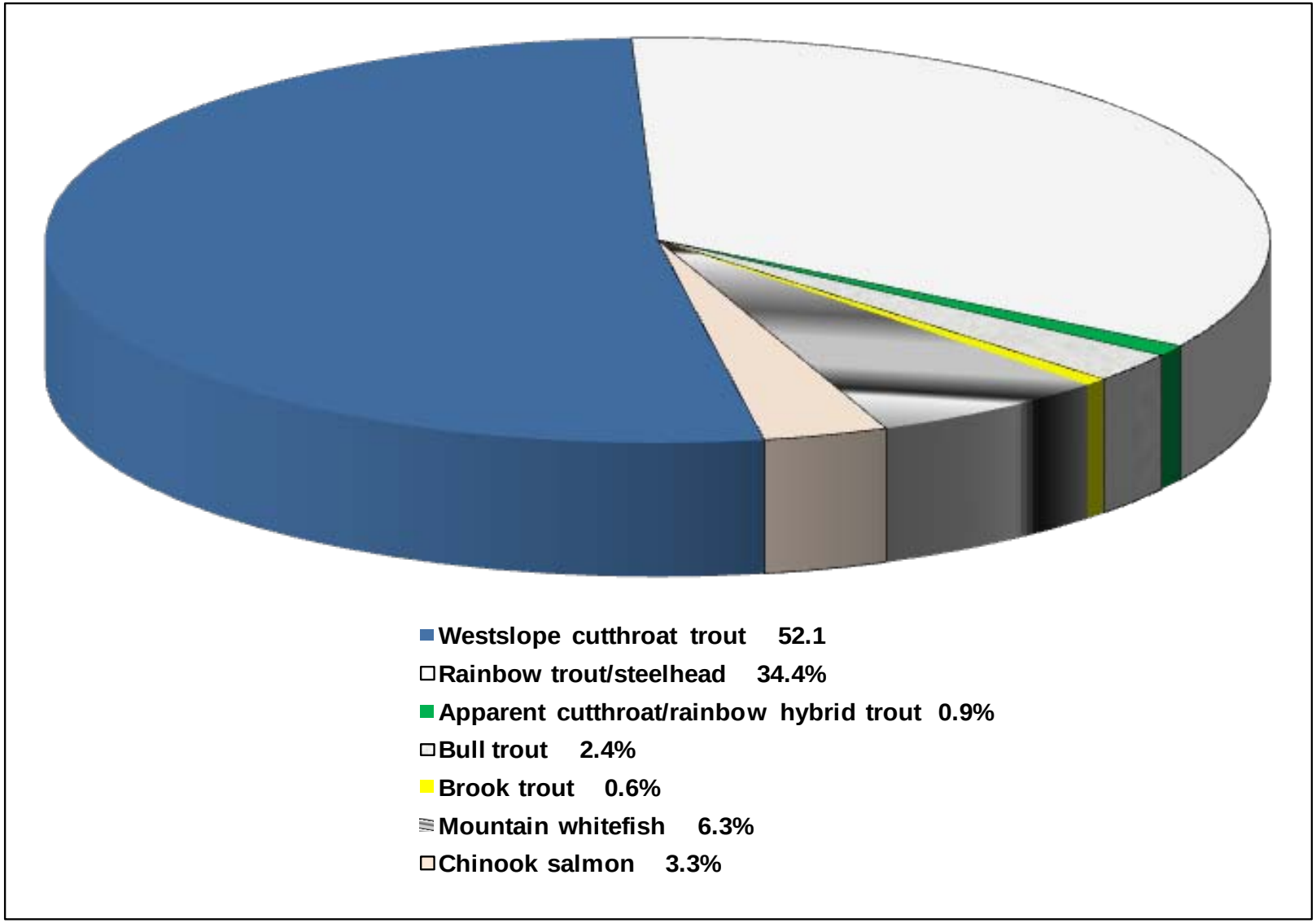

Figure 21. Species composition of fish (n = 334) caught by IDFG project anglers in the main-stem Middle Fork Salmon River, 2010.

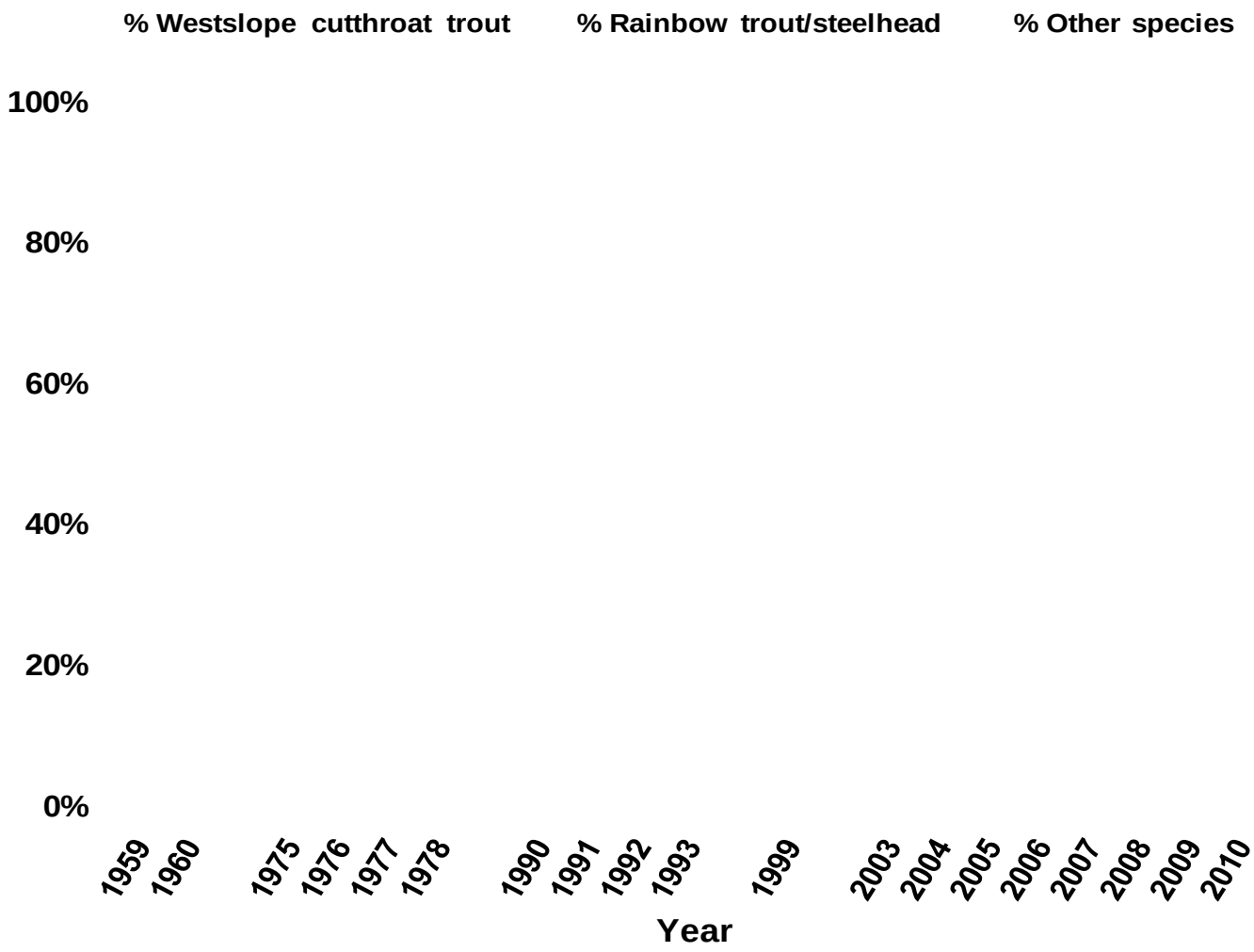

Figure 22. Proportions of species caught by project anglers in the Middle Fork Salmon River, 1959, 1960, 1975, 1976, 1978, 1990 to 1993, 1999, 2003 to 2005, and 2007 to 2010. Other species includes all fish species caught per year except westslope cutthroat trout and rainbow trout/steelhead.

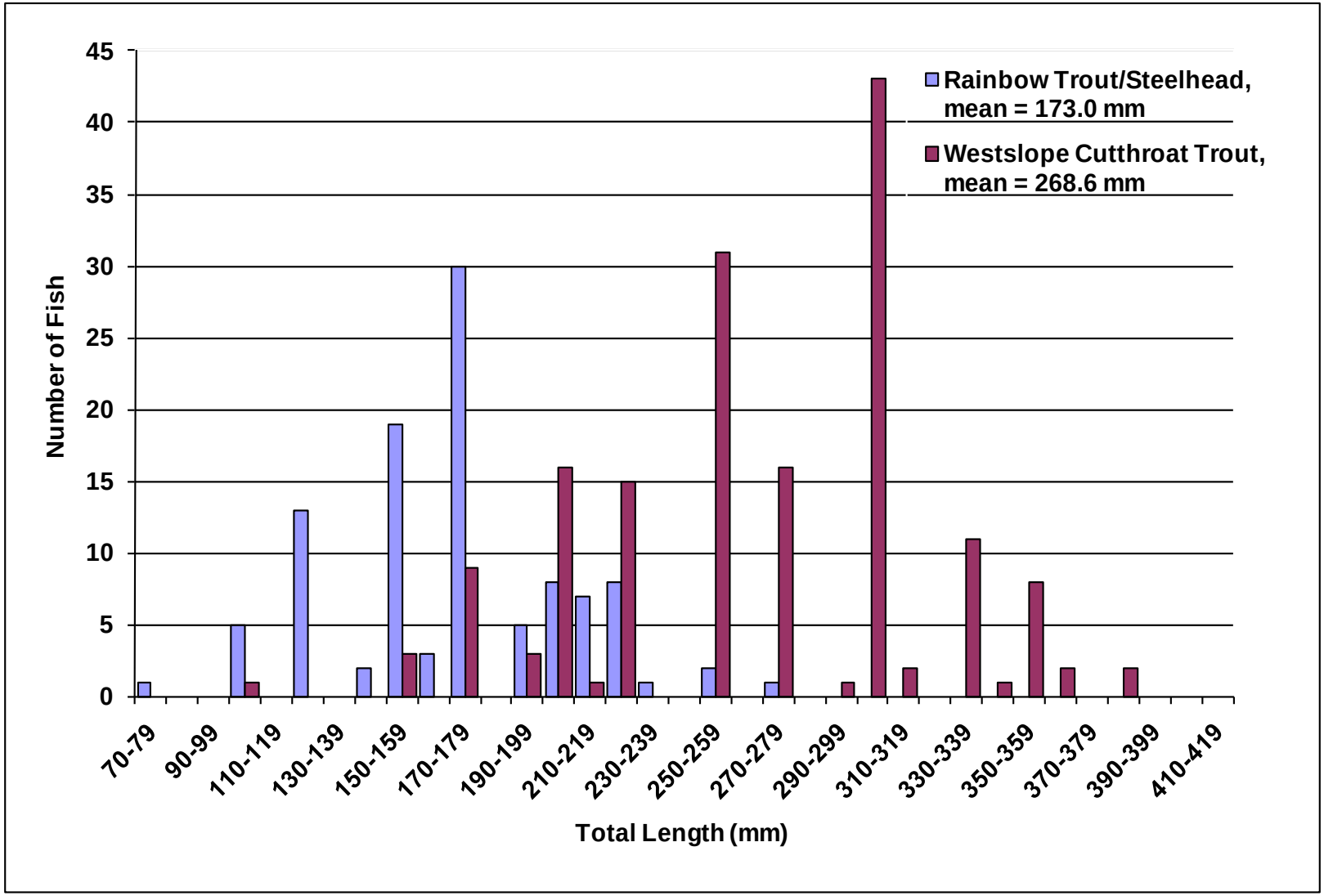

Figure 23. Length frequency of westslope cutthroat trout (n = 174) and rainbow trout/steelhead (n = 115) caught by project anglers in the Middle Fork Salmon River, 2010.

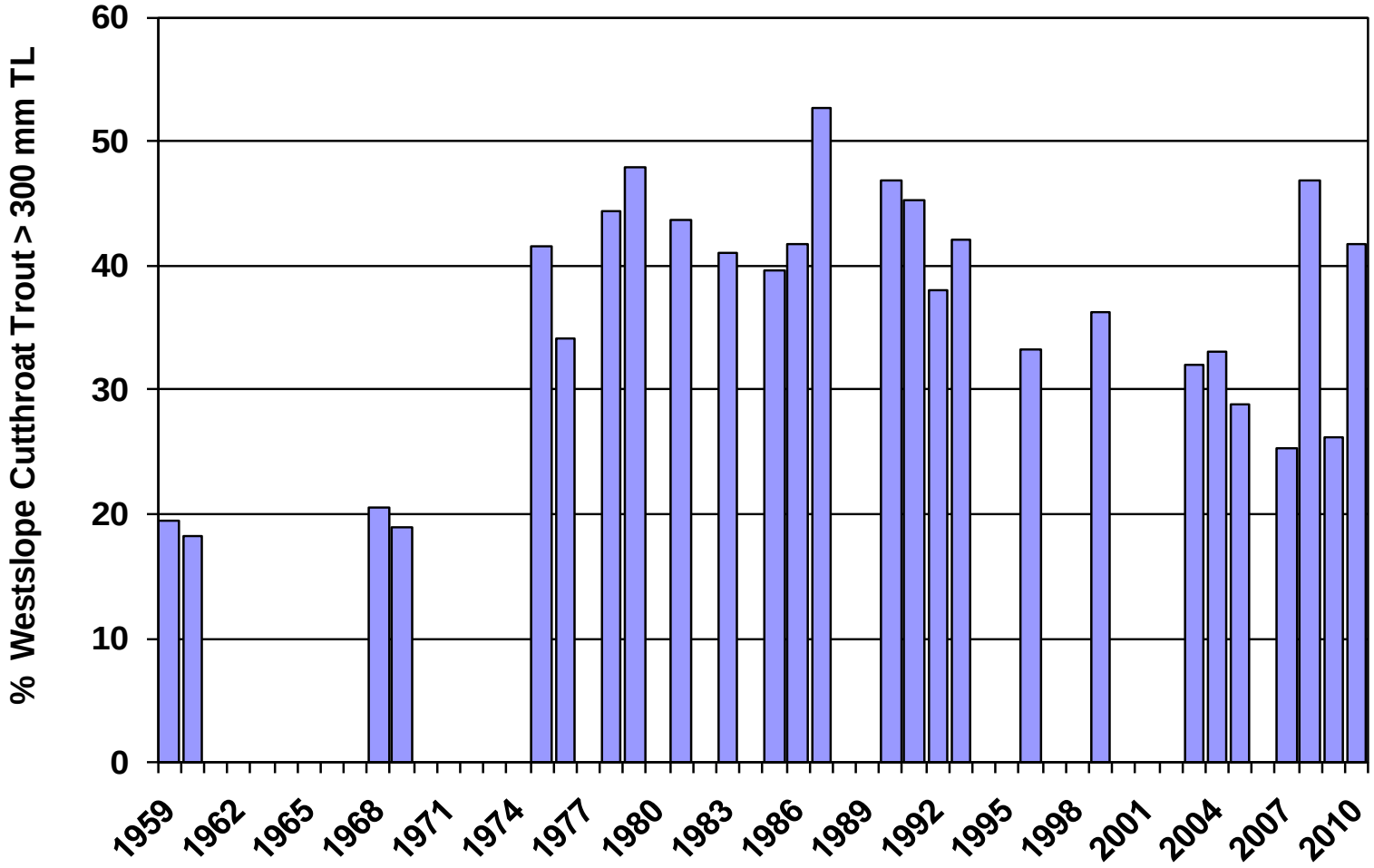

Figure 24. Percentage of westslope cutthroat trout larger than 300 mm total length (TL) sampled by project angling in the Middle Fork Salmon River in 1959, 1960, 1968, 1969, 1975, 1976, 1978, 1979, 1981, 1983, 1985 to 1987, 1990 to 1993, 1996, 1999, 2003 to 2005, and 2007 to 2010.

SALMON REGION FISHERY MANAGEMENT 2010 ANNUAL REPORT

Public Outreach – Technical Assistance and Angler Recruitment and Retention

ABSTRACT

During 2010 project staff responded to approximately 282 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, and collaborated with resource partners in conducting ice fishing and Free Fishing Day fishing derbies. Our outreach efforts were attended by 1,060 anglers and regional residents. Regional staff also crafted press releases regarding Chinook salmon fishing, ice fishing techniques and safety, Chinook spawning ground counts, and habitat use of trout and salmon in the upper Salmon River to assist the public in gaining a greater appreciation for their fisheries resources.

To encourage angler participation, regional staff collaborated with statewide efforts to restructure and simplify fishing rules in an effort to improve angler comprehension of the rules. Staff also developed a proposal for a new fishing pond near Carmen, Idaho and negotiated with several ranches for public access adjacent to the Lemhi River.

An estimated 45,000 anglers fish 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 office conducts an array of public outreach programs designed to initiate and involve the public in fishing and fishery-related matters, collaborates with state and federal agencies on fishery projects that encompass overlapping physical and jurisdictional boundaries, and responds to a multitude of informational requests from the public, county, state, federal and other non-governmental offices, and tribal entities.

OBJECTIVES

To provide technical assistance regarding fisheries related issues, concerns, and recommendations to state, federal, 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 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 fisheries related topics at various public forums including Salmon City's Reading Program, Rotary International, Career Day, Sawtooth Society's Forum and Lecture Series, and Lemhi County's Headstart Program. 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, and fish habitat restoration endeavors.

Regional staff also collaborated with statewide efforts to restructure and simplify fishing rules to assist angler comprehension of fishing rules.

Regional staff developed a proposal for a new fishing water near Carmen, Idaho, and negotiated public access proposals on ranches adjacent to the Lemhi River.

RESULTS AND DISCUSSION

During 2010, we responded to approximately 282 technical assistance requests via letters, e-mail, field inspections, meetings, and reports for assistance or comments on water, habitat, and fishery-related matters (Appendix F).

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 agency. Due to the remoteness of the Salmon Region, we were often the only governmental 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. Department 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 307 young anglers participated in the various events. Additionally, a total of 120 young anglers attended the 19th Annual Kids' Ice Fishing Derby on January 30th at Hyde Pond. In the summer of 2010, regional staff also assisted with the Salmon's city- sponsored summer fishing program attended by 20 young anglers.

We presented fisheries related topics to approximately 620 attendees at a variety of public forums including Salmon City's Reading Program (20 attendees) , Rotary International (30 attendees), Career Day (540 attendees), and the Sawtooth Society's Forum and Lecture Series (40 attendees), and Lemhi County's Headstart Program (30 attendees). We also presented "Trout in the Classroom" programs in the Challis, Leadore, and Salmon school districts to approximately 106 students ranging from 4th graders to high school seniors.

Fisheries staff also generated news releases regarding Chinook salmon fishing, ice fishing techniques and safety, Chinook spawning ground counts, and habitat use of trout and salmon in the upper Salmon River.

The collective efforts of fisheries staff statewide resulted in the IDFG Commission approving a new simplified fishing rules brochure for the 2011-2012 fishing seasons. This effort will hopefully recruit additional anglers to the sport of fishing by simplifying the readability of the rules and increase the "comfort" level of new anglers inclined to participate in the sport.

A proposal was developed for a new fishing pond at the University of Idaho's Nancy Cummings Research Center near Carmen, Idaho. The proposal is directed at rehabilitating a 2.73 acre pond and public facilities for daylight-only public fishing. Additionally, staff worked with the Nature Conservancy and the Beyeler Ranches to negotiate angler access to portions of the Lemhi River. It is hoped that by summer 2011, anglers will have access to an additional 2 miles of fishing on the Lemhi River.

Regional fisheries and habitat staff, along with personnel of the Upper Salmon Basin Model Watershed Project, provided assistance in efforts to functionally re-connect Big Timber, Whitefish, Canyon, Bohannon, Wallace, Carmen, and Patterson-Big Springs creeks. These re-

connect efforts are very complex, with each project in various stages of development and implementation. The proposed re-connect projects will require on-going assistance to be fully realized.

Regional staff investigated a potential spill when a semi truck and trailer slid into the Salmon River. Luckily, the contents were organic and fuel spill was minimal.

MANAGEMENT RECOMMENDATIONS

1. 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.

2. 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 RCE, consideration should be given to adding staff to administer habitat and water rights technical issues as well as aquatic education.

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

4. Maintain opportunities to introduce more kids to fishing by continuing to offer fishing clinics and derbies, and developing public fishing waters and access throughout the region.

SALMON REGION FISHERY MANAGEMENT 2010 ANNUAL REPORT

Upper Salmon River Chinook Salmon Fishery

July 1, 2009 to June 30, 2010

and

July 1, 2010 to June 30, 2011

ABSTRACT

A Chinook salmon fishery was conducted by IDFG on 197 km of the Salmon River between the town of Salmon, Idaho and Sawtooth Fish Hatchery during the summer of 2009. The fishery opened on June 20, 2009 and closed July 26, 2009. Creel personnel conducted 1,860 interviews with anglers. Angler pressure consisted of 61,774 hrs of effort. Anglers harvested 2,918 adult Chinook salmon and 601 "jack" Chinook salmon. Anglers released 339 hatchery adult Chinook salmon, 336 hatchery "jack" Chinook salmon, 542 non-adipose clipped adult Chinook salmon and 291 non-adipose clipped "jack" Chinook salmon. Peak angler counts occurred on July 12 and July 18 for the Sawtooth and Ellis fisheries, respectively. Creel personnel recovered 43 coded-wire tags from harvested fish.

A Chinook salmon fishery was conducted by IDFG on 74.5 km of the Salmon River between the towns of Salmon, Idaho and Ellis, Idaho, during 2010. Additionally, approximately 8.7 km of river was open to Chinook salmon fishing between Stanley, Idaho, and the Sawtooth Fish Hatchery weir. The Ellis portion of the fishery opened June 12, 2010 and closed August 4, 2010. The Stanley portion of the fishery opened July 3, 2010 and continued through July 5, 2010. Creel personnel conducted 1,581 interviews with anglers. Angler pressure consisted of 49,824 hrs of effort. Anglers harvested 1,815 adult Chinook salmon and 79 "jack" Chinook salmon. Anglers released 122 hatchery adult Chinook salmon, 22 hatchery "jack" Chinook salmon, 198 non-adipose clipped adult Chinook salmon and 126 non-adipose clipped "jack" Chinook salmon. Peak angler counts occurred on July 11 for the Ellis fishery. Creel personnel recovered 33 coded-wire tags from fish harvested during the Ellis fishery.

INTRODUCTION

Authorization for an upper Salmon River adipose clipped hatchery Chinook salmon fishery occurred during spring of 2009 when the IDFG Commission authorized a season based on run strength predictions. The Commission approved regulations that allowed sport harvest to begin on June 20 on the portion of the Salmon River between the town of Salmon and Sawtooth Fish Hatchery and continue until harvestable shares of fish were reached by anglers. Anglers were authorized to keep two adult Chinook salmon per day with a possession limit of six adult Chinook salmon. The portion of the Chinook salmon run returning to Sawtooth Fish Hatchery during 2009 that consisted of "jack" Chinook salmon were non-adipose clipped because of low brood year release numbers. Regulation modifications during July, based on strong "jack" Chinook salmon return numbers, for the Ellis portion of the upper Salmon River fishery allowed anglers to keep two "jack" Chinook salmon per day (plus two adults) for a daily limit of four Chinook salmon with a possession limit of 12 fish. Anglers were allowed to fish for Chinook salmon from 0500 hrs to 2200 hrs.

During 2010, the IDFG Commission approved regulations that allowed sport harvest of adipose clipped hatchery Chinook salmon to begin on June 12 for the portion of the Salmon River between the towns of Salmon and Ellis. Anglers were authorized to keep five Chinook salmon daily (of which no more than three were to be adults) with a possession limit of 15 (of which no more than nine were to be adults). Additionally, the Commission approved a season during July 3, 4, and 5 for the portion of the Salmon River between Stanley and the Sawtooth Fish Hatchery. Anglers were authorized to keep one adult adipose clipped Chinook salmon and two adipose clipped "jack" Chinook salmon per day with a possession limit of nine fish. The Stanley fishery was limited during 2010 because returning two ocean adult Chinook salmon were non-adipose clipped because of low brood year release numbers. Anglers were allowed to fish for Chinook salmon from 0500 hr to 2200 hr.

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 headquarters and the angling public as requested.

STUDY AREA AND METHODS

During 2009 and 2010, the lower boundary of the upper Salmon River Ellis Chinook salmon fishery (River section 17) was located approximately 137 m below Island Park in the town of Salmon, Idaho (Figure 25). The upper fishery boundary extended approximately 18 m above the confluence of the Pahsimeroi River and Salmon River at Ellis. Within section 17, approximately 74.5 km of river were open to fishing. Holding water for Chinook salmon was

limited in the lower portion of the river. Anglers accessed the river in numerous points due to the close proximity of highways and secondary roads. Anglers accessed the lower 15 km of the river near the town of Salmon primarily by drift boats, although boat ramps were limited. However, concentrations of bank anglers occurred early in the season at the Island Park. Approximately 80% of boat and bank anglers fished within the upper 9 km of the fishery. Within the upper portion of the fishery, the majority of people fished in close proximity to the Deer Gulch campground. Bank anglers constituted the majority of anglers in the upper fishery, although the number of drift boats and jet boats has increased slightly, annually. High flows occurred early in the fishery due to early summer snow melt or spring rain events. Harvest success rates were typically greater early and late in the day due to activity patterns of salmon. During 2009, angling effort was limited exclusively to early and late periods of the day because of high water temperatures. Angler turnover was limited because of distances to population centers. Angling pressure was driven by published harvest data, hatchery rack return data, and river flow data. During 2009 and 2010, approximately 500-1,000 Chinook salmon were counted at the hatchery before angler numbers exceeded twenty people. During the peak of the fishery, daily peak counts exceeded 100 and 139 bank anglers and 54 and 67 boat anglers during 2009 and 2010, respectively. Stock composition consisted of Pahsimeroi Fish Hatchery summer Chinook salmon, Sawtooth Fish Hatchery spring Chinook salmon, and natural - non-adipose clipped hatchery Chinook salmon from upriver tributaries and tribal programs. During 2009 and 2010, Redfish Lake Sockeye salmon were not detected during the fishery, possibly due to later run timing. Pahsimeroi Fish Hatchery Chinook salmon were recycled back to the fishery in locations such as the town of Salmon, the Iron Creek Bridge, Colston Corner, and Deer Gulch.

A roving creel method was implemented to collect angler data in River Section 17 during 2009 and 2010. Two fisheries technicians worked Thursday through Monday and always had Tuesday and Wednesday off. Creel days were stratified into morning and evening work shifts of six hrs in length. Work shifts were six hours in length to allow crew people time to drive to sample areas, fuel vehicles, store collected snouts, and enter data into the Creel Application Program (CAS) within an 8-hour work day. Work shift times were 0600 - 1200 hrs and 1530 - 2130 hrs. Thursday, Friday, and Saturday were always evening creel times and Sunday and Monday were always morning creel times. Work shifts and start times were systematically selected for each day prior to the start of the season to minimize shift change stress, allow travel time to work areas, allow crews time to purchase camp groceries and achieve an adequate sample of anglers. A fishing day was approximately 17 hrs in length.

During 2009, one technician worked exclusively to collect catch and effort information in the more heavily fished portion of section 17. The technician queried anglers regarding species targeted, time fishing started, collected information regarding the number and type of fish caught and released, checked for marks and tags, and measured lengths and sex of fish kept. A second technician conducted one bank angler and one boat angler count toward the beginning and end of each shift, respectively, for a total of two counts per shift. Additionally, the second technician collected catch and effort data from bank anglers and waited at boat ramps to creel boat anglers in the lower, less heavily fished portion of the fishery. During 2010, each technician collected catch and effort data and conducted counts in their assigned portions of river. Vehicle and boat trailer counts were converted to angler numbers, based on results from previously collected data, in places where visibility from the highway was limited. Species targeted data from anglers was used to adjust counts to reflect only Chinook salmon anglers.

During 2009, estimated harvest of marked recycled fish was created for each method of harvest by recoding the species designation from hatchery Chinook salmon to recycled hatchery Chinook salmon and re-running harvest estimates for the associated period. Additional review

conducted during 2010 showed the species recoding method underestimated harvest of recycled fish.

During 2010, estimates of kept marked recycled fish were created for each method of harvest (boat or bank) by dividing the number of handled recycled fish by the total number of handled fish and multiplying the quotient by the estimated combined harvest of recycled and non-recycled fish for the fishery period. For example, if one marked recycled bank kept fish was checked during the creel and 25 non-recycled hatchery bank kept fish were checked during the creel and the estimated harvest of bank kept hatchery fish for the work period was 44, then the estimated harvest of bank kept recycled fish was [(1/26) X 44] = 1.7 or 2 fish.

During 2009, the lower boundary of the upper Salmon River Section 18 Chinook salmon fishery was located approximately 18 m above the confluence of the Pahsimeroi River and Salmon River at Ellis, Idaho. The upper fishery boundary terminated at the confluence of the East Fork Salmon River and Salmon River. Within section 18, approximately 67.5 km of river were open to fishing. In some areas, the wide valley resulted in a braided river. Privately owned properties constituted the vast majority of the landholdings. Thus, anglers accessed the river section through a limited number of publicly owned boat ramps, campgrounds, and road access points. Common boat ramp locations were areas such as Tunnel Rock, Bayhorse Campground, Challis Bridge Recreation Site, Penal Gulch, Bruno/Watt's Bridge, and Cottonwood Campground. The greatest concentrations of boat anglers floated between Challis Bridge and Bruno/Watt's Bridge. The areas accessible to bank anglers received moderate to light amounts of angling pressure. Typical bank angling areas included Deadman's Hole/Tunnel Rock, McNabb Point, Bruno/Watt's Bridge, Penal Gulch, Cottonwood, and Ellis. Daily peak counts exceeded 35 bank anglers and 15 boat anglers. Stock composition consisted of Sawtooth Fish Hatchery spring Chinook salmon and natural, non-adipose clipped hatchery Chinook salmon from upriver tributaries and tribal programs. Redfish Lake Sockeye salmon were not detected during the fishery, possibly due to later run timing. Sawtooth Fish Hatchery Chinook salmon were recycled back into the fishery in locations such as Watt's Bridge. During 2010, the section 18 portion of the Salmon River fishery was closed because of projected low return numbers of adipose clipped adult Chinook salmon to Sawtooth Fish Hatchery.

A roving creel method was implemented to collect angler data in section 18 during 2009. Two fisheries technicians worked Thursday through Monday and always had Tuesday and Wednesday off during the 2009 fishery. Creel days were stratified into morning and evening work shifts of six hrs in length. Work shifts were six hrs in length to allow crew people time to drive to sample areas, fuel vehicles, store collected snouts, and enter data into the CAS program within an 8-hr work day. Work shift times were 0600 - 1200 hrs and 1530 - 2130 hrs. Thursday, Friday, and Saturday were always evening creel times and Sunday and Monday were always morning creel times. Work shifts and start times were systematically selected for each day prior to the start of the season to minimize shift change stress, allow travel time to work areas, allow crews time to purchase camp groceries and achieve an adequate sample of anglers. A fishing day was approximately 17 hrs in length. One technician worked exclusively to collect catch and effort information in section 18. The technician queried anglers regarding species targeted, time fishing started, collected information regarding the number and type of fish caught and released, checked for marks and tags, measured lengths and sex of fish kept, and recorded reported wild - natural fish release locations with a GPS. The second technician conducted one bank angler and one boat angler count toward the beginning and end of each shift, respectively, for a total of two counts per shift. Additionally, the second technician collected catch and effort data from bank anglers and waited at boat ramps to creel boat anglers. Vehicle and boat trailer counts were converted to angler numbers, based on results

from previously collected data, in places where visibility from the highway was limited. Species targeted data from anglers was used to adjust counts to reflect only Chinook salmon anglers.

During 2009, the lower boundary of the upper Salmon River section 19 Chinook salmon fishery began at the confluence of the East Fork Salmon River and the Salmon River. The upper fishery boundary was approximately 100 m downstream from the Sawtooth Fish Hatchery weir. Within section 19, approximately 75 km of river were open to fishing. Anglers accessed the river in numerous points due to the close proximity of highways and secondary roads. Anglers dispersed throughout the fishery due to reduced river widths and considerable amounts of excellent holding water areas for Chinook salmon. Holes where anglers gathered included the Holman Hole - Black Hole, Torrey's Hole, Yankee Fork - Sunbeam, Redfish Lake Hole, and Buckhorn Bridge. Bank anglers dominated the fishery, with limited numbers of drift boat and rafting anglers. The majority of anglers targeted trout early and late in the season. Daily counts of salmon anglers exceeded 185 during the peak of the fishery. Flows dropped gradually over the course of the season due to consistent snow melt and cold nights. Stock composition consisted of Sawtooth Fish Hatchery spring Chinook salmon and natural, non-adipose clipped hatchery Chinook salmon from upriver tributaries and tribal programs. Redfish Lake Sockeye salmon were not detected during the fishery, possibly due to later run timing. Sawtooth Fish Hatchery Chinook salmon were recycled back into the fishery in locations such as Torrey's Hole.

During 2010, the lower boundary of the upper Salmon River section 19 Chinook salmon fishery began approximately 18 m upstream from the mouth of Valley Creek in Stanley. The upper fishery boundary was posted approximately 100 m downstream from the Sawtooth Fish Hatchery weir. Within section 19, approximately 8.7 km of river were open to fishing.

During 2009, a roving creel method was implemented to collect angler data in section 19. Three fisheries technicians worked Thursday through Monday and always had Tuesday and Wednesday off during the 2009 fishery. Creel days were stratified into morning and evening work shifts of six hrs in length. Work shifts were six hours in length to allow crew people time to drive to sample areas, fuel vehicles, store collected snouts, and enter data into the CAS program within an 8-hr work day. Work shift times were 0600 - 1200 hrs and 1530 - 2130 hrs. Thursday, Friday, and Saturday were always evening creel times and Sunday and Monday were always morning creel times. Work shifts and start times were systematically selected for each day prior to the start of the season to minimize shift change stress, allow travel time to work areas, allow crews time to purchase camp groceries and achieve an adequate sample of anglers. A fishing day was approximately 17 hrs in length.

Two technicians worked exclusively to collect catch and effort information throughout the section 19 fishery. The technicians queried anglers regarding species targeted, time fishing started, collected information regarding the number and type of fish caught and released, checked for marks and tags, measured lengths and sex of fish kept , and recorded reported wild-natural fish release locations with a GPS. A third technician conducted one bank angler and one boat angler count toward the beginning and end of each shift, respectively, for a total of two counts per shift. Vehicle and boat trailer counts were converted to angler numbers, based on results from previously collected data, in places where visibility from the highway was limited. Species targeted data from anglers was used to adjust counts to reflect only Chinook salmon anglers.

During 2009, estimated harvest of marked recycled fish was created for each method of harvest by recoding the species designation from hatchery Chinook salmon to recycled hatchery

Chinook salmon and re-running harvest estimates for the associated period. Additional review conducted during 2010 showed the species recoding method underestimated harvest of recycled fish.

During 2010, a roving creel method was used to collect angler catch and effort data from section 19. One biologist collected angler catch and effort data and conducted counts during the three-day fishery. Work shifts consisted of two morning work periods and one evening work period. One angler count was conducted shortly after work began each day and another count was conducted toward the end of each work shift for a total of two counts per shift. Work shifts were approximately six hrs long.

RESULTS AND DISCUSSION

During 2009, approximately 590, 178, and 1,092 angler interviews were conducted by creel personnel in river sections 17, 18, and 19, respectively (Table 40). During 2010, approximately 1,537 and 44 angler interviews were conducted by creel personnel in river sections 17 and 19, respectively.

During 2009, peak angler counts occurred during the week July 16 for the section 17 fishery. Peak angler counts occurred during the week of July 9 for the section 18 and Section 19 fishery (Figure 26). During 2010, peak angler counts occurred during the week of July 16 (Figure 27). Anglers harvested 1,415, 113, and 1,390 adult Chinook salmon in river sections 17, 18, and 19, respectively, in the fishery during 2009 (Table 41). Additionally, anglers harvested 601 "jack" Chinook salmon in river section 17. There was no reported harvest of "jack" Chinook salmon in river sections 18 and 19 because 1-ocean hatchery returns to Sawtooth Fish Hatchery were non-adipose clipped because of low release numbers. Anglers released a total of 339 adipose clipped adult salmon and 336 adipose clipped "jack" salmon in combined river sections. Anglers released 86, 44, and 412 non-adipose clipped adult Chinook salmon in river sections 17, 18, and 19 respectively. Anglers released a total of 265 non-adipose clipped "jack" Chinook salmon in combined river sections.

Anglers fished a total of 24,101, 6,642, and 31,031 hrs of effort in river sections 17, 18, and 19, respectively, during 2009. Approximately 29 percent of the fishing effort in section 17 was generated by boat anglers. Approximately 18 percent of the fishing effort in section 18 was generated by boats anglers. Angling effort by boat in river section 19 was very limited because of motor restrictions within the SNRA, limited floatable water, and competition for space with recreational rafters. Anglers averaged a total of 9, 35, and 14 hrs per fish caught and 12, 59, and 22 hrs per fish kept for sections 17, 18, and 19, respectively.

During 2009, creel personnel collected 45 snouts during the process of checking harvested fish for marks. Twenty-seven of the snouts were collected in section 17, one was collected in section 18, and 17 snouts were collected in section 19. Two of the snouts collected in section 17 did not yield coded-wire tags.

Anglers harvested 1,815 adult Chinook salmon in river section 17 in the fishery during 2010 (Table 42). Additionally, anglers harvested 70 "jack" Chinook salmon in river section 17. Anglers released a total of 122 adipose clipped adult salmon and 14 adipose clipped "jack" salmon in river section 17. Anglers released 155 non-adipose clipped adult Chinook salmon and 126 non-adipose clipped "jack" Chinook salmon in river section 17. Anglers harvested 9

"jack" Chinook salmon during the three day fishery in section 19. Anglers released 43 non-adipose clipped adult Chinook salmon and 8 adipose clipped "jack" Chinook salmon in section 19. There was no reported harvest of adult Chinook salmon in section 19 during the three day fishery.

Anglers fished a total of 48,075 and 1,749 hrs of effort in river sections 17 and 19, respectively, during 2010. Approximately 32 percent of the fishing effort in section 17 was generated by boat anglers. Anglers averaged a total of 21 and 29 hrs per fish caught and 26 and 194 hrs per fish kept for sections 17 and 19, respectively.

Creel personnel collected 33 snouts during the process of checking harvested fish for marks during 2010. None of the fish checked for marks in section 19 contained coded-wire tags.

Overall, the salmon fishery that was held on the upper Salmon River during 2009 was very successful. Anglers harvested 3,519 salmon in a portion of the Salmon River that had been closed to salmon fishing for over 30 years. The sport angler portion of the harvest share was basically met and both Pahsimeroi Fish Hatchery and Sawtooth Fish Hatchery met adult broodstock needs for 2009. The roving creel that was implemented on 197 km of river during 2009 was carried out with considerable less cost compared to multiple check stations that were required for the Stanley fishery during 2008.

Although a smaller portion of the upper Salmon River was open to salmon fishing during 2010, anglers still harvested 1,894 Chinook salmon. Hrs of angling effort in section 17 doubled during 2010 compared to 2009. The original sport angler harvest share estimate of approximately 1,600 fish for section 17 was exceeded during 2010. However, a harvest share adjustment of 3,200 fish that occurred late in the season based on a re-calculated run size was never met. IDFG received several complaints regarding the use of jet boats near the Ellis area during the fishery. However, creel technicians recorded the number of complaints received and the numbers never escalated over time.

Although the section 19 Stanley fishery was short lived during 2010, the opening morning angler count exceeded 60 people. Participation in the three day fishery declined each day as anglers left for more productive fisheries. Several anglers commented to creel personnel that they were glad to have the opportunity to fish even if the chance of catching a legal adult was low. The low numbers of fish in the water created creel survey challenges as it was difficult to sample people before they exited the fishery.

During 2009 and 2010, hatchery staff occasionally closed trapping facilities because of large daily return numbers and limited space. The closure of hatchery trapping facilities added uncertainty with regards to returns of recycled hatchery fish and could possibly complicate run reconstruction values.

During the 2010 fishery, there were discrepancies between predicted fish return numbers, PIT-tag based counts at Columbia and Snake River hydropower projects, and fish counts at the hatchery rack. Better in-season monitoring of fish run size values would help alleviate concerns about fisheries closures and provide opportunity to adjust harvest share values as needed.

MANAGEMENT RECOMMENDATIONS

1. Refine creel methods and techniques through adaptive management.
2. Support further improvements with regards to run size estimation techniques.
3. Encourage real-time run size monitoring during fisheries.
4. Review in-season fish movement when hatchery trapping facilities are closed.

Table 40. Angler interviews by river section for the upper Salmon River Chinook salmon fishery, 2009 and 2010.

River Section	Year	Angler Interviews
	2009	
17		590
18		178
19		1,092
	2010	
17		1,537
19		44

Table 41. Summary of fish harvested, fish released, success rates and angler effort by access type for the upper Salmon River Chinook salmon fishery, 2009.

River Section	Access	# Salmon Kept			Salmon Released					Total Salmon Caught	Angler Hours	Hours/Fish	
		Adults	Jacks	Total	Ad-clipped Adults	Ad-clipped Jacks	Non Ad-clipped Adults	Non Ad-clipped Jacks	Total			Caught	Kept
17	**Bank**	1027	435	1462	104	153	61	20	338	1800	17138	10	12
17	**Boat**	388	166	554	60	97	25	6	188	742	6963	9	13
17 Total		**1415**	**601**	**2016**	**164**	**250**	**86**	**26**	**526**	**2542**	**24101**	9	12
18	**Bank**	103	0	103	0	0	39	33	72	175	5458	31	53
18	**Boat**	10	0	10	0	0	5	0	5	15	1184	79	118
19	**Bank**	1390	0	1390	175	86	412	232	905	2295	30912	13	22
19	**Boat**	0	0	0	0	0	0	0	0	0	119	0	0
18,19 Total		**1503**	**0**	**1503**	**175**	**86**	**456**	**265**	**982**	**2485**	**37673**	15	25
Fishery Total	**All**	**2918**	**601**	**3519**	**339**	**336**	**542**	**291**	**1508**	**5027**	**61774**	**12**	**18**

Table 42. Summary of fish harvested, fish released, success rates and angler effort by access type for the upper Salmon River Chinook salmon fishery, 2010.

River Section	Access	# Salmon Kept			Salmon Released					Total Salmon Caught	Angler Hours	Hours/Fish	
		Adults	Jacks	Total	Ad-clipped Adults	Ad-clipped Jacks	Non Ad-clipped Adults	Non Ad-clipped Jacks	Total			Caught	Kept
17	**Bank**	1000	60	1060	78	3	100	13	194	1254	32843	26	31
17	**Boat**	815	10	825	44	11	55	113	223	1048	15232	15	18
17 Total		**1815**	**70**	**1885**	**122**	**14**	**155**	**126**	**417**	**2302**	**48075**	21	26
19	**Bank**	0	9	9	0	8	43	0	51	60	1749	29	194
19	**Boat**	0	0	0	0	0	0	0	0	0	0	0	0
19 Total		**0**	**9**	**9**	**0**	**8**	**43**	**0**	**51**	**60**	**1749**	29	194
Fishery Total	**All**	**1815**	**79**	**1894**	**122**	**22**	**198**	**126**	**468**	**2362**	**49824**	**21**	**26**

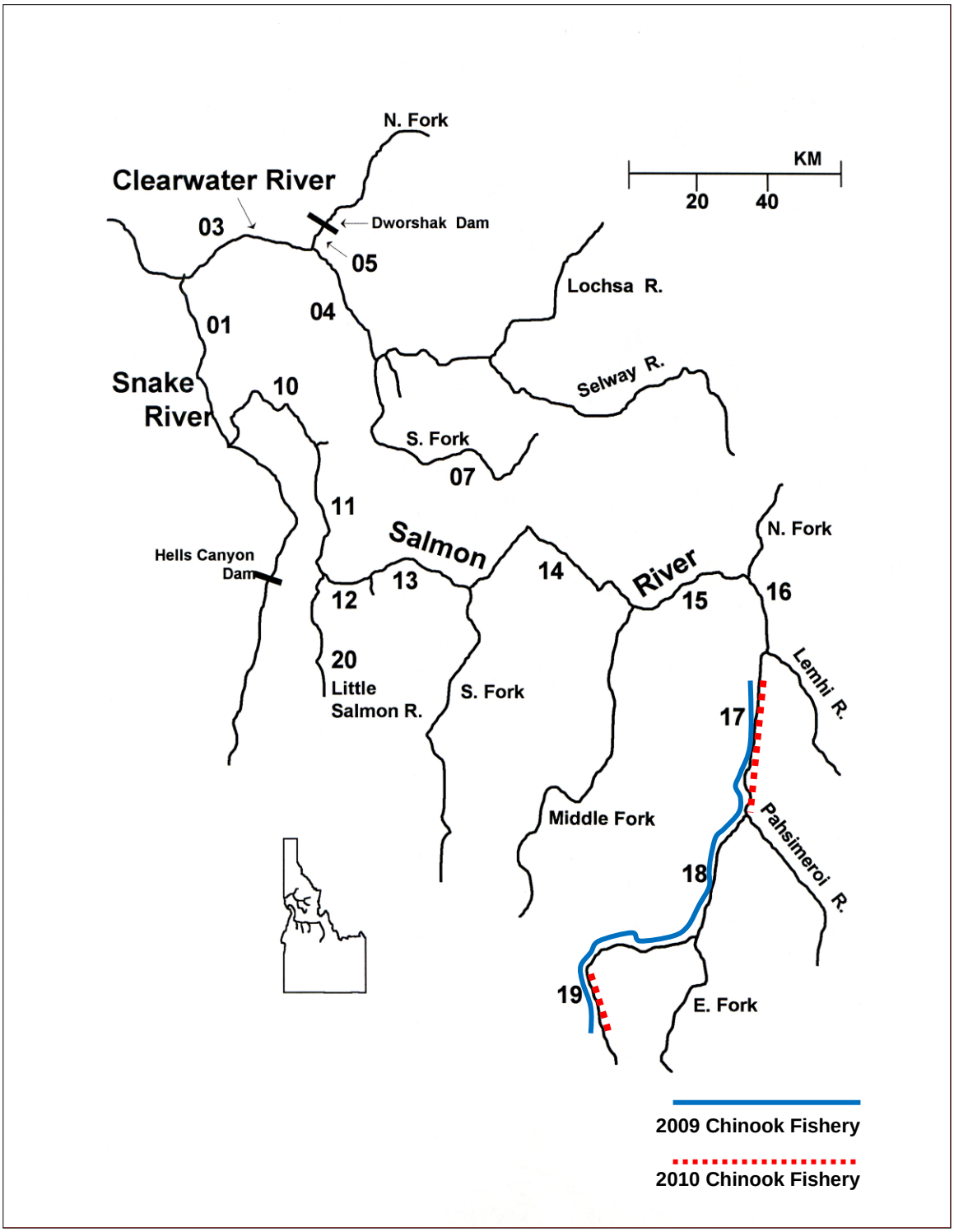

Figure 25. Upper Salmon River Chinook salmon fishery, 2009 and 2010.

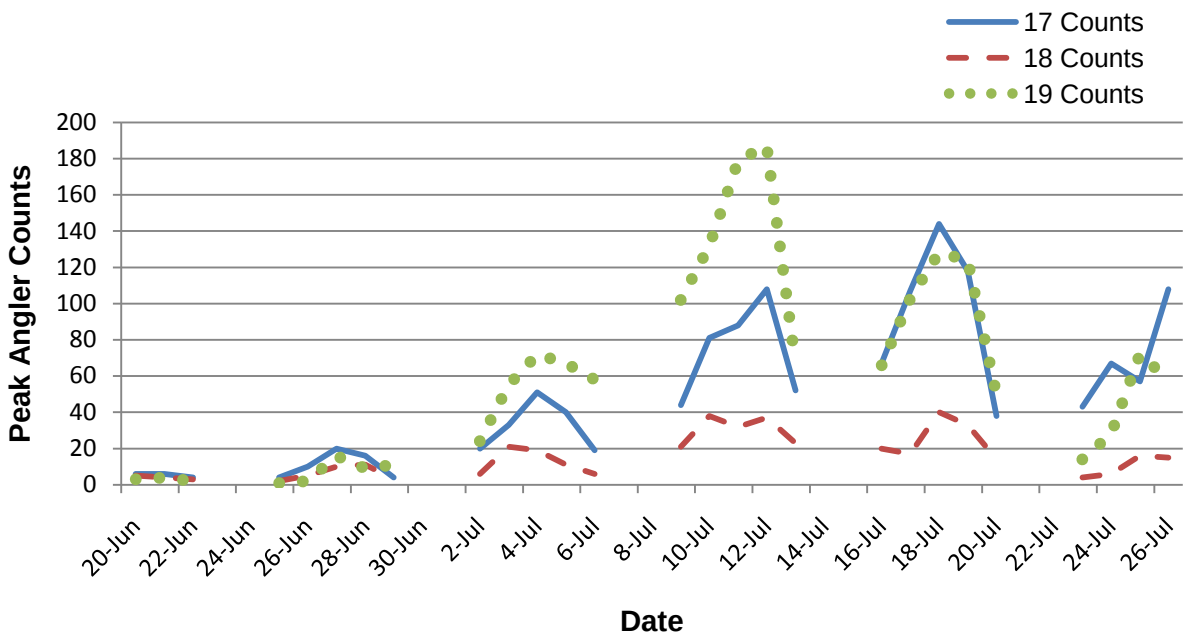

Figure 26. Peak angler counts for river sections 17, 18, and 19 during the upper Salmon River Chinook salmon fishery, 2009.

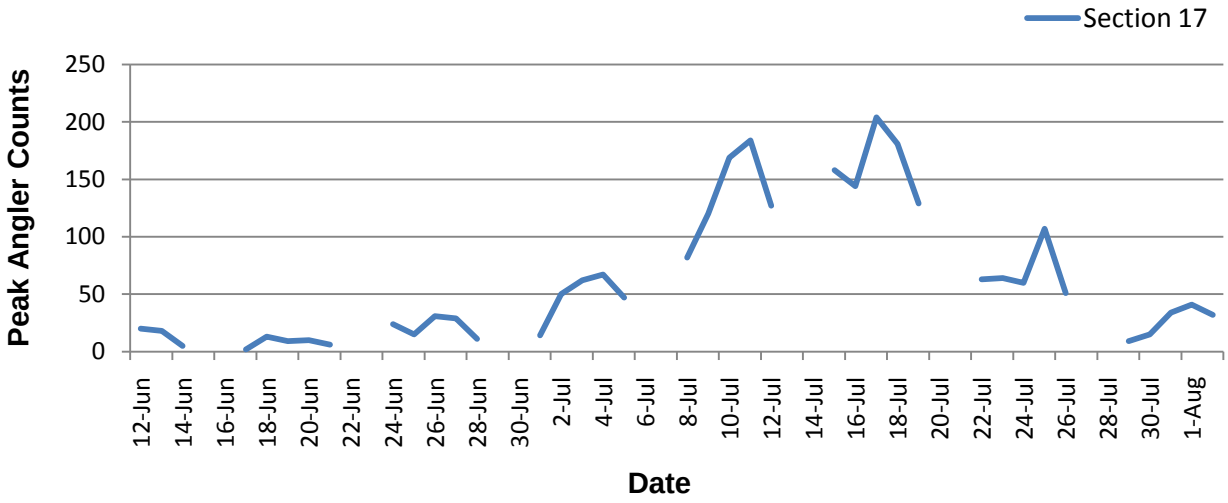

Figure 27. Peak angler counts for river section 17 during the upper Salmon River Chinook salmon fishery, 2010.

APPENDICIES

Appendix A. Locations and physical characteristics of Salmon Region mountain lakes surveyed in 2010.

Lake Name	Location in WGS84 Decimal Degrees Latitude °N	Longitude °W	Aspect	Spawning Potential	Bahls Impact Rating
Basin Creek Lake #5	44.84145	113.85536	E	Fair	Low
Bray Lake #1	44.67418	113.81479	E	None	None
Bray Lake #2	44.67535	113.81602	E	Fair	Low
Bray Lake #3	44.68096	113.82150	S	Poor	None
Bray Lake #4	44.68505	113.81855	SE	Poor	None
Bray Lake #5	44.68637	113.81585	S	Poor	None
Bray Lake #6	44.69878	113.79186	E	Adequate	None
Bray Lake #8	44.67738	113.80119	E	Poor	None
Bray Lake #9	44.67078	113.81101	N	Poor	None
Kidney Lake #1	44.52630	114.97322	NE	Poor	Low
Kidney Lake #1A	44.52498	114.97517	NE	Poor	None
Kidney Lake #2	44.52244	114.97227	NW	Poor	Low
Kidney Lake #3	44.51965	114.97302	N	Poor	Low
Opal Lake	44.89979	114.28392	SE	Excellent	Low
Puddin Mountain Lake #1	45.09959	114.59641	W	Poor	Low
Puddin Mountain Lake #2	45.09998	114.60019	N	Poor	Low
Puddin Mountain Lake #3	45.09974	114.59986	S	Poor	Low
Puddin Mountain Lake #4	45.10548	114.60128	NE	Poor	Low
Puddin Mountain Lake #4A	45.10284	114.60066	NE	Poor	Low
Puddin Mountain Lake #5	45.10735	114.60488	NE	Fair	Low
Puddin Mountain Lake #6	45.10243	114.60522	N	Poor	Low
Puddin Mountain Lake #7	45.10028	114.60847	NE	Fair	None
Puddin Mountain Lake #8	45.10131	114.60936	E	Poor	None
Puddin Mountain Lake #9	45.11063	114.60970	NE	Fair	None
Puddin Mountain Lake #10	45.11351	114.61418	E	Poor	None
Puddin Mountain Lake #12	45.50567	115.29762	NE	Poor	None
Puddin Mountain Lake #13	45.11156	114.60371	ALL[a]	Poor	Low
Puddin Mountain Lake #14	45.11654	114.60715	SE	Poor	None
Puddin Mountain Lake #15	45.11961	114.60880	SE	Poor	None
Ship Island Lake #5	45.15682	114.60120	NW	Adequate	Moderate
Ship Island Lake #6	45.15296	114.60348	NE	Adequate	Low
Ship Island Lake #7	45.15110	114.60327	N	Fair	Low
Ship Island Lake #8	45.15276	114.60024	N	Poor	None
South Fork Fall Creek Lake #1	44.47241	115.16466	NW	Poor	None
South Fork Fall Creek Lake #1A	44.47181	115.16786	ALL	Poor	None
South Fork Fall Creek Lake #2	44.46856	115.16336	NW	Fair	None
South Fork Fall Creek Lake #3	44.45929	115.17039	NE	Poor	Low
South Fork Fall Creek Lake #4	44.45782	115.17974	NE	Poor	None

[a] ALL=Lake open in all directions.

Appendix B. Site characteristics of stream transects surveyed by electrofishing in the upper Salmon River in 2010.

Stream	Tran-sect[a]	Sample Date	Water Temp. (C^o)	Transect Length (m)	Transect Mean Width (m)	Transect Area (m^2)	Sub-basin	Location in WGS84 Latitude Longitude Decimal Degrees	
Alder	L	06/14/2010	14.0	102.0	5.5	561.0	Pahsimeroi River	44.56858	114.187110
Alder	M	06/15/2010	13.5	100.0	5.7	570.0	Pahsimeroi River	44.55607	114.19244
Alder	M	06/15/2010	17.0	95.0	5.4	513.0	Pahsimeroi River	44.55143	114.19445
Alder	M	06/17/2010	11.0	109.0	6.4	698.0	Pahsimeroi River	44.54177	114.19351
Cache	L	07/19/2010	ND	200.0	ND	ND	Middle Fork Salmon River	44.78090	114.80390
Castle	L	08/11/2010	13.0	100.0	5.2	520.0	Pahsimeroi River	44.80130	114.46899
Castle	L	08/10/2010	9.0	106.0	5.8	614.8	Pahsimeroi River	44.80457	114.45066
Castle	L	08/10/2010	12.0	111.0	5.3	588.3	Pahsimeroi River	44.81452	114.43892
Castle	L	08/11/2010	9.5	100.0	4.8	480.0	Pahsimeroi River	44.82299	114.42694
Castle	M	08/18/2010	9.5	98.0	4.3	421.4	Pahsimeroi River	44.82351	114.40963
Duck	L	06/16/2010	15.0	105.0	4.0	420.0	Pahsimeroi River	44.60085	113.94776
Duck	U	06/03/2010	14.5	100.0	4.9	490.0	Pahsimeroi River	44.59550	113.94297
Elkhorn	L	07/16/2010	ND	100.0	ND	ND	Middle Fork Salmon River		
Garden	L	05/13/2010	ND	ND	ND	ND	North Fork to Headwaters	44.50744	114.22516
Garden	L	07/18/2010	ND	ND	ND	ND	Middle Fork Salmon River	44.73420	115.12900
Indian	L	07/18/2010	ND	825.0	ND	ND	Middle Fork Salmon River	44.76950	115.09080
Little Pahsimeroi River	M	07/29/2010	14.5	120.0	4.0	480.0	Pahsimeroi River	44.55784	113.89342
Little Pahsimeroi River	U	07/28/2010	15.0	81.0	4.7	380.7	Pahsimeroi River	44.55160	113.88028
Muddy Springs	L	07/13/2010	13.5	200.0	6.3	480.0	Pahsimeroi River	44.60282	113.96172
Muddy Springs	M	07/12/2010	16.0	108.0	5.2	561.6	Pahsimeroi River	44.59469	113.95657
Pahsimeroi River	M	08/03/2010	13.0	85.0	2.9	246.5	Pahsimeroi River	44.55687	113.89867
Pahsimeroi River	M	07/28/2010	16.0	110.0	5.2	572.0	Pahsimeroi River	44.54862	113.88334
Pahsimeroi River	M	07/26/2010	18.0	130.0	3.8	494.0	Pahsimeroi River	44.53904	113.87048
Pahsimeroi River	M	07/26/2010	17.0	145.0	4.1	594.5	Pahsimeroi River	44.53024	133.85374
Papoose	L	07/21/2010	13.5	182.9	ND	ND	Middle Fork Salmon River	45.17410	114.72119
Pungo	L	07/19/2010	11.0	ND	ND	ND	Middle Fork Salmon River	44.76482	115.07371
Sheep	L	07/20/2010	ND	60.0	ND	ND	Middle Fork Salmon River	44.94250	114.72830
Soldier	L	07/20/2010	14.0	ND	ND	ND	Middle Fork Salmon River	45.02860	114.72682

Appendix B Cont.

Stream	Tran-sect[a]	Sample Date	Water Temp. (C^o)	Transect Length (m)	Transect Mean Width (m)	Transect Area (m^2)	Sub-basin	Location in WGS84 Latitude Decimal Degrees	Longitude Decimal Degrees
Weasel	L	05/07/2010	8.0	100.0	1.4	139.0	Horse Creek to North Fork	44.88691	114.30554
Wilson	L	07/20/2010	14.5	100.0	ND	ND	Middle Fork Salmon River	45.03353	114.72312

[a] L = transect's lower reach, M = middle reach, and U = upper reach.
[b] ND = No data.

Appendix C. Locations and dimensions of main-stem traditional transects, Middle Fork Salmon River, surveyed in 2010.

Transect Name	River km[a]	Transect Length (m)	Visibility (m)	Visibility Corridor (m)	Transect Area (m^2)	Traditional Species[b]
Boundary	0.9	60.9	3.2	12.8	780.2	SB
Gardells Hole	4.6	126.0	2.9	11.6	1,461.6	C2, CK
Velvet	8.8	36.2	3.2	12.8	473.2	C2, CK
Elkhorn	14.1	68.0	2.9	11.6	788.8	SB
Sheepeater	21.3	102.0	2.7	10.8	1,101.6	SB
Greyhound	25.8	99.0	3.1	12.4	1,227.6	C2, CK
Rapid River	29.6	74.0	3.0	12.0	888.0	SB
Indian	40.8	137.0	2.7	10.8	1,479.6	SB
Pungo	45.1	77.0	2.6	10.4	800.8	C2, CK
Marble Pool	51.7	142.0	2.9	11.6	1,647.2	C2, CK
Skijump	52.3					SB
Lower Jackass	60.9	111.0	3.1	12.4	1,376.4	C2, CK
Cougar	65.9	50.0	2.7	10.8	540.0	SB
Whitie Cox	74.9	102.0	2.9	11.6	1,183.2	C2, CK
Rock Island	75.2	122.0	2.9	11.6	1,415.2	SB
Hospital Pool	82.9	80.0	2.7	10.8	864.0	C2, CK
Hospital Run	84.3	66.0	2.7	10.8	712.8	SB
Tappan Pool	94.9	137.0	3.1	12.4	1,698.8	C2, CK
Tappan Run	95.1					SB
Flying B	106.6	75.0	2.9	11.6	870.0	C2, CK
Airstrip	108.6	100.0	2.9	11.6	1,160.0	SB
Survey	119.0	75.0	2.4	9.6	720.0	SB
Big Creek Bridge	124.6	185.0	2.6	10.4	1,924.0	C2, CK
Love Bar	127.0	100.0	2.6	10.4	1,040.0	SB
Ship Island	134.6	126.0	2.6	10.4	1,310.4	C2, CK
Little Ouzel	143.2					SB
Otter Bar	144.0	143.0	2.4	9.6	1,372.8	C2, CK
Goat Creek Pool	151.5	134.0	2.5	10.0	1,340.0	C2, CK
Goat Creek Run	151.8	122.0	2.6	10.4	1,268.8	SB

[a] River km readings start at Dagger Falls.

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

[c] Survey site no longer exists due to river blow-out.

Appendix D. Locations and dimensions of main-stem Middle Fork Salmon River historical (Corley) transects surveyed in 2010.

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	3.2	12.8	1,088.0	C2, CK
Mahoney Camp	67.4	50.0	2.7	10.8	540.0	SB,C2, CK
White Creek Pack Bridge	78.1	300.0	2.9	11.6	3,480.0	SB,C2, CK
Bernard Airstrip	109.4	110.0	2.9	11.6	1,276.0	SB,C2
Cliffside Rapids Hole	141.3	300.0	2.6	10.4	3,120.0	SB,C2
Hancock Rapids Hole	147.0	120.0	2.4	9.6	1,152.0	C2

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

Appendix E. Locations and dimensions of Middle Fork Salmon River tributary transects surveyed in 2010.

Transect Name	Tributary Location[a]	Transect Length (m)	Visibility (m)	Visibility Corridor (m)	Transect Area (m^2)	Traditional Species[b]
Pistol Creek Lower	125 m above pack bridge	28.0	2.7	10.8	302.4	SB,C2, CK
Pistol Creek Upper	100 m above lower site	40.0	2.7	10.8	432.0	SB,C2, CK
Indian Creek Lower	75 m above mouth	76.0	2.4	9.6	729.6	SB,C2, CK
Indian Creek Upper	300 m above mouth	50.0	2.6	10.4	520.0	SB,C2, CK
Marble Creek	Above pack bridge	64.0	2.6	10.4	665.6	SB,C2, CK
Loon Creek Lower[c]	Below pack bridge					SB,C2, CK
Loon Creek Upper[c]	360 m above pack bridge					SB,C2, CK
Camas Creek Lower	Below pack bridge	75.0	2.2	8.8	660.0	SB,C2
Camas Creek Upper	Above pack bridge	37.0	2.2	8.8	325.6	SB,C2, CK
Big Creek[c]	360 m above mouth					SB,C2

[a] Location description applies to individual tributary.
[b] SB = Steelhead B-run, C2 = Westslope cutthroat trout, and CK = Chinook salmon.
[c] Not surveyed in 2010.

Appendix F. Summary of entities requesting technical assistance and approximate number of responses or comments on water and fishery-related matters.

Entity	Approximate Number of Requests
U.S. Army Corps of Engineers	10
Idaho Department of Water Resources	30
Idaho Department of Lands	3
U.S.D.A. Forest Service	15
Idaho Department of Environmental Quality	7
U.S. Fish and Wildlife Service	25
Idaho Governor's Office of Species Conservation	12
N.O.A.A. (N.M.F.S.)	25
Shoshone-Bannock Indian Tribe	8
The Nature Conservancy	20
U,S, Bureau of Reclamation	4
Private consultants	15
Idaho Outfitters and Guides Licensing Board	4
Mining Companies	15
Idaho Department of Transportation	13
City of Salmon	2
Freedom of Information Act	1
Attorney General's Office	4
Custer County	3
Bureau of Land Management	12
Upper Salmon Basin Model Watershed Project	14
Northwest Power Planning Council	4
Private landowners	35
Idaho State Police	1
Total	282

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