FISHERY MANAGEMENT INVESTIGATIONS

IDAHO DEPARTMENT OF FISH AND GAME

FISHERY MANAGEMENT ANNUAL REPORT

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SALMON REGION 2012

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ABBREVIATIONS USED IN THIS DOCUMENT

BU – bull trout
Ck – Chinook salmon
CPUE – catch-per-unit-effort
CT – cutthroat trout
DNA - deoxyribonucleic acid
DO – dissolved oxygen
EBT – eastern brook trout
eDNA – environmental deoxyribonucleic acid
g - gram
GPS – global positioning system
IDFG – Idaho Dept. of Fish and Game
kg - kilogram
km - kilometer
KOK – kokanee salmon
LLID - latitude-longitude identification
LT – lake trout
m – meter
MFSR – Middle Fork Salmon River
mg/l – milligrams per liter
mm - millimeter
MWF – mountain whitefish
ND – no data
NPM – northern pikeminnow
RBT – rainbow trout
RSS – redside shiner
SCNF – Salmon Challis National Forest
SFH – Sawtooth Fish Hatchery
SH - steelhead
SIA – stable isotope analysis
SNRA – Sawtooth National Recreation Area
SOCK – sockeye salmon
SUC - sucker
SWA – Sawtooth Wilderness Area
TL – total length
μm - micrometer
UNK - unknown
USFS – U.S. Forest Service
USR – Upper Salmon River
VES – visual encounter survey
Wr – relative weight
Zmax – maximum depth
ZPR – zooplankton ratio
ZQI – zooplankton quality index

SALMON REGION FISHERY MANAGEMENT 2012 ANNUAL REPORT

Mountain Lake Stocking, Surveys, and Management Plan

ABSTRACT

The Idaho Department of Fish and Game contracted stocking of 76 mountain lakes in the Salmon-Challis National Forest, Sawtooth National Recreation Area, and Sawtooth Wilderness Area during 2012. Sawtooth Flying Service stocked 61 lakes with 40,897 westslope cutthroat trout *Oncorhynchus clarkii lewisi* fry. Eleven lakes were planted with 8,059 Troutlodge triploid rainbow trout *O. mykiss* fry. Three lakes received a total of 2,526 Arctic grayling *Thymallus arcticus* fry, and one lake was stocked with 2,629 golden trout *O. aguabonita* fry this year.

Fishery staff surveyed one mountain lake in the Lemhi River drainage in 2012. The survey crew sampled Arctic grayling at Nez Perce Lake. A corresponding amphibian survey resulted in observation of more than 20 juvenile western long-toed salamanders *Ambystoma macrodactylum*. The lake was rated as having low human impact.

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INTRODUCTION

The Salmon Region of the Idaho Department of Fish and Game (IDFG) has approximately one thousand mountain lakes within its borders. Of these 1,000 lakes, 197 are requested to be stocked on a three-year rotation with either Arctic grayling *Thymallus arcticus*, golden trout *Oncorhynchus aquabonita*, triploid rainbow trout *O. mykiss*, or westslope cutthroat trout *O. clarkii lewisi* fry. Five additional lakes are scheduled to be stocked every year due to high fishing pressure. These five lakes are Hindman Lake #1, Iron Lake #2, Meadow Creek Lake, Wallace Lake, and Yellowjacket Lake #2. The stocking rotations provide diverse mountain lake fishing opportunities to the public. Stocking rotation A includes 64 mountain lakes, rotation B is comprised of 82 lakes, and rotation C has 66 lakes. Years of stocking for rotations A, B, and C for 2012 through 2022 are shown in Table 1.

In recent years, the Salmon Region has prioritized conducting mountain lake surveys due to the paucity of aquatic data from high mountain lakes. Development of a Mountain Lake Fish 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 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 (IDFG 2012).

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 Fish Management Plan

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

STUDY AREA AND METHODS

Mountain Lake Stocking

Salmon Region mountain lakes in the Salmon-Challis National Forest (SCNF), Sawtooth National Recreation Area (SNRA), and Sawtooth Wilderness Area (SWA) were stocked with

Arctic grayling, golden trout, rainbow trout, and westslope cutthroat trout fry. Mackay Fish Hatchery provided rainbow trout fry while Cabinet Gorge Fish Hatchery contributed cutthroat trout fry. Arctic grayling eggs were spawned at Meadow Lake, Wyoming and the resulting fry were reared at IDFG's Ashton and Mackay Fish hatcheries. Golden trout stock originated at Story Fish Hatchery in Story, Wyoming, and the fry were reared at Mackay Fish Hatchery before release. Regional stocking of fry into mountain lakes follows a three-year rotation with each lake usually receiving fish once every three years. Salmon Region fisheries biologists used the nomenclature rotations A, B, and C to describe which lakes were stocked each year. Mountain lakes included in rotations A, B, and C were published in the 2011 Salmon Region annual report (Curet et al. 2013). Rotational stocking information included each lake's IDFG catalog number, physical lake location on national forest, national recreation land, or in the SWA, species and number of fish stocked, latitude-longitude concatenation identification (LLID), and the lake's location in WGS84 datum, latitude and longitude decimal degree coordinates. The 2012 stocking followed Rotation B (Table 1).

Beginning in 2012, IDFG contracted aerial mountain lake stocking with Sawtooth Flying Service based in McCall, Idaho. The contracting company was provided with the list of mountain lakes to be stocked annually using rotations A, B, or C. The Sawtooth Flying Service pilot and one-person crew were provided with global positioning system (GPS) coordinates for each lake as well as physical maps with the location and best flight route of lakes to be stocked during each rotation. Previous yearly stockings by IDFG staff determined the most efficient flight plan to use when conducting aerial stocking. The flight routes for each rotation were refined in recent years to keep flight time and fuel costs to their most efficient level.

On a typical flight day, Mackay Hatchery staff met the Sawtooth Flying Service crew at the Mackay airport to help load the fry to be stocked. On multi-flight days, hatchery staff also drove to the Stanley airport to meet the plane and help load more fry for additional stocking flights. Prior to loading fry in the plane, Mackay Hatchery staff netted, measured the prescribed number of fry by species for each lake (the number of fry is based on netted fish weight), and then placed the weighted fry into plastic bags. Staff recorded the lake, species, and number of fry on each bag. Oxygen was added to each bag before sealing, and the bagged fish were arranged in the specific order in which lakes were to be encountered during the flight. All bags were loaded into the Cessna – 185 fixed-wing airplane at the airport in flight order to ensure each lake received the correct species and number of fish. After takeoff, the pilot and flight crew person used GPS coordinates and aerial maps to follow the stocking rotation route. Upon approaching a lake to be stocked, the crew person notified the pilot of the upcoming lake. The crew person then selected that lake's proper bag (or bags) of fry, cut each bag open, and poured the fry into a hopper located on the floor of the plane. The hopper was shaped like a large funnel with a plug in the bottom. As the plane dropped into the lake basin, the pilot told the crew person to "Pull" as they approach the drop zone at the center of the lake. The crew person released the hopper plug when the plane was at the lowest point above the lake's surface and fish exited from the bottom of the plane. The plane's height at release varied at each lake, depending on the lake size, tree heights along shore, wind direction and speed, and physical barriers surrounding the lake. The pilot immediately climbed the plane out of the lake's air space and proceeded to the next lake. Each stocking rotation included 64 to 82 lakes and usually required multiple flights and/or days to complete all stocking for one rotation (Curet et al. 2013).

Mountain Lake Surveys

Regional IDFG personnel conducted one mountain lake survey in 2012 by backpacking into the Lemhi River drainage. We documented fish presence and species by angling. Fish were measured to the nearest mm total length (TL), and weighed (g). Fish spawning potential of the inlet and outlet was assessed, along with total spawning area (m^2) available, and the presence of fry and fingerling. Physical characteristics of the lake, surrounding geology and plant morphology, weather conditions at survey time, and access (km) by trail and cross-country travel were also recorded. The shoreline area was 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 the area surrounding the lake. An amphibian survey was conducted 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 survey crew performed a full perimeter search without accounting for various habitat types. Survey data were entered into the statewide mountain lake database for future analysis. The physical location and characteristics of the surveyed mountain lake is detailed in Appendix A. Survey data sheets were archived at the Salmon Region office.

Mountain Lake Fish Management Plan

As part of the development of a statewide management plan, IDFG headquarters and statewide fishery staff created a Lakes and Reservoirs software application that incorporates statewide lowland and mountain lake survey data into a geo-referenced database with maps and photos. The database is designed to encompass the informational needs of affected regional managers, allowing data entry in a consistent, universal format, and data retrieval through web-based query reports.

RESULTS AND DISCUSSION

Mountain Lake Stocking

In 2012, Mackay Fish Hatchery personnel supervised the stocking of 72 mountain lakes by aircraft in the SCNF, SNRA, and SWA on four dates: August 31, and September 1, 7, and 8. Four other lakes were stocked by tanker truck. Fifty-seven lakes were aerially stocked with 22,697 cutthroat trout fry. Eleven lakes were stocked with 8,059 Troutlodge triploid rainbow trout fry and three lakes received a total of 2,526 Arctic grayling fry. One lake, Alpine, was stocked with 2,629 golden trout fry, consisting of 1,995 fry stocked by airplane and 634 fry by backpacking. At the time of stocking, cutthroat trout fry averaged 35 mm TL, Arctic grayling averaged 51 mm TL, golden trout fry averaged 31 mm TL, and rainbow trout fry averaged 35 mm TL. Hindman Lake #1, which was scheduled to receive 500 cutthroat trout, was inadvertently not stocked in 2012. As Hindman #1 is scheduled to be stocked yearly, this oversight should be corrected in 2013. Five lakes scheduled to receive Arctic grayling fry in 2012 were not stocked due to the unavailability of fry. Arctic grayling, totaling 3,250 fry, were not stocked in Alpine Creek Lake #15, Rainbow Lake, Seafoam Lake #6, Upper Redfish Lake #1, and Vanity Lake #13. Another four lakes were stocked at lower densities with grayling and golden trout due to inadequate fry availability. Alpine Lake received 2,629 golden trout fry when it was scheduled to receive 3,850 fry while Alpine Creek lakes #4, #13, and #14 received partial stockings of Arctic grayling that totaled 1,499 fry. These three lakes were scheduled to receive 4,025 fry.

Flight time in 2012 totaled 14.6 hours at a cost of $6,643 or an average of $92.26 per lake. Additionally, three lakes in IDFG's Magic Valley Region were stocked during the September 7 flight and were not counted toward the average cost per lake shown above. By comparison, in 2011, 66 lakes were stocked during 16.6 hours of flight time at a cost of $7,387 or an average of $111.92 per lake.

Mountain Lake Surveys

One mountain lake survey was conducted during September 2012 in the Lemhi River drainage. Fishery staff angled 27 arctic grayling in Nez Perce Lake during three hours of fishing (Table 3). A corresponding amphibian survey at the lake resulted in observation of more than 20 juvenile western long-toed salamanders *Ambystoma macrodactylum.* The crew noted that the September 21 survey date seemed late for observing salamander juveniles and the juvenile observed appeared small and not very developed for the time of year. The crew assigned a human impact rating of "low" for Nez Perce Lake with one campsite counted.

MANAGEMENT RECOMMENDATIONS

1) Continue stocking mountain lakes using Rotation C in 2013.

2) Stock all golden trout lakes in 2013 that were not stocked in 2007 through 2012.

3) Coordinate with the IDFG's Fisheries Bureau to find a reliable, consistent source of arctic grayling and golden trout fry.

4) Coordinate the annual aerial stocking regime with the contracting company and hatchery personnel to assist with stocking schedule.

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

6) Continue to work with regional fishery managers to develop a statewide Mountain Lake Fish Management Plan.

Table 1. Salmon Region stocking rotations A, B, and C by year, 2012 through 2022.

	Stocking Rotation Sequence		
	A	B	C
Year of Stocking		2012	2013
	2014	2015	2016
	2017	2018	2019
	2020	2021	2022

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

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

Table 3. Salmon Region mountain lakes (*n* = 1) surveyed in 2012.

LLID[a]	IDFG Catalog No.	Lake Name	Survey Date	Primary Fish Species Observed	Amphibian Species Observed
1133908445099	0700001273.00	Nez Perce Lake	9/21/2012	arctic grayling	western long-toed salamander

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

SALMON REGION FISHERY MANAGEMENT 2012 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 (Wr), and changes in zooplankton abundance and forage availability in 2012. Herd Lake's average zooplankton quality index (ZQI) value of 1.63 in 2012 was the highest recorded value since 2002 and indicates unlikely forage competition.

Regional fishery staff collected 419 rainbow trout during 121.7 gill netting hours at Jimmy Smith Lake. Sampled rainbow trout had a size range of 126 to 295 mm TL with an average length of 229 mm, compared to a size range of 150 to 250 mm TL and an average length of 183 mm in 2011. The average weight of the lake's rainbow trout increased to 125.9 g in 2012, compared to an average of 66.5 g for 2011. The 2012 average Wr of rainbow trout sampled in 2012 declined slightly from 89.1 in 2011 to 87.7 in 2012. The average ZQI value for Jimmy Smith this year was 2.02, suggesting competition for zooplankton food availability was unlikely and also represented the highest average ZQI calculated in nine sampling periods.

The average ZQI for Williams Lake was 1.20, a two-fold improvement over the 2011 average of 0.61 and represented the highest value calculated in ten sampling periods. Interestingly, three of four lowland lakes (Herd, Jimmy Smith, and Williams lakes) sampled in 2012 recorded their highest ZQI values for all sample periods at each lake.

Rainbow trout were spawned from Lake Creek, the inlet stream to Williams Lake, and the resulting eggs were shipped to IDFG's Hayspur Fish Hatchery for progeny broodstock development for the third straight year. Fishery staff conducted water temperature and dissolved oxygen (DO) sampling during the second half of 2012 as part of a regional intent to create a baseline DO dataset for Williams Lake for one year. In August and September, DO levels were above 5.0 mg/L from the surface to a depth of 9 m. After lake stratification occurred, likely in late October, the range of acceptable DO levels increased from the surface to 19 m in depth. Staff recorded a DO level of 17.3 at 1 m and 5.2 mg/L at 19 m in November sampling at Williams Lake.

We calculated a ZQI average value of 0.05 for Yellowbelly Lake in 2012, slightly lower than the 2011 average of 0.06, indicating that forage resources were limited and competition for food is likely occurring. The lake has consistently produced low ZQI values over five sampling periods with ZQI averages ranging from 0.01 to 0.06. In a continuing effort to establish a cutthroat trout fishery in Yellowbelly Lake, 41,161 cutthroat fry were released in 2012.

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INTRODUCTION

In the Salmon Region, lowland lakes, reservoirs, and ponds provide important fisheries to anglers due to their accessibility and in some lakes the ability to stock hatchery fish by truck. These waters, particularly the ponds, are critical in recruiting young anglers given the higher abundances of stocked fish and subsequent higher catch rates. These lowland fisheries were managed to provide diverse recreational and angling opportunities for the public. Currently, the Salmon Region contains 23 lowland lakes, 2 reservoirs, and 11 public ponds (Curet et al. 2010). These waters were sampled more intensively than other water bodies given higher angler pressure. Understanding fish population dynamics and forage availability (e.g. zooplankton quality index) assists managers in setting creel limits and ensuring we are meeting objectives developed in the Fisheries Management Plan, 2013-2018.

OBJECTIVES

Herd Lake

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

Jimmy Smith Lake

Monitor rainbow trout in Jimmy Smith to detect improvements to the trout population's size structure and/or condition in response to an increased bag limit from 6 trout to 25 trout a day.

Perform a mark-recapture effort to calculate a population estimate of rainbow trout in Jimmy Smith Lake.

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

Kelly Creek Pond

Conduct an examination of the Kelly Creek Pond site to determine the feasibility of repairing the water intake structure.

Mosquito Flat Reservoir

Conduct an examination of the outlet valve structure to determine the integrity of the valve after reports of leakage and oxygen-deprived fish below the dam. Assess damage and make repairs as needed and feasible.

Williams Lake

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

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

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

Conduct monthly DO and water temperature profiles for one year to document a baseline dataset for the lake.

Yellowbelly Lake

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

STUDY AREA AND METHODS

Herd Lake

Herd Lake is a landslide lake located in the East Fork Salmon River drainage in Custer County at 2,187 m elevation (WGS84 datum, latitude longitude decimal degrees coordinates of 44.08921^{o}N, 114.17364^{o}W). The lake has a surface area of 6.7 ha and is a coldwater rainbow trout fishery. 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. IDFG fishing regulations were also changed in 2011 with bag limits increased from 6 trout to 25 trout per day in an effort to improve size structure of trout.

Zooplankton tow samples were collected at Herd Lake on August 17, 2012 near the inlet, mid-lake, and at the outlet following methods outlined by Teuscher (1999). The fishery crew deviated from Teuscher's methods by sampling the outlet and mid-lake sites at 7 m and the inlet site at 5 m due to decreased lake depth. Samples were stored in 100% ethyl alcohol for nine days, at which time ZQI values were analyzed using methodology developed by Yule (unpublished) and Teuscher (1999).

Jimmy Smith Lake

Jimmy Smith Lake is a landslide lake located in north central Custer County in the East Fork Salmon River drainage at 1,948 m elevation with a surface area of 26.0 ha (WGS84 datum, latitude and longitude decimal degree coordinates of 44.16907^{o}N, 114.40249^{o}W). The lake has one outlet, Big Lake Creek, and three inlet streams, Jimmy Smith, Corral, and Big Lake creeks. The outlet is located at the north end of the lake and the three inlet streams are located at the west, north, and northeast ends of the lake. The lake supports a naturally reproducing population of rainbow trout that likely originated from 184,600 rainbow trout stocked from IDFG's Mackay Fish Hatchery between 1927 and 1938. The lake has not been stocked since that time.

Prior to a 2012 gill net effort at Jimmy Smith Lake on June 25, regional staff angled and marked rainbow trout with a left ventral fin clip. Subsequent data from gill net efforts recorded the number of marked recaptures. Data collected from these efforts were also used to calculate a population estimate for rainbow trout. A Peterson single mark-recapture population estimate

with the Chapman modification was used to estimate trout abundance in Jimmy Smith (Ricker 1975):

$$\hat{N} = \frac{(n_1 + 1)(n_2 + 1)}{(m_2 + 1)} - 1$$

where n_1 = number caught and marked in first sampling period; n_2 = number caught in second sampling period; and m_2 = number of marked animals in second sampling period.

Confidence intervals were calculated using the table provided in Chapman (1948). Two floating and six sinking experimental, variable mesh gill nets 45 m long X 1.8 m deep with 6 panels (1.9, 2.5, 3.2, 3.8, 5.1, and 6.4 cm bar mesh) were used June 25-26, 2012 to sample the rainbow trout population of Jimmy Smith Lake. Nets were set during the evening of June 25, fished overnight, checked, and removed the following day. Captured fish were identified to species, measured for TL mm, and weighed (g). Rainbow trout Wr values were calculated using formulas developed by Murphy et al. (1991).

Zooplankton sampling was conducted at Jimmy Smith Lake on August 17, 2012 near the inlet, mid-lake, and at the outlet following methods outlined by Teuscher (1999). As with Herd Lake, the sample crew deviated from Teuscher's methods by sampling the inlet and outlet sites at 3 m and the mid-lake site at 4 m due to decreased lake depth. Samples were stored in 100% ethyl alcohol for nine days, at which time ZQI values were analyzed using methodologies in Tuescher (1999).

Kelly Creek Pond

Early development of Kelly Creek Pond is unknown, but the pond has existed since at least the 1920's when mining activity occurred in the Stanley Basin. Sluice ditches dug in the hillsides of the Kelly Creek drainage provided water not only for hydraulic mining, but also leaked water into a low lying area that became known as Kelly Creek Pond. The pond is located approximately 17 km northwest of Stanley, adjacent to Kelly Creek, a tributary to Basin Creek and the Salmon River at WGS84 datum,decimal degree coordinates of 44.28318^{o} N, -114.92225^{o} W. Situated at 2,065 m in elevation, the pond covers 0.8 ha surface area and until recently, provided a popular youth and family fishery in the Stanley Basin. In late summer 2011, regional fishery staff received a report the pond was dewatered. On May 12, 2012, fishery staff surveyed the pond and found it empty. The water inlet was blocked due to winter logging activities. Further investigation revealed that IDFG had no water rights at the pond. In the summer of 2012, the Halstead Fire burned through the pond area and damage to the pond remains unknown (May 2013).

Early fish stocking records are also unknown, but rainbow trout were reported in the pond in the early 1900's. In 1996 IDFG stocked Kelly Pond with 550 unspecified rainbow trout. Since then, annual stocking included various rainbow trout stock, including catchable size domestic Kamloops, triploid Hayspur Kamloops, and triploid Hayspur rainbows. From 2003 to 2011, IDFG stocked about 1,050 triploid Troutlodge each year. In 2012, stocking was suspended until a post-fire survey is completed and the pond is repaired.

Mosquito Flat Reservoir

Mosquito Flat Reservoir, located on Challis Creek approximately 20 km from the town of Challis, is a man-made irrigation reservoir constructed in 1954. Set at 2,114 m in elevation, the reservoir is located at coordinates (using WGS84 datum in decimal degrees) of 44.51902^{o} N, -114.43566^{o} W. At full pool, the reservoir stores 793 acre-feet of water with a surface area of 16.2 ha. In 1984, 28% of the reservoir's volume was donated to IDFG for maintenance of fish populations (Liter and Lukens 1994). To date, the 28% level is reserved as a minimum pool necessary for fish habitat and survival and represents 222 acre-feet with a surface area of 8.5 ha. The Mosquito Flat Water Users maintain the other 72% of the reservoir. Triploid rainbow trout were stocked annually by IDFG. In the past 10 years, an average of 5,200 catchable sterile rainbows were stocked each year. Brook trout *S. fontinalis* have also been documented in the reservoir. Though never stocked by IDFG, brook trout apparently migrated downstream from the Challis Creek lakes (Liter and Lukens 1994). The reservoir is a popular local fishery due to its proximity with the city of Challis.

In mid-summer 2012, the Regional fishery manager was notified by the Mosquito Flat Water Users group that the water control valve structure at the dam's outlet was damaged. Leakage resulting from the faulty valve allowed the reservoir to draw down below the 28% minimum pool volume needed to maintain a fishery.

Williams Lake

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

Zooplankton sampling was conducted in 2012 at Williams Lake at three locations (near the inlet, at mid-lake, and near the outlet) on the afternoon of August 13, 2012 following methods outlined above. Samples were stored in 100% ethyl alcohol for nine days, at which time ZQI values were analyzed using methods outlined above.

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

Additionally, fertilized eggs were collected using the dry method from pairings of adult rainbow trout on May 7, 2012 for potential broodstock development at Hayspur Fish Hatchery.

Dissolved oxygen levels in Williams Lake were sampled approximately once each winter for the last eight years by regional staff. Beginning in August 2012, regional staff began to conduct DO and water temperature profiles each month for one year to obtain a baseline dataset. Sampling was performed by boat during temperate months and by drilling a hole in the ice during winter months at the approximate location of the lake's deepest point (Zmax). Using

a YSI Model 5560 DO multi-probe sensor, fishery staff sampled the DO level and water temperature at the lake's surface and at one meter intervals through the water column from one to 20 m in depth.

Yellowbelly Lake

Yellowbelly Lake, an oligotrophic lake, is located in southern Custer County at 2,157 m elevation. The lake has 77.9 ha of surface area, a maximum depth of 24.5 m, and 8.4 km of shoreline. The lake is located at WGS84 datum, latitude and longitude decimal degree coordinates of 44.00050^{o}N, 114.87677^{o}W. The principle in-flow is provided by Yellowbelly Lake Creek. Documented fish species in the lake are brook trout, westslope cutthroat trout, rainbow trout, bull trout, northern pikeminnow *Ptychocheilus oregonensis*, and sucker (various species) *Catastomus sp*. In an effort to reestablish native fish populations, the lake was treated with rotenone in 1990. Additionally, a fish barrier located at the outlet of Yellowbelly Lake was removed in 2000 by SNRA personnel to reestablish connectivity with the mainstem Salmon River. Until 2011, Yellowbelly Lake was managed as a catch-and-release westslope cutthroat trout fishery. Yellowbelly Lake was reclassified under general bag and possession limits in the 2011-2012 IDFG fishing rules.

Zooplankton samples were taken at three locations (near the inlet, at mid-lake, and near the outlet) on Yellowbelly Lake on the afternoon of August 16, 2012 following methods outlined by Teuscher (1999). Samples were stored in 100% ethyl alcohol for nine days, at which time ZQI values were analyzed using methodology outlined above.

RESULTS AND DISCUSSION

Herd Lake

Herd Lake's ZQI average value of 1.63 in 2012 is the highest recorded value for this lake since 2002 and suggests zooplankton forage competition is unlikely (Tables 4 and 5; Figure 1). When performing the lab analysis, personnel observed the presence of larger-sized copepods from the 153μm mesh sieve tows at all three lake sample locations (inlet, mid-lake, and outlet). Raw unadjusted weights for the three 153μm samples were also higher than normal this year, likely due to the presence of copepods. We recorded weights of 16.0 g, 40.2 g, and 26.2 g, respectively, for the inlet, mid-lake, and outlet for the 153μm mesh sieve tows. By comparison, in August 2011 our inlet, mid-lake, and outlet samples weighed 0.02 g, 0.08 g, and 0.04 g, respectively.

Jimmy Smith Lake

Regional fishery staff collected 419 rainbow trout during 121.7 gill netting hours at Jimmy Smith Lake in 2012 (Table 6). Rainbow trout had a size range of 126 to 295 mm TL with an average length of 229 mm (Table 6, Figure 2). By comparison in 2011 rainbow trout ranged from 150 to 250 mm TL and had an average length of 183 mm. The average weight of rainbow trout improved to 125.9 g in 2012, compared to 100 g, 84 g, 81 g, and 66.5 g averaged for sampling years 2008 through 2011, respectively (Table 6). The average Wr of rainbow trout sampled in 2012 showed a minor decrease compared to the previous year. A value of 87.7 was calculated for 2012 while an average of 89.1 was calculated for 2011 (Table 6; Figure 3). Average relative weights (Wr) continue to lag behind the robust Wr averages calculated in 2003,

2005, and 2006 (Table 6). This year's catch rate of 3.4 fish per hour was among the lowest values for the 10 sample periods (Table 6). Based on a linear regression there was no evidence of an increase or decrease in Wr of rainbow trout with size (r^2 = 0.02, F = 3.179, P=0.08), suggesting food availability for trout were similar across the sizes (Figure 4).

For the mark-recapture event, 472 rainbows were marked with a left pelvic fin clip via angling over a 7-day period comprising 74 hours of effort. A total of 419 fish were collected in overnight gill net sets during the recapture portion on June 25-26, 2012 of which five fish were recaptures (i.e. marked). The population was estimated at 33,109 rainbow trout (C.I. 12,736 - 101,455 trout) in Jimmy Smith. Shortly after conducting the population estimate, regional fishery manager Tom Curet conducted a visual inspection along the inlet on June 26 and observed a large number of rainbows spawning in the tributary. Thus, the population estimate likely violated the assumption of no movement in or out of the population. Future population estimates in Jimmy Smith need to be performed later in the summer or fall to ensure rainbow trout have not moved out of the system.

New fishing rules implemented in January 2011 increased the daily bag limit from 6 trout to 25 trout in Jimmy Smith Lake. The rule change was directed at increasing angler effort and harvest in an attempt to improve the size structure of fish by decreasing their density. Currently, we do not have any creel data with angler pressure and harvest. The larger average length and weight of rainbows sampled may be due to regulation change with higher harvest or a biotic/abiotic factor regulating the population.

The average ZQI value for Jimmy Smith Lake in 2012 was 2.02 (Table 5, Figure 5), suggesting competition for zooplankon food was unlikely (Table 4). The value in 2012 represents the highest average ZQI calculated for Jimmy Smith Lake in nine sample periods and is the single highest value calculated to date for the region's four lowland lakes (Herd, Jimmy Smith, Williams, and Yellowbelly lakes) routinely sampled for ZQI's (Table 5).

Kelly Creek Pond

The extent of damage to the pond area from the 2012 fire season is not yet known. When the site is accessible in 2013, regional fishery staff and personnel from the SCNF will meet to survey the pond, assess damages, and develop a plan to repair the pond and its access area, including parking and picnic area needs.

Mosquito Flat Reservoir

In September 2012, the Mosquito Flat Water Users completely drained the reservoir in preparation for repairs. In October, the contracting company, Challis Creek Cattle Company, removed damaged sections of pipe and the broken valve stem on the dam structure from the top of the dam downhill to the gate box at the outlet. Useable pipe sections were repaired while unusable sections were replaced (Figures 6 and 7). The contractor added protective tubing around the valve stem from the top of the dam down to the gate box. Vertical H-brace supports and strapping were fabricated and installed to provide lateral support and secure the protective tubing and valve stem (Figures 8 and 9). Testing of the control valve and gate box was conducted on October 18, 2012. The head gate was then closed to allow refilling of the reservoir. Total cost of repairs was $3,474.90, of which materials cost $419.27 and 89 hours of labor totaled $3,055.63.

Williams Lake

Zooplankton sampling produced an average value of 1.20 in 2012, suggesting competition for zooplankton food unlikely. This year's average ZQI represented the highest value calculated for ten sampling events at Williams Lake (Table 5, Figure 10).

On May 7, 2012, 16 female and 16 male rainbow trout from Lake Creek were collected and spawned. Regional IDFG cooperator Ken John tended the fertilized eggs until "button up." Approximately 45,000 fry were released into Lake Creek on June 24, 2012. Additionally, eggs from six rainbow trout pairs spawned were transported to the Eagle Fish Health Lab that day. Progeny from these eggs will be reared as potential additions to IDFG's Hayspur Fish Hatchery's broodstock program. Tissue samples and ovarian fluids from all adult rainbow trout collected were sampled and tested for pathogens. Results were negative for all tested pathogens.

Fishery staff conducted water temperature and DO sampling during three of five months during the latter half of 2012 as part of a regional intent to create a baseline dataset for Williams Lake for one year. Preliminary results indicated acceptable DO levels ($\geq$5.0 mg/L for the lake's rainbow and bull trout) in August, September, and November. No sampling was conducted in October and December 2012. At the surface, DO measured 10.3 mg/L and 12.1 mg/L for August and September, respectively (Figure 11). The DO level was still above the tolerance level from the surface to a depth of 9 m with DO levels of 6.7 mg/L and 8.2 mg/L in August and September at 9 m, respectively (Figure 11). After lake stratification occurred, likely in late October, the range of acceptable DO levels increased from the surface to 19 m in depth. Fishery staff measured DO levels of 17.3 mg/L at 1 m and 5.2 mg/L at 19 m in the November sample (Figure 11).

Yellowbelly Lake

We calculated a ZQI average value of 0.05 for Yellowbelly Lake in 2012, slightly lower than the 2011 average of 0.06, which suggests zooplankton forage resources were limited and competition for food is likely occurring (Table 4, Figure 12). The lake has consistently produced low ZQI values over five sampling periods from 2007 to 2012 with averages ranging from 0.01 to 0.06 (Figure 10).

For five years (2002 to 2006), between 1,200 and 6,600 westslope cutthroat trout fry were stocked annually in Yellowbelly Lake. These stockings were apparently unsuccessful in establishing an adequate westslope cutthroat trout population. Seven gill net efforts between 2004 to 2011 produced a total of 151 (10.3%) salmonids while non-salmonid fish (redside shiner *Richardsonius balteatus*, suckers, and northern pikeminnow) totaled 1,308 (89.7%) (Curet et al. 2013). Of the 151 salmonids sampled, cutthroat trout only comprised 17% (n = 26) of the salmonid species observed. The low number of cutthroat adults observed during gill netting may have been due to the relatively low numbers of westslope cutthroat trout fry available for stocking and/or the inconsistent stocking patterns. The goal of establishing a westslope cutthroat fishery in a drainage and lake system dominated by non-salmonids and a non-native salmonid (brook trout) appears limited. In 2008, cutthroat stocking increased to 11,000 fry and was increased again in 2009 with 19,044 cutthroat fingerlings and 12,500 cutthroat fry stocked. In 2009, the Region requested 30,000 cutthroat fry be stocked in Yellowbelly Lake per year for five years beginning in 2010. In 2012, 41,161 westslope cutthroat fry were stocked into Yellowbelly Lake on September 19.

MANAGEMENT RECOMMENDATIONS

Herd Lake

In 2013, re-introduce tiger muskellunge into Herd Lake in an effort to improve the size structure of the rainbow trout population. Evaluate the rainbow trout population size structure pre and post tiger muskie introduction.

Jimmy Smith Lake

Continue to monitor ZQIs in August 2013.

Monitor the rainbow trout population periodically to assess size structure changes in response to the increased bag limit imposed in 2011.

Kelly Creek Pond

The popularity of this IDFG Family Fishing Water necessitates for Region staff to collaborate with the SCNF to repair the pond, including the construction of suitable inlet and outlet structures. Signage replacement and development of access and parking facilities also needs to be addressed.

Mosquito Flat Reservoir

Continue to work cooperatively with the Mosquito Flat Water Users to ensure the reservoir is maintained at the minimum 28% pool volume.

Evaluate angler use and exploitation in 2013 using remote creel techniques.

Williams Lake

Continue to monitor DO levels and water temperature to provide a long-term dataset of water quality parameters in Williams Lake.

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

Yellowbelly Lake

Continue to monitor salmonid CPUE and species composition via gill netting to determine the effectiveness of cutthroat trout stockings.

Table 4. 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 5. Zooplankton quality index (ZQI) values and average zooplankton ratio (ZPR) values sampled in August each year at Herd, Jimmy Smith, Williams, and Yellowbelly Lake.

		ZQI[a] Sample Location				ZPR[b] Sample Location			
Lake	Year	Inlet	Mid-lake	Outlet	ZQI Average (SE)	Inlet	Mid-lake	Outlet	ZPR Average (SE)
Herd	2002	0.01	0.01	--	0.01 (0.00)	--	--	--	0.04
	2003	0.01	0.01	--	0.01 (0.00)	0.03	0.08	--	0.05 (0.03)
	2004	--	0.07	0.00	0.04 (0.04)	--	0.04	0.00	0.02 (0.02)
	2006	0.01	0.02	--	0.02 (0.01)	0.11	0.17	--	0.14 (0.03)
	2007	--	1.30	1.26	1.28 (0.02)	0.54	0.46	--	0.50 (0.04)
	2008	--	1.13	0.82	0.98 (0.16)	1.03	1.02	--	1.02 (0.01)
	2009	0.20	0.20	0.26	0.22 (0.02)	0.21	0.38	0.48	0.36 (0.08)
	2011	0.04	0.08	0.02	0.05 (0.02)	0.14	0.21	0.13	0.16 (0.03)
	2012	0.54	0.96	3.38	1.63 (0.89)	0.28	0.41	0.62	0.44 (0.10)
Jimmy Smith	2002	--	0.00	0.00	0.00	--	0.00	0.00	0.00
	2003	0.10	0.20	--	0.20 (0.05)	0.10	0.10	--	0.10 (0.00)
	2004[c]	--	--	--	0.03	--	--	--	0.03
	2007	--	0.02	0.02	0.02 (0.00)	--	0.12	0.20	0.16 (0.04)
	2008	--	0.02	0.02	0.02 (0.00)	--	0.25	0.25	0.25 (0.00)
	2009	0.01	0.01	0.01	0.01 (0.00)	0.01	0.06	0.08	0.05 (0.02)
	2011	0.01	0.02	0.11	0.05 (0.03)	0.01	0.05	0.14	0.07 (0.04)
	2012	2.30	2.05	1.70	2.02 (0.17)	0.23	0.28	0.21	0.23 (0.02)
Williams	2000	--	--	--	0.67	--	--	--	0.85
	2001	0.65	0.71	1.40	0.92 (0.24)	0.51	0.66	0.77	0.65 (0.08)
	2002	0.29	0.98	0.71	0.66 (0.20)	0.43	0.56	1.10	0.70 (0.21)
	2003	0.50	0.80	0.80	0.72 (0.10)	--	--	--	1.55
	2005	0.15	0.60	0.92	0.56 (0.22)	0.53	0.78	0.82	0.71 (0.09)
	2008	0.24	0.72	1.23	0.73 (0.29)	0.68	1.33	0.38	0.80 (0.28)
	2009	0.85	0.85	0.39	0.70 (0.15)	0.38	0.52	0.65	0.51 (0.08)
	2010	0.11	0.33	0.23	0.23 (0.06)	0.30	1.17	0.38	0.62 (0.28)
	2011	0.51	0.60	0.72	0.61 (0.06)	0.41	0.37	0.82	0.53 (0.14)
	2012	1.41	0.83	1.37	1.20 (0.19)	0.58	0.42	0.83	0.61 (0.12)

Table 5. Continued.

Lake	Year	ZQI[a] Sample Location			ZQI Average (SE)	ZPR[b] Sample Location			ZPR Average (SE)
		Inlet	Mid-lake	Outlet		Inlet	Mid-lake	Outlet	
Yellowbelly	2007	0.00	0.00	0.04	0.01 (0.01)	0.00	0.00	0.67	0.22 (0.22)
	2008	0.05	0.02	0.01	0.03 (0.01)	0.38	0.50	0.33	0.40 (0.05)
	2009	0.02	0.02	0.01	0.02 (0.00)	0.13	0.13	0.04	0.10 (0.03)
	2011	0.03	0.11	0.05	0.06 (0.02)	0.29	0.47	0.22	0.32 (0.07)
	2012	0.03	0.04	0.07	0.05 (0.01)	0.25	0.27	0.28	0.27 (0.01)

[a] ZQI = Zooplankton quality index.

[b] ZPR = Zooplankton ratio.

[c] Field data lost during a computer hard drive failure; averages taken from annual report.

Table 6. Summary of rainbow trout gill net sampling efforts in Jimmy Smith Lake, 1964,1996, 2001, 2003, 2005, 2006, and 2008 to 2012.

Survey Date	Sample Size	Size Range (Total length mm)	Average Total Length (mm)	Average Weight (g)	No. Gill Nets	Total Gill net Hours	Fish/Net Hour (CPUE)	Average Relative Weight
15 Dec 1964[b]	--	130-380	233	--	--	--	--	--
11 Jun 1996	157	155-332	213	--	1	15.0	10.5	--
21-22 Jun 2001	113	110-370	203	--	1	16.5	6.8	--
21 Jul 2003	144	112-368	277	283.3	4	62.2	2.3	105.5
07-08 Jun 2005	351	138-412	238	311.4	4	65.2	5.4	107.8
13-15 Jun 2006	809	133-419	222	162.7	4	181.8	4.4	107.5
31 Jul – 01 Aug 2008	914	147-320	201	100.0	4	90.3	10.1	81.0
20-21 May 2009	689	132-325	203	83.7	4	69.8	9.9	77.7
25-26 May 2010	591	100-295	205	80.5	4	71.7	8.2	75.5
27-28 Jun 2011	676	150-250	183	66.5	4	90.3	7.5	89.1
25-26 Jun 2012	419	126-295	229	125.9	8	121.7	3.4	87.7

[a] Based on creel data.

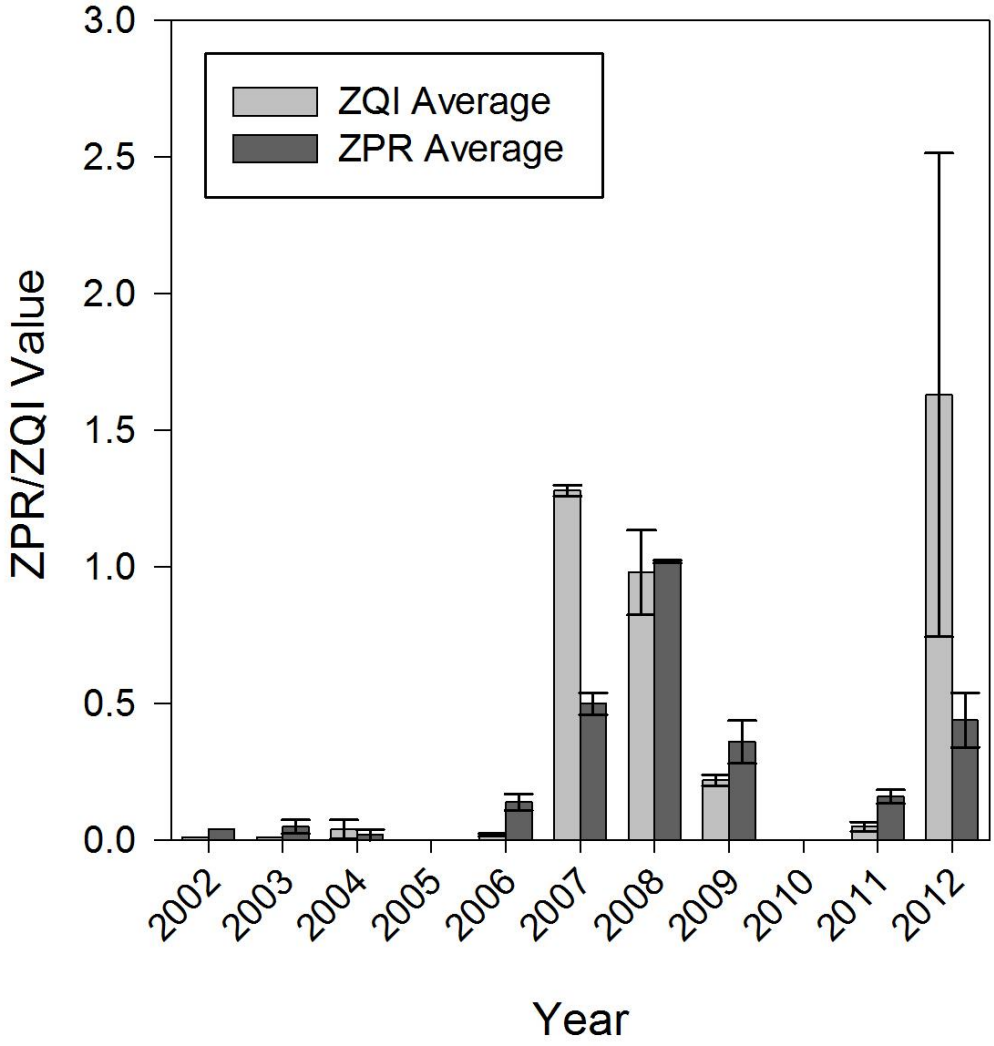

Figure 1. Zooplankton ratio (ZPR) and zooplankton quality index (ZQI) values for Herd Lake, 2002 to 2004, 2006 to 2009, 2011, and 2012.

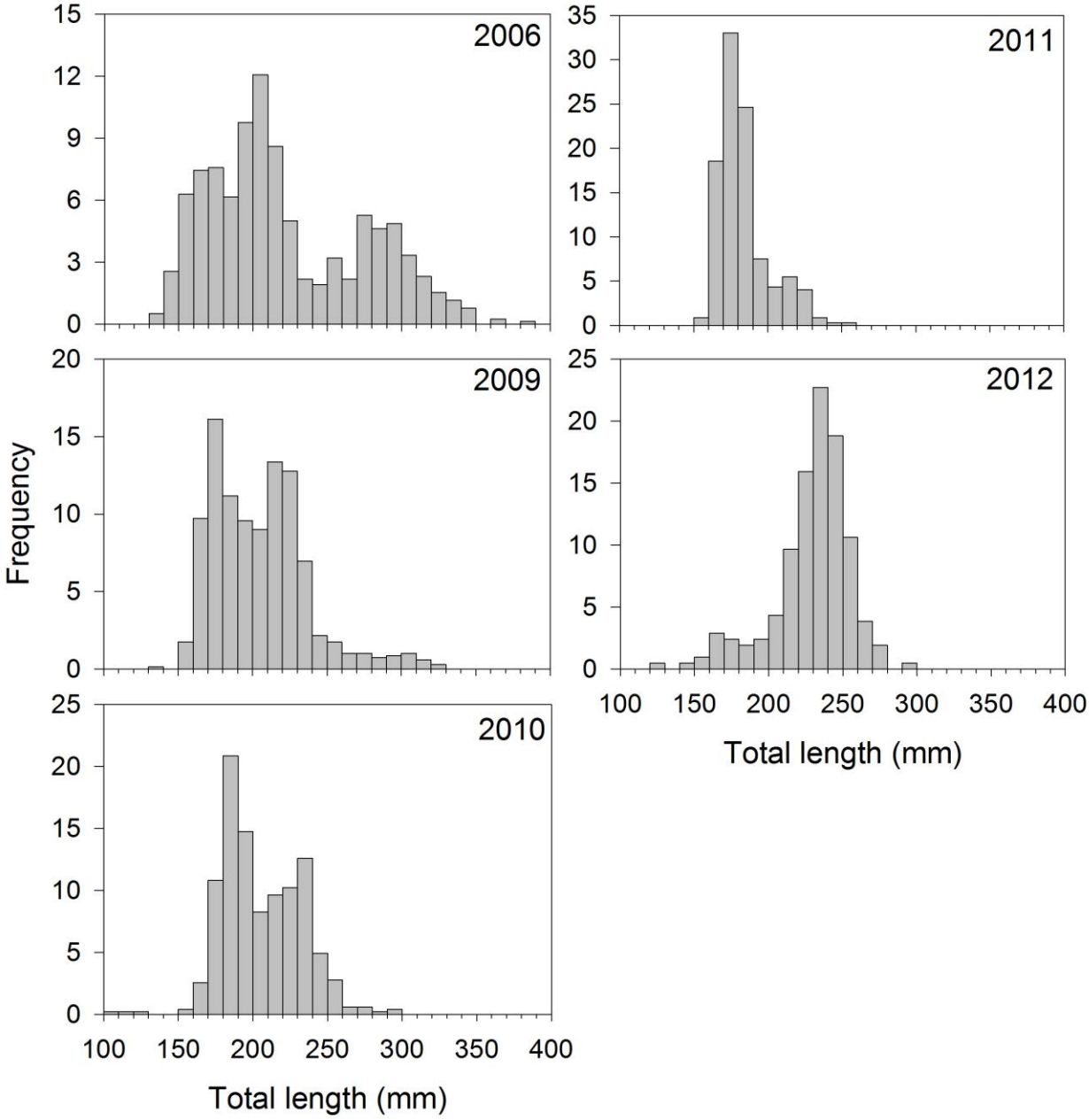

Figure 2. Rainbow trout length frequency histograms from gill net efforts in Jimmy Smith Lake, 2006, and 2008 to 2012.

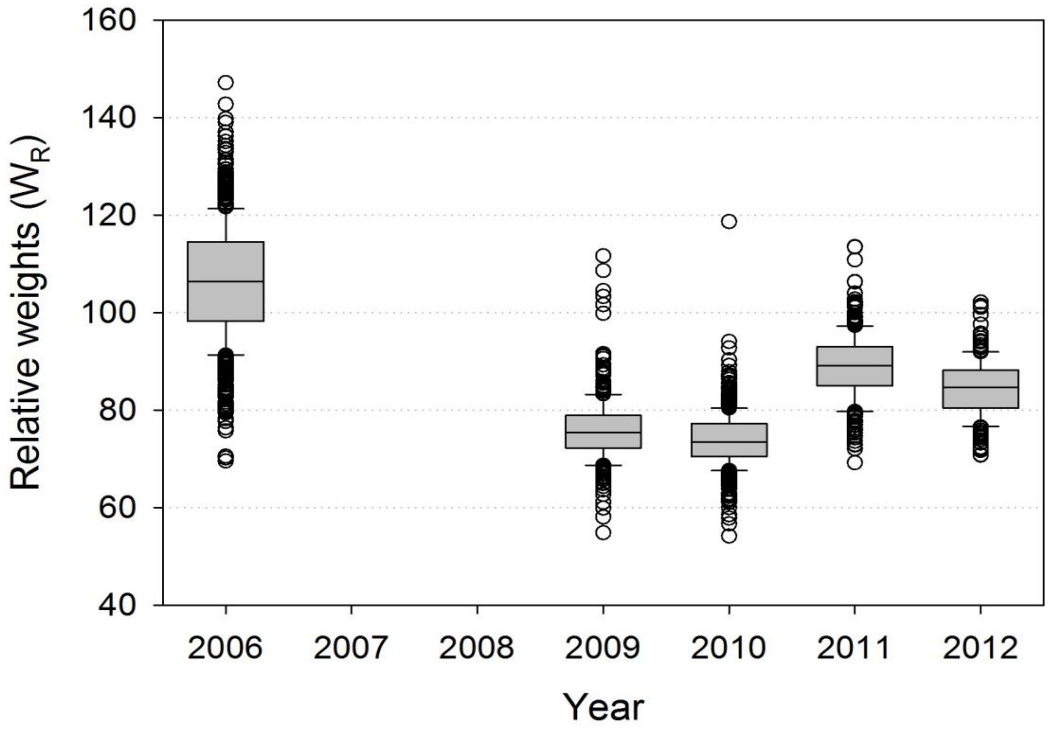

Figure 3. Box plots of rainbow trout relative weights (W_r) from years 2006 to 2012 in Jimmy Smith Lake.

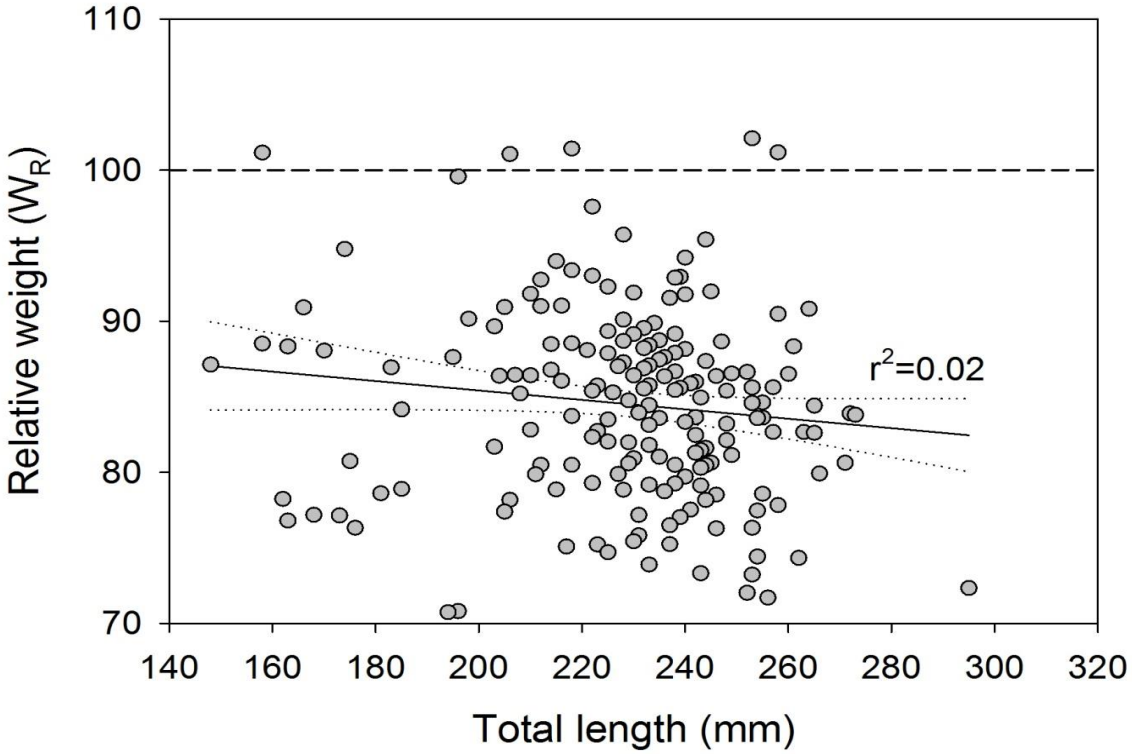

Figure 4. Rainbow trout relative weight (W_r) by total length (mm) collected in 2012 at Jimmy Smith Lake. Solid line indicates linear regression results with associated 95% confidence intervals.

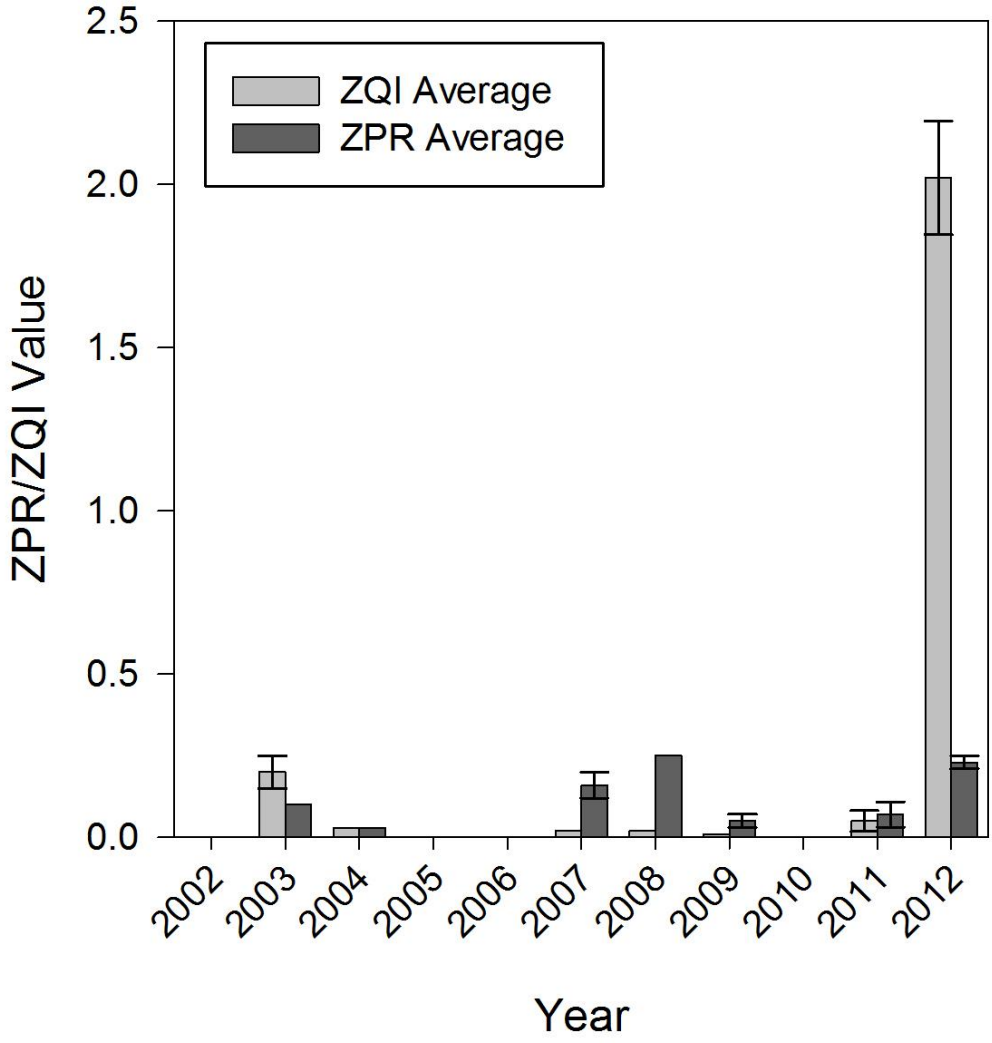

Figure 5. Zooplankton ratio (ZPR) and zooplankton quality index (ZQI) values for Jimmy Smith Lake, 2002 to 2004, 2006 to 2009, 2011, and 2012.

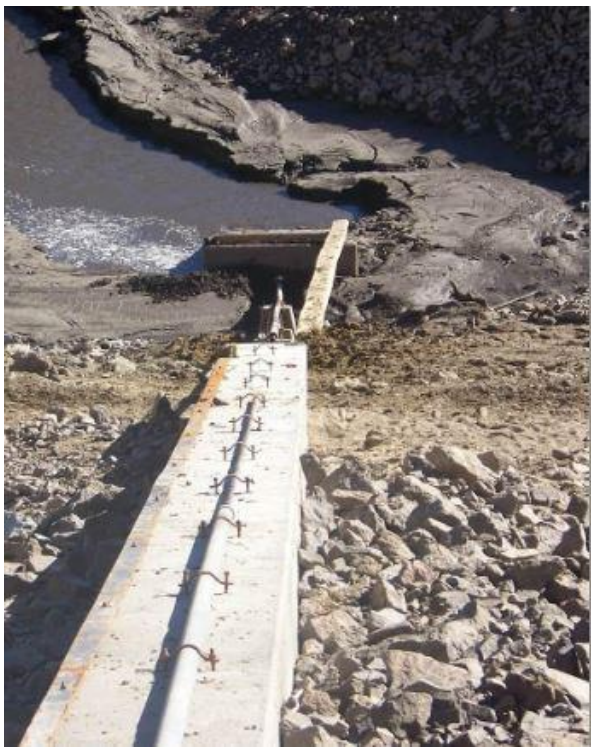

Figure 6. Repaired valve stem and protective tube leading from the top of the dam at Mosquito Flat Reservoir downhill toward the gate box at the outlet. Damaged pipe is visible in front of the gate box.

Figure 7. Closer view of damaged, bent pipe with the smaller valve stem visible inside the pipe connected to the front of the gate box. Wood plank at right was used to access the gate box.

Figure 8. Looking downslope, the repaired pipe and protective tube stretch from the top of the dam to the gate box at the outlet. Newly fabricated H-brace vertical supports hold valve stem and tubing secure.

Figure 9. View of pipe and valve stem tubing entering the gate box at the outlet. The raised gate, just visible above the gate box, signifies the valve is wide open during testing of the dam structure after repairs.

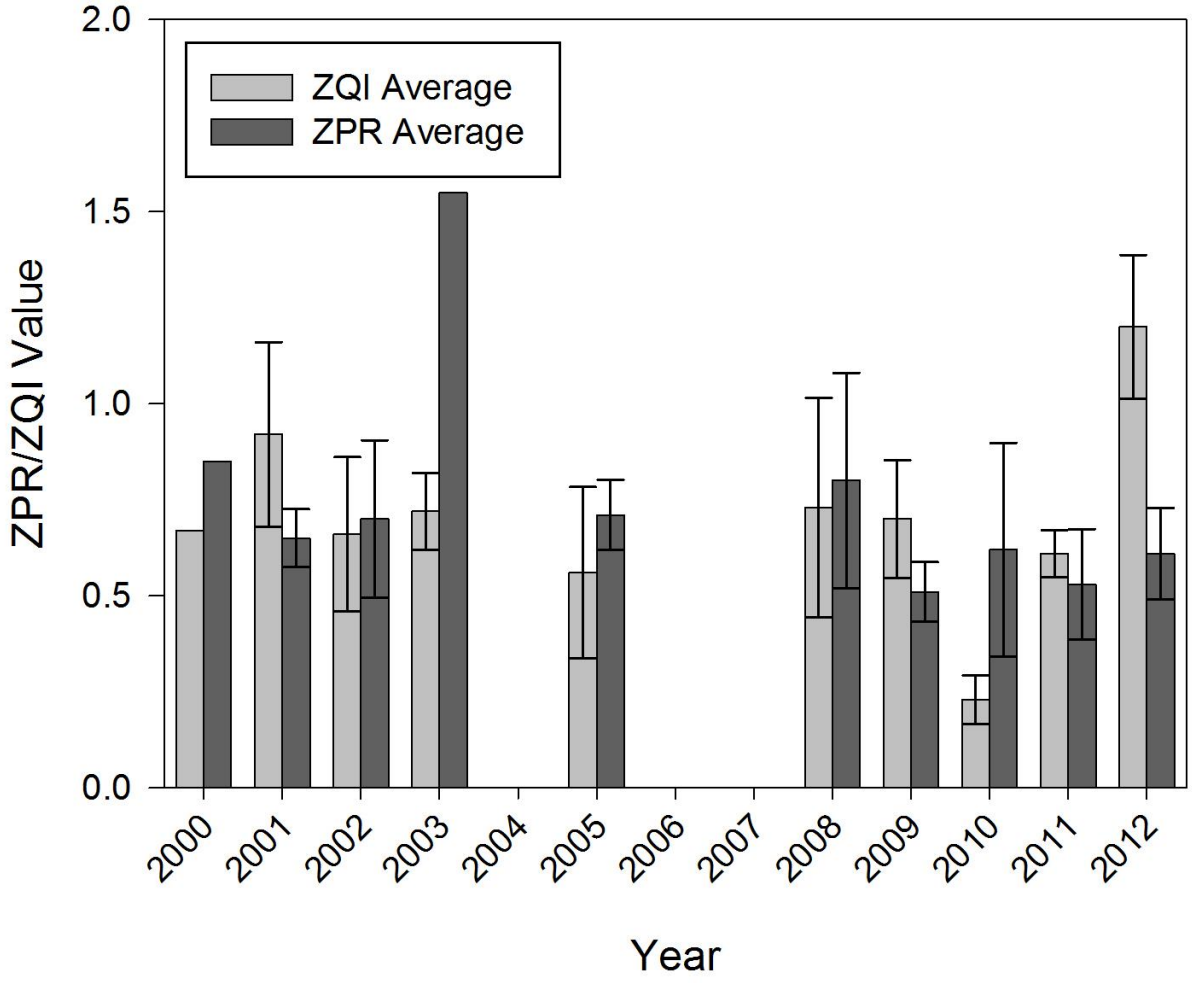

Figure 10. Average zooplankton ratio (ZPR) and zooplankton quality index (ZQI) values at Williams Lake, 2000 to 2003, 2005, and 2008 to 2012.

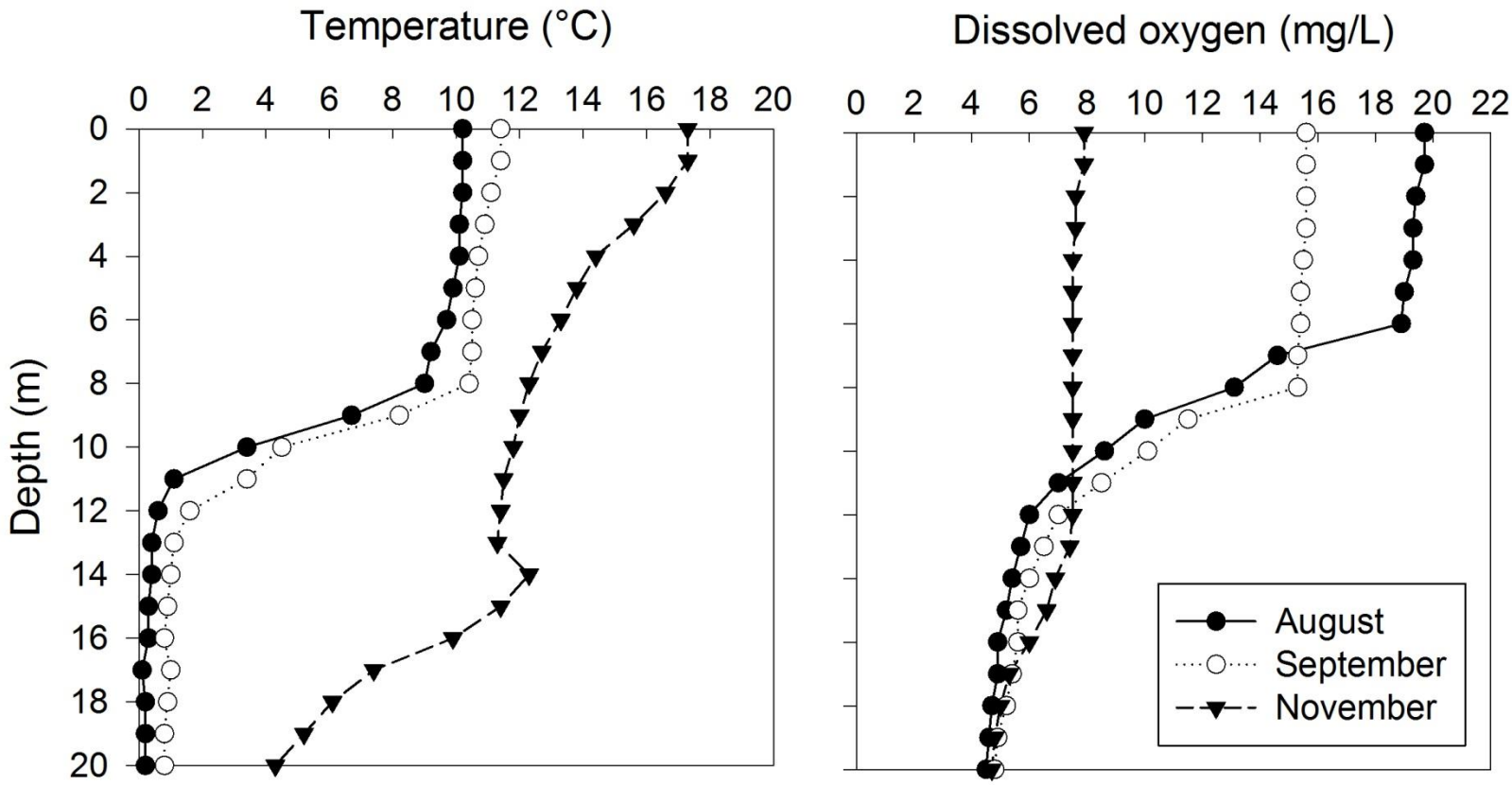

Figure 11. Dissolved oxygen and temperature profile sampling at Williams Lake, August, September, and November 2012.

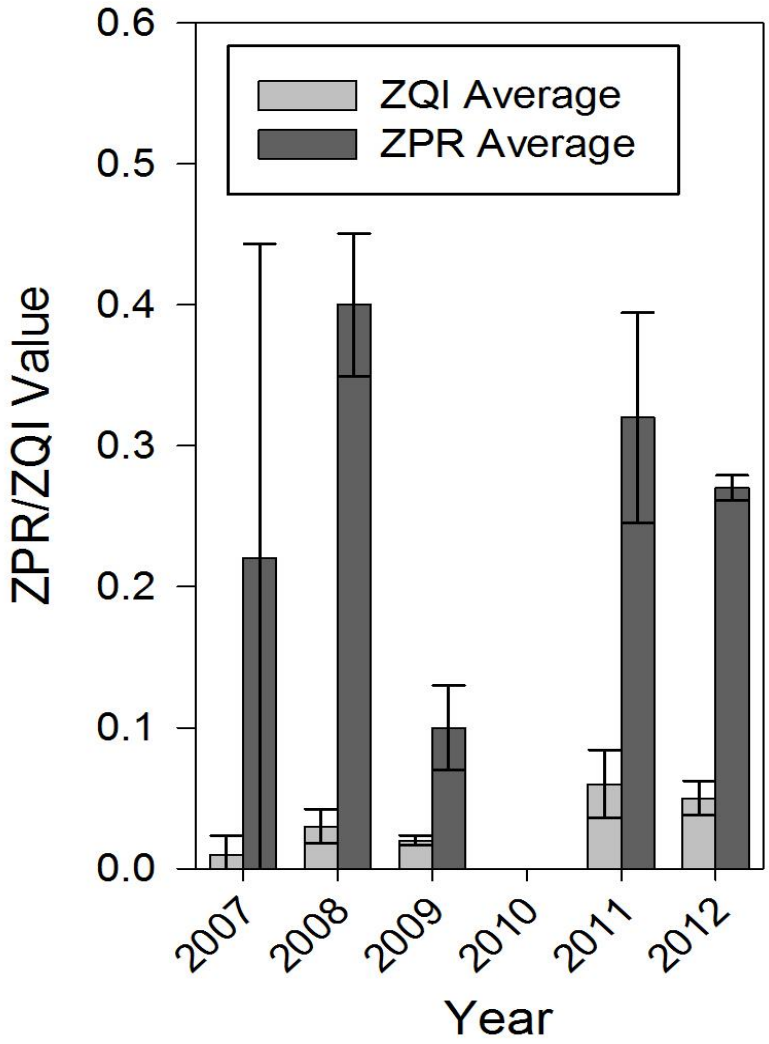

Figure 12. Average zooplankton ratio (ZPR) and zooplankton quality index (ZQI) values at Yellowbelly Lake, 2007 to 2009, 2011, and 2012.

SALMON REGION FISHERY MANAGEMENT 2012 ANNUAL REPORT

Stanley Lake Monitoring

ABSTRACT

From May 8 to June 22, 2012 intensive gill netting in Stanley Lake resulted in collecting 849 fish, comprised of 41 kokanee *O. nerka* (lacustrine sockeye salmon), 209 lake trout *S. namaycush*, 217 brook trout, 58 hatchery rainbow trout, and 3 westslope cutthroat trout. One sucker and two bull trout *S. confluentus* were also collected; both species had not been encountered in any previous sampling efforts in Stanley Lake. One-hundred eighteen lake trout were tagged as part of a mark-recapture effort. The population estimate of lake trout in Stanley Lake was 548 fish (95% CI 318-1,014 fish). Gill net hours totalled 4,069.5 with an average catch rate of 0.2 fish/hour. Based on a creel survey at Stanley Lake in 2012, anglers fished an estimated 10,197 hours and caught 13,834 fish. Stocked hatchery rainbow trout represented 90% of the total estimated catch.

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Marsha White, Regional Fishery Technician
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INTRODUCTION

Stanley Lake is one of 23 lowland lakes in the Salmon Region (Curet et al. 2010). Regional fishery staff defines lowland lakes as being generally accessible by road and currently stocked with fish by truck. The Department manages lowland lake fisheries to provide diverse recreational and angling opportunities for the public, and collects and maintains information on lowland lakes that helps managers meet objectives of the Fisheries Management Plan, 2013-2018. Stanley Lake is a popular fishing and camping destination in the Stanley basin.

The lake's first habitat improvement effort, implemented by the Civilian Conservation Corps under supervision of the U.S. Bureau of Fisheries in 1935, sought to increase productivity by cutting down and dragging trees or dropping trees directly into the lake to create more habitat, and constructing brush shelters in shoal areas (Hauck 1957). When a 1954 IDFG fishing survey concluded that anglers spent only an estimated 50 angler days at the lake annually, the Department and the U.S. Fish and Wildlife Service launched more restorative efforts to improve the fishery. A fish barrier was constructed in 1954 to prevent movement of undesirable non-sport fish and the lake was treated with toxaphene to eradicate fish inhabiting the lake. Rainbow trout stocking was initiated in 1956 after the lake was deemed non-toxic (Hauck 1957). In 1957, commercial fertilizer was added to bring the lake's nitrogen content into balance with the calcium, potassium and phosphorus in the water. Since 1923, a number of fish species have been stocked, including smelt *Osmerus mordax*, brook trout, cutthroat trout, kokanee *O. nerka* (lacustrine sockeye salmon), and rainbow trout. The Department also made one stocking of 15,219 lake trout fingerlings in 1975. Since 1991, rainbow trout is the only species that has been stocked. For the past five years, IDFG has stocked the lake with approximately 14,400 catchable sized sterile rainbow trout per year.

Historically, there were few investigations into the fish composition of Stanley Lake. The first gill net effort in 1934 produced a large and varied sample of 403 fish, consisting of bull trout, kokanee, mountain whitefish *Prosopium williamsoni*, redside shiner, northern pikeminnow, and suckers (Rodeheffer 1935). Of the seven gill net surveys conducted since Rodeheffer (1935), four were conducted in the past six years (2007, 2010, 2011, and 2012). In 2012, the Department conducted an intensive six-week gill netting effort to increase the limited fishery dataset for Stanley Lake and to gain an understanding of the lake trout population dynamics.

OBJECTIVES

Conduct a gill net survey to monitor current species in Stanley Lake.

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

Collect white muscle and liver samples from lake trout mortalities during gill netting for stable isotope analysis.

Implant depth telemetry tags in six large adult lake trout to monitor spatial and temporal movements.

Collect genetic samples of lake trout implanted with depth telemetry tags for DNA testing to determine their sex.

Conduct sonic tracking of lake trout on a bi-weekly basis through the summer. In late August, increase the number of monthly tracking days to help determine fall movement patterns and potential spawning and/or aggregation areas in Stanley Lake.

Estimate age and growth of lake trout using otoliths.

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

Conduct environmental DNA (eDNA) sampling at Stanley Lake to assess the effectiveness of eDNA as a tool to determine lake trout presence in the basin.

STUDY AREA AND METHODS

Stanley Lake, accessed by driving 8 km west of the town of Stanley, Idaho, is located at (WGS84 datum) latitude and longitude decimal degree coordinates of 44.24497^{o}N, 115.05603^{o}W and is 1,987 m in elevation. Mount McGown towers near the lake's southwest corner at 3,005 m. The lake has a maximum depth of 26 m, a mean depth of about 13 m, and a surface area of 72.6 ha. Primary in-flow to the lake is from Stanley Lake Creek, located on the west end of the lake, along with two other intermittent streams and numerous seeps. The outlet stream, Stanley Lake Creek, begins on the northeast end of the lake and includes a concrete barrier located approximately 402 m downstream from the lake. The barrier was constructed by IDFG in the mid 1950's to eliminate the number of non-game fish entering the lake.

During 14 days in May and 13 days in June, 2012, fishery staff conducted daytime and overnight gill net sets using a simple randomized grid design to select sites throughout the entire lake, including the pelagic area. Staff also gill netted three days outside the May and June timeframe: April 8 immediately following ice-off at the lake, and October 8-9 to collect two lake trout for insertion of a depth telemetry tag. Fishery staff also used other fish capture methods on a much smaller scale than gill nets, including boat electrofishing, and daytime and overnight set lines with bobbers and set lines without bobbers. Fish captured were identified to species, measured TL (mm), and weighed (g). Live captured lake trout were placed in a large cooler with fresh water until the entire net was retrieved. Generally, live lake trout less than 406 mm TL received T-bar anchor Floy tags while larger lake trout received spaghetti tags inserted under the dorsal fin. In certain cases, large lake trout were anesthetized and surgically implanted with depth telemetry tags to track their movement and monitor spawning behavior. All tagged fish were allowed to recover before release into Stanley Lake. Non-tagged live salmonids were released back into the lake. Some lake trout were allowed to recover overnight in live wells, ensuring their healthy release. The Floy and spaghetti tags will be used to monitor growth and are also part of an on-going angler exploitation study (Curet et al. 2013). Genetic samples were taken on captured salmonids, including lake trout that received sonic tags in an effort to determine the individual sex of these fish.

Lake trout abundance was estimated using the Schnabel method (Schnabel 1938), which estimates abundance over multiple marking and recapture events over a short period, and consists of the following calculation:

$$\widehat{\mathrm{N}} = \frac{\sum_{i=2}^{t} n_i M_i}{\sum_{i=2}^{t} m_i + 1}$$

where t = number of sampling occasions; n_i = number of fish caught in ith sample; m_i = number of fish with marks caught in ith sample; and M_i = number of marked fish present in the population of ith sample.

To assess recent diet items, stomach contents of live-captured lake trout were removed by gastric lavage (Seaburg 1957, Finnell 1988). Stomach contents were placed in jars containing 95% ethanol to be analyzed later. A sample of salmonid mortalities were dissected and samples of white muscle tissue and the entire liver of each fish were collected for stable isotope analysis (SIA) testing. Ototliths were removed from lake trout mortalities. Lake trout mortalities were dissected for SIA testing as well.

Stanley Lake has become a trophy lake trout fishery within the Stanley Basin. In 1959, anglers fished an estimated 8,600 hours, which translated to an estimated 2,500 angler days with 12,000 fish caught. The catch consisted of 82% rainbow trout and 18% brook trout, a surprising result as only rainbows were stocked post-rehabilitation and brook trout had not been reported in 1957 and 1958 angler surveys. A five-month creel survey in 2011 indicated that anglers fished an estimated 12,848 hours and caught 12,912 fish (Curet et al. 2013). Rainbows comprised 89% (n = 11,478) of the 2011 estimated catch while kokanee was the second highest species caught at 6% (n = 715). Creel methods in 2012 followed those described for 2011 (Curet et al. 2013). Fishery staff conducted a creel survey effort in 2012 from late May to October 30.

Fishery staff performed sonic tracking of lake trout implanted with depth telemetry tags usually twice a month through the summer. In late summer and into the fall, the number of tracking days increased as staff schedules and Halstead Fire restrictions near Stanley allowed. Fishery staff generally tracked lake trout once per week or sometimes more, tying in with creel survey duties concurrently during September and October.

Environmental DNA (eDNA) sampling was conducted in the fall of 2012 using three regional lakes as controls where the one fish species in each lake was known. Stanley Lake and two other regional lakes were also sampled as tests where all fish species were not known or may have changed since the lake's last sampling interval.

RESULTS AND DISCUSSION

The following results from 2012 sampling efforts at Stanley Lake are preliminary. Stable isotope analysis and eDNA results are not yet available as this report goes to press. During 2013, regional fishery staff will continue to compile and analyze data related to this year's gill netting effort. Complete results will be forthcoming as either a stand-alone report section or a Stanley Lake portion incorporated into the Lowland Lakes section of the 2013 annual report.

Regional fishery staff collected 849 fish during thirty days of gill netting in Stanley Lake. Almost 4,070 total gill net hours were fished, resulting in the capture of eight fish species (Table 7). Fish composition consisted of 42% kokanee (n = 354), 26% brook trout (n = 217), 25% lake trout (n = 209), and 7% hatchery rainbow trout (n = 58). Small numbers of redside shiner,

westslope cutthroat trout, bull trout, and sucker were also encountered (Table 7). As the largest species and top predator in the lake, lake trout averaged 552 mm and ranged in size from 202 to 1,005 mm TL. Brook trout averaged 262 mm TL with a range of 126 to 374 mm. Kokanee averaged 205 mm TL with a size range of 147 to 336 mm, and hatchery rainbow trout averaged 286 mm TL and ranged from 206 to 444 mm TL. Previously, suckers had not been observed in early creel surveys or documented in the lake since Rodeheffer's (1935) survey. One sucker was encountered this year. Bull trout, which were reputed to inhabit the lake, had not been observed in recent sampling, but were also collected in 2012.

Of the 209 lake trout encountered during 2012 gill netting, 118 received IDFG numbered spaghetti or T-bar anchor Floy tags during 2012 tagging operations. Forty-seven lake trout with tags were recaptured during the six-week sampling period. Almost half of the tagged fish (n = 22) were recaptures of lake trout tagged this year. However, 22 recaptured lake trout were from previous tagging years. Recaptures included 6 lake trout tagged in 2007, 4 in 2010, and 12 tagged in 2011.

The lake trout population in Stanley Lake was estimated at 548 fish (95% CI 318-1,014 fish). Age and growth analysis of these previously tagged fish will be included in the 2013 report. Otoliths were extracted from 54 lake trout mortalities in 2012 and were archived in the Salmon Region office for later analysis.

A total of 79 salmonids were dissected for stable isotope analysis, consisting of 41 kokanee, 15 lake trout, 13 brook trout, and 10 hatchery rainbows.

Six lake trout were implanted with depth telemetry (sonic) tags in 2012; four were tagged in June and two tagged in October. The tagged fish ranged from 600-945 mm TL and weighed ranged in weight from 1.8-10.6 kg. During July, August, and September, fish locations were widely dispersed by site and depth in the lake. In October, the majority of fish locations were found in the eastern one-third of the lake near the outlet (Figure 13). By November, the majority of detected fish locations appeared even more tightly concentrated along the northeastern shoreline and bay area of the outlet (Figure 14). The lake trout may have been aggregating but not spawning along the northeast shoreline or were possibly spawning in this area. We experienced two apparently malfunctioning sonic tags with their depth functions for October and November. Fortunately, the two tags continued to emit working signals, enabling us to bi-angulate their location even though depth readings were suspect. One tag consistently showed a depth of 0 (i.e. at the lake's surface) for the last 10 tracking days of the fall. The second tag varied slightly, showing depths of 1-4 m for the last 10 tracking days. In 8 of the last 10 days, this tag consistently displayed a 2 m depth. The sample size of four sonic tags, of which two tags appeared to be giving unreliable depth readings, makes preliminary analysis difficult. Sonic tracking will continue through the 2013 fall season. The inclusion of more data by that time may enable us to better analyze their movement patterns, especially in the late summer and autumn time periods.

Genetic samples were taken from sonic tagged lake trout to determinie their sex. The sonic tagged fish DNA, as well as a sample of known sex and unknown sex lake trout, was sent to IDFG's Eagle Genetics Lab to determine sexes of the unknown samples. Results were not yet available as this report goes to press.

Expanded creel estimates indicated that anglers spent 10,197 hours of effort to catch 13,834 fish at Stanley Lake in 2012 (Tables 8 and 9). Boat anglers contributed an estimated 3,285 hours of fishing time, bank anglers added 6,605 hours, and float tube anglers accounted

for the remaining 307 hours. Of the estimated 13,834 fish caught, 6,130 were harvested and 7,704 were released. Rainbow trout comprised the majority of the estimated catch with 12,456 fish, of which 5,752 were kept and 6,704 were released. The total estimated number of brook trout caught was 654. Anglers kept 218 brook trout and released 436 more. Bull trout ranked third of fish caught this year with an estimated 459 released. The high number of caught and released bull trout is likely the result angler misidentification given the low number of this species collected in gill nets and expansion estimates used in the creel (Tables 8 and 9). While 56 lake trout were estimated to have been caught, no lake trout were estimated kept. Catch and harvest estimates for the six species caught in 2012 are shown in Table 8. The overall CPUE was 1.36 fish/hour caught and 0.64 fish/hour kept (Table 8). These rates were slightly higher than last year's CPUE of 1.05 fish/hour caught and 0.59 fish/hour kept (Curet et al. 2013). Creel results for the past two seasons (2011 and 2012) suggest that few lake trout were caught relative to other species and anglers released a high proportion of the lake trout caught (Table 9; Curet et al. 2013).

MANAGEMENT RECOMMENDATION

Currently, regional staff is developing a management plan for Stanley Lake. Concerns over the removal of the migration barrier, the possibility of lake trout expansion into other lakes in the drainage thereby posing possible threats to established bull trout and sockeye salmon *O. nerka* populations through competition and/or predation, along with angler considerations to the elimination of a trophy lake trout fishery are all being considered. Possible options to consider, if lake trout removal is deemed justified or necessary, include the use of daughterless lake trout technology, rotenone treatment, and/or mechincal removal via gill netting. Maintaining the current management of the lake may also be a viable option (i.e. a do nothing approach).

Table 7. Summary of gill net efforts in Stanley Lake, 1934, 1978, 1981, 1986, 2007, and 2010 to 2012.

Survey Date	Species[a] CT	EBT	KOK	LT	HRBT	RSS	BU	Total No. of Fish	No. Gill net Hours	Fish/ Gill net Hour
3 Jul 1934	0	0	7	0	0	200	6	403[b]	72.0	5.6
03 Oct, 05 Oct 1978	1	2	1	3	0	5	0	12	--	--
20-23 May 1981	0	12	13	14	0	0	0	68	504.0	0.1
03 Jun, 09 Oct 1986	0	0	22	12	0	0	0	59	--	--
16-18 May 2007	0	3	20	43	5	1	0	72	164.5	0.4
28-29 Jun 2010	0	16	46	18	3	0	0	83	111.5	0.7
31 May - 01Jun, 08-09 Jun 2011	1	54	41	53	32	0	0	181	397.8	0.5
08 Apr, 08 May - 22 Jun, 08-09 Oct 2012	3	217	354	209	58	5	2	849[c]	4,069.5	0.2

[a] Species: CT = Cutthroat trout, EBT = Brook trout, KOK = Kokanee, LT = Lake trout, HRBT = Hatchery rainbow trout, RSS = Redside shiner, and BU = Bull trout.

[b] Total includes 4 mountain whitefish, 51 northern pikeminnow, and 135 suckers (various species), Rodeheffer 1935.

[c] Total includes 1 sucker.

Table 8. Expanded catch and harvest estimates for Stanley Lake from creel surveys, 2012.

Species	Estimated No. of Fish Harvested	Estimated No. of Fish Released	Estimated Total No. of Fish Caught	Catch Per Unit Effort (CPUE)
Rainbow trout	5,752	6,704	12,456	1.22
Kokanee	84	38	122	0.01
Bull trout	76[a]	459	534	0.05
Brook trout	218	436	654	0.06
Lake trout	0	56	56	0.01
Westslope cutthroat trout	0	12	12	<0.01
Total	6,130	7,704	13,834	
Average CPUE for fish caught				1.36
Average CPUE for fish kept				0.64

[a] Two bull trout were allegedly harvested in the unexpanded creel.

Table 9. Summary of expanded creel estimates for Stanley Lake (unexpanded 1962 and 1964).

		Total No.	Total No.		Estimated Number of Fish By Species										
					Lake Trout		Brook Trout		Kokanee		Hatchery Rainbow Trout		Bull Trout	No. RBT	Return to Creel
Year	Total Effort	Fish Caught	Fish Kept	Overall CPUE	Kept	Rel'd	Kept	Rel'd	Kept	Rel'd	Kept	Rel'd	Rel'd	Stocked	Rate
1958	7,400		5,900	0.1-1.65										8,000	
1959	8,600	12,000		1.40										9,966	
1962[a]	*725*	*620*		*0.86*										10,006	
1964[a]	*337*	*272*		*0.81*			*15*		*44*		*213*			10,284	*2.07*
1986	11,326		9,303	>0.82	14		465		994		4420		3	13,250	33.36
2004	9,641	7,947	3,944	0.82	172	193	87	351	102	96	3,670	3,085	0	14,151	47.74
2005	9,190	4,085	1,657	0.44	238	125	45	108	279	54	1,140	2,012	67	15,278	20.63
2011	12,849	12,912	7,535	1.05	27	71	102	28	257	458	7,087	4,391	289	17,798	64.49
2012	10,197	13,834	6,130	1.36	0	56	218	436	84	38	5,752	6,704	459[b]	17,483	71.25

[a] Both 1962 and 1964 were unexpanded (raw) creel data only.

[b] Does not include an estimated 76 bull trout allegedly harvested.

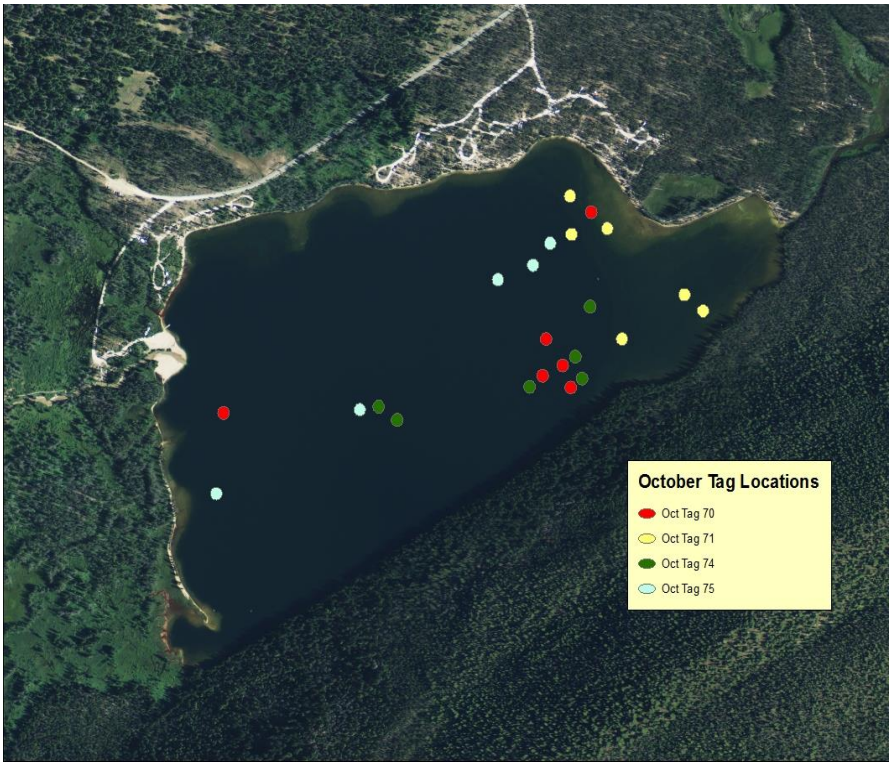

Figure 13. Map showing locations of four sonic tagged lake trout tracked in Stanley Lake during six days in October 2012.

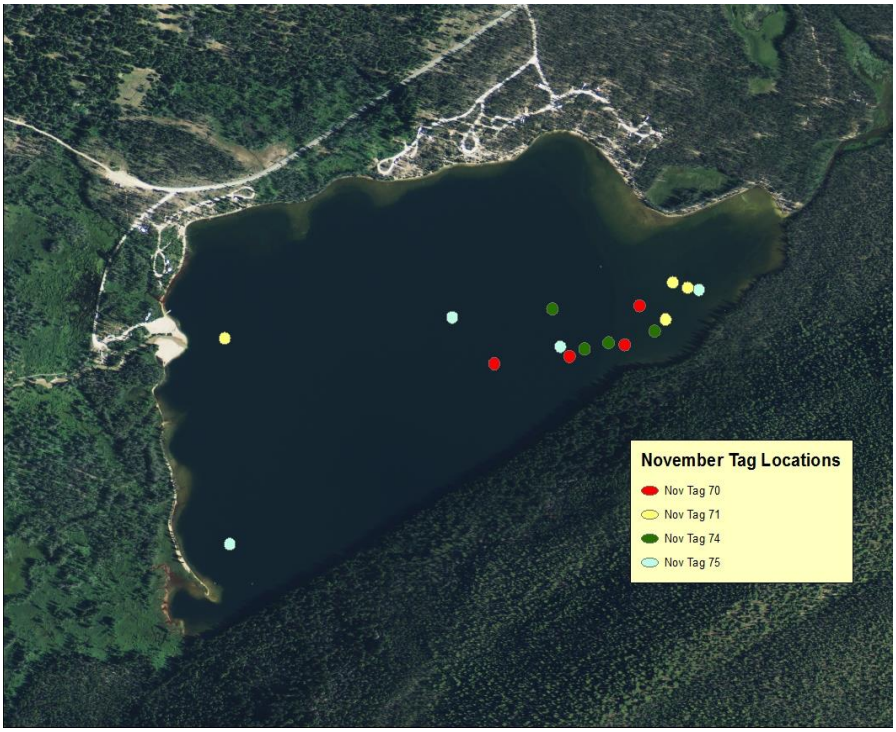

Figure 14. Map showing locations of four sonic tagged lake trout tracked in Stanley Lake during four days in November 2012.

SALMON REGION FISHERY MANAGEMENT 2012 ANNUAL REPORT

River and Stream Surveys - Wild Trout Population Monitoring

ABSTRACT

Regional fishery personnel conducted resident adult rainbow trout and bull trout spawning ground surveys to monitor redd count trends in the Salmon Region. A total of 368 rainbow trout redds were counted in three survey transects in the upper Lemhi River and Big Springs Creek, a Lemhi River tributary. This year's total more than doubled the 172 redds observed in 2011. In the Hayden Creek drainage, fishery staff counted a total of 212 bull trout redds compared to 220 redds counted in the same transects in 2011. Big Timber Creek in the upper Lemhi River drainage had a total of 52 bull trout redds observed compared to 36 last year. In the upper Salmon River drainage near Stanley, four transects produced a total of 89 bull trout redds compared to 79 redds counted in 2011.

Fish hatchery personnel in the Salmon Region collected data on resident salmonids and other fish species encountered at their respective weirs. During 2012, resident fish counted at the Pahsimeroi Fish Hatchery rack included 118 rainbow trout and 8 bull trout. The number of bull trout and mountain whitefish encountered at the East Fork Satellite Facility increased from 2011 with 303 and 239 counted this year, respectively. In 2011, 251 bull trout and 187 mountain whitefish were counted. The Redfish Lake Creek trap encountered 82 bull trout, 107 sockeye salmon *Oncorynchus nerka*, 1 Chinook salmon *O. tshawytscha*, 482 suckers, and 213 northern pikeminnow in 2012. Fish collected in 2012 at the Sawtooth Fish Hatchery weir included 21 bull trout, 6 westslope cutthroat trout, 15 rainbow trout, 4 mountain whitefish, 136 sockeye salmon, and 129 suckers.

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INTRODUCTION

Wild Trout Population Surveys

Regional fishery staff did not conduct any stream surveys in 2012.

Fluvial Trout Monitoring

Alpine and Fishhook Creeks

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

Bear Valley Creek

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

Big Springs Creek and Lemhi River

In 1994, IDFG began surveying resident rainbow trout redds on Big Springs Creek, a tributary to the upper Lemhi River near Leadore. By 1997, regional fishery staff had established another transect area on the upper Lemhi River to also monitor long-term resident rainbow trout population trends. The annual monitoring effort on the two Big Springs Creek transects and the Lemhi River transect is conducted to identify trends in the number of redds observed. Fishing rule changes on the Lemhi River were implemented in 1994 where only rainbow trout 356 mm (14 inches) and greater could be harvested. Theoretically, rule changes, habitat improvement projects, and tributary reconnect projects in the Lemhi River drainage should produce an increased number of rainbow trout spawners within these transects.

Big Timber Creek

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

East Fork Hayden Creek

East Fork Hayden Creek, a tributary to Hayden Creek in the Lemhi River drainage, is annually surveyed for bull trout spawning. The trend transect is located in a meadow 5 km upstream from the creek's confluence with Hayden Creek. Counts have been conducted in this transect since 2002.

Fourth of July Creek

Bull trout redd counts in Fourth of July Creek in the Stanley basin were initiated in 2003 to monitor fish population responses to recent flow improvement projects, elimination of passage barriers at diversion structures, and screening of irrigation ditches. Fourth of July Creek is a tributary to the mainstem Salmon River 23 km south of Stanley 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 *O. tshawytscha* spawning redds. In 2005 during Chinook salmon redd count surveys, many bull trout adults were observed spawning in upper Hayden Creek above the mouth of Bear Valley Creek (Esselman et al 2007). Consequently, regional fishery staff initiated bull trout redd counts on Hayden Creek in 2006. The location of these counts has 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 and other fish species are encountered at the Pahsimeroi, East Fork, Redfish Lake Creek, and Sawtooth Fish Hatchery weirs as part of routine steelhead (anadromous rainbow trout) and Chinook salmon trapping activities. Adult fish collection structures provide a reliable method of enumerating fluvial fish migrating up river to spawn in the Pahsimeroi River, East Fork Salmon River, and the upper Salmon River drainage.

OBJECTIVES

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. Fishery biologists will continue to analyze bull trout movement, distribution, abundance, and timing efforts using identified trend transects.

STUDY AREA AND METHODS

Fluvial Trout Monitoring

Alpine and Fishhook Creeks

Two visual ground counts are conducted annually about two weeks apart on both Alpine and Fishhook creeks in the Stanley Basin to monitor the timing of bull trout spawning and enumerate redds. Alpine Creek is a tributary of Alturas Lake Creek. In response to an absence

of bull trout redds in 2008 and 2009 in the existing Alpine Creek trend transect, a new trend transect site was identified downstream from the original transect in 2011 by IDFG's sockeye recovery team (K. Plaster, IDFG, personal communication). The replacement trend transect begins 0.7 km above the mouth compared to old transect which started 2.9 km above the mouth of Alpine Creek. The new transect is similar to the original site with about one-half of the transect located in a low gradient meadow. Elevation differences between the two transects are slight. While the old transect dropped 20 m in elevation over a 1.2 km distance, the new transect drops 39 m in 1.1 km. Recovery team staff observed one bull trout redd in the new trend transect in 2010 and two redds in 2011.

A similar situation occurred in Fishhook Creek, a tributary of Redfish Lake Creek. The sockeye recovery team added a second transect site in Fishhook Creek 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. Surveys on the newer Alpine Creek transect were conducted August 26 and September 12, 2012 (WGS84 datum, Start: 43.89707^{o}N, -114.91327^{o}W, and end: 43.90245^{o}N, -114.92246^{o}W). Redd counts surveys on the Fishhook Creek trend transect were conducted August 27 and September 12, 2012 (Start: 44.13706^{o}N, -114.96703^{o}W, and end: 44.13472^{o}N, -114.97622^{o}W), and surveys on the second Fishhook Creek transect were conducted August 27 and September 18, 2012 (Start: 44.14882^{o}N, -114.93716^{o}W, and end: 44.13992^{o}N, -114.96205^{o}W).

Bear Valley Creek

Fluvial and resident bull trout redd counts on Bear Valley Creek were conducted September 13 and 19, 2012 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 that visually measured smaller in size were considered to be those of resident bull trout. The Bear Valley transect consists of c-channel habitat (WGS84 datum, Start: 44.77604^{o}N, -113.74279^{o}W, and end: 44.78339^{o}N, -113.75476^{o}W). 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^{o}N, -113.75476^{o}W and end: 44.79727^{o}N, -113.81159^{o}W). In 2011, this transect was divided into two reaches that still encompassed the same total stream distance as established in 2007. This transect, located above the trend transect site in Bear Valley Creek, was surveyed on September 13, 14, and 19, 2012 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 (WGS84 datum, Start: 44.70896^{o}N, -113.39917^{o}W, and end: 44.72855^{o}N, -113.43430^{o}W) and the historic Darwin Neibaur Ranch (Start: 44.70047^{o}N, -113.38436^{o}W, and end: 44.70896^{o}N, -113.39917^{o}W). The upper Lemhi River site includes that section of Lemhi River flowing through the property known as the Merrill Beyeler Ranch from the fence line 100 meters upstream of the upper water gap to the lower fenced boundary (Start: 44.68689^{o}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 3, 2012. Generally, two fishery staff are assigned per transect for each of the three transects. In 2012, we deviated from this methodology for the Karl Tyler Ranch transect by using three surveyors.

Big Timber Creek

Resident bull trout redd counts in Big Timber Creek drainage were conducted September 27, October 4, and October 5, 2012 using visual ground count methods. Coordinates of the likely trend transect in Rocky Creek, a tributary to Big Timber Creek, started at WGS84 datum, 44.52937°N, -113.46415°W and ended at 44.52073°N, -113.43355°W. Coordinates of other transects in Big Timber Creek are as follows: Big Timber Creek transect directly upstream of Rocky Creek began at 44.49958°N, -113.46215°W and ended at 44.52073°N, -113.43355°W, and the Big Timber Creek transect immediately downstream of Rocky Creek began at 44.52073°N, -113.43355°W and ended at 44.54818°N, -113.41308°W.

East Fork Hayden Creek

Resident bull trout redd counts on East Fork Hayden Creek were conducted September 14, 2012 using visual ground count methods. The 2012 count date was determined by averaging the previous three years' data to estimate peak spawning time (WGS84 datum, Start: 44.72984°N, -113.67145°W, and end: 44.72438°N, -113.66671°W). The East Fork Hayden Creek transect consists of c-channel type habitat.

Fourth of July Creek

Salmon Region fishery staff conducted the Fourth of July Creek bull trout redd count on September 7, 2012 using visual ground count methods (WGS84 datum, Start: 44.04112°N, -114.75831°W, and end: 44.05039°N, -11469165°W).

Hayden Creek

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

Classification of fluvial and resident bull trout redds followed the same protocol as listed above for Bear Valley Creek. In past years, survey dates in the trend transect were selected to correspond as closely as possible with the peak of fluvial bull trout spawning activity and then approximately one week after the peak. Two counts were conducted in 2012 in the new trend transect on September 14, and 21.

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

Pahsimeroi, East Fork, and Sawtooth Fish Hatchery personnel annually provide results of resident salmonids encountered during routine steelhead and Chinook salmon trapping operations for reporting and analysis by regional fisheries staff. Additionally, a temporary weir and trap is operated annually on Redfish Lake Creek near Sawtooth Fish Hatchery to monitor salmonid movement in and out of Redfish Lake. Counts of bull trout on Redfish Lake Creek were established to more accurately track migratory bull trout populations using the Redfish Lake system.

RESULTS AND DISCUSSION

Fluvial Trout Monitoring

Alpine and Fishhook Creeks

No bull trout redds were observed in the new (2011) trend transect on Alpine Creek in 2012. By comparison, two redds were counted in 2011 and one redd in 2010 (Table 10, Figure 15). No bull trout have been observed the last three years in the original trend area above the falls. Based on these observations, bull trout appear to be spatially redistributed in the Alpine Creek drainage. The sockeye recovery team plans to continue surveying the original trend area for spawning bull trout when conducting bull trout redd counts in the new Alpine Creek trend site (K. Plaster, IDFG, personal communication).

Twenty-six redds were observed in the trend transect in Fishhook Creek in 2012, compared to 11 redds observed in 2010 and 2011 (Table 11, Figure 16). Over the 15 years crews have surveyed this transect, the number of redds observed in the trend site has varied from a low of 11 (2010 and 2011) to a high of 42 in 2007 and 2009. The second bull trout spawning transect, located downstream of the trend transect site in Fishhook Creek, produced nine redds in 2012, compared to seven redds in 2011 and 10 redds counted in 2010 (Table 12, Figure 17).

Bear Valley Creek

Regional fishery staff counted 33 fluvial bull trout redds in the Bear Valley Creek trend transect in 2012 compared to 36 bull trout redds observed in 2011 (Table 13, Figure 18). The trend of bull trout redds counted in this transect has been generally stable, averaging 34 redds per year during 11 sample periods. However, to date the redd count pattern appears cyclic with high counts of 42 and 44 in 2003 and 2004, respectively, followed by four lower count years, a high count of 42 again in 2009, and then a descending count for the last three years (Figure 18). Upstream of this trend transect, 91 bull trout redds were counted in 2012 (Table 14). The total number of redds observed upstream of the trend transect has varied from a low of 21 to a high of 115 during the past seven years (Table 14). Likely, spawning resident and fluvial bull trout populations use more of the Bear Valley Creek drainage than previously documented.

Big Springs Creek and Lemhi River

Fishery staff observed a total of 368 rainbow trout redds in two Big Springs Creek transects and one transect in the upper Lemhi River (Table 15, Figure 19) in 2012. One hundred thirty redds were counted in the historic Neibaur Ranch transect while 224 redds were

observed in the current Tyler Ranch transect (Table 15). Fourteen redds were counted in the current Beyeler Ranch transect in the upper Lemhi River. This year's total count was more than double the 172 redds counted in 2011. The majority of this year's increase was found in the Tyler Ranch section on Big Springs Creek. In 2012, surveyors counted 224 redds in the Tyler transect compared with 49 redds counted in 2011. High water runoff in late June 2011, measured downstream of the Tyler Ranch in the Lemhi River at the USGS gauging station, may have helped scour the Lemhi and its tributaries and shifted substrate to create or enhance suitable spawning habitat.

Reviewing redd counts from the three survey reaches over time indicates a generally increasing trend (Figure 19). The total number of redd counts has fluctuated annually and likely indicates that variable factors affect the rainbow trout spawning population. These sites will continue to be monitored annually and redd count trends will be evaluated.

Big Timber Creek

Bull trout redds counted in the Big Timber Creek drainage totaled 52 in 2012, 16 more redds than observed in 2011 (Table 16, Figure 20). The total includes two transects in Big Timber Creek and one transect in Rocky Creek. Earlier bull trout redd counts (2007 and 2008) in the Big Timber Creek drainage were exploratory surveys to determine possible bull trout spawning areas. These early counts covered longer stretches of Big Timber and Rocky creeks, as well as portions of tributaries Trail and Lake creeks, and are not directly comparable to results from 2010 forward (Table 16, Figure 20).

East Fork Hayden Creek

A total of 49 bull trout redds were observed in East Fork Hayden Creek trend transect in 2012 compared to 32 counted in 2011 (Table 13, Figure 21). The bull trout redd count this year was above the previous 10-year average of 44 redds. As in 2011, only one survey count was conducted this year instead of the usual two. Fishery staff noted 75 adult bull trout observed during this year's redd count survey. Thirty percent (n = 22) of 75 fish were observed on redds. This percentage should be considered a conservative count as numerous fish spooked and moved off redds before being tallied. Only bull trout observed on redds were included in the live fish count.

Fourth of July Creek

Fifty-four completed bull trout redds were counted in the Fourth of July Creek trend transect in 2012, a similar number observed for the last four years (Table 17, Figure 22). Since counts were initiated in 2003, there has been a general upward trend in redd counts, which is interesting considering a large wildfire in the drainage in 2005 included the transect area. This population is likely responding to improved passage conditions within the watershed that include screening facilities on irrigation ditches to protect juvenile salmonids, and increased flows during the fall migration of spawning adults.

Hayden Creek

Nineteen bull trout redds were counted in the Hayden Creek trend site in 2012 while 49 bull trout redds were counted in 2011 (Table 13). Both resident and fluvial-sized bull trout were observed spawning in Hayden Creek in 2012, marking the eighth consecutive year of differing life histories being observed in the same tributary. The Hayden Creek trend transect, located

8.1 km upstream of the mouth of Bear Valley Creek, exhibits similar spawning of both resident and fluvial-sized bull trout.

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

In the last four years, the number of resident rainbow trout migrating past the Pahsimeroi Fish Hatchery weir has increased from 50 to the low to mid-100 fish range (Table 18; Figure 23). In 2012, 118 resident rainbow trout were encountered at the weir compared to 107 counted in 2011. This is the second highest number of rainbow trout trapped since 1991 (Table 18). The male to female sex ratio continues to consistently favor females over the recorded period. This year, 79% of rainbow trout encountered at the Pahsimeroi trap were female. Picket spacing at the Pahsimeroi weir likely favors passage of resident male rainbow trout upriver through the weir while inhibiting female movement. Eight bull trout were also encountered during the 2012 spring trapping period, the same number of bull trout observed in 2011.

Trapping at the East Fork Satellite Facility resulted in capturing 303 bull trout, 7 westslope cutthroat trout, 1 apparent cutthroat trout x rainbow trout *O. clarkii x O. mykiss*, 239 mountain whitefish, and 2 rainbow trout in 2012 (Table 19). Bull trout numbers appear to be increasing during the last nine years of trap operations (Figure 24). Westslope cutthroat and rainbow trout numbers have remained relatively stable but have numbered in single digits since 1986 with the exception of 2002 and 2005 (Table 19). The number of mountain whitefish remained in the three digit range with 239 observed in 2012; counts of mountain whitefish have ranged from 91 to 359 counted per year since 2004.

Sawtooth Fish Hatchery personnel encountered 21 bull trout, 6 westslope cutthroat trout, 9 rainbow trout, 2 apparent cutthroat trout x rainbow trout hybrid, 4 mountain whitefish, 136 sockeye salmon *O. nerka*, 2 wild/natural steelhead smolts, 129 suckers, and 3 northern pikeminnow during steelhead and Chinook salmon trapping periods (Table 20). The number of bull trout encountered at the Sawtooth weir this year was below the 10-year average of 34 fish (Table 20, Figure 25). While counts of resident salmonids dropped this year, variable trapping dates make trend comparisons of individual species encountered at the trap difficult.

At the Redfish Lake Creek trap, 82 bull trout, 107 sockeye salmon, 1 Chinook salmon, 213 northern pikeminnow, and 482 suckers were captured during the 2012 trapping season (Table 21). The overall salmonid count decreased for the second year while non-salmonids increased in 2012 when compared to 2010 and 2011. However, since 1999 the number of bull trout encountered at the trap has shown a generally increasing trend since operations began in 1999 (Figure 26).

MANAGEMENT RECOMMENDATIONS

1) Report yearly non-target fish encountered at the Pahsimeroi Fish Hatchery during steelhead and Chinook salmon trapping seasons.

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

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

Table 10. Bull trout redd counts observed in trend survey sections of Alpine Creek, 1998 to 2012.

Year	Survey Dates	No. of New Redds Per Survey Date	Cumulative No. of Redds
1998	23 Aug, 11 Sep	0, 1	1
1999	26 Aug[a]	3	3
2000	30 Aug, 15 Sep	6, 9	15
2001	28 Aug, 11 Sep[b]	11, 15	26
2002	30 Aug, 12 Sep	8, 14	22
2003	27 Aug, 08 Sep	11, 14	25
2004	30 Aug, 09 Sep	6, 9	15
2005	30 Aug, 12 Sep	9, 13	22
2006	29 Aug, 12 Sep	6, 13	19
2007	28 Aug, 12 Sep	17, 18	35
2008	28 Aug, 11 Sep	0, 0	0
2009	27 Aug, 09 Sep	0, 0	0
2010	31 Aug, 13 Sep[c]	0, 1	1
2011	25 Aug, 12 Sep	0, 2	2
2012	26 Aug, 12 Sep	0, 0	0

[a] Only one count completed.
[b] Counts done independently, not cumulatively.
[c] Transect site moved 1.1 km downstream.

Table 11. Bull trout redd counts observed in the trend survey section of Fishhook Creek, 1998 to 2012.

Year	Survey Dates	No. of New Redds Per Survey Date	Cumulative No. of Redds
1998	08/22, 09/10	5, 11	16
1999	08/22, 08/26	0, 15	15
2000	08/31, 09/14	12, 18	30
2001[a]	08/28, 09/11	15, 11	26
2002	09/04, 09/11	6, 17	23
2003	08/27, 09/08	6, 17	23
2004	08/30, 09/09	10, 11	21
2005	08/30, 09/12	12, 23	35
2006	08/29, 09/13	16, 25	41
2007	08/29, 09/13	21, 21	42
2008	08/29, 09/11	8, 13	21
2009	08/27, 09/11	9, 33	42
2010	08/31, 09/13	11, 11	22
2011	08/24, 09/13	8, 11	19
2012	08/27, 09/12	9, 17	26

[a] Counts done independently, not cumulatively.

Table 12. Bull trout redd counts observed in the second (lower) survey section of Fishhook Creek, 2008 to 2012.

Year	Survey Dates	No. of New Redds Per Survey Date	Cumulative No. of Redds
2008	08/29, 09/12	5, 14	19
2009	08/27, 09/10	2, 12	14
2010	08/31, 09/13	0, 10	10
2011	08/24, 09/13	0, 7	7
2012	08/27, 09/18	3, 6	9

Table 13. Bull trout redd count summary of trend transects in the Hayden Creek drainage, 2002 to 2012. Both fluvial and resident bull trout redds were included in transect counts.

	No. of Bull Trout Redds in Selected Trend Transects			
Year	Hayden Creek	Hayden Creek "new" (2010)	East Fork Hayden Creek	Bear Valley Creek
2002			33	26
2003			25	42
2004			26	44
2005			41	34
2006	74[a]		49	26
2007	115[a]		52	25
2008	28[a]		61	27
2009	22[a]		54	42
2010		29	55	37
2011		49	32	36
2012		39	49	33

[a] Includes transects in variable locations.

Table 14. Summary of fluvial and resident bull trout redd counts above the Bear Valley Creek trend transect, 2006 to 2012.

	No. of Bull Trout Redds		
Year	Wright Creek to pack bridge	Above pack bridge	Total
2006	19	41	60
2007	45	70	115
2008			21[a]
2009			24[a]
2010			22[a]
2011	30	73	103
2012	19	72	91

[a] Redd counts combined for both transects.

Table 15. Number of resident rainbow trout redds counted in the Lemhi River and Big Springs Creek, 1994 to 2012.

Date	Lemhi River (Beyeler Ranch)	Big Springs Creek (Neibaur Ranch)	Big Springs Creek (Tyler Ranch)	Total No. Rainbow Trout Redds
04/26/1994	--	--	--	40[a]
05/03/1995	--[b]	57	--	57
05/03/1996	7	32	--	39
04/21/1997 and 05/03/1997	8	44	45	97
05/03/1998	18	93	124[c]	235
04/29/1999	29	39	71	139
04/20/2000	23	160	123	306
04/05/2001	2	95	186	283
04/25/2002	3	360	193	556
04/22/2003	56	128[d]	103	287
04/22/2004	15	174	45	234
04/26/2005	3	75	43	121
04/27/2006	9	63	143	215
04/26/2007	8	163	62	233
05/05/2008	9	82	108	199
05/04/2009	10	100	54	164
05/04/2010	18	132	57	207
05/04/2011	20	103	49	172
05/03/2012	14	130	224	368

[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 16. Big Timber Creek drainage bull trout redd counts, 2007, 2008, and 2010 to 2012.

Year	Survey Dates	Total No. of Bull Trout Redds
2007	09/11, 09/12	25
2008	09/30, 10/02	16
2010	09/22, 10/06, and 10/07	21
2011	09/20, 09/29, and 10/06	36
2012	09/27, 10/04, and 10/05	52

Table 17. Fluvial bull trout redd counts observed in the trend survey section of Fourth of July Creek, 2003 to 2012.

Year	Survey Date	No. of Bull Trout Redds
2003	09/17	16
2004	09/09	33
2005	09/02	41
2006	09/06	71
2007	09/05	49
2008	09/01	26
2009	09/10	50
2010	09/09	56
2011	09/08	51
2012	09/07	54

Table 18. Summary of resident trout encountered at the Pahsimeroi Fish Hatchery during spring steelhead trapping, 1991 to 2012.

		No. Resident Rainbow Trout				
Year	Trapping Dates	Males	Females	Total	No. Bull Trout	Other Salmonids[a]
1991	02/13-05/15	--	--	81	0	0
1992	02/07-04/30	--	--	55	0	0
1993	02/19-05/04	7	36	43	0	0
1994	02/15-05/06	10	17	27	0	0
1995	02/20-05/16	11	17	28	0	0
1996	03/01-05/25	5	23	28	0	0
1997	03/01-05/09	1	7	8	0	0
1998	03/01-05/08	8	17	25	0	0
1999	02/19-05/03	7	17	24	0	0
2000	02/25-05/01	10	27	37	0	0
2001	03/01-03/17	27	41	68	0	0
2002	03/01-05/05	19	43	62	0	0
2003	02/28-05/02	9	31	40	0	0
2004	03/05-04/29	11	39	50	1	0
2005	03/02-05/12	4	50	54	1	1 CTxRBT
2006	03/03-04/26	13	29	42	0	1 CT[b]
2007	03/09-05/27	5	23	28	0	1 CT[b], 1 EBT
2008	02/27-05/21	14	62	76	5	1 RBT sex unknown, 1 EBT
2009	02/20-05/21	16	34	50	0	0
2010	02/22-05/13	43	101	144	1	5 MWF

Table 18. Continued.

Year	Trapping Dates	No. Resident Rainbow Trout			No. Bull Trout	Other Salmonids[a]
		Males	Females	Total		
2011	02/23-05/10	20	86	106	8	1 RBT sex unknown
2012	02/22-05/21	25	93	118	8	0

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

[b] Encountered outside range of steelhead trapping dates.

Table 19. Salmonid and non-game species encountered during steelhead and Chinook salmon trapping seasons at the East Fork Satellite Facility, 1984 to 2012.

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 19. Continued.

Year	Trapping Dates	Salmonid and Non-game Species[a] BU	CT	RBT	EBT	MWF	SUC	Total
2009	03/20-05/12, 06/10-09/21	200	7[e]	0	0	98	0	305
2010	03/25-05/13, 06/11-09/21	209	2	7	0	225	0	443[f]
2011	03/29-05/10, 06/11-09/21	251	1[e]	7	0	187	3	451[g]
2012	03/27-05/15, 06/14-09/21	303	8[e]	2	0	239	0	552

[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 apparent cutthroat/rainbow hybrid trout encountered during Chinook salmon trapping season.

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

[g] Total includes two wild/natural steelhead smolts encountered during Chinook salmon trapping season.

Table 20. Salmonid and non-game fish encountered during steelhead and Chinook salmon trapping seasons at Sawtooth Fish Hatchery, 1984 to 2012.

		Salmonid and Non-game Species[a]							
Year	Trapping Dates	BU	CT	RBT	EBT	MWF	SOCK	SUC	Total
1984	07/07-09/06[b]	1	0	0	0	0	0	0	1
1985	03/14-05/15, 06/14-09/15	--	--	--	--	--	--	--	--
1986	03/13-04/23, 06/20-09/09	3	0	0	0	0		0	3
1987	03/07-05/01, 05/13-09/08	--	--	--	--	--	--	--	--
1988	03/03-05/03, 05/23-09/06	--	--	--	--	--	--	--	--
1989	03/13-05/03, 06/07-09/11	--	--	--	--	--	--	--	--
1990	03/02-05/07, 05/21-09/14	7	0	0	0	1	0	0	8
1991	02/28-05/14, 06/07-09/15	17	0	0	0	0	0	0	17
1992	03/02-04/30, 05/28-09/18	24	0	0	0	0	0	0	24
1993	03/18-05/12, 06/18-09/06	5	0	0	0	0	0	0	5
1994	03/16-05/09, 05/31-10/26	38	0	0	0	0	0	0	38
1995	03/15-05/10, 06/12-09/06	6	0	0	0	0	0	0	6
1996	03/20-05/13, 06/20-09/11	4	1	1	0	9	0	226	241
1997	03/20-05/12, 06/16-09/04	5	0	6	0	1	0	116	11
1998	03/23-05/08, 06/10-09/14	4	4	5	0	12	0	252	277
1999	03/23-05/06, 06/28-09/07	8	4	10	0	34	0	97	153
2000	03/20-05/04, 05/30-09/25	27	1	3	0	1	0	0	32
2001	03/19-05/03, 05/24-09/14	31	0	0	0	0	0	0	31
2002	03/20-05/02, 05/28-09/09	23	0	3	0	8	0	26	60
2003	03/28-05/05, 06/12-09/09	29	0	2	0	1	0	8	40
2004	03/15-04/29, 05/25-09/15	8	0	2	0	5	0	14	29
2005	03/25-05/05, 06/05-09/19	33	1	2	0	15	0	5	56
2006	03/27-05/01, 06/19-09-15	25	3	18	0	35	0	0	81
2007	03/15-05/01, 05/25-09/11	72	13	27	0	8	0	189	309
2008	03/19-05/06, 06/11-09/17	18	10	10	0	20	0	1,089	1,147
2009	03/19-05/07, 06/24-10/16	24	10[c]	8	0	6	0	170	218
2010	03/23-05/04, 05/27-09/16	76	13	24	0	71	648[d]	741	1,573[e]
2011	03/24-05/05, 07/10-09/09	30	13	15	0	7	590	10	667[f]

Table 20. Continued.

				Salmonid and Non-game Species[a]					
Year	Trapping Dates	BU	CT	RBT	EBT	MWF	SOCK	SUC	Total
2012	03/21-05/03, 06/21-10/18	21	8[c]	9	0	4	136	129	313[g]

[a] BU = Bull trout, CT = Westslope cutthroat trout; RBT = Rainbow trout, EBT = Brook trout, MWF = Mountain whitefish, SOCK=Sockeye salmon, and SUC = Sucker.
[b] Trap not operated for steelhead.
[c] Includes 2 apparent cutthroat x rainbow hybrid trout.
[d] First year of reporting sockeye salmon incidental to Chinook salmon trapping.
[e] Total includes 2 wild/natural Chinook salmon smolts encountered during steelhead trapping season.
[f] Total includes 1 wild/natural Chinook salmon smolt encountered during Chinook trapping season and 1 wild/natural steelhead smolt.
[g] Total includes 1 sockeye salmon smolt, 2 wild/natural steelhead smolts, and 3 northern pikeminnow.

Table 21. Salmonid and non-game fish encountered during sockeye salmon trapping at Redfish Lake Creek temporary weir, 1999 to 2012.

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
2011	07/22-10/14	113	542	4	0	242	463	1,364
2012	07/13-10/17	82	107	1	0	213	482	885

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

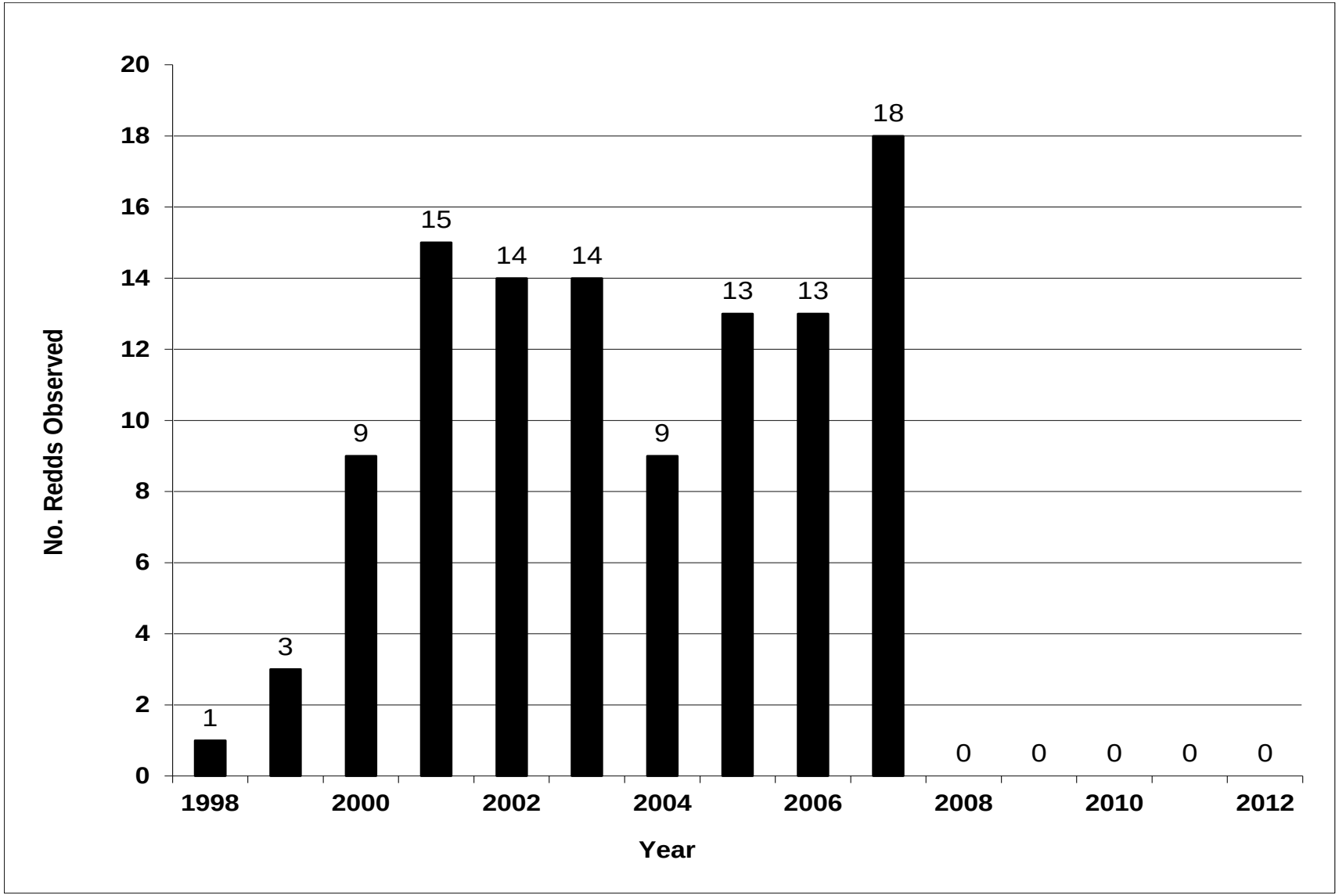

Figure 15. Bull trout redd counts in Alpine Creek, 1998 to 2012.

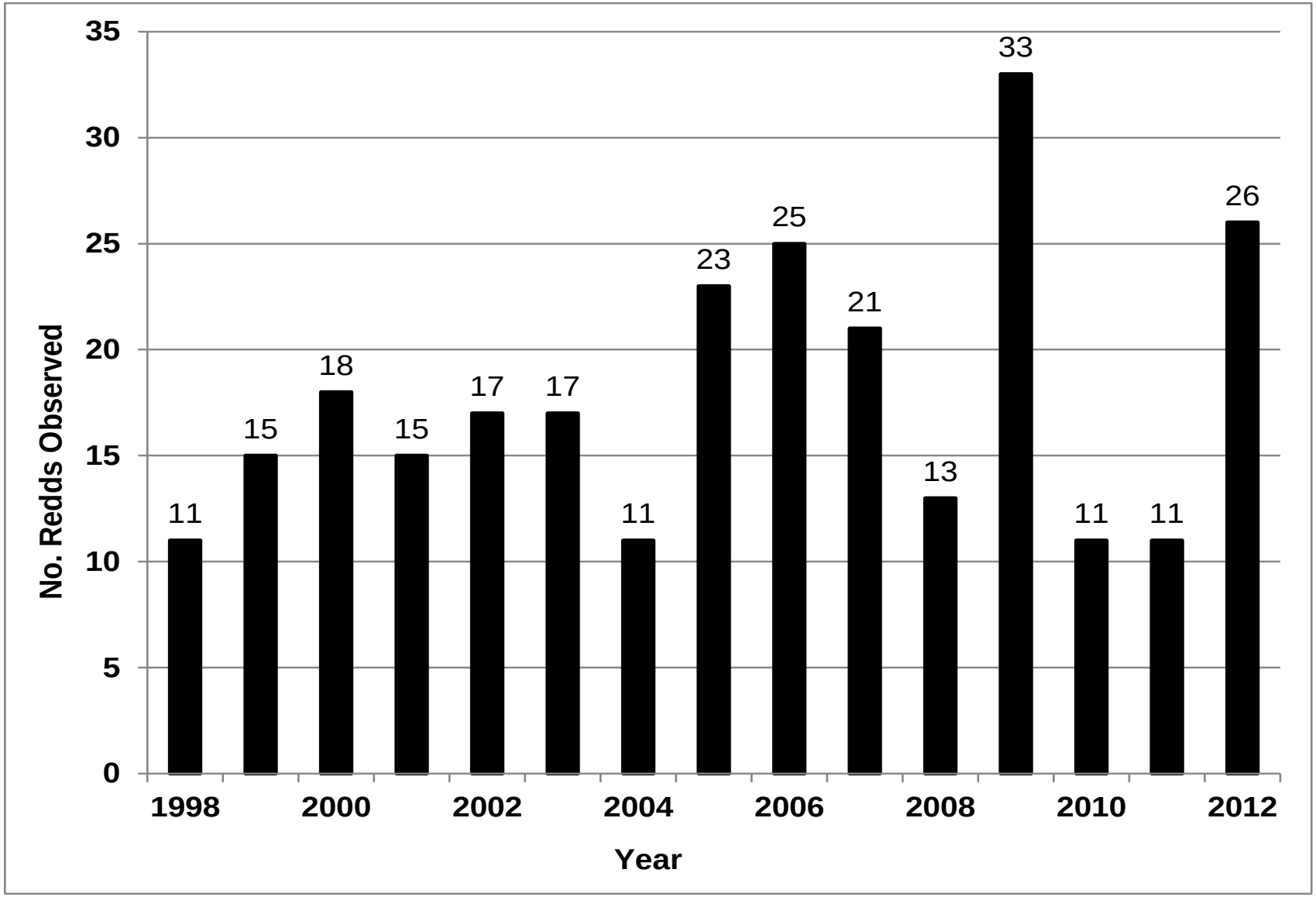

Figure 16. Bull trout redd counts observed in the trend transect of Fishhook Creek, 1998 to 2012.

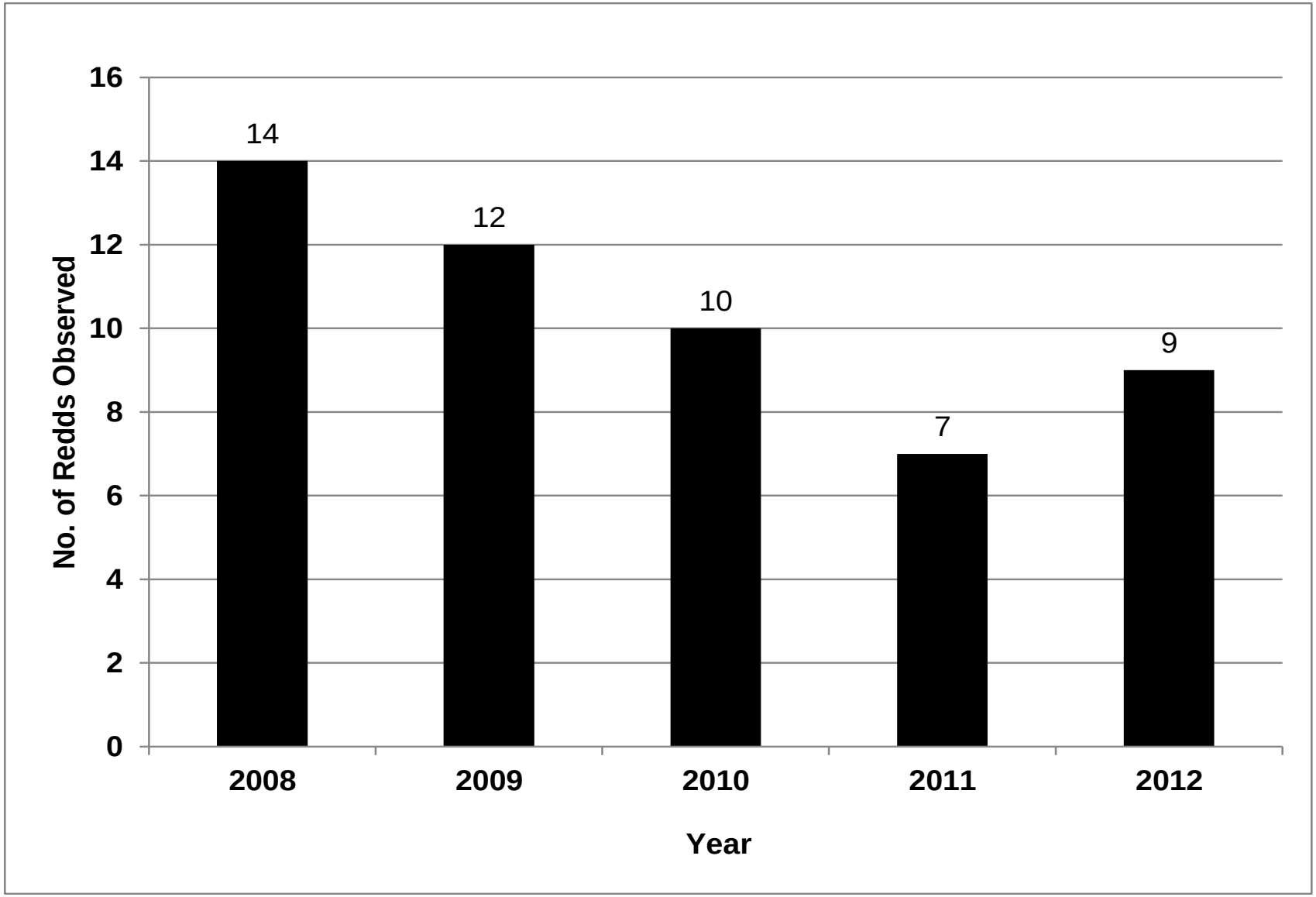

Figure 17. Bull trout redd counts observed in the second transect in Fishhook Creek, 2008 to 2012.

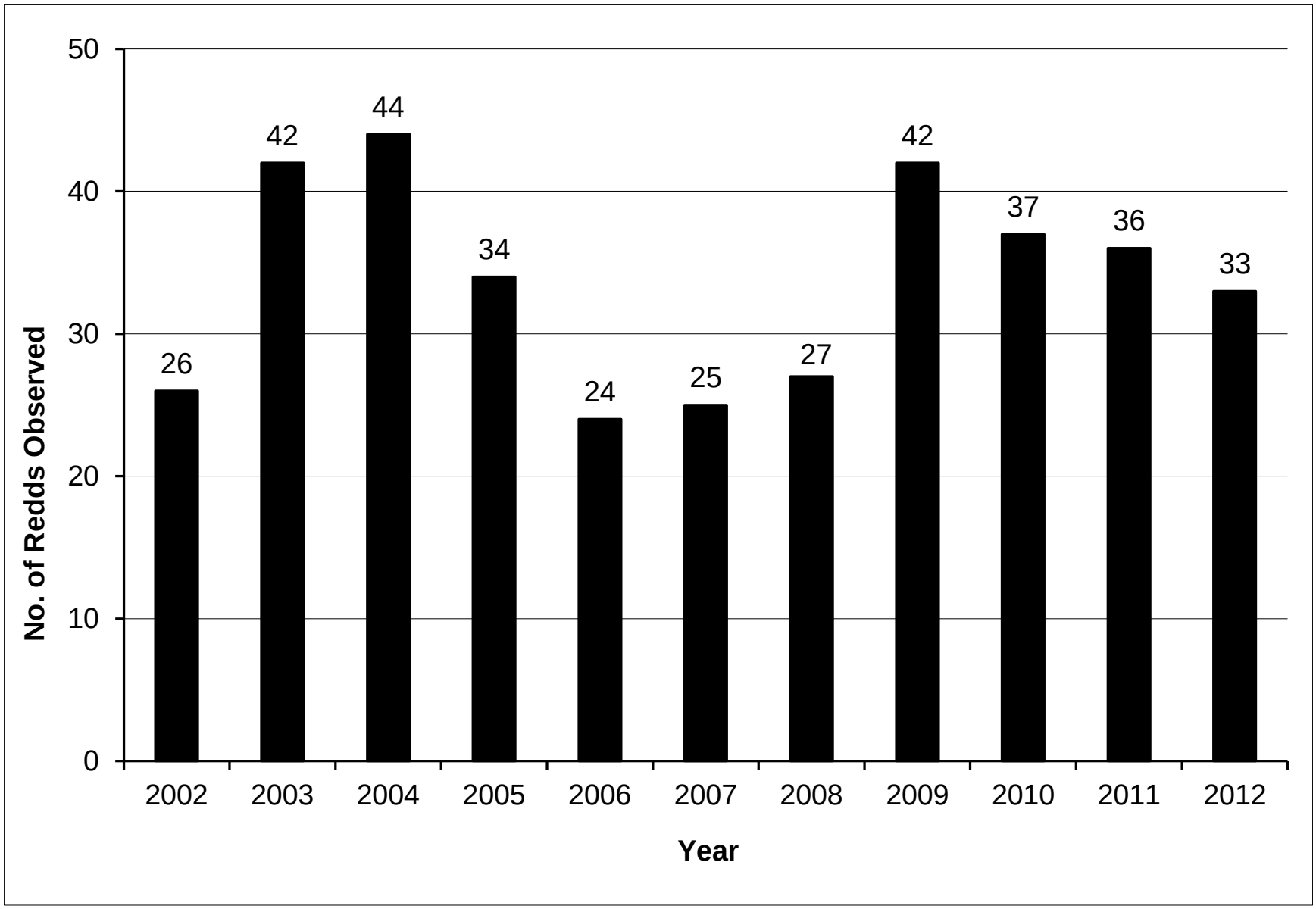

Figure 18. Bull trout redd counts observed in the Bear Valley Creek trend transect, 2002 to 2012.

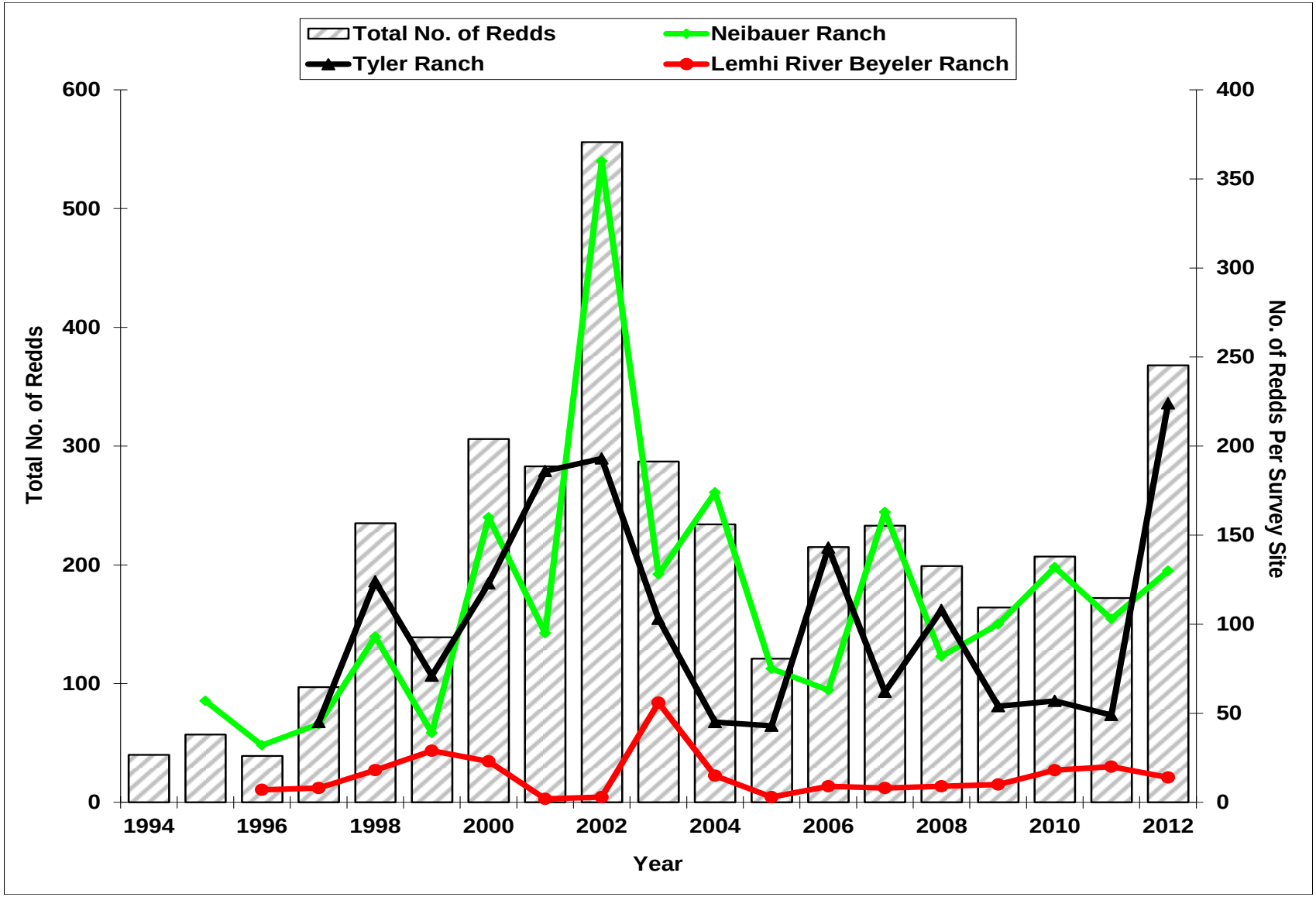

Figure 19. Resident rainbow trout spawning redds counted during ground surveys in the upper Lemhi River (Beyeler Ranch) and Big Springs Creek (Neibaur and Tyler ranches), 1994 to 2012.

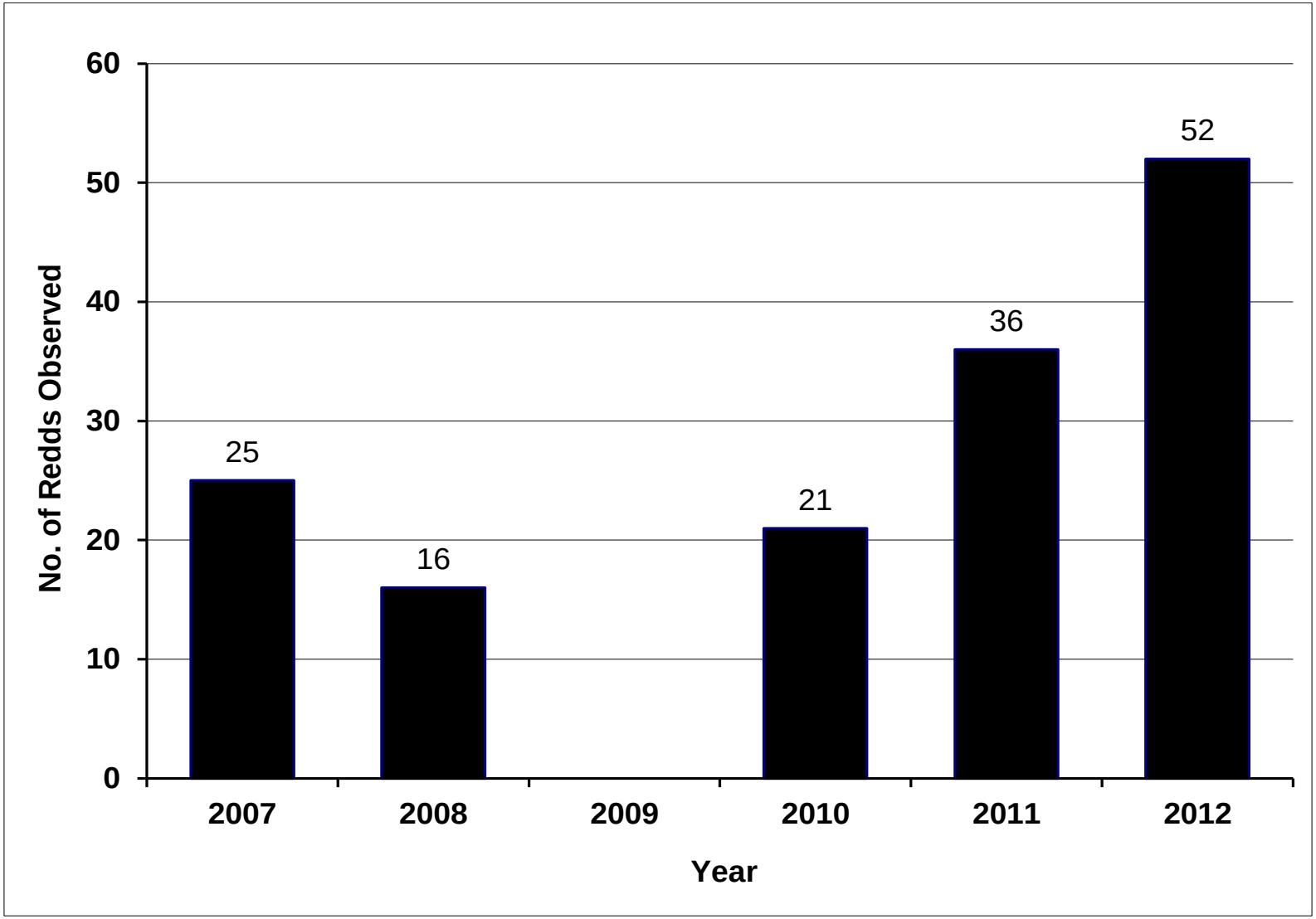

Figure 20. Summary of total bull trout redd counts in two transects of Big Timber Creek and one transect in Rocky Creek, a tributary of Big Timber Creek, 2007, 2008, and 2010 to 2012. Counts in 2007 and 2008 were exploratory over a larger area of Big Timber Creek and various tributaries and are not directly comparable to counts from 2010 to present.

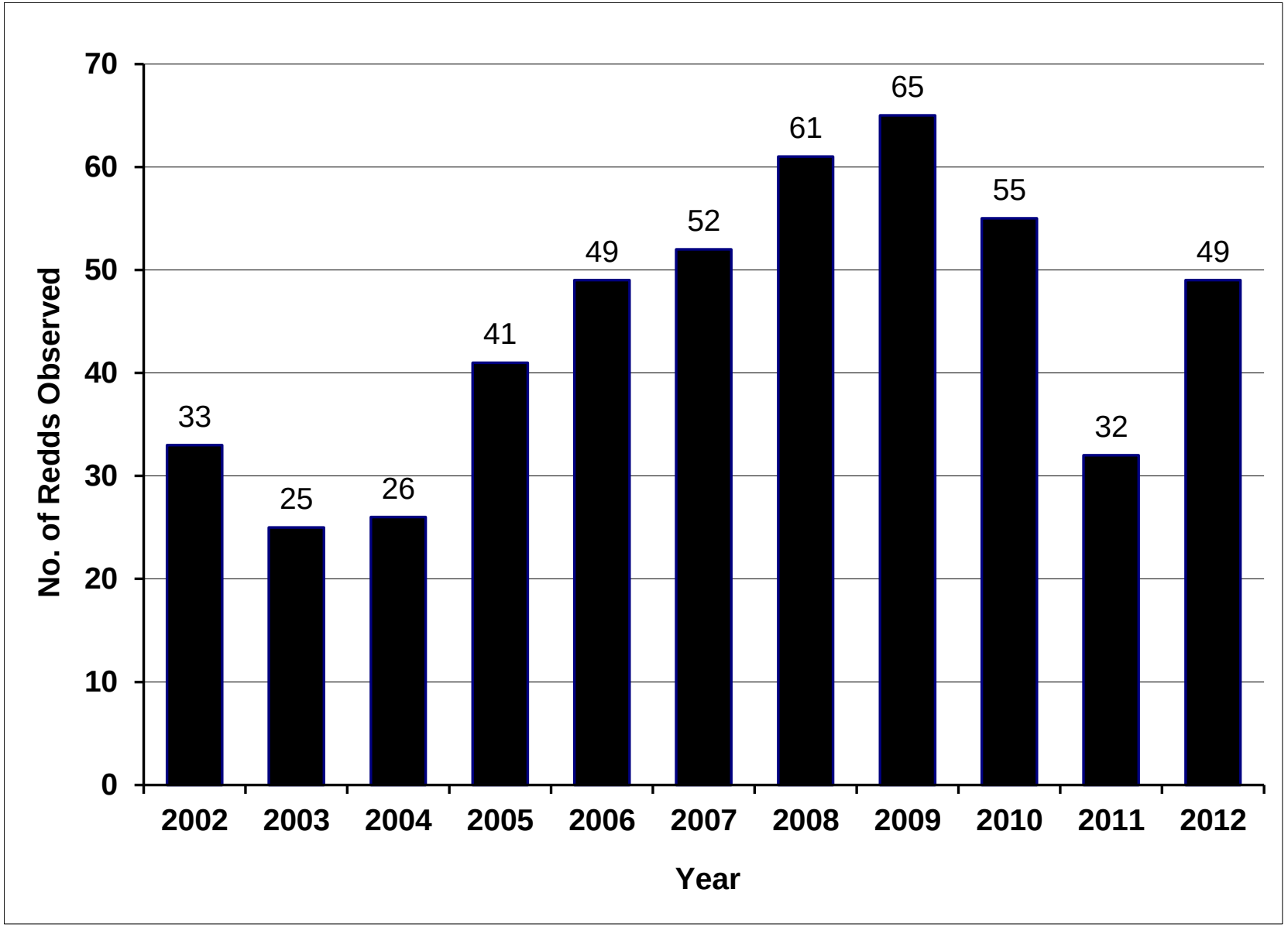

Figure 21. Resident bull trout redd counts in East Fork Hayden Creek, 2002 to 2012.

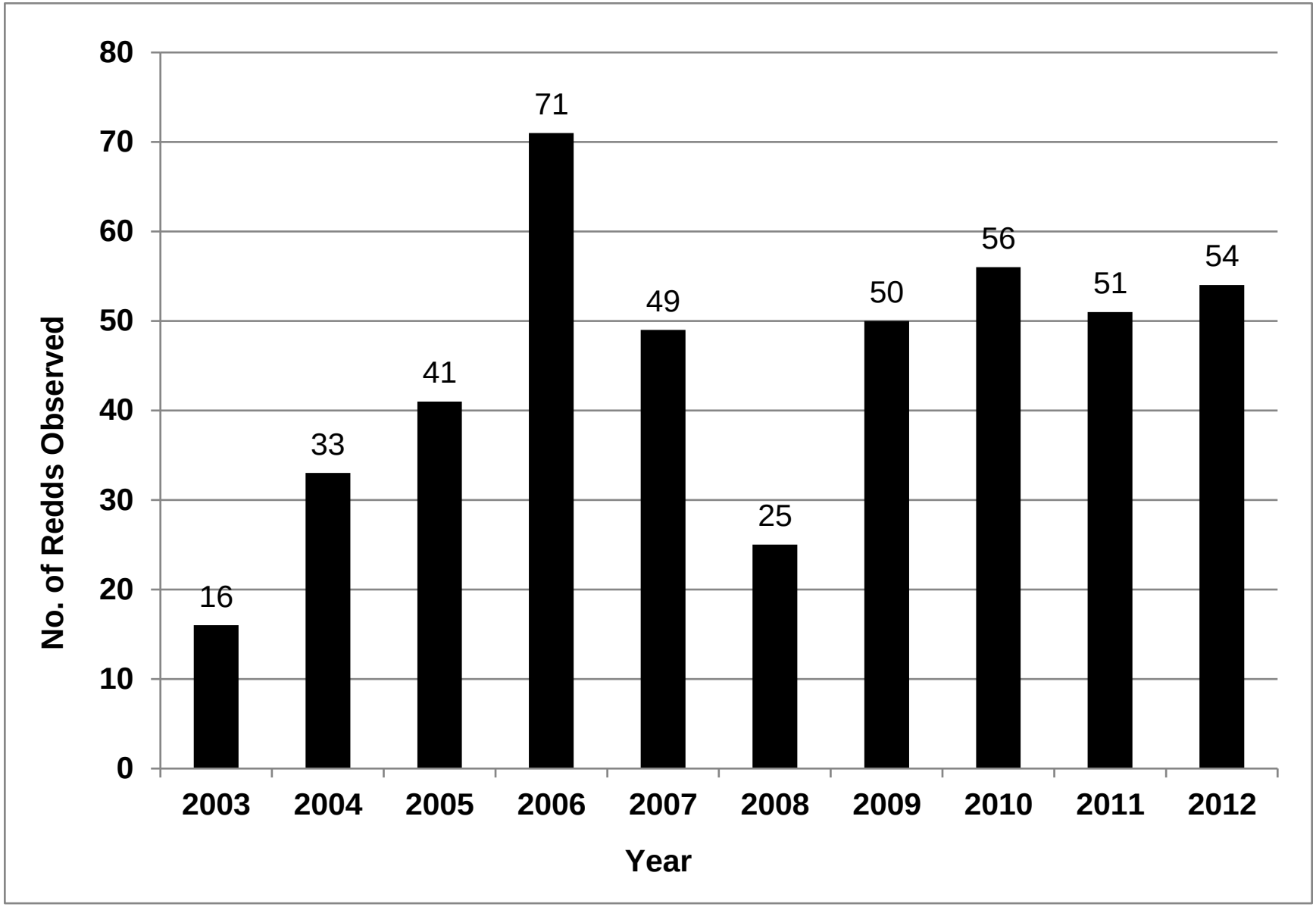

Figure 22. Fluvial bull trout redd counts in Fourth of July Creek (Sawtooth National Recreation Area), 2003 to 2012.

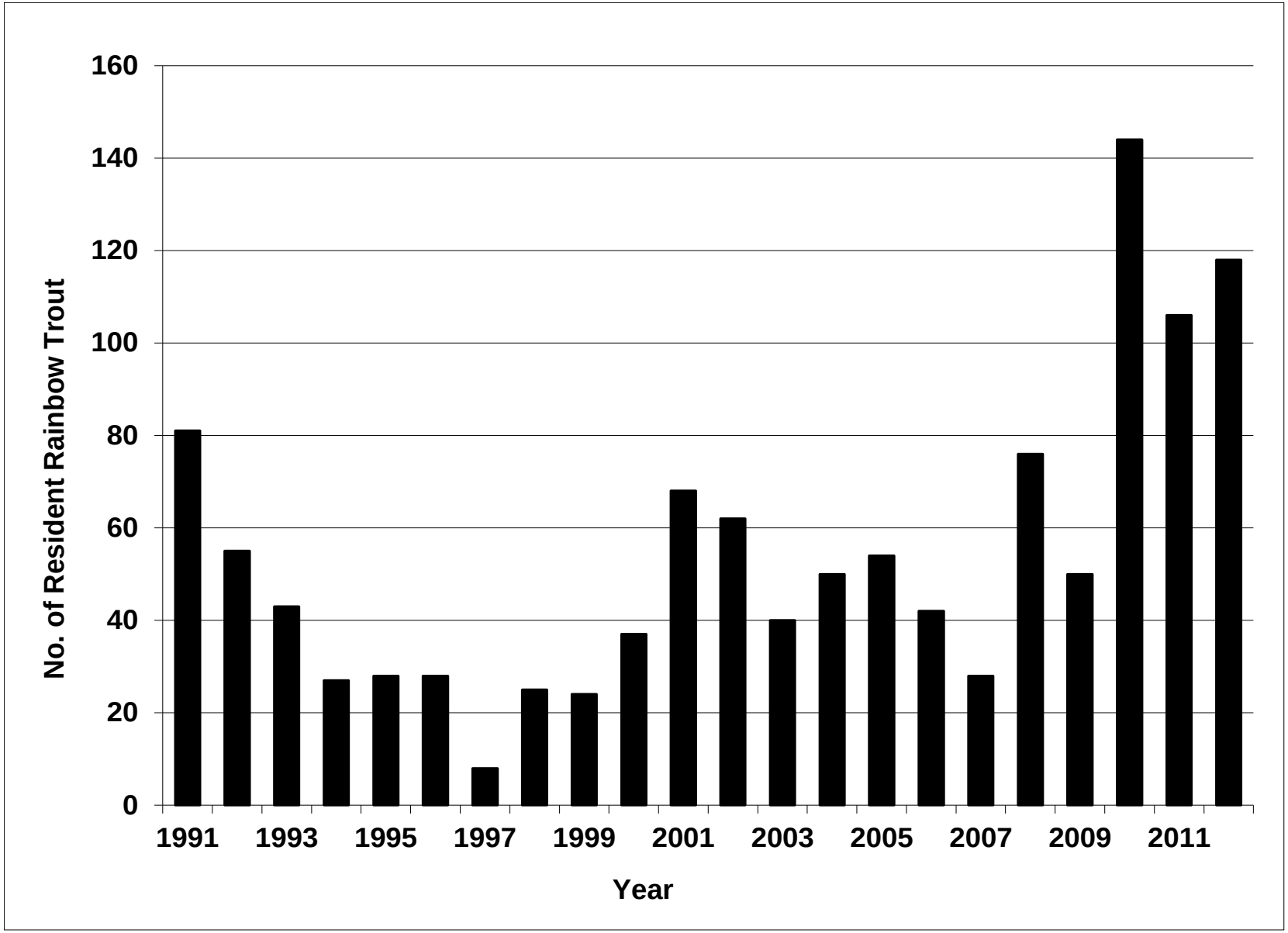

Figure 23. Annual count of resident rainbow trout trapped at the Pahsimeroi Fish Hatchery, 1991 to 2012.

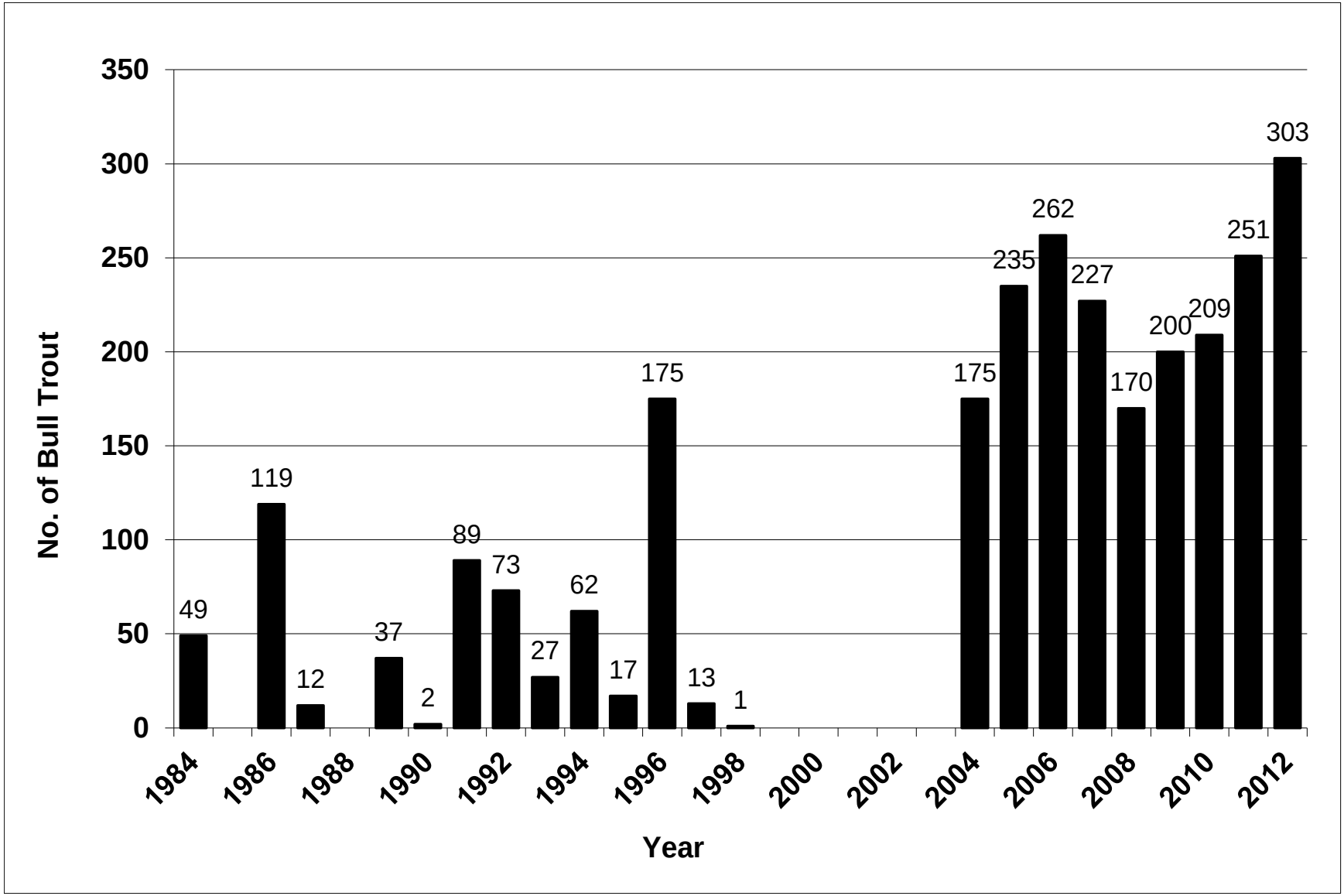

Figure 24. Annual count of bull trout trapped at the East Fork Satellite Facility, 1984 to 2012.

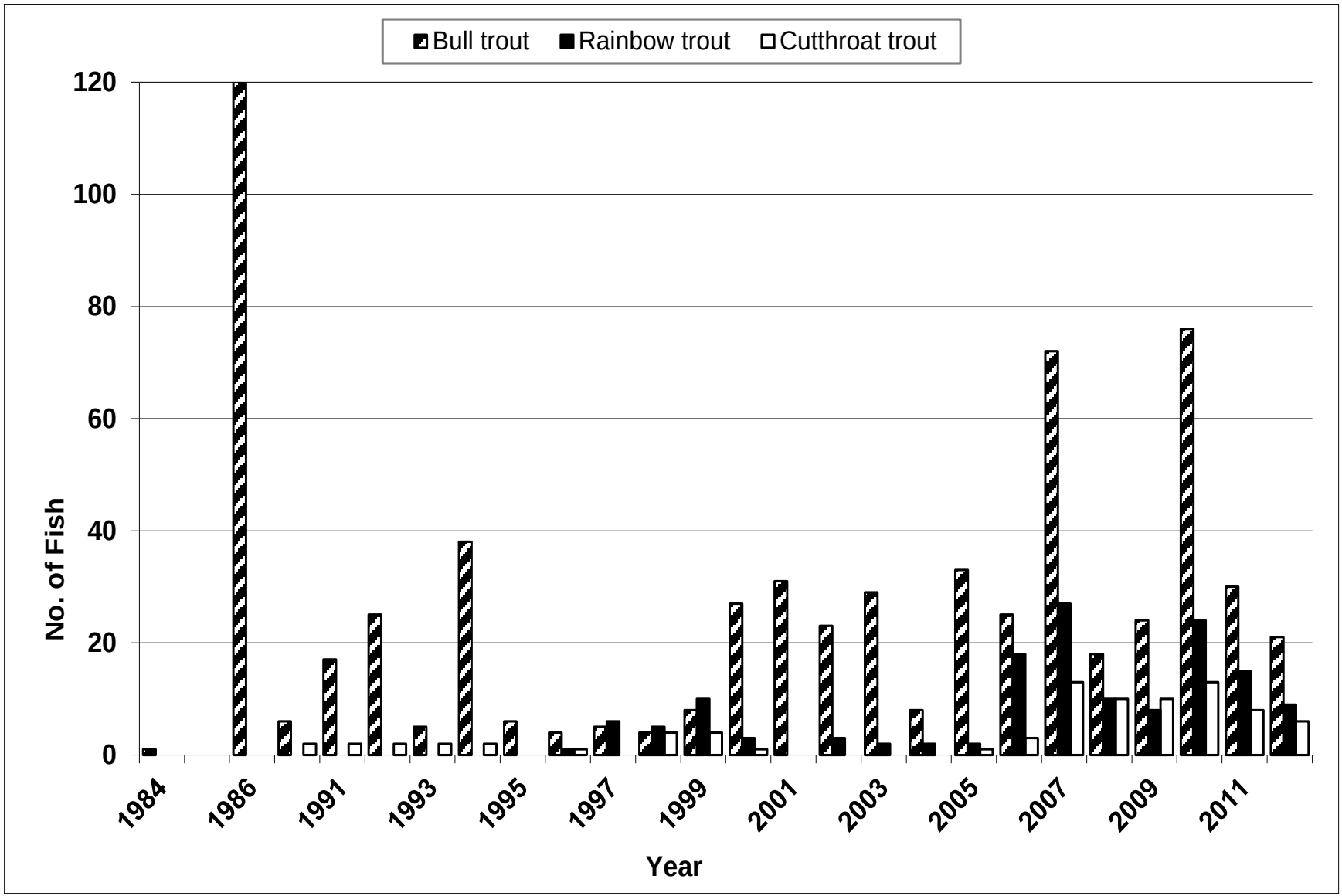

Figure 25. Annual count of selected resident salmonids trapped at Sawtooth Fish Hatchery, 1984 to 2012.

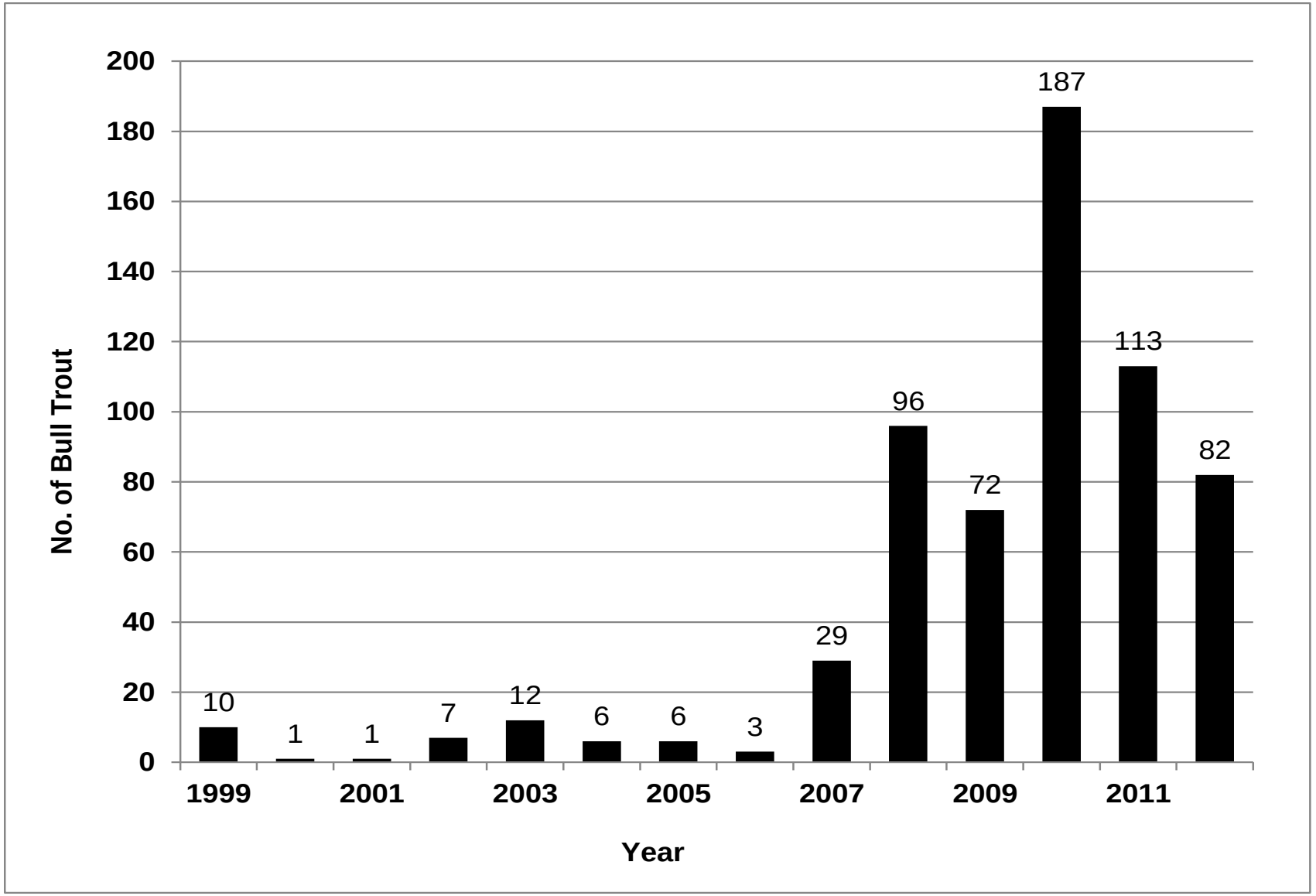

Figure 26. Number of bull trout encountered at the Redfish Lake Creek trap, 1999 to 2012.

SALMON REGION FISHERY MANAGEMENT 2012 ANNUAL REPORT

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

ABSTRACT

During July and August 2012, IDFG personnel snorkeled 25 of 28 mainstem Middle Fork Salmon River (MFSR) transects to determine fish species composition, abundance, size, and density. For the 25 mainstem MFSR traditional transects surveyed in 2012, overall densities for the three bellwether species declined from 2011 results. Westslope cutthroat trout had an overall average density of 0.8 fish/100 m^2, rainbow trout /steelhead were 0.4 fish/100 m^2, and juvenile Chinook salmon were 2.2 fish/100 m^2. By comparison in 2011, westslope cutthroat trout had an average density of 2.4 fish/100 m^2, rainbow trout /steelhead was 1.0 fish/100 m^2, and juvenile Chinook salmon was 8.1 fish/100 m^2. We also evaluated whether fish densities differed significantly above (i.e. mainstem) and below tributaries (i.e. plumes) in the MFSR. A total of 35 sites of mainstem and tributary plumes were surveyed in 2012. Of the sites surveyed, 26 contained higher fish densities in the plumes than the mainstem. Plumes averaged 1.4 °C (SE$\pm$0.2) colder than the mainstem MFSR. Linear regression indicated a negative relationship with water temperature (°C) and river kilometers from the mouth in both plumes (r^2=0.23) and mainstem (r^2=0.27) in the MFSR. Mean fish densities were similar in the mainstem and plumes in the upper section of MFSR (*t*-test, $t(18) = 1.041$, $p = 0.312$) and middle section of the MFSR (*t*-test, $t(22) = 1.768$, $p = 0.091$). Mean fish densities differed significantly between mainstem and plumes in the lower section of the MFSR (*t*-test, $t(24) = 2.456$, $p = 0.022$) with fish densities higher in the plumes than in the mainstem MFSR. This data suggests the importance of plume habitat with connected tributary streams relative to fish distribution and utilization in mainstem river habitats. As the river warms moving downstream, the importance of plume habitat became more pronounced than in the upper river sections where temperatures were more moderate.

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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.

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

The Middle Fork is a major recreational river offering a wide variety of outdoor and back-country experiences. The number of people floating the river has increased substantially in the past 50 years, from 625 in 1962 to 9,557 floaters in 2012. The U.S. Forest Service estimated total use days during the 2012 permit season (May 28-Sept. 3) to be 58,184 days, a 20% increase from 48,635 days use days calculated for 2011 (D. Leuzinger, USFS, personal communication).

The earliest IDFG fishery study in the MFSR, 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 westslope cutthroat trout abundance and to evaluate catch-and-release regulations on the mainstem MFSR 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 transects are described as mainstem historical (Corley) transects (n = 6). The Department then began additional studies within the MFSR drainage. In 1981, traditional mainstem steelhead transects were established and IDFG began evaluating wild steelhead trout populations in the MFSR (Thurow 1982, 1983, 1985). In 1985, the Department added additional snorkel sites to enumerate cutthroat trout and Chinook salmon, and began estimating steelhead, juvenile Chinook salmon, and westslope cutthroat trout densities in the MFSR and its tributaries (Reingold and Davis 1987a, 1987b, 1988; Lukens and Davis 1989; Davis et al. 1992; Schrader and Lukens 1992; Liter and Lukens 1994, 1996). The snorkel sites established since 1981 are known in this report as mainstem (n = 28) or tributary (n = 10) transects.

In the upper Salmon River basin, water is diverted in tributary streams to provide ranchers with water to irrigate fields and to provide water for stock and domestic uses. In high agricultural areas, entire stream reaches can be diverted for irrigation purposes between April and the end of November. Tributary streams provide several key habitat benefits to fish. Large, fluvial adult fish use tributary streams for spawning and the resultant juvenile fish utilize streams for rearing. Connected tributary streams are crucial for the survival of fishes that exhibit fluvial life histories. During the summer months, tributary streams provide cold water inputs to larger rivers where water temperatures can approach more lethal temperatures for salmonids (>20^{0}C). The cold water plumes created by these streams provide thermal refugia for cold water species. Furthermore, the cold water plume habitat provides an ideal location for fish to station themselves for feeding opportunities while spending the majority of their time in an area where water temperature is ideal for metabolic processes. In the MFSR drainage, tributary streams

flow throughout the year due to the remoteness and limited agricultural areas of the entire drainage. We evaluated an intact river ecosystem (MFSR) to determine if the cold water refugia provided by connected tributary streams is important to fish, particularly as water temperatures rise further downriver.

OBJECTIVES

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

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

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

Determine the importance of thermal tributary plumes for salmonid refugia in the mainstem MFSR.

STUDY AREA AND METHODS

Mainstem and Tributary Snorkeling Transects

All MFSR transects were conducted using snorkeling techniques described by Thurow (1982). Snorkeling was conducted by two snorkelers floating downstream with the current remaining as motionless as possible along both sides of the river margin. The area surveyed was estimated by multiplying the length snorkeled by the visible corridor (i.e. visibility). Visibility was measured at each site by suspending a sighting object in the water column and allowing the snorkeler to drift downriver until the object was unidentifiable. The snorkeler then moved upriver until the object reappeared clearly. The measured distance (m) between the object and the observer's facemask was the visibility. Snorkelers identified salmonids to species and lengths in one inch TL increments. Fish lengths were later converted to mm TL. Snorkelers reported presence for sucker (various species), northern pikeminnow, redside shiner, and freshwater clams or other mussels; observations of these species were not enumerated.

Historical transects on the mainstem MFSR were established prior to 1985 while traditional transects were established since 1985. All six MFSR historical (Corley) transects and nine of 10 traditional tributary transects were snorkeled in 2012. Physical information on mainstem and tributary snorkel sites surveyed in 2012 is located in Appendices B, C, and D detailing snorkel transects, locations, and transect measurements.

During July 25 to August 1, 2012, 10 plume and tributary stream sites were sampled in the upper MFSR section from Elkhorn Creek to Marble Creek. During the same time period, 12 plume and tributary streams in the middle MFSR section from Little Loon Creek to Sheep Creek

were also surveyed, while in the lower MFSR section, we surveyed 13 plume and tributary streams from Warm Springs Creek to Goat Creek. All sites were sampled via snorkeling 50 m above the tributary in the mainstem and 50 m below the tributary in the plume. We also collected temperatures in each of the selected tributaries as well as above and below the tributary in the mainstem MFSR.

Project Angling

Project anglers used conventional fly-fishing and spin cast gear to collect fish species data on the mainstem MFSR from Boundary Creek, located 0.9 km downstream of Dagger Falls, to the mouth of the Middle Fork, 153.4 km downstream of Dagger Falls (Figure 27). Fish were identified by species, measured to the nearest 10 mm TL, and released. This year, project anglers focused on collecting genetic samples solely from mountain whitefish before release.

Tributary Surveys

Three tributaries in the MFSR drainage were electro-fished to encounter salmonids and other species and obtain genetic samples.

RESULTS AND DISCUSSION

Mainstem and Tributary Snorkeling Transects

From July 25 to August 1, 2012, IDFG personnel snorkeled 25 of 28 mainstem MFSR traditional transects. IDFG personnel counted a total of 903 salmonids, including 195 (22%) westslope cutthroat trout, 84 (9%) rainbow trout/steelhead, 518 (57%) juvenile Chinook salmon, 102 (11%) mountain whitefish, 4 (0.4%) bull trout and 1 (0.1%) brook trout (Table 22). Additionally, northern pikeminnow, sucker (various species), and pearlshell *Margaritifera falcata* (Freshwater clams) were observed but were not enumerated this year. In 2011, snorkelers counted 2,127 salmonids, comprised of 397 westslope cutthroat trout, 174 rainbow trout/steelhead, 1,356 juvenile Chinook salmon, 7 bull trout, and 190 mountain whitefish. Snorkeling and river conditions were good this year with almost all mainstem transects (n = 25) surveyed while in 2011 only 14 of 28 transects were surveyed.

Average densities for cutthroat trout, rainbow trout, and Chinook salmon in mainstem MFSR transects decreased this year when compared to 2011 (Table 23; Figures 28, 29, and 30). The cutthroat trout average density of 0.8 fish/100 in 2012 was less than half the average density of 2.4 fish/100 m^2 observed in 2011. The 2012 average density of rainbow trout was also less than half from a year ago, from 0.4 fish/100 m^2 this year compared to 1.0 fish/100 m^2 in 2011. Juvenile Chinook salmon densities were also down this year, decreasing from an average density of 8.1fish/100 m^2 in 2011 to 2.2 fish/100 m^2 in 2012. However, it would be misleading to make direct comparisons of 2012 results to 2011 findings. While only 14 transects were surveyed in 2011, all 14 snorkel sites were located upstream of Hospital Pool and include transects that generally hold higher numbers of cutthroat, rainbow trout/steelhead, and Chinook salmon. This year's average densities include snorkel sites covering almost the entire river distance from Boundary Creek to the mouth of the MFSR.

Catch-and-release regulations on the mainstem have been in effect since 1972. As part of IDFG's monitoring of catch-and-release effects, snorkelers in mainstem transects counted the number of cutthroat trout greater than 300 mm TL observed in mainstem transects. While the percent of cutthroat greater than 300 mm TL was calculated at 13% in 1971, the percent has ranged from 13% to 60% since that time. In 2012, 46% (*n* = 89) of the 195 cutthroat observed were greater than 300 mm in mainstem transects (Table 22; Figures 31 and 32).

All six historical (Corley) transects on the mainstem MFSR were snorkeled in 2012 (Table 24). Westslope cutthroat trout densities in these transects ranged from 0.2 to 2.0 fish/100 m^2 and averaged 0.8 fish/100 m^2 in 2012 (Table 25). Rainbow trout densities ranged from 0.03 to 1.5 fish/100 m^2 and had an average density of 0.3 fish/100 m^2. Juvenile Chinook salmon were observed in three of six transects this year. Chinook densities ranged from 0.2 to 7.0 fish/100 m^2 and averaged 1.5 fish/100 m^2. Mountain whitefish, northern pikeminnow, suckers, and redside shiners were also observed in the Corley transects this year (Table 25). No pearlshell observations were noted in the six Corley transects snorkeled in 2012 while two of three Corley transects surveyed in 2011 included these freshwater clams (Curet et al 2013).

In nine of 10 MFSR tributary transects snorkeled in 2012, IDFG personnel counted 62 westslope cutthroat trout, 86 rainbow trout/steelhead, and 195 juvenile Chinook salmon in these transects (Table 26). Average densities of westslope cutthroat trout, rainbow trout/steelhead, and Chinook salmon in these tributary transects were 1.1, 1.9, and 4.6, respectively in 2012 (Table 27). This compares with average densities of 1.0, 0.4, and 1.3 for westslope cutthroat trout, rainbow trout/steelhead, and juvenile Chinook salmon, respectively, in 2011.

Pearlshell clams were observed in four of 25 mainstem transects surveyed during snorkeling in 2012 (Table 22). IDFG began recording incidental observations of freshwater mussels during MFSR snorkel surveys in 2010. By the summer of 2011, we noted pearlshell distribution ranged from Indian Creek downriver as far as Ship Island Creek in the mainstem MFSR, a distance of approximately 96 river km (Curet et al 2011, 2013). This year, snorkelers observed pearlshells in the Rapid River transect (about 11 km upstream of Indian Creek), expanding the known distribution of these freshwater clams to approximately 107 river km on the Middle Fork. Likely, pearlshell distribution is more extensive than presently documented.

Summary tables of cutthroat, rainbow trout/steelhead, and Chinook salmon observed during snorkeling of mainstem traditional transects, historical (Corley) transects, and tributary transects are shown in Tables 28-30. These tables list yearly total numbers of fish and average densities by year.

The mainstem MFSR snorkeling transects selected likely represent one of the longest term trend data sets on westslope cutthroat trout. However, little has been done to evaluate which transects provide accurate trends in mimicking population abundance (High et al. 2008). Also, some transects are difficult and dangerous to snorkel during flow conditions greater than 2.5 feet on the river level gage at Middle Fork Lodge. Survey counts conducted during high flows may represent inherent snorkeler bias since a snorkeler may not be able to accurately observe fish when challenged by difficult water conditions.

In addition to snorkeling mainstem traditional, mainstem historical (Corley), and tributary transects this year, fishery staff conducted a comparison study of salmonid densities and differing water temperatures in plume and above plume areas at 35 selected MFSR tributary sites. Snorkelers observed a total of 912 fish in the 70 snorkel reaches above and below

tributaries, of which 90% (*n* = 820) were comprised of westslope cutthroat trout, rainbow trout/steelhead, and Chinook salmon (Table 31). The remaining 10% included mountain whitefish, bull trout, trout fry (various species), northern pikeminnow, and suckers.

We evaluated whether fish densities differed significantly above (i.e. mainstem) and below tributaries (i.e. plumes) in the MFSR. Of the 35 tributary sites surveyed, 26 contained higher fish densities in the plumes downstream of the tributary than in the above plume i.e. in the mainstem Middle Fork (Table 32, Figure 33). The number of sites surveyed which contained higher densities in the mainstem than the plumes by section were 3 in the upper, 2 in the middle, and 2 in the lower sections. Densities ranged from a high of 49.3 fish/100 m^2 in the plume below Little Solider Creek to no fish observed in the mainstem above Ship Island Creek (Table 32).

Mean fish densities were similar in the mainstem and plumes in the upper section of MFSR (*t*-test, $t(18)=1.041$, $p=0.312$) and middle section of the MFSR (*t*-test, $t(22)=1.768$, $p=0.091$) (Figure 34). Mean fish densities differed significantly between mainstem and plumes in the lower section of the MFSR (*t*-test, $t(24)=2.456$, $p=0.022$) with fish densities higher in the plumes than in the mainstem MFSR (Figure 34). This data suggests the importance of plume habitat with connected tributary streams relative to the fish distribution and utilization in mainstem river habitats. As the river warms moving downstream, the importance of plume habitat becomes more pronounced than in the upper river sections were temperatures were more moderated. The importance of plume habitats for fish in the MFSR drainage with connected tributary streams should translate to benefits in plume habitats for fish in other basins. This study also provides a framework for future research into assessing factors resulting in suitable plume habitat for fish. Ultimately understanding the role of the plume habitat will assist future efforts in reconnecting tributary streams within basins where seasonal irrigation withdrawal reduces connectivity during thermally stressful summer time for fish.

Plumes averaged 1.4°C (SE$\pm$0.2) colder than in the mainstem MFSR and ranged from 0^0C to 4^0C colder (Table 32). Both Marble and Indian creeks were 1°C warmer than the mainstem. The coldest tributary surveyed this year was Teapot Creek at 6°C. However, there was no temperature difference in the plume compared to the mainstem at Teapot due to the small size of the tributary (Table 32). Linear regression indicated a negative relationship with water temperature (°C) and river kilometers from the mouth in both plumes ($r^2=0.23$) and mainstem ($r^2=0.27$) in the MFSR (Figure 35).

Project Angling

Fishery staff caught and released 541 fish in the mainstem MFSR during the 2012 survey (Table 33, Figure 36). Of the salmonids encountered, westslope cutthroat trout comprised 55% (*n* = 299) while rainbow trout/steelhead accounted for another 38% (*n* = 206) . Mountain whitefish comprised 3% (*n* = 14), bull trout 2% (*n* = 14), and apparent cutthroat trout x rainbow trout hybrid 1% (*n* = 4). Three non-salmonid species added the remaining 1% of the total fish shown in Figure 36: northern pikeminnow (*n* = 5), redside shiner (*n* = 1), and sucker (*n* = 1). Anglers caught a higher proportion of rainbow trout in 2012 when compared to 2011 (Figure 37). In 2012, rainbows accounted for 38% of the total angled catch compared to 29% in 2011 (Figure 37). Cutthroats comprised 55% of all fish caught in 2012 compared to 67% last year. The 2012 average TL for westslope cutthroat trout and rainbow trout/steelhead caught by project anglers were 269 mm and 170 mm, respectively (Figure 38). In 2011, average lengths for cutthroat trout and rainbow trout/steelhead caught by angling were 258 and 188 mm,

respectively. A summary of fish species caught during project angling for the past 11 sample periods is shown in Table 33.

Catch-and-release regulations have been in effect since 1972. Prior to this date, approximately 20% of the westslope cutthroat trout caught by project anglers were over 300 mm TL. In 2012, the proportion of westslope cutthroat trout larger than 300 mm TL caught by project anglers was 40% (*n* = 120). Since the regulation change, this proportion has fluctuated yearly, ranging from 26% to 53% (Figure 39). The yearly fluctuation is likely a difference in angler skill level, gear type, sample timing, flows, and water clarity.

During angling on the mainstem MFSR, genetic samples were taken from 13 mountain whitefish (Table 34). Samples were archived in the Regional office for analysis as funds become available.

Tributary Surveys

Three MFSR tributaries were electro-fished in 2012 to survey their fish populations and collect genetic samples. Genetics were collected from 88 salmonids during these surveys, including 86 rainbow trout/steelhead, and 2 mountain whitefish (Table 34). Fish species collected by stream, the number of genetic samples taken, sample dates, and transect locations are identified in Table 34. Samples were archived in the IDFG Salmon Region office for analysis as funds become available.

MANAGEMENT RECOMMENDATIONS

1) Continue annual monitoring of westslope cutthroat trout, rainbow trout/steelhead, and juvenile Chinook salmon in all 28 mainstem sites, 10 tributary sites, and 6 historical mainstem MFSR sites via snorkeling in July.

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

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

Table 22. Numbers of fish counted in mainstem traditional snorkel transects, Middle Fork Salmon River, 2012.

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	0	0	5	5	4	9	4	0	17	202	0	202	0	23	0	P[b]	0	247
Gardells Hole	0	2	0	0	2	0	1	0	0	1	37	0	37	0	4	0	0	0	44
Velvet	0	1	1	2	4	2	2	0	0	4	3	0	3	0	0	0	0	0	11
Elkhorn	0	1	1	1	3	1	3	0	0	4	20	0	20	0	2	0	0	0	29
Sheepeater	0	0	0	1	1	0	5	0	0	5	8	0	8	1	5	0	0	0	20
~~Greyhound~~																			
Rapid River	0	5	2	5	12	1	13	0	0	14	3	0	3	0	18	0	P	0	47[c]
Indian Pool	0	3	4	3	10	1	0	0	0	1	0	0	0	0	3	0	0	0	14[d]
Pungo	0	4	4	9	17	0	1	0	0	1	1	0	1	0	1	0	0	0	20
Marble Pool	0	9	8	26	43	0	2	0	0	2	76	0	76	0	13	P	P	0	134[c]
Skijump	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lower Jackass	0	5	4	5	14	0	0	0	0	0	0	0	0	0	3	0	P	0	17
Cougar	0	1	2	1	4	2	0	0	0	2	2	0	2	0	8	0	0	0	16
Whitie Cox	0	4	4	2	10	0	0	0	0	0	0	0	0	0	0	P	P	0	10
Rock Island	0	0	1	2	3	1	2	0	0	3	32	0	32	0	3	0	0	0	41[c]
Hospital Pool	0	2	1	2	5	0	1	0	0	1	23	0	23	0	2	P	P	0	31
Hospital Run	0	1	0	0	1	0	2	0	0	2	31	0	31	1	3	P	P	0	38
Tappan Pool	0	1	5	5	11	1	0	0	0	1	0	0	0	0	0	P	P	0	12[c]
Flying B	0	2	4	1	7	0	0	0	0	0	0	0	0	0	2	0	0	0	9
Airstrip	0	2	6	3	11	0	2	6	3	11	20	0	20	0	1	P	0	0	43
Survey	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Big Creek Bridge	0	1	1	4	6	0	4	0	0	4	0	0	0	1	0	P	0	0	11
Love Bar	1	1	1	0	3	1	4	0	0	5	0	0	0	0	4	0	P	0	12
Ship Island	0	2	2	8	12	0	0	0	0	0	31	0	31	1	3	P	P	0	47
Little Ouzel	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Otter Bar	0	0	1	4	5	1	2	0	0	3	2	0	2	0	0	P	P	P	10
Goat Creek Pool	0	2	0	0	2	0	2	0	0	2	4	0	4	0	2	0	0	0	10
Goat Creek Run	0	1	2	0	3	0	1	0	0	1	23	0	23	0	2	0	P	0	29
Total	1	50	55	89	195	15	56	10	3	84	518	0	518	4	102	P	P	P	903

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

Table 23. Densities of westslope cutthroat trout, rainbow trout/steelhead, and juvenile Chinook salmon in mainstem traditional snorkel transects, Middle Fork Salmon River, 2012.

			Densities (Fish/100 m^2)			
Transect Name	River km[a]	Transect Area (m^2)	Westslope Cutthroat Trout	Rainbow Trout/ Steelhead	Chinook Salmon	Other Fish[b]
Boundary	0.3	860.4	0.6	2.0	23.5	2.7
Gardells Hole	4.3	1,360.8	0.2	0.1	2.7	0.3
Velvet	8.8	266.4	1.5	1.5	1.1	0.0
Elkhorn	13.6	625.6	0.5	0.6	3.2	0.3
Sheepeater	21.3	938.4	0.1	0.5	0.9	0.6
Greyhound	24.5	--	--	--	--	--
Rapid River	29.6	651.2	1.8	2.2	0.5	2.8
Indian Pool	40.0	1,205.6	0.8	0.1	0.0	0.2
Pungo	44.3	708.4	2.4	0.1	0.1	0.1
Marble Pool	51.0	1,306.4	3.3	0.2	5.8	1.0
Skijump	52.3	--	--	--	--	--
Lower Jackass	60.6	1,021.2	1.4	0.0	0.0	0.1
Cougar	64.6	460.0	0.9	0.4	0.4	1.7
Whitie Cox	73.9	1,101.6	0.9	0.0	0.0	P[c]
Rock Island	74.1	1,317.6	0.2	0.2	2.7	0.2
Hospital Pool	82.9	864.0	0.6	0.1	2.7	0.2
Hospital Run	84.3	712.8	0.1	0.3	4.4	0.6
Tappan Pool	92.6	1,479.6	0.7	0.1	0.0	P
Flying B	106.6	630.0	1.1	0.0	0.0	0.3
Airstrip	108.6	924.0	1.2	0.4	2.2	0.1
Survey	119.7	630.0	0.2	0.0	0.0	0.0
Big Creek Bridge	124.6	1,554.0	0.4	0.3	0.0	0.1
Love Bar	127.8	840.0	0.4	0.6	0.0	0.5
Ship Island	135.8	1,058.4	1.1	0.0	2.9	0.4
Little Ouzel	144.0	--	--	--	--	--
Otter Bar	144.6	1,258.4	0.4	0.2	0.2	P
Goat Creek Pool	151.5	1,179.2	0.2	0.2	0.3	0.2
Goat Creek Run	151.8	1,073.6	0.3	0.1	2.1	0.2
Total		24,027.6	21.3	10.2	55.7	12.6
Average			0.8	0.4	2.2	0.4

[a] River km readings begin at Dagger Falls at 0.0 km.
[b] Includes bull trout, mountain whitefish, and brook trout.
[c] P = Species present but not enumerated.

Table 24. Number of westslope cutthroat trout and rainbow trout/steelhead by length group (mm), Chinook salmon by age group, and other fish species counted in the mainstem historical (Corley) transects, Middle Fork Salmon River, 2012.

	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	1	1	1	3	0	1	5	6	12	5	0	5	0	16	P[b]	P	0	16	36
Mahoney Camp	0	2	2	6	10	0	0	0	0	0	35	0	35	0	4	P	0	0	4	49
White Creek Pack Bridge	0	5	3	7	15	0	1	0	0	1	34	0	34	0	6	P	P	0	6	56
Bernard Airstrip	0	0	4	3	7	0	0	0	0	0	0	0	0	0	1	0	0	0	1	8
Cliffside Rapids Hole	0	2	2	1	5	1	1	1	0	3	4	0	4	0	1	P	P	P	1	13
Hancock Rapids Hole	0	1	3	6	10	0	1	0	0	1	0	0	0	0	0	P	0	P	0	11
Total	0	11	15	24	50	1	4	6	6	17	78	0	78	0	28	P	P	P	28	173

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

[b] P = Species present but not enumerated.

Table 25. Densities of westslope cutthroat trout, rainbow trout/steelhead, Chinook salmon, and other fish species observed in the mainstem historical (Corley) snorkel transects, Middle Fork Salmon River, 2012.

	Densities (Fish/100 m^2)			
Transect Name	Westslope Cutthroat Trout	Rainbow Trout/ Steelhead	Chinook Salmon	Other Species[a]
Little Creek Guard Station	0.4	1.5	0.6	2.0
Mahoney Camp	2.0	0.0	7.0	0.8
White Creek Pack Bridge	0.5	0.03	1.1	0.2
Bernard Airstrip	0.8	0.0	0.0	0.1
Cliffside Rapids Hole	0.2	0.1	0.2	0.04
Hancock Rapids Hole	1.0	0.1	0.0	P
Total	4.9	1.7	8.9	3.1
Average	0.8	0.3	1.5	0.6

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

Table 26. 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, 2012.

Transect Name	Westslope Cutthroat Trout					Rainbow Trout/Steelhead					Chinook Salmon			Other Species[a]						Total Fish
	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	
Pistol Creek Lower	0	2	0	4	6	4	6	0	0	10	19	0	19	0	3	0	0	0	3	38
Pistol Creek Upper	0	3	0	0	3	7	5	0	0	12	2	0	2	0	0	0	0	0	0	17
Indian Creek Lower	0	0	0	0	0	5	3	0	0	8	2	0	2	1	1	0	0	0	2	12
Indian Creek Upper	0	1	0	1	2	15	4	0	0	19	99	0	99	0	1	0	0	0	1	121
Marble Creek	0	0	1	0	1	3	0	0	0	3	4	0	4	0	1	0	0	0	1	9
Loon Creek Lower	0	4	1	2	7	5	2	0	0	7	22	0	22	0	4	0	P[b]	0	4	40
Loon Creek Upper	0	0	0	0	0	1	0	0	0	1	2	0	2	0	2	0	P	0	2	5
Camas Creek Lower	2	4	10	11	27	2	8	1	0	11	31	6	37	3	66	0	0	0	69	144
Camas Creek Upper	1	7	3	5	16	5	8	1	1	15	8	0	8	1	24	0	0	0	25	64
Big Creek	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	3	21	15	23	62	47	36	2	1	86	189	6	195	5	102	0	P	0	107	450

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

[b] P = Species present but not enumerated.

Table 27. Densities of westslope cutthroat trout, rainbow trout/steelhead, Chinook salmon, and other fish species observed in tributary snorkel transects, Middle Fork Salmon River, 2012.

	Densities (Fish/100 m^2)			
Transect Name	Westslope Cutthroat Trout	Rainbow Trout/ Steelhead	Chinook Salmon	Other Species[a]
Pistol Creek Lower	1.9	3.1	5.9	0.9
Pistol Creek Upper	0.5	1.9	0.3	0.0
Indian Creek Lower	0.0	1.2	0.3	0.3
Indian Creek Upper	0.5	4.3	22.5	0.2
Marble Creek	0.1	0.3	0.5	0.1
Loon Creek Lower	2.4	2.2	7.1	1.3
Loon Creek Upper	0.0	0.4	0.8	0.8
Camas Creek Lower	2.0	0.8	2.7	5.0
Camas Creek Upper	2.8	2.7	1.4	4.4
Big Creek	--	--	--	--
Total	10.2	16.9	41.5	13.0
Average	1.1	1.9	4.6	1.4

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

Table 28. Summary of westslope cutthroat trout, rainbow trout/steelhead, and Chinook salmon numbers and their average densities in mainstem traditional snorkel transects, Middle Fork Salmon River, 1971, 1978, 1984 to 1993, 1996, 1999, 2003 to 2005, and 2007 to 2012.

	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
2011[e]	397	2.4	174	1.0	1,357	8.1	16,757.2
2012	195	0.9	84	0.4	518	2.2	24,027.6

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

Table 29. Summary of westslope cutthroat trout, rainbow trout/steelhead, and Chinook salmon numbers and their average densities in mainstem historical (Corley) snorkel transects, Middle Fork Salmon River, 1996, 1999, 2003 to 2005, and 2007 to 2012.

	Westslope Cutthroat Trout		Rainbow Trout/Steelhead		Chinook Salmon		
Year	No. of Fish	Average Density[a]	No. of Fish	Average Density	No. of Fish	Average Density	Total Transect Area (m^2)
2003	92	0.9	22	0.2	141	1.4	10,069.2
2004	--	--	--	--	--	--	--
2005	112	4.6	0	--	0	--	5,308.0
2007	40	1.1	12	0.3	0	--	4,376.0
2008	--	--	--	--	--	--	--
2009	57	0.6	5	0.1	0	0.0	9,824.0
2010	107	1.7	1	0.02	0	0.0	10,656.0
2011[b]	183	3.3	9	0.2	129	2.3	5,636.0
2012	50	0.8	17	0.3	78	1.5	8,938.0

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

[b] Three of six transects surveyed in 2011.

Table 30. 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 2012.

	Westslope Cutthroat Trout		Rainbow Trout/Steelhead		Chinook Salmon		
Year	No. of Fish	Average Density[a]	No. of Fish	Average Density	No. of Fish	Average Density	Total Transect Area (m^2)
1985	39	1.7	128	5.4	20	0.9	2,356.8
1986	37	1.5	179	7.3	56	2.3	2,455.3
1987	23	1.0	106	4.4	9	0.4	2,412.5
1988	27	1.0	128	4.6	33	1.2	2,782.0
1989	7	0.3	68	2.4	89	3.2	2,782.0
1990	34	1.2	140	5.0	16	0.6	2,792.0
1991	33	0.9	78	2.2	3	0.1	3,615.0
1992	17	0.5	52	1.7	9	0.3	3,149.0
1993	86	0.8	97	0.8	1	0.1	10,809.0
1996	95	0.9	113	1.0	1	0.0	10,985.0
1999	44	1.1	140	0.2	141	3.4	4,349.6
2003	85	1.8	102	2.2	412	8.8	4,704.0
2004[b]	68	2.2	69	1.9	673	23.1	3,742.9
2005	42	1.1	91	2.2	49	1.2	4,447.2
2007	27	0.1	28	0.1	29	0.1	4,073.2
2008	--	--	--	--	--	--	--
2009	65	1.3	36	0.7	52	1.1	4,901.2
2010	60	1.9	40	1.4	11	0.3	3,635.2
2011[c]	28	1.0	12	0.4	39	1.3	2,904.8
2012	62	1.1	86	1.6	195	3.6	5,473.8

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

[b] Six of 10 transects surveyed in 2004.

[c] Five of 10 transects surveyed in 2011.

Table 31. Numbers of fish observed during snorkeling in tributary plumes and above plume sites in the mainstem Middle Fork Salmon River, 2012. Tributaries are listed in sequence as encountered downriver of Boundary Creek.

		Westslope Cutthroat Trout Total Length (mm)					Rainbow Trout/Steelhead Total Length (mm)					Chinook Salmon			Other Species[a]					
Tributary	Strata	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	Trout fry	Total Fish
Elkhorn	Above plume	0	0	0	0	0	16	2	0	0	18	7	0	7	0	0	0	0	0	25
Elkhorn	Plume	1	8	0	4	13	7	0	0	0	7	0	0	0	0	7	0	0	0	27
Deer Horn	Above plume	0	0	0	0	0	4	0	0	0	4	3	0	3	0	0	0	0	0	7
Deer Horn	Plume	0	1	0	1	2	1	0	0	0	1	0	0	0	0	0	0	0	0	4[e]
Rapid River	Above plume	0	0	0	0	0	0	0	0	0	0	10	0	10	0	1	0	0	1	12
Rapid River	Plume	0	0	0	0	0	1	0	0	0	1	11	0	11	0	0	0	0	0	12
Cow	Above plume	0	0	0	0	0	1	1	0	0	2	42	0	42	0	0	0	0	0	44
Cow	Plume	0	0	0	0	0	3	0	0	0	3	18	0	18	0	0	0	0	0	21
Garden	Above plume	0	0	0	0	0	1	0	0	0	1	3	1	4	0	0	0	0	0	5
Garden	Plume	0	1	0	0	1	4	3	0	0	7	13	0	13	0	0	0	0	0	21
Indian	Above plume	0	1	1	0	2	0	0	0	0	0	10	0	10	0	1	0	0	0	13
Indian	Plume	0	1	1	0	2	3	0	0	0	3	13	0	13	1	1	0	0	0	20
Pungo	Above plume	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	2
Pungo	Plume	0	0	0	0	0	0	4	0	0	4	12	0	12	0	0	0	0	0	16
Teapot	Above plume	0	0	1	0	1	0	0	0	0	0	22	3	25	0	1	0	0	0	27
Teapot	Plume	0	0	2	0	2	0	2	0	0	2	22	1	23	0	0	0	0	0	27
Little Soldier	Above plume	2	0	1	0	3	0	0	0	0	0	6	0	6	0	1	0	0	0	10
Little Soldier	Plume	0	1	2	1	4	1	2	0	0	3	62	0	62	0	2	0	0	0	71
Marble	Above plume	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	2
Marble	Plume	0	1	1	0	2	1	0	0	0	1	7	0	7	0	0	0	0	0	10
Little Loon	Above plume	0	1	0	1	2	1	3	0	0	4	7	0	7	0	0	0	0	0	13
Little Loon	Plume	0	0	0	0	0	2	1	0	0	3	0	0	0	0	0	0	0	1	4
Cougar	Above plume	0	0	0	1	1	1	0	0	0	1	1	1	2	0	0	1	0	0	5
Cougar	Plume	0	0	1	1	2	0	0	0	0	0	10	0	10	0	0	1	0	0	13
Mahoney	Above plume	0	0	0	0	0	3	1	0	0	4	3	0	3	0	0	0	0	0	7
Mahoney	Plume	0	1	0	0	1	0	0	0	0	0	12	0	12	0	0	0	0	0	13
Pine	Above plume	0	0	0	0	0	0	1	0	0	1	0	0	0	0	2	0	0	0	3
Pine	Plume	0	0	0	1	1	2	0	0	0	2	0	0	0	0	0	0	0	0	4
White	Above plume	0	0	0	0	0	0	0	0	0	0	10	0	10	0	0	0	0	0	10
White	Plume	0	0	0	0	0	1	0	0	0	1	19	0	19	0	2	0	0	0	22

Table 31. Continued.

Tributary	Strata	Westslope Cutthroat Trout Total Length (mm)					Rainbow Trout/Steelhead Total Length (mm)					Chinook Salmon			Other Species[a]					
		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	Trout fry	Total Fish
Big Loon	Above plume	0	2	0	0	2	0	0	0	0	0	2	0	2	0	0	0	0	0	4
Big Loon	Plume	0	3	1	0	4	0	2	0	0	2	11	0	11	0	5	0	0	0	22
Norton	Above plume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2
Norton	Plume	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2
Cub	Above plume	0	0	0	0	0	0	0	0	0	0	5	0	5	1	0	0	0	0	6
Cub	Plume	0	1	1	2	4	0	0	0	0	1[d]	15	0	15	0	2	0	1	0	23
Little Grouse	Above plume	0	1	0	0	1	0	1	0	0	1	23	0	23	0	0	0	0	0	25
Little Grouse	Plume	0	1	3	5	9	1	3	0	0	4	27	1	28	3	0	0	0	0	44
Camas	Above plume	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Camas	Plume	0	3	1	0	4	0	1	0	0	1	0	0	0	0	3	0	0	0	8
Big Bear	Above plume	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1[c]
Big Bear	Plume	0	0	1	0	1	1	0	0	0	1	12	0	12	0	0	0	0	0	14[c]
Sheep	Above plume	0	0	0	1	1	0	0	0	0	0	5	2	7	0	0	0	0	0	8
Sheep	Plume	1	0	1	2	4	0	0	0	0	0	1	0	1	1	0	0	0	5	11
Warm Springs	Above plume	0	0	0	0	0	1	0	0	0	1	5	0	5	0	0	0	0	0	6
Warm Springs	Plume	0	0	3	1	4	0	0	0	0	0	2	0	2	0	1	0	0	0	7
Brush	Above plume	0	0	0	0	0	1	0	0	0	1	0	1	1	0	0	0	0	1	3
Brush	Plume	0	2	1	1	4	0	2	0	0	2	1	0	1	2	0	0	0	0	9
Soldier	Above plume	0	0	0	0	0	1	0	0	0	1	2	0	2	0	1	0	0	0	4[c]
Soldier	Plume	0	0	5	3	8	0	0	0	0	0	21	0	21	4	0	0	0	0	33
Wilson	Above plume	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	2
Wilson	Plume	0	2	3	0	5	0	0	0	0	0	0	0	0	0	1	0	1	0	7
Bobtail	Above plume	0	1	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Bobtail	Plume	0	1	0	1	2	0	1	0	0	1	5	0	5	0	1	0	0	0	9
Waterfall	Above plume	0	0	0	2	2	0	2	0	0	2	4	0	4	0	2	0	0	0	10
Waterfall	Plume	0	1	2	1	4	0	0	0	0	0	16	0	16	0	0	0	0	2	24[f]
Big	Above plume	0	1	0	0	1	0	0	0	0	0	12	0	12	0	0	0	0	1	14[c]
Big	Plume	0	0	1	0	1	6	2	0	0	8	5	0	5	0	0	0	0	0	14[c]
Golden	Above plume	0	0	0	0	0	0	1	0	0	1	4	0	4	0	0	0	0	0	5
Golden	Plume	0	1	1	0	2	0	3	0	0	3	5	0	5	0	0	0	0	0	10
Papoose	Above plume	0	1	1	1	3	3	0	0	0	3	0	0	0	0	0	0	0	0	6
Papoose	Plume	0	0	0	3	3	1	0	0	0	1	0	0	0	1	1	0	1	1	8

Table 31. Continued.

Tributary	Strata	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	Trout fry	Total Fish
Ship Island	Above plume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ship Island	Plume	0	5	2	4	11	0	0	0	0	0	11	0	11	0	0	0	1	0	23
Stoddard	Above plume	0	0	0	0	0	2	1	0	0	3	4	0	4	0	1	0	0	0	8[c]
Stoddard	Plume	0	0	0	0	0	2	1	0	0	3	1	0	1	0	0	0	0	0	4
Roaring	Above plume	0	0	1	1	2	1	2	0	0	3	6	0	6	0	3	0	0	0	14
Roaring	Plume	0	0	2	7	9	0	5	0	0	5	7	0	7	4	4	1	0	0	30
Goat	Above plume	0	4	0	0	4	0	0	0	0	0	0	0	0	0	1	0	0	0	5
Goat	Plume	0	1	4	3	8	0	1	0	0	1	1	0	1	4	2	1	1	0	18
Total		4	48	46	48	146	73	48	0	0	122[d]	542	10	552	22	49	4	5	12	912

[a] BU = Bull trout, MWF = Mountain whitefish, NPM = Northern pikeminnow, and SUC = Sucker (various species).
[b] P = Species present but not enumerated.
[c] Pearlshell (Freshwater clams) present.
[d] One RBT unsized.
[e] Includes one sculpin (*Cottus sp.*).
[f] Includes two redside shiners.

Table 32. Temperatures, temperature differences, and species densities in 35 snorkeling tributary plumes and above plume sites in the mainstem Middle Fork Salmon River, 2012. Tributaries are listed in the sequence encountered travelling downriver from Boundary Creek.

Tributary	Strata	Temperature (°C)	Plume Temperature Difference (°C)	Tributary Temperature Difference (°C)	Species Densities[a]						
					CT	RBT/SH	CK[b]	BU	MWF	Trout fry	Total
Elkhorn	Above plume	16.0	2.0		0.0	14.0	5.4	0.0	0.0	0.0	19.4
Elkhorn		--									
Elkhorn	Plume	14.0	2.0		10.1	5.4	0.0	0.0	5.4	0.0	20.9
Deer Horn	Above plume	17.0	1.5		0.0	4.4	3.3	0.0	0.0	0.0	7.8
Deer Horn		--									
Deer Horn	Plume	15.5	1.5		1.6	0.8	0.0	0.0	0.0	0.0	2.4
Rapid River	Above plume	17.5	2.5	3.0	0.0	0.0	7.9	0.0	0.8	0.8	8.7
Rapid River		14.5									
Rapid River	Plume	15.0	2.5	0.5	0.0	0.5	5.7	0.0	0.0	0.0	6.3
Cow	Above plume	--			0.0	1.4	30.4	0.0	0.0	0.0	31.9
Cow		--									
Cow	Plume	16.0			0.0	2.2	13.0	0.0	0.0	0.0	15.2
Garden	Above plume	15.0	2.0	5.0	0.0	0.8	3.0	0.0	0.0	0.0	3.8
Garden		10.0									
Garden	Plume	13.0	2.0	3.0	0.8	5.3	9.8	0.0	0.0	0.0	15.9
Indian	Above plume	15.0	0	-1.0	1.4	0.0	6.9	0.0	0.7	0.0	9.0
Indian		16.0									
Indian	Plume	15.0	0	-1.0	1.4	2.1	9.0	0.7	0.7	0.0	13.9
Pungo	Above plume	16.0	3.0	6.0	0.0	0.0	1.3	0.0	0.0	0.0	1.3
Pungo		10.0									
Pungo	Plume	13.0	3.0	3.0	0.0	2.7	8.0	0.0	0.0	0.0	10.7
Teapot	Above plume	13.0	0	7.0	0.7	0.0	16.7	0.0	0.7	0.0	18.0
Teapot		6.0									
Teapot	Plume	13.0	0	7.0	1.3	1.3	15.3	0.0	0.0	0.0	18.0
Little Soldier	Above plume	14.0	1.0	4.0	2.2	0.0	4.3	0.0	0.7	0.0	7.2
Little Soldier		10.0									
Little Soldier	Plume	13.0	1.0	3.0	2.8	2.1	43.1	0.0	1.4	0.0	49.3
Marble	Above plume	15.0	0	-1.0	0.0	0.0	1.9	0.0	0.0	0.0	1.9
Marble		16.0									
Marble	Plume	15.0	0	-1.0	1.9	0.9	6.5	0.0	0.0	0.0	9.3

Table 32. Continued.

Tributary	Strata	Temperature (°C)	Plume Temperature Difference	Tributary Temperature Difference	Species Densities[a]						
					CT	RBT/SH	CK[b]	BU	MWF	Trout fry	Total
Little Loon	Above plume	17.5	2.5	3.5	1.4	2.9	5.1	0.0	0.0	0.0	9.4
Little Loon		14.0									
Little Loon	Plume	15.0	2.5	1.0	0.0	3.8	0.0	0.0	0.0	1.3	3.8
Cougar	Above plume	18.0	0.5	3.0	1.3	0.7	1.3	0.0	0.0	0.0	3.3
Cougar		15.0									
Cougar	Plume	17.5	0.5	2.5	1.2	0.0	6.2	0.0	0.0	0.0	7.4
Mahoney	Above plume	17.0	1.0	6.0	0.0	2.7	2.0	0.0	0.0	0.0	4.7
Mahoney		11.0									
Mahoney	Plume	16.0	1.0	5.0	0.7	0.0	8.0	0.0	0.0	0.0	8.7
Pine	Above plume	14.0	1.0	3.0	0.0	0.6	0.0	0.0	1.3	0.0	1.9
Pine		11.0									
Pine	Plume	13.0	1.0	2.0	0.6	1.3	0.0	0.0	0.0	0.0	1.9
White	Above plume	16.0	1.0	2.0	0.0	0.0	7.2	0.0	0.0	0.0	7.2
White		14.0									
White	Plume	15.0	1.0	1.0	0.0	0.7	13.8	0.0	1.4	0.0	15.9
Big Loon	Above plume	19.0	0	0	1.2	0.0	1.2	0.0	0.0	0.0	2.5
Big Loon		19.0									
Big Loon	Plume	19.0	0	0	3.0	1.5	8.3	0.0	3.8	0.0	16.7
Norton	Above plume	18.0	1.0	2.0	0.0	0.0	0.0	0.0	1.7	0.0	1.7
Norton		16.0									
Norton	Plume	17.0	1.0	1.0	0.0	0.0	0.0	0.8	0.8	0.0	1.7
Cub	Above plume	20.0	2.0	3.0	0.0	0.0	3.5	0.7	0.0	0.0	4.2
Cub		17.0									
Cub	Plume	18.0	2.0	1.0	2.8	0.7	10.4	0.0	1.4	0.0	15.3
Little Grouse	Above plume	20.0	2.0	5.0	0.7	0.7	16.7	0.0	0.0	0.0	18.1
Little Grouse		15.0									
Little Grouse	Plume	18.0	2.0	3.0	6.5	2.9	20.3	2.2	0.0	0.0	31.9
Camas	Above plume	15.5	3.5	3.5	0.7	0.0	0.0	0.0	0.0	0.0	0.7
Camas		12.0									
Camas	Plume	12.0	3.5	0	2.0	0.5	0.0	0.0	1.5	0.0	4.0
Big Bear	Above plume	18.0	2.0	3.0	0.6	0.0	0.0	0.0	0.0	0.0	0.6
Big Bear		15.0									
Big Bear	Plume	16.0	2.0	1.0	0.7	0.7	8.3	0.0	0.0	0.0	9.7

Table 32. Continued.

Tributary	Strata	Temperature (°C)	Plume Temperature Difference	Tributary Temperature Difference	Species Densities[a] CT	RBT/SH	CK[b]	BU	MWF	Trout fry	Total
Sheep	Above plume	19.0	0	0.5	0.7	0.0	4.9	0.0	0.0	0.0	5.6
Sheep		18.5									
Sheep	Plume	19.0	0	0.5	2.8	0.0	0.7	0.7	0.0	3.5	4.2
Warm Springs	Above plume	17.5	0.5	4.5	0.0	0.6	3.1	0.0	0.0	0.0	3.7
Warm Springs		13.0									
Warm Springs	Plume	17.0	0.5	4.0	2.4	0.0	1.2	0.0	0.6	0.0	4.2
Brush	Above plume	20.0	1.0	1.0	0.0	0.6	0.6	0.0	0.0	0.6	1.3
Brush		19.0									
Brush	Plume	19.0	1.0	1.0	2.7	1.3	0.7	1.3	0.0	0.0	6.0
Soldier	Above plume	20.0	2.0	4.0	0.0	0.7	1.4	0.0	0.7	0.0	2.8
Soldier		16.0									
Soldier	Plume	18.0	2.0	2.0	4.4	0.0	11.7	2.2	0.0	0.0	18.3
Wilson	Above plume	19.0	3.0	4.0	0.0	0.0	1.3	0.0	0.0	0.0	1.3
Wilson		15.0									
Wilson	Plume	16.0	3.0	1.0	2.3	0.0	0.0	0.0	0.5	0.0	2.7
Bobtail	Above plume	15.0	0	4.0	1.7	0.0	0.0	0.0	0.0	0.0	1.7
Bobtail		11.0									
Bobtail	Plume	15.0	0	4.0	1.9	0.9	4.6	0.0	0.9	0.0	8.3
Waterfall	Above plume	16.0	0.5	3.0	1.2	1.2	2.5	0.0	1.2	0.0	6.2
Waterfall		13.0									
Waterfall	Plume	15.5	0.5	2.5	3.0	0.0	12.1	0.0	0.0	1.5	15.2
Big	Above plume	18.0	2.0	2.0	0.8	0.0	9.1	0.0	0.0	0.8	9.8
Big		16.0									
Big	Plume	16.0	2.0	0	0.5	3.7	2.3	0.0	0.0	0.0	6.5
Golden	Above plume	18.5	1.5	2.5	0.0	0.7	2.7	0.0	0.0	0.0	3.3
Golden		16.0									
Golden	Plume	17.0	1.5	1.0	1.2	1.9	3.1	0.0	0.0	0.0	6.2
Papoose	Above plume	19.0	0.5	1.5	1.7	1.7	0.0	0.0	0.0	0.0	3.3
Papoose		17.5									
Papoose	Plume	18.5	0.5	1.0	1.7	0.6	0.0	0.6	0.6	0.6	3.3

Table 32. Continued.

Tributary	Strata	Temperature (°C)	Plume Temperature Difference	Tributary Temperature Difference	Species Densities[a] CT	RBT/SH	CK[b]	BU	MWF	Trout fry	Total
Ship Island	Above plume	17.0	1.5		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ship Island		--									
Ship Island	Plume	15.5	1.5		3.9	0.0	3.9	0.0	0.0	0.0	7.8
Stoddard	Above plume	18.5	0.5	3.5	0.0	4.2	5.6	0.0	1.4	0.0	11.1
Stoddard		15.0									
Stoddard	Plume	18.0	0.5	3.0	0.0	3.8	1.3	0.0	0.0	0.0	5.1
Roaring	Above plume	19.0	4.0	6.0	1.1	1.7	3.3	0.0	1.7	0.0	7.8
Roaring		13.0									
Roaring	Plume	15.0	4.0	2.0	4.0	2.2	3.1	1.8	1.8	0.0	12.9
Goat	Above plume	19.0	1.0	6.0	2.3	0.0	0.0	0.0	0.6	0.0	2.9
Goat		13.0									
Goat	Plume	18.0	1.0	5.0	5.3	0.7	0.7	2.7	1.3	0.0	10.7

[a] Species: CT = Westslope cutthroat trout, RBT/SH = Rainbow trout/steelhead, CK = Chinook salmon, BU = Bull trout, and MWF = Mountain whitefish.

[b] CK includes Chinook salmon age-0 and age-1 counts combined.

Table 33. Summary of fish caught and released during project angling in the mainstem Middle Fork Salmon River, 1996, 1999, 2003 to 2005, and 2007 to 2012.

Year	Total No. of Fish	No. of Fish By Species[a]										Total Hours Fished
		CT	RBT/SH	BU	RBTxCT	CK	MWF	EBT	RSS	NPM	SUC	
1996	400	280	116	0	0	0	2	0	0	2	0	UNK[b]
1999	322	182	12	0	8	0	0	0	0	0	0	UNK
2003	260	167	91	0	0	1	0	0	1	0	0	UNK
2004	430	243	184	1	0	1	0	0	0	1	0	133.8
2005	401	226	157	7	0	0	2	0	0	5	0	69.3
2007	542	264	253	2	1	0	6	0	0	16	0	121.7
2008	155	64	90	0	1	0	0	0	0	0	0	26.9
2009	601	340	230	2	8	0	4	1	2	14	0	166.0
2010	334	174	115	8	3	11	21	2	0	0	0	116.2
2011	162	109	47	0	0	0	6	0	0	0	0	42.0
2012	541	299	206	11	4	0	14	0	1	5	1	145.9

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

[b] UNK = Unknown.

Table 34. Summary of salmonid genetic samples collected during angling in the mainstem Middle Fork Salmon River (MFSR) and electrofishing selected tributaries, July 25 to August 1, 2012.

Stream/River	Sample Date	WGS84 Latitude	WGS84 Longitude	Species[a] and No. of Genetic Samples Taken BU	CK	MWF	RBT/SH
Loon Creek	29 Jul 2012	44.80788	-114.81194	--	--	1	15
MFSR[b] - mainstem from Boundary Cr. to Gardells Hole	25 Jul 2012	44.52831	-115.29286	--	--	--	--
MFSR - mainstem from Gardells Hole to John's Camp	26 Jul 2012	44.56658	-115.30079	--	--	--	--
MFSR – mainstem from John's Camp to Pungo Creek	27 Jul 2012	44.65089	-115.16636	--	--	--	--
MFSR - mainstem from Pungo Creek to Pine Flat	28 Jul 2012	44.76477	-115.07285	--	--	8	--
MFSR - mainstem from Pine Flat to Johnny Walker	29 Jul 2012	44.76496	-114.89416	--	--	2	--
MFSR - mainstem from Johnny Walker to Survey	30 Jul 2012	44.89551	-114.73227	--	--	3	--
Pistol Creek	27 Jul 2012	44.76697	-115.08873	--	--	1	38
Rapid River	27 Jul 2012	44.68002	-115.15263	--	--	--	33

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

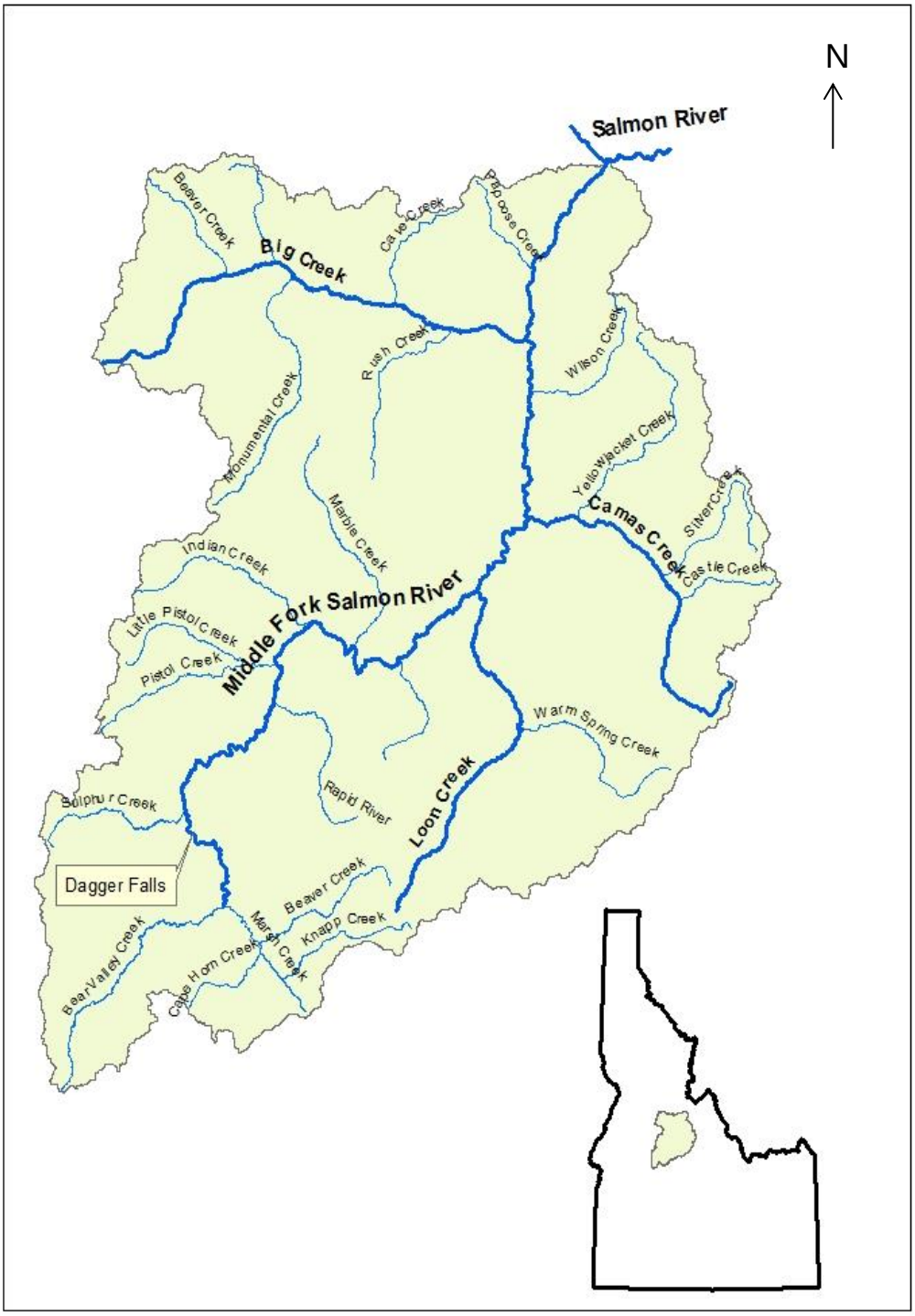

Figure 27. Map of the Middle Fork Salmon River and major tributaries, Idaho.

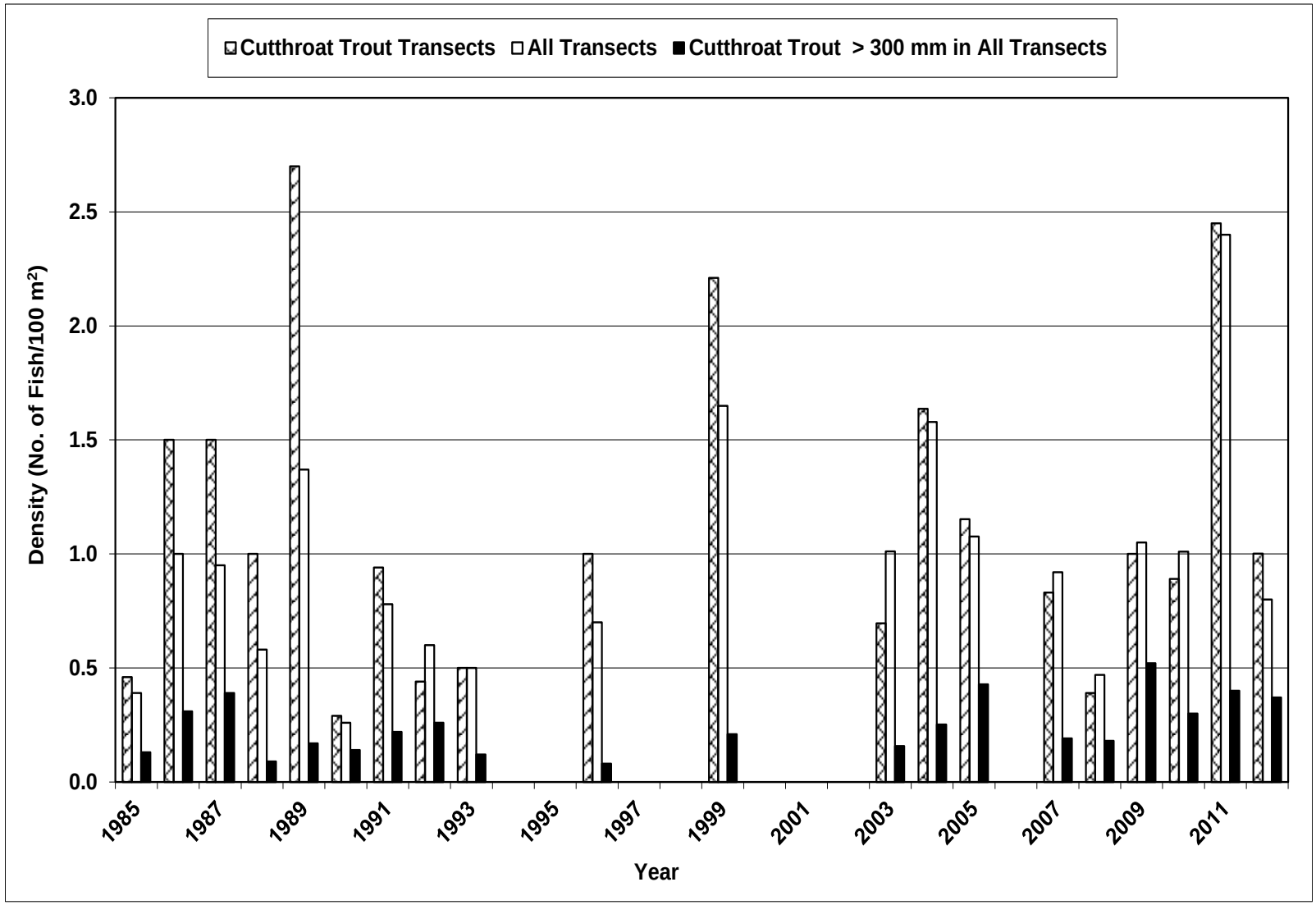

Figure 28. Densities of westslope cutthroat trout in westslope cutthroat trout-only transects (see Appendix B), in all transects, and densities of westslope cutthroat trout greater than 300 mm counted in all transects during mainstem snorkel surveys, Middle Fork Salmon River, 1985 to 2012. Not all transects sampled in all years.

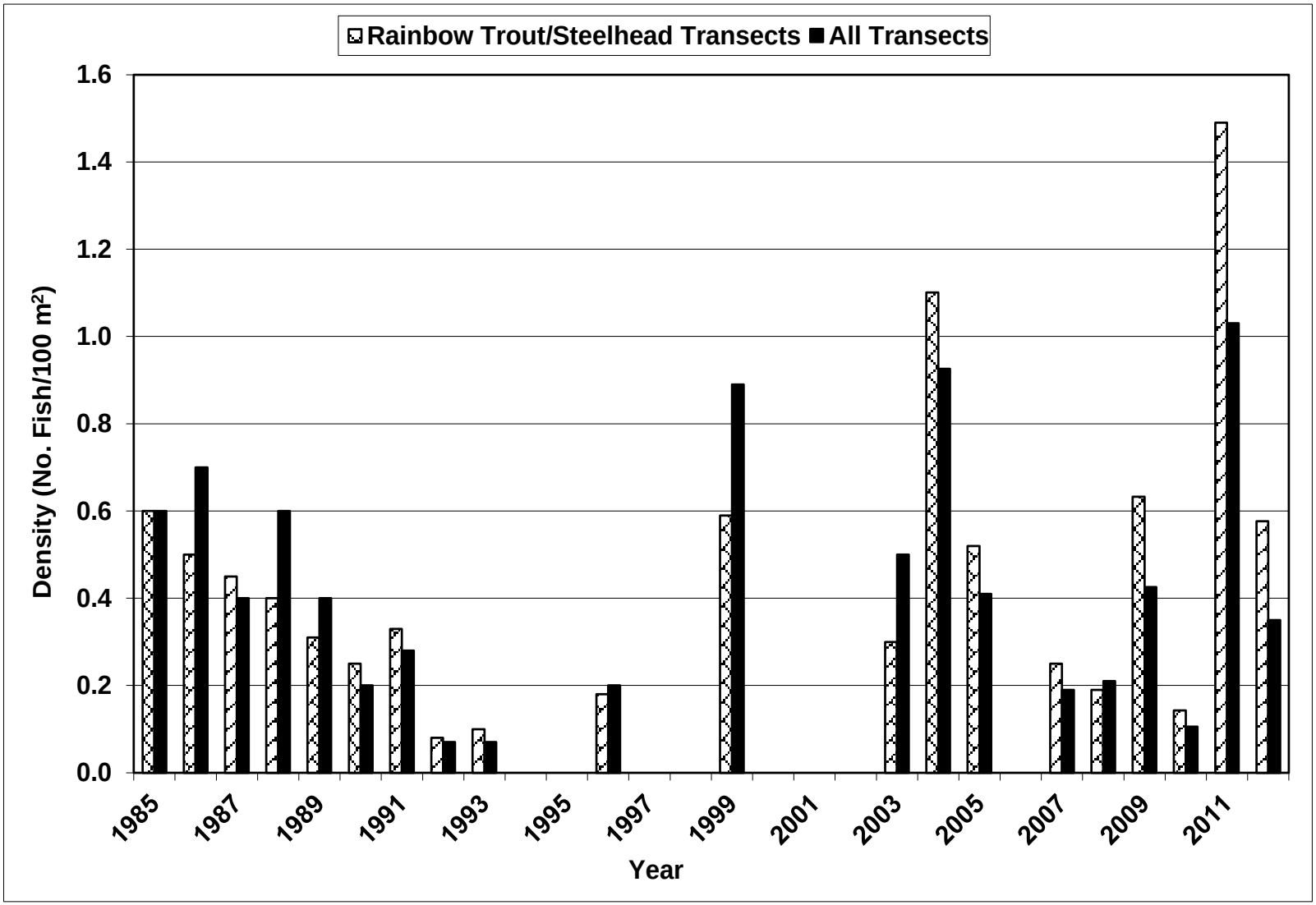

Figure 29. Densities of rainbow trout/steelhead in rainbow trout/steelhead-only transects (see Appendix B) and in all transects during mainstem snorkel surveys, Middle Fork Salmon River, 1985 to 2012. Not all transects sampled in all years.

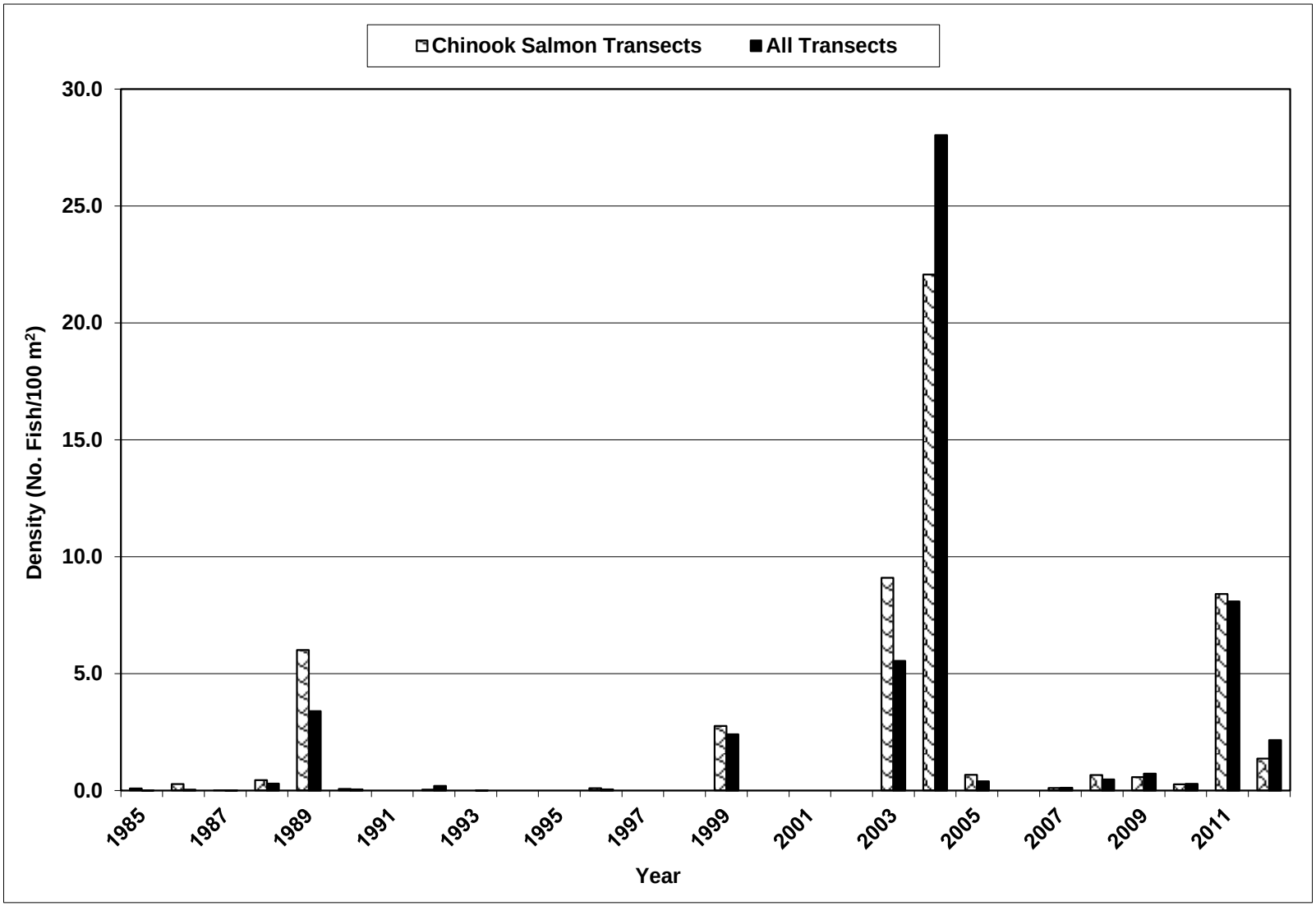

Figure 30. Densities of Chinook salmon in Chinook salmon-only transects (see Appendix B) and in all transects during mainstem Middle Fork Salmon River snorkel surveys, 1985 to 2012. Not all transects sampled in all years.

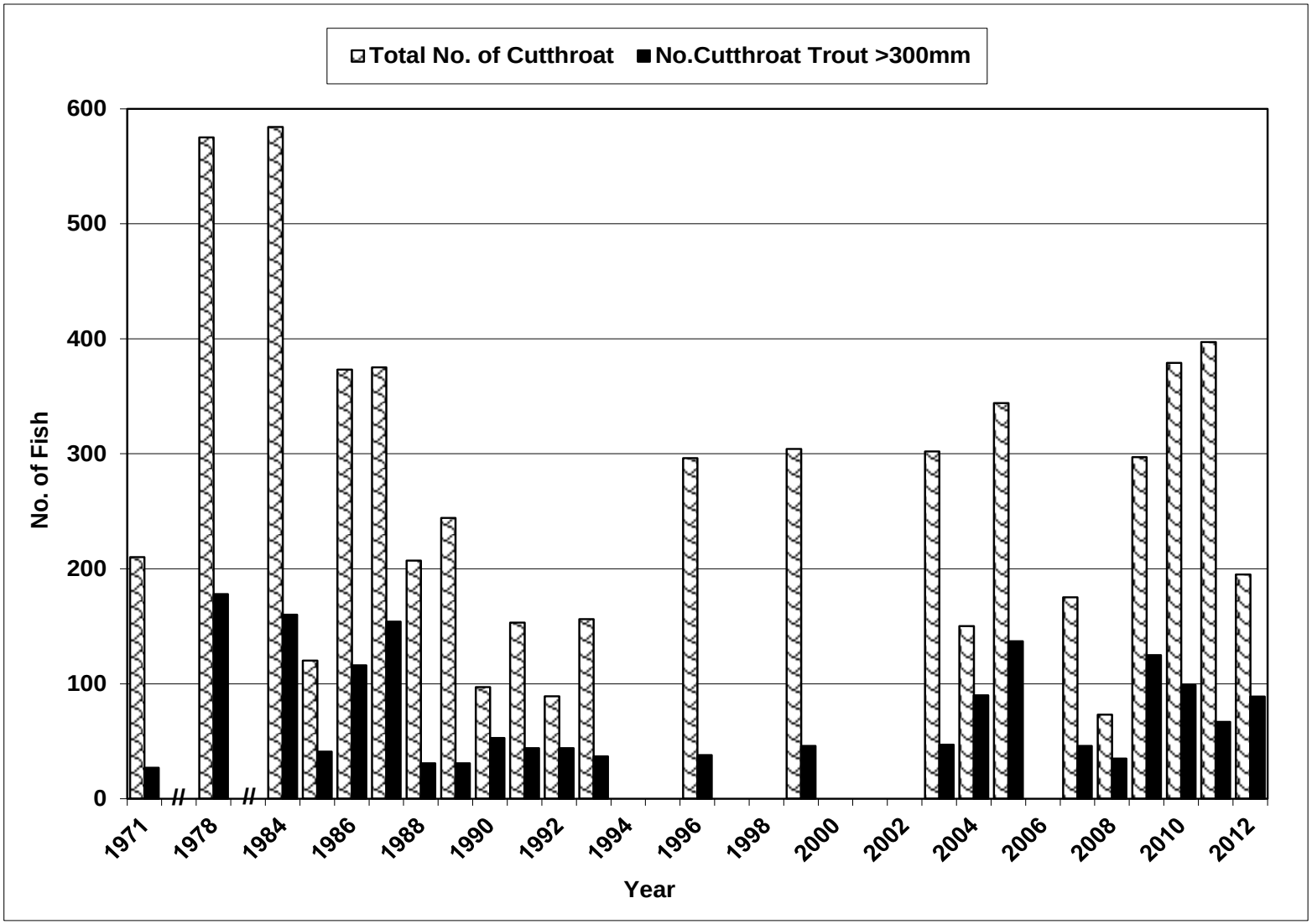

Figure 31. Number of westslope cutthroat trout counted in mainstem snorkel transects and number of cutthroat larger than 300 mm total length (TL) per year sampled, Middle Fork Salmon River, 1971, 1978, 1984 to 2012. Not all transects sampled in all years.

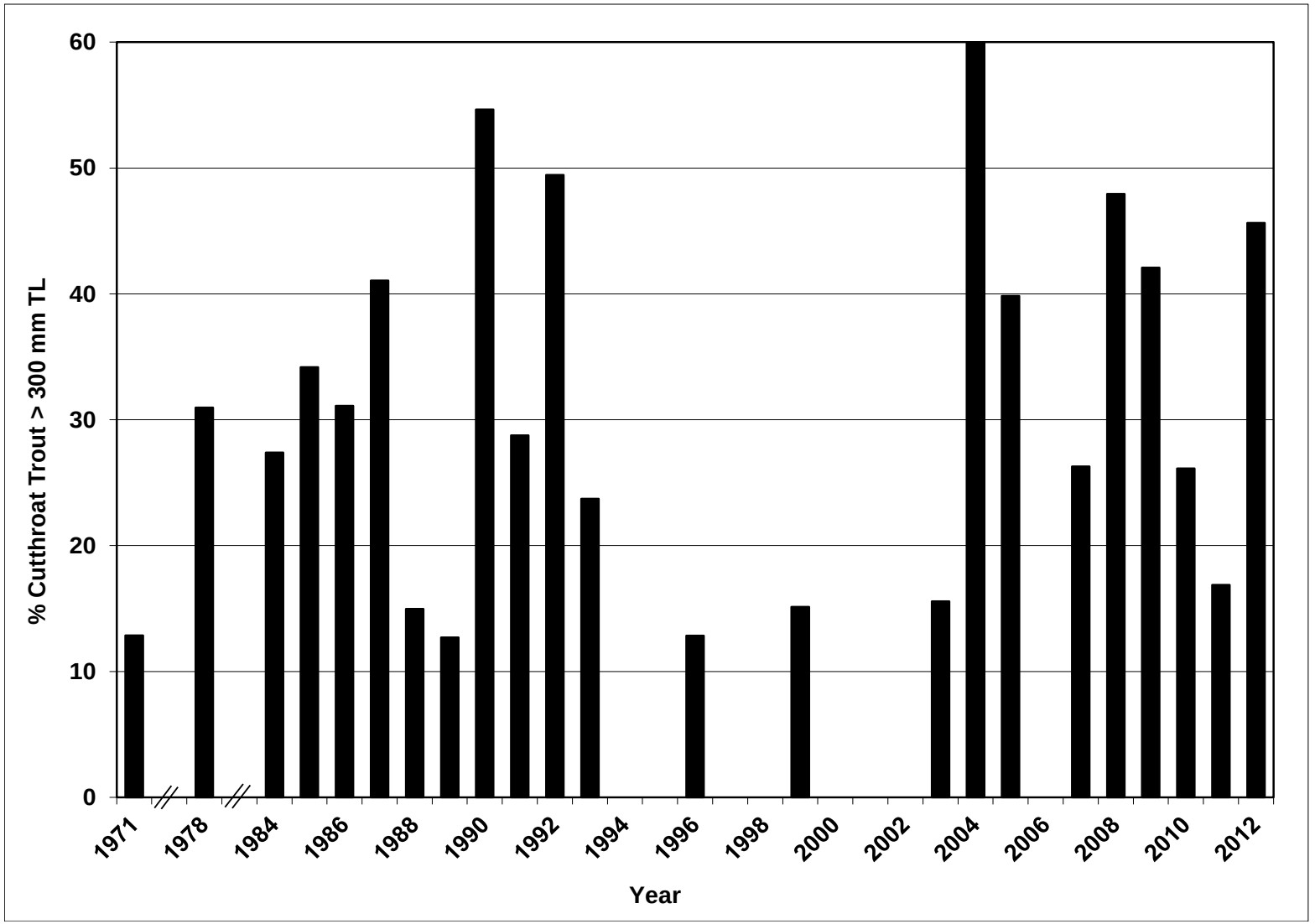

Figure 32. Percent of westslope cutthroat trout larger than 300 mm total length (TL) sampled by mainstem snorkeling, Middle Fork Salmon River, 1971, 1978, 1984 to 2012. Not all transects sampled in all years.

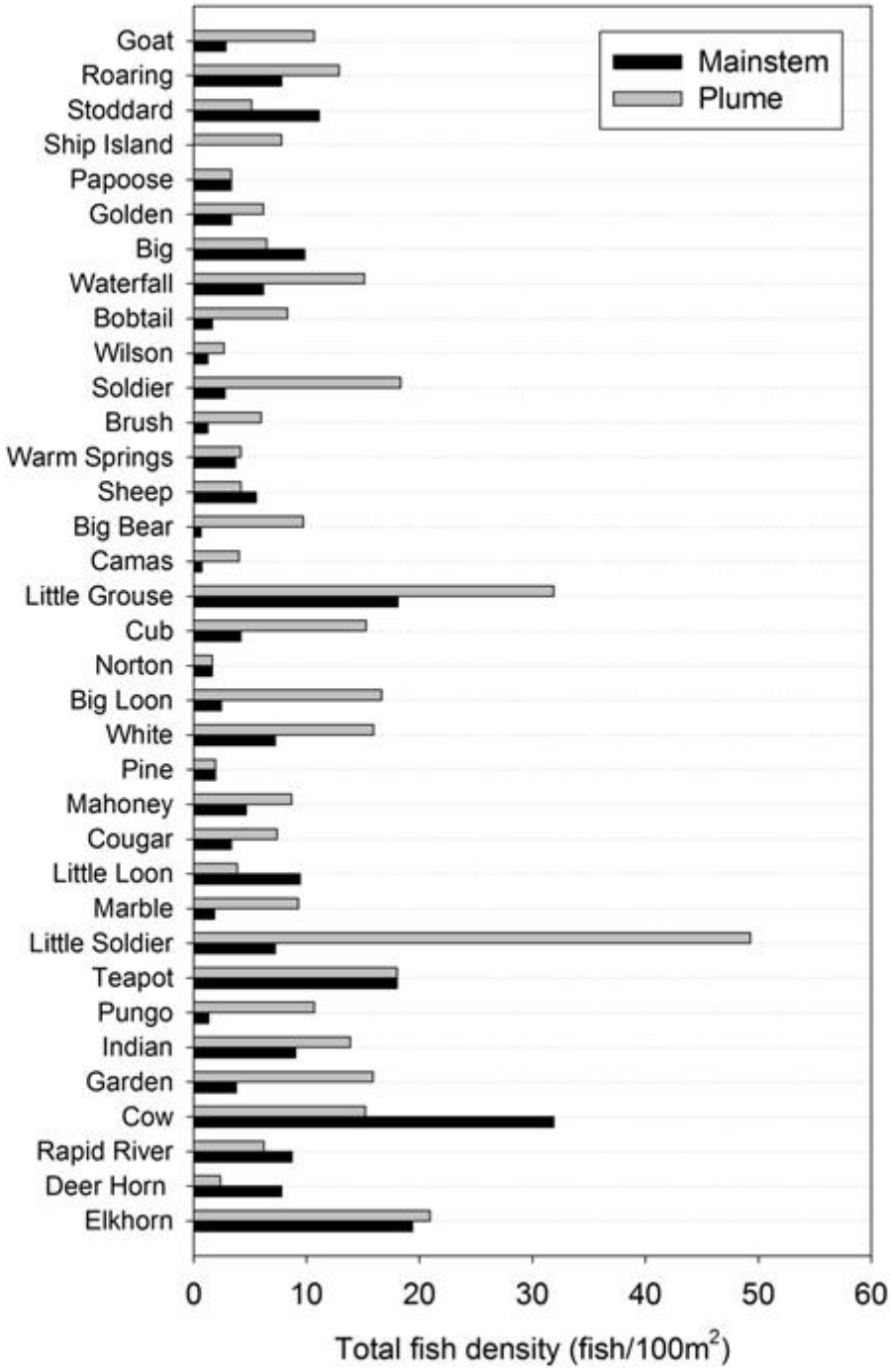

Figure 33. Densities of fish (fish/100m^2) in the mainstem Middle Fork Salmon River above plumes and below plumes from tributaries observed via snorkeling, starting from the highest upriver site at Elkhorn Creek to the lowest downriver site at Goat Creek.

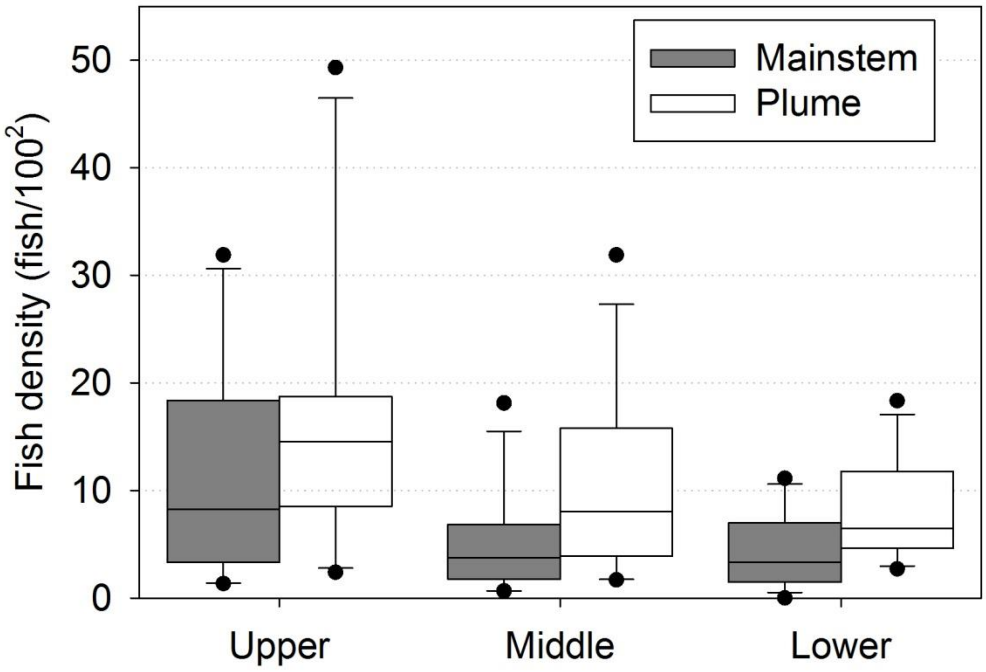

Figure 34. Boxplot comparisons of fish densities (fish/100m^2) in three river sections of the mainstem Middle Fork Salmon River above plumes and in plumes at 35 selected sites, 2012.

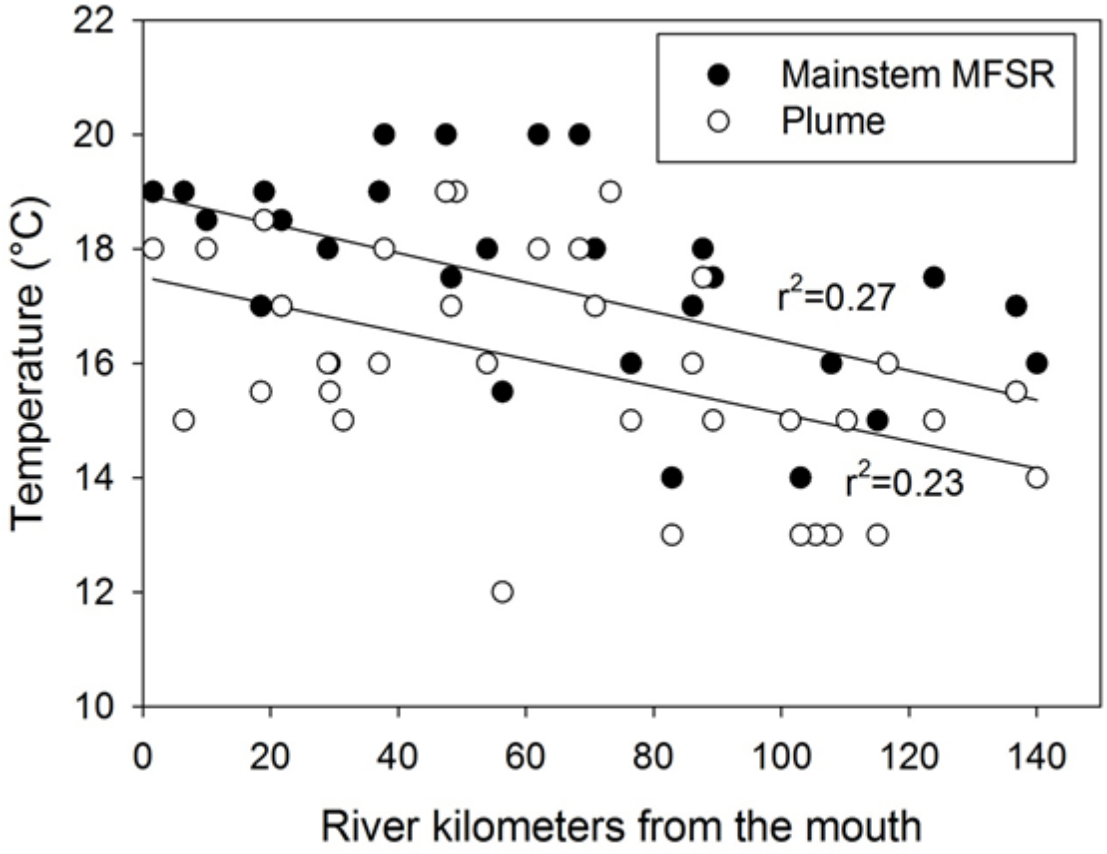

Figure 35. Temperatures in the mainstem Middle Fork Salmon River (MFSR) and plumes, proceeding from the mouth of the MFSR to the most upriver site. Solid lines indicate linear regressions.

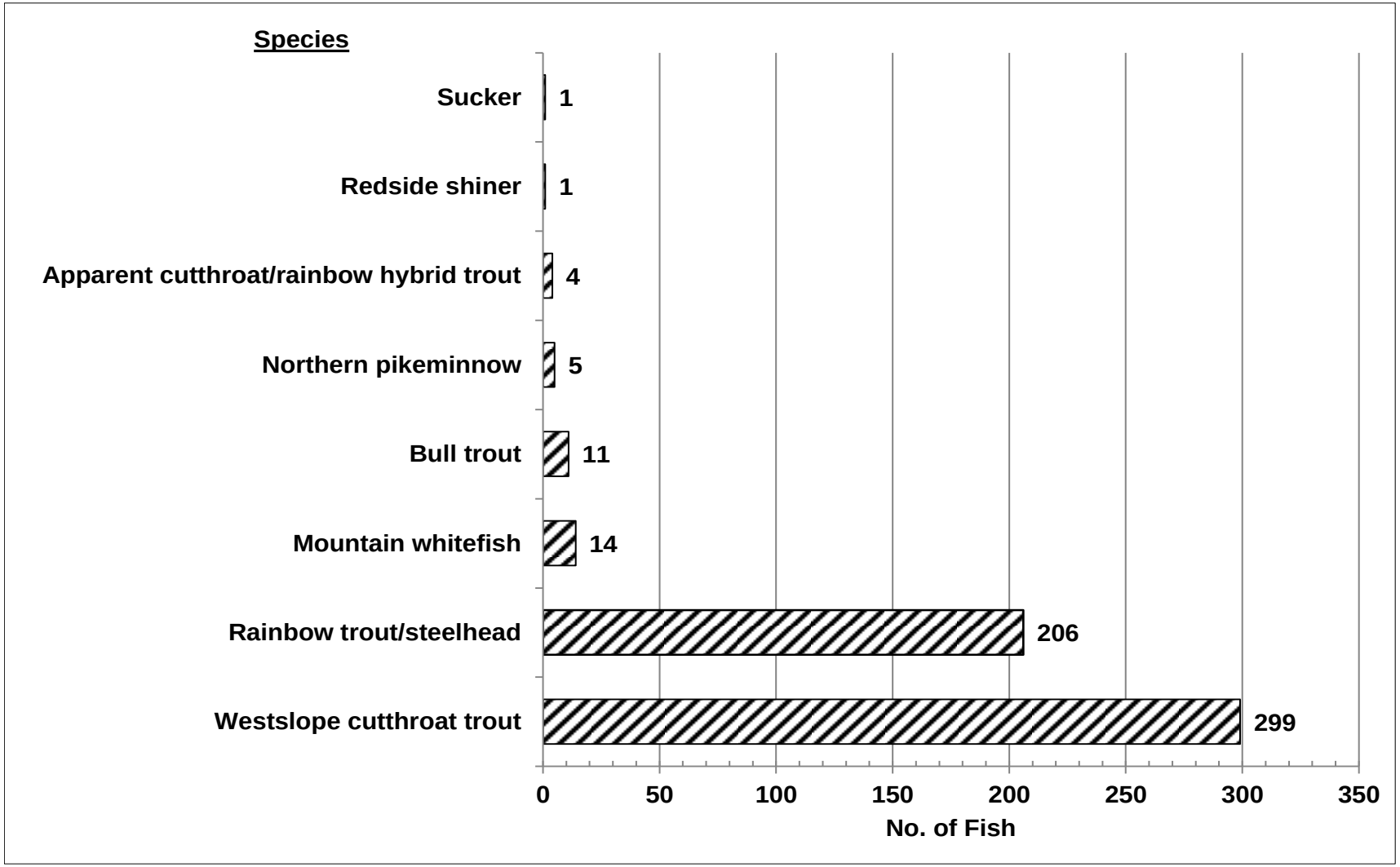

Figure 36. Species composition of fish (*n* = 541) caught by project anglers in the mainstem Middle Fork Salmon River, 2012.

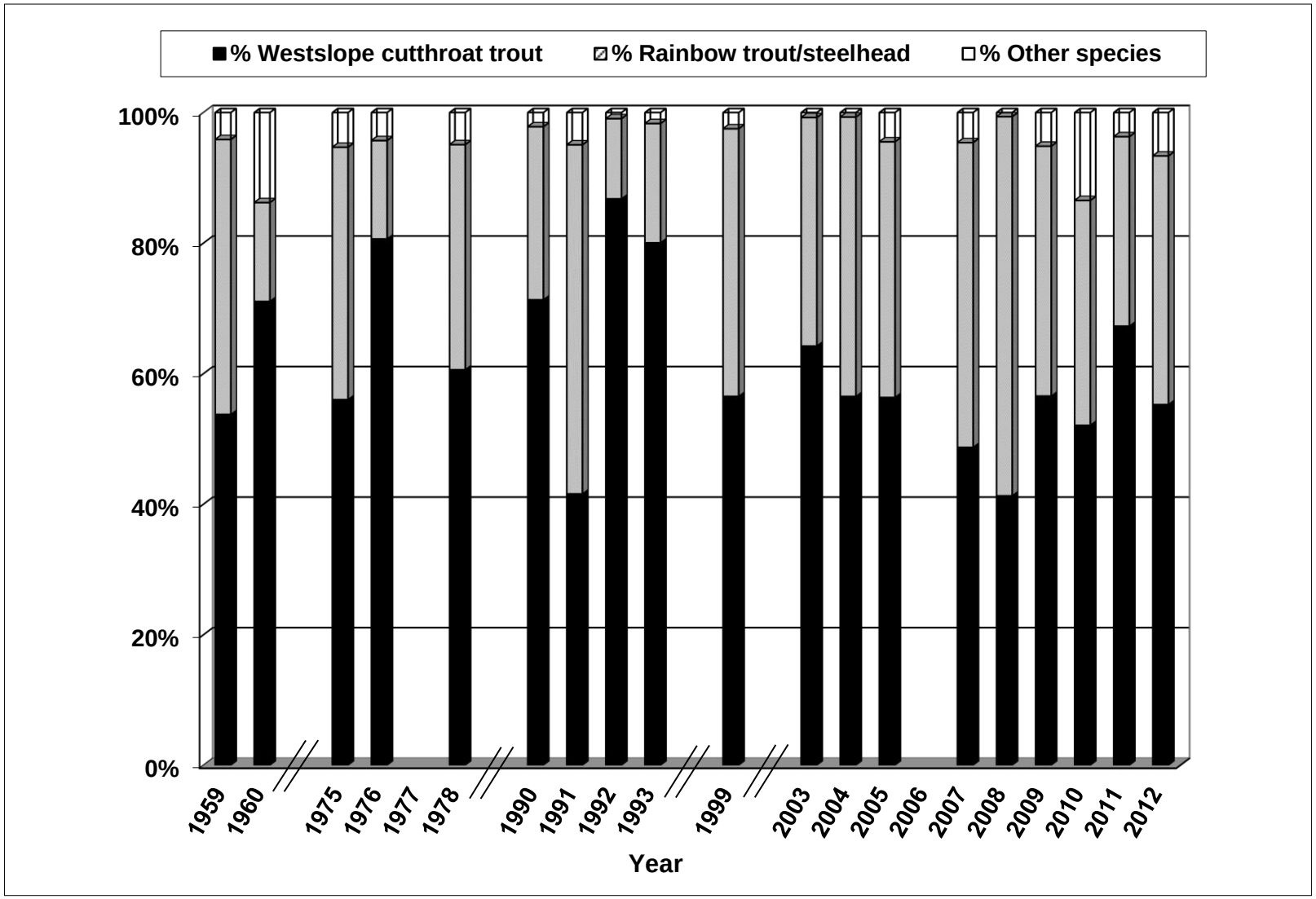

Figure 37. Proportions of species caught by project anglers in the Middle Fork Salmon River, 1959, 1960, 1975, 1976, 1978, 1990 to 1993, 1999, 2003 to 2012. Other species includes all fish species caught per year except westslope cutthroat trout and rainbow trout/steelhead.

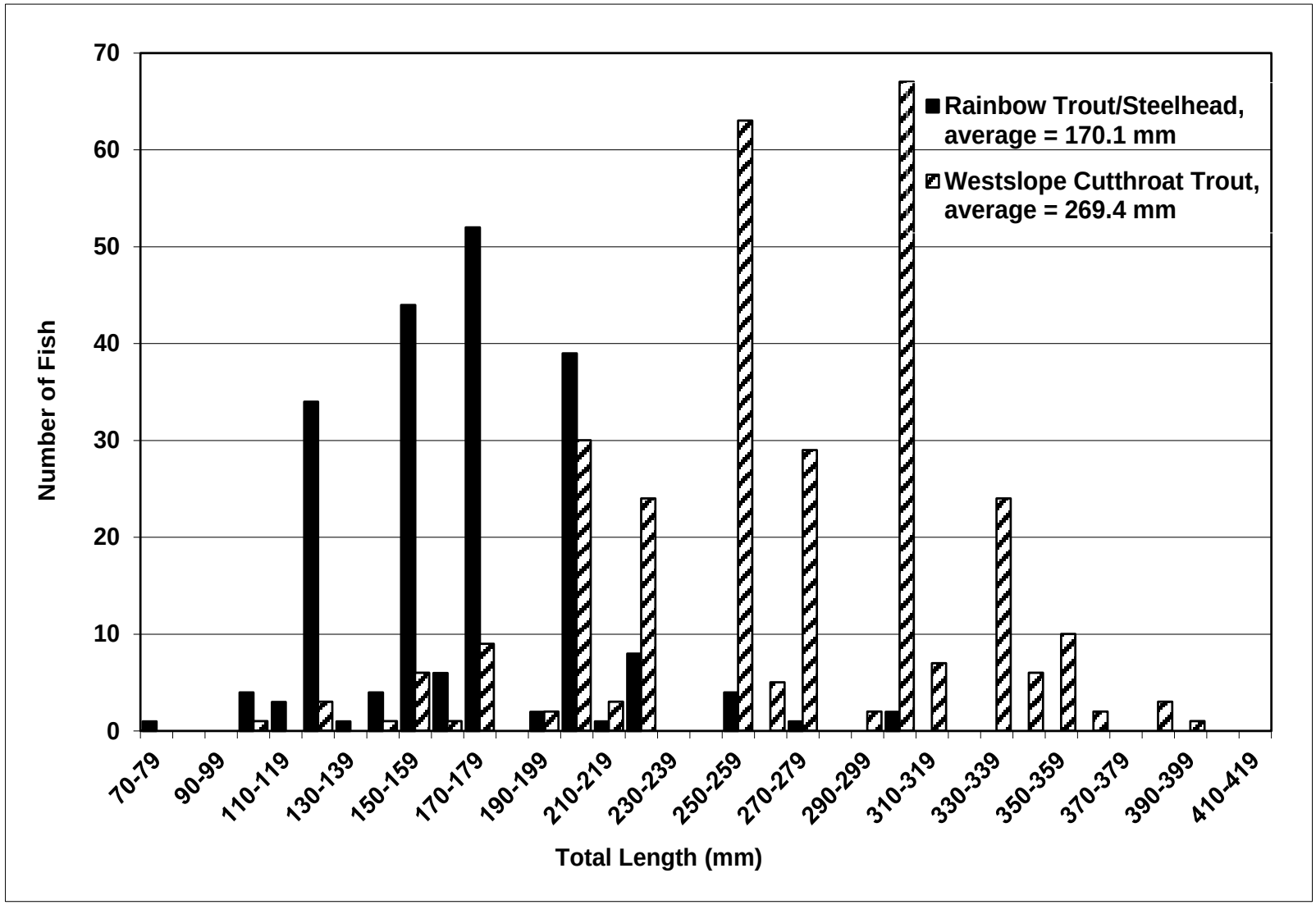

Figure 38. Length frequency of rainbow trout/steelhead (*n* = 206) and westslope cutthroat trout (*n* = 299) caught by project anglers in the Middle Fork Salmon River, 2012.

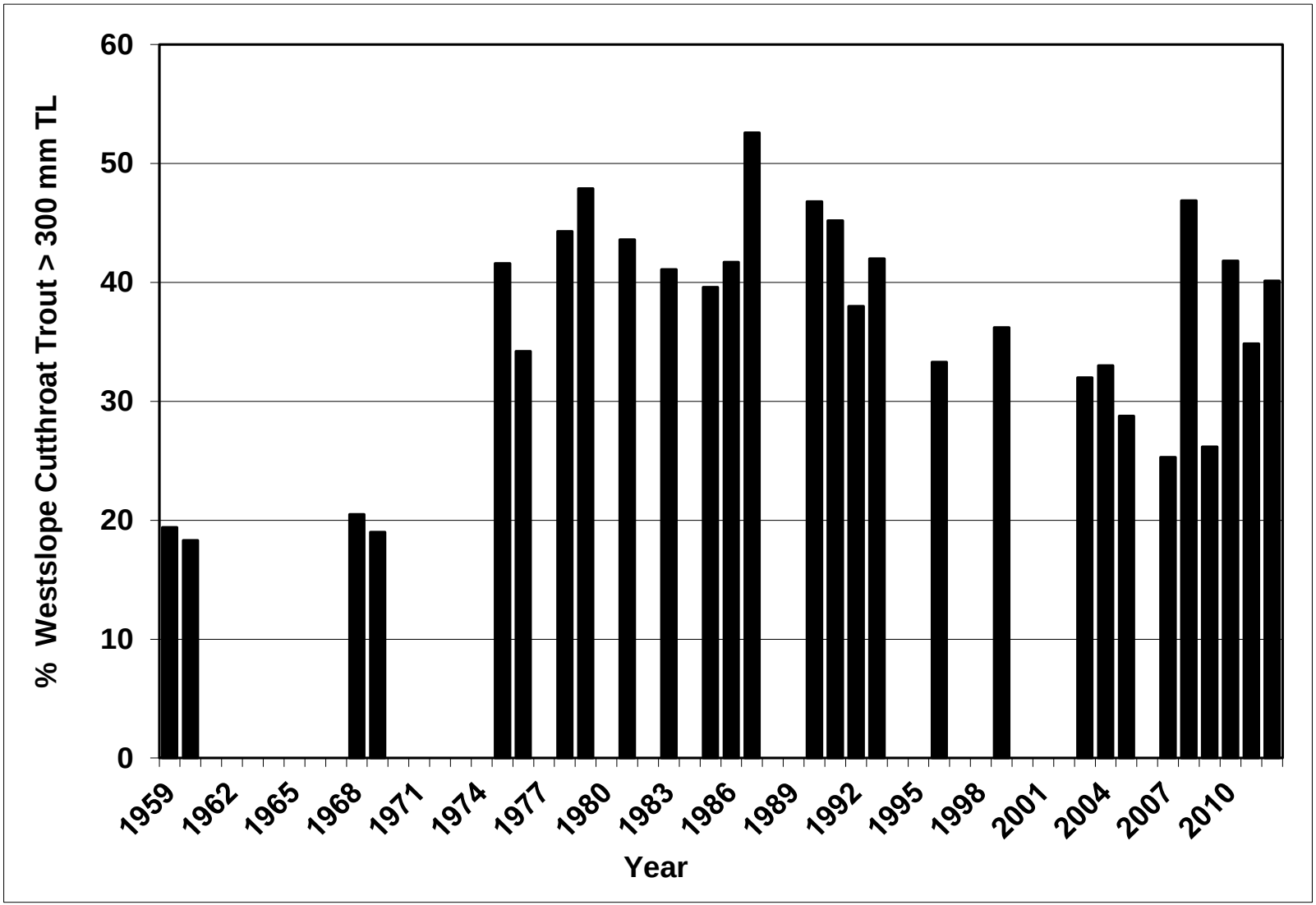

Figure 39. Percentage of westslope cutthroat trout larger than 300 mm total length (TL) sampled by project angling in the Middle Fork Salmon River, 1959 to 2012.

SALMON REGION FISHERY MANAGEMENT 2012 ANNUAL REPORT

Public Outreach – Technical Assistance and Angler Recruitment and Retention

ABSTRACT

During 2012, project staff responded to numerous requests for technical assistance from state, federal and tribal entities, non-government organizations and private individuals. We submitted comments to agencies and private entities regarding a variety of projects with the potential to alter fisheries habitat.

To increase public awareness of the value of fisheries habitat and to increase and maintain participation in fishing, staff participated in angler informational meetings, "Trout in the Classroom" presentations, a Career Day Expo for students, and a week-long county fair display. Fishery staff also collaborated with resource partners in conducting ice fishing and Free Fishing Day fishing derbies. Our outreach efforts were attended by almost 1,250 anglers and regional residents. Regional staff also crafted press releases regarding Chinook salmon fishing, steelhead trout fishing, and ice fishing techniques and safety to assist the public in gaining a greater appreciation for their fishery resources.

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

An estimated 45,000 anglers fished in the Salmon Region in 2012, 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.

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Jon Flinders, Regional Fishery Biologist

Marsha White, Regional Fishery Technician

Tom Curet, Regional Fishery Manager

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, and federal government offices, other non-governmental offices, and tribal entities.

OBJECTIVES

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

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.

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

METHODS

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

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

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

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

RESULTS AND DISCUSSION

During 2012, we responded to numerous technical assistance requests for assistance or comments on water, habitat, and fishery-related matters (Appendix E).

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. In 2012 the region was provided permanent technical assistance support from the IDFG's Upper Snake Region. This support will allow the management biologists much more freedom and flexibility relative to general fish management activities.

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 210 young anglers participated in the various events. Additionally, a total of 81 young anglers attended the 21st Annual Kids' Ice Fishing Derby on January 29, 2012 at Hyde Pond.

We presented fisheries related topics to approximately 450 junior high and high school attendees at Career Day Expo. We also presented "Trout in the Classroom" programs in the Leadore and Salmon school districts to approximately 405 students ranging from 4th graders to high school upper classmen.

Fisheries staff also generated news releases regarding Chinook salmon and steelhead trout fishing, ice fishing techniques and safety, and the 2012 Chinook fishery in the upper Salmon River.

Staff also worked with The Nature Conservancy to pursue the creation of a fishing access site adjacent to the V. Don Olson Ranch. Details and negotiations are on-going.

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

MANAGEMENT RECOMMENDATIONS

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) Provide assistance to the new Environmental Staff biologist until the person becomes familiar and comfortable with their duties.

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

SALMON REGION FISHERY MANAGEMENT 2012 ANNUAL REPORT

Upper Salmon River Chinook Salmon Fishery

ABSTRACT

A Chinook salmon fishery was conducted by IDFG on 141.3 km of the Salmon River between the Sawtooth Fish Hatchery and Ellis, Idaho, during the summer of 2012. The Stanley area fishery (location code 19) opened on June 23, 2012 and closed August 5, 2012. The Ellis area fishery (location code 18) opened on July 4, 2012 and closed August 5, 2012. Creel personnel interviewed 2,731 Chinook salmon anglers. Angler pressure consisted of an estimated 36,550 hours of effort in the combined fishery areas. The greatest amount of angler effort occurred during the week of July 9. Anglers harvested an estimated 801 adult hatchery Chinook salmon and 81 "jack" Chinook salmon in the fishery. The IDFG portion of the harvestable share was 1,292 adult hatchery Chinook salmon. An estimated 22 "recycled" hatchery Chinook salmon were harvested by anglers. Anglers released an estimated 560 Chinook salmon with intact adipose fins and 95 hatchery Chinook salmon during the fishery. Sawtooth Fish Hatchery reported that 2,495 hatchery Chinook salmon returned to the hatchery weir during 2012. Sport anglers exploited an estimated 24% of hatchery Chinook salmon during the fishery. Peak river discharge in the Stanley area occurred during May 2012 compared to June during 2010 and 2011. Creel staff sampled 27.4% of the estimated Chinook salmon harvested by sport anglers for tags and marks. Trout and salmon anglers harvested and released an estimated 625 and 3,615 hatchery rainbow trout, respectively, during the Chinook salmon fishery. Anglers released the greatest number of Chinook salmon with intact adipose fins in the 6 km or river immediately downstream of the Sawtooth Fish Hatchery weir. Anglers released the greatest number of Chinook salmon with intact adipose fins during the week of July 16. The release of one sockeye salmon was reported by a Chinook salmon angler on August 3 and later verified by creel staff. The Shoshone Bannock Tribe reported that tribal members harvested an estimated 259 hatchery Chinook salmon from the Salmon River during the summer of 2012.

Authors:

Jon Hansen, Regional Fishery Biologist

Brent Beller, Regional Fishery Technician

INTRODUCTION

Authorization for an upper Salmon River hatchery Chinook salmon fishery occurred during spring of 2012 when the IDFG Commission approved a season based on run strength predictions. The Commission approved regulations that allowed sport harvest to begin on June 23 on the portion of the Salmon River from the Highway 75 Salmon River bridge about 229 m upstream of the mouth of the East Fork Salmon River upstream to a posted boundary about 91 m downstream of the Sawtooth Fish Hatchery weir (referred to as the Stanley area fishery). Additionally, the portion of the Salmon River, stretching from about 91 m upstream from the confluence with the Pahsimeroi River upstream to the posted boundary about 229 m upstream of the mouth of the East Fork Salmon River was opened to fishing beginning July 4 (referred to as the Ellis area fishery) (Figure 40). Anglers were authorized to keep 4 hatchery Chinook salmon per day of which no more than 2 could be adults. The angler possession limit was 12 hatchery Chinook salmon of which no more than 6 could be adults. Anglers were allowed to fish for Chinook salmon from 0500 hour to 2200 hour Mountain Standard Daylight time.

The pre-season forecast estimated 11,351 hatchery adult Chinook salmon would return to Sawtooth Fish Hatchery during 2012 (Sharr, IDFG, unpublished data). The final number (after harvest) of adult hatchery Chinook salmon that returned to Sawtooth Fish Hatchery was 2,495 fish (Hamilton 2012). Additionally, 293 hatchery "jack" Chinook salmon returned to Sawtooth Fish Hatchery (Hamilton 2012). IDFG's portion of the hatchery Chinook salmon harvest share, based on the number of PIT-tagged fish that returned to Lower Granite Dam, was 1,292 fish (Sharr, IDFG, unpublished data).

Snow pack levels in the Salmon Region diminished significantly during the month of April. Consequently, peak Salmon River discharge occurred in the month of May during 2012 compared to June during 2010 and 2011 (Figure 41).

OBJECTIVES

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

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

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

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

Provide enforcement personnel with information regarding possible violations.

Report any observations by field personnel of aquatic invasive species.

STUDY AREA AND METHODS

Salmon River Location Codes

Location Code 18

The lower boundary of location code 18 is located at the confluence of the Pahsimeroi River and the Salmon River. The upper boundary of location code 18 is located at the confluence of the East Fork Salmon River and the Salmon River. In location code 18, approximately 67 km of the mainstem Salmon River was open to Chinook salmon fishing. All data was collected and analyzed based on location code boundaries – not fishery area boundaries.

A roving creel was conducted by 2 technicians between 0600 hour and 2200 hour. Each day was split into 2, 8 hour shifts with 1 technician working each shift. Each work week consisted of both weekend days and 3 randomly selected week days. The technicians collected angler effort, catch data, and conducted 3 randomly selected angler counts each work shift. The release locations of Chinook salmon with intact adipose fins reported by anglers during interviews were recorded by creel clerks on GPS units based on the location of the interview. As the season progressed, a third creel technician waited at boat ramps to collect completed trip boat data.

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

All field personnel reviewed instructional videos regarding safety issues that could be encountered in the field. Additionally, crews reviewed a video and were given instructions regarding how aquatic invasive species should be identified and reported.

Location Code 19

The lower boundary of location code 19 is located at the confluence of the East Fork Salmon River and the Salmon River. The upper boundary of location code 19 is located 91 m downstream of the weir by the Sawtooth Fish Hatchery. Approximately 74 km of the mainstem Salmon River was open for hatchery Chinook salmon fishing.

Location code 19 was stratified into 2 areas for the purpose of data collection. One creel technician was assigned to each work area during every work shift. All technicians collected angler effort, angler catch data, and conducted 3 randomly selected angler counts every work shift. The release locations of Chinook salmon with intact adipose fins reported by anglers during interviews were recorded by creel clerks on GPS units based on the location of the interview. Initially, creel was conducted every day of the week. However, after the upper Salmon River fishery was extended to include the Ellis fishery area, work days were changed to reflect the schedule as described above for Section 18. Additionally, only 1 creel technician collected angler effort, catch data, and conducted angler counts for both stratified work areas during the evening shift.

Estimates of Angler Pressure and Catch

For each work period, interview data was used to calculate the proportion of anglers fishing for salmon versus fishing exclusively for trout. A work period consisted of 5 week days or 2 weekend days. The angler count data for each work period was then multiplied by the proportion of anglers fishing for Chinook salmon to adjust for trout anglers in the fishery. Adjustments for bank and boat trout anglers were calculated independently.

Angler counts were conducted from vehicles or on foot from vantage points in areas where anglers were concentrated. All visible bank anglers were tallied. Vehicles parked in known fishing areas were tallied if anglers were not visible. The mean number of anglers per vehicle was calculated from interview data and multiplied by vehicle counts to create an estimated number of unseen bank anglers associated with vehicles. A similar method was used to generate an estimated number of boat anglers based on boat trailer counts.

Expanded estimated values of angler effort and catch were developed using the South Dakota Creel Entry Analysis Software (CAS). Estimated values of angler effort and catch were developed separately for weekdays and weekend days and summed to create values for Monday through Sunday of each calendar week. Estimated values of angler effort and catch were developed for each location code and summed to create estimated values of total pressure and catch for the fishery.

Estimates of Harvested "Recycled" Chinook Salmon

Sawtooth Fish Hatchery staff subsampled 134 hatchery Chinook salmon (117 adults and 17 "jacks") at the hatchery trap and designated them as fish to be "recycled" into the fishery. The "recycled" fish were trapped during 3 different days (July 12, 13, and 20), marked with a left opercle punch, and trucked to a location immediately upstream of the confluence of Valley Creek and the Salmon River. Methods similar to those used to calculate estimated expansions of coded-wire tags recovered during fisheries were applied to angler-caught "recycled" Chinook salmon to create estimated values of harvested "recycled" fish. For example, each "recycled" "jack" or adult fish recorded during an angler interview was divided by a sample rate created from the estimated harvest and the number of fish checked for marks for the associated work period. The expanded harvest of recycled fish (by disposition) from each work period was then summed to create a total estimated harvest of all "recycled" salmon.

RESULTS AND DISCUSSION

Salmon River Location Codes

Location Code 18

The peak week of angler effort in location code 18 occurred immediately after the Ellis fishery area opened on July 4 (Figure 42). The majority of angler effort was focused in the vicinity of Deadman's Hole. The reduction in angler effort over time possibly occurred because the majority of hatchery fish migrated through the Ellis area fishery before July 9 as indicated by Chinook salmon trapped at the Sawtooth Fish Hatchery (Figure 42).

Based on raw data, creel staff conducted 452 angler interviews in location code 18 (Table 35). Angler participation in the Chinook salmon fishery was low in location code 18 compared to location code 19. Anglers harvested an estimated 102 hatchery Chinook salmon and released 65 Chinook salmon with intact adipose fins in location code 18 during the fishery (Table 36). The majority of fish kept were caught by bank anglers. Similar proportions of hatchery Chinook salmon and Chinook salmon with intact adipose fins were caught after the week of July 7. Creel staff sampled 40.2% of the estimated sport-angler-harvested Chinook salmon for tags and marks. The angler catch-per-unit-effort was 0.017 for hatchery Chinook salmon.

Location Code 19

The peak week of angler effort in location code 19 occurred during the week of July 9 (Table 36). Angler effort significantly declined after July 16. The decline in angler effort corresponded with a significant decline in the number of Chinook salmon trapped at the Sawtooth Fish Hatchery weir (Figure 42; Hamilton, unpublished report, 2012).

Based on raw data from the Chinook salmon fishery, creel staff conducted 2,279 interviews in location code 19 (Table 35). The overwhelming majority of fish checked by creel clerks were kept by bank anglers. The greatest concentration of bank anglers occurred in the areas of Buckhorn Bridge and Sunbeam. Boat anglers primarily used the portion of the Salmon River between Torrey's Hole and the East Fork Salmon River. Creel clerks checked 201 Chinook salmon for tags and marks (Table 35).

The estimated angler harvest of hatchery Chinook salmon was 780 fish in location code 19 (Table 36). Anglers released 495 Chinook salmon with intact adipose fins. Similar proportions of hatchery Chinook salmon and Chinook salmon with intact adipose fins were caught by anglers during the last two weeks of the fishery. Based on raw angler interview data, the greatest number of Chinook salmon with intact adipose fins were caught in the 6 km of river immediately downstream of the Sawtooth Fish Hatchery weir (Figure 43). The angler catch-per-unit-effort was 0.028 for hatchery Chinook salmon. The estimated sport angler harvest exploitation rate was 24% for combined river sections. The Shoshone Bannock Tribes reported tribal members harvested an estimated 259 hatchery Chinook salmon from the Salmon River during the summer of 2012.

The estimated harvest of "recycled" Chinook salmon was 22 fish (Table 37). Of the 134 "recycled" salmon, 56 (42%) returned to the Sawtooth Fish Hatchery weir (Hamilton, unpublished report, 2012). Additionally, another 56 (42%) of the 134 "recycled" Chinook salmon were unaccounted for in either the estimated harvest or fish counted at the Sawtooth Fish Hatchery weir.

As in 2008, 2009, 2010 and 2011, trout anglers were found in greater densities in the Buckhorn Bridge area, in the Stanley vicinity, and the portion of the Salmon River below Torrey's Hole. Based on visual observations, the number of guided boat trips increased considerably below Torrey's Hole compared to previous years. Trout anglers caught an estimated 3,442 hatchery rainbow trout in location codes 18 and 19 during the Chinook salmon fishery (Table 38). Additionally, Chinook salmon anglers caught an estimated 173 hatchery rainbow trout in location codes 18 and 19 during the Chinook salmon fishery. Trout anglers typically caught and released greater numbers of resident fish compared to salmon anglers. However, salmon anglers caught greater numbers of bull trout, especially bull trout over 30cm in length.

SNRA staff posted signs that stated anglers should not park in raft launch areas or block launch sites on the river bank. The signs were posted in areas adjacent to the Yankee Fork of the Salmon River. The posted signs led to discussions held by IDFG fish managers, SNRA staff, and the Custer County Sheriff's Office regarding potential conflict between anglers and rafters. Creel clerks or other IDFG Regional staff did not observe any conflicts nor received any complaints from either anglers or rafters during 2012.

Creel staff verified an angler released one sockeye salmon on August 3, 2012. An expanded estimate of sockeye salmon catch was not calculated because the angler was not interviewed during the creel survey.

Creel clerks reported they lacked adequate time to collect angler interview data because of drive time associated with angler counts in location code 19. Similar concerns were voiced by creel clerks during the steelhead fishery of spring 2012. Beginning in 2013, Regional staff recommends creel technicians conduct fewer angler counts during Chinook salmon creel surveys to allow more time to collect angler interview data. Additionally, a reduced number of angler counts from 6 per day to 4 per day were recently supported by University of Idaho staff based on a review the University conducted of 2010 data sets (Mike Quist, personal communication, 2011).

MANAGEMENT RECOMMENDATIONS

1) Implement creel methodology recommended by the University of Idaho.

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

3) Reduce angler counts during Chinook salmon fisheries in the upper Salmon River to two counts per work shift to allow creel clerks more time to collect interview data.

Table 35. Summary of raw angler creel data from the upper Salmon River Chinook salmon fisheries, 2012.

Location Code	Access Type	Number Interviews	Hours Fished	Hours/ Interview	Chinook Kept	Chinook Released		Total Catch	Fish Checked For Marks
						Hatchery	Non-adipose clipped		
18	Bank	356	1,380	4	38	4	19	61	38
	Boat	96	636	7	3	0	2	5	3
	Total	452	2,016	4	41	4	21	66	41
19	Bank	2,260	8,601	4	229	24	140	393	198
	Boat	19	138	7	4	0	1	5	3
	Total	2,279	8,739	4	233[a]	24	141	398	201
	Total	2,731	10,756	4	274	28	162	464	242

[a] Includes seven "recycled" salmon.

Table 36. Summary of expanded estimated angler effort, fish harvested, fish released, and success rates by location code for the upper Salmon River Chinook salmon fisheries, 2012.

		Harvest						Releases								
Week of	Location Code	Hatchery Adult	Hatchery Jack	Total	Bank Hours	Boat Hours	Total Hours	Non-Adipose-Clipped Adults	Non-Adipose-Clipped Jacks	Hatchery Adults	Hatchery Jacks	Total Released	Total Caught	Hours Per Kept	Hours Per Caught	Hatchery CPUE[a]
7/2	18	60	2	62	1,635	1,085	2,720	22	0	9	0	31	93	44	29	0.026
7/9	18	19	0	19	1,318	1,001	2,319	19	0	0	4	23	42	122	55	0.010
7/16	18	12	3	15	674	410	1,084	23	0	0	0	23	38	72	29	0.014
7/23	18	6	0	6	177	121	298	0	0	0	0	0	6	50	50	0.020
7/30	18	0	0	0	66	0	66	0	1	0	0	1	1	--	66	--
L.C. 18 Totals		**97**	**5**	**102**	**3,870**	**2,617**	**6,487**	**64**	**1**	**9**	**4**	**78**	**180**	**64**	**36**	**0.018**
6/18	19	9	0	9	425	17	442	0	0	0	0	0	9	49	49	0.020
6/25	19	63	6	69	2,508	0	2,508	27	2	2	2	33	102	36	25	0.029
7/2	19	147	23	170	5,797	0	5,797	73	3	28	0	104	274	34	21	0.034
7/9	19	202	5	207	9,151	0	9,151	111	0	8	4	123	330	44	28	0.024
7/16	19	163	32	195	6,930	356	7,286	119	8	12	4	143	338	37	22	0.029
7/23	19	54	6	60	3,192	0	3,192	71	0	6	6	83	143	53	22	0.023
7/30	19	66	4	70	1,687	0	1,687	81	0	4	6	91	161	24	10	0.047
L.C. 19 Totals		**704**	**76**	**780**	**29,690**	**373**	**30,063**	**482**	**13**	**60**	**22**	**577**	**1,357**	**39**	**22**	**0.029**
All Locations Totals		**801**	**81**	**882**	**33,560**	**2,990**	**36,550**	**546**	**14**	**69**	**26**	**655**	**1,537**	**41**	**24**	**0.027**

[a] Catch per unit of effort

Table 37. Estimated harvest of “recycled” Chinook salmon by disposition during the upper Salmon River fishery, 2012.

Date	Work Period	Observed Marks	Fish Checked For Marks (Jacks or Adults)	Estimated Harvest (Jacks or Adults)	Sample Rate	Estimated Harvest Recycled Fish
7/14	7	1	24	80.75	0.2972	3.36
7/21	9	1	16	61.43	0.2605	3.84
7/22	9	1[a]	4	16.62	0.2407	4.16
7/28	11	3	10	20.78	0.4812	6.23
7/31	12	1[a]	1	3.96	0.2525	3.96
Total Recycled Salmon						21.55

[a] " jack" Chinook salmon

Table 38. Summary of resident trout estimated harvest and release information by angler type in Salmon River location codes 18 and 19 during the Chinook salmon fishery, 2012.

		Harvest			Releases		
Fish Species	Location Code	Trout Anglers	Chinook Angler By-Catch	Total Estimated Harvest	Trout Anglers	Chinook Angler By-Catch	Total Estimated Releases
Hatchery Rainbow Trout	18	155	0	155	123	35	158
	19	424	46	470	3,319	138	3,457
Wild Rainbow Trout	18	0	0	0	73	2	75
	19	0	0	0	175	13	188
Cutthroat Trout	18	0	0	0	459	122	581
	19	0	0	0	798	121	919
Whitefish	18	0	0	0	17	167	184
	19	0	0	0	537	45	582
Sucker spp	18	17	18	35	0	29	29
	19	0	5	5	6	18	24
Bull Trout less than 30cm total length	18	0	0	0	2	2	4
	19	0	0	0	35	51	86
Bull Trout more than 30cm total length	18	0	0	0	0	8	8
	19	0	0	0	31	154	185

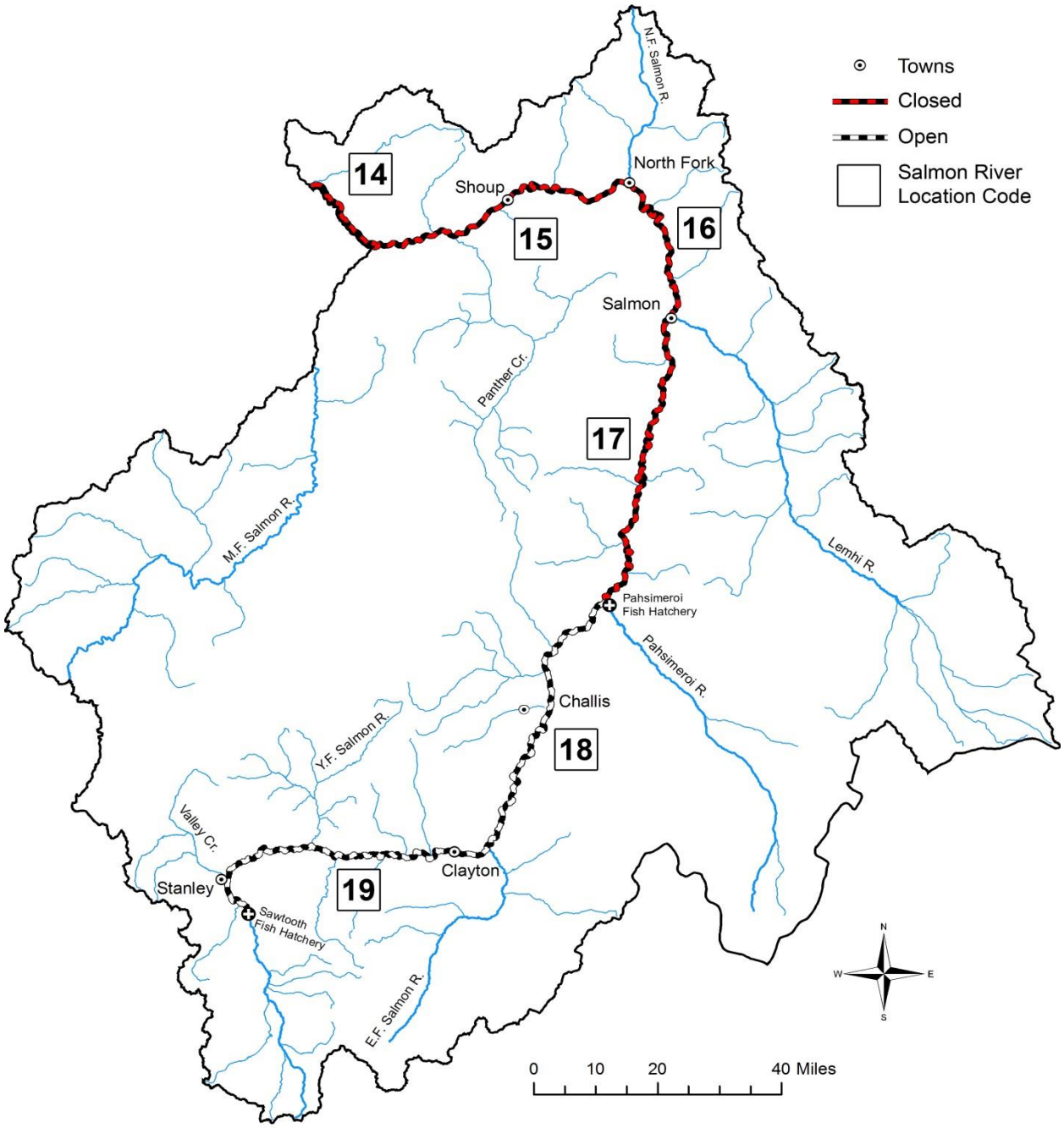

Figure 40. Map of the Upper Salmon River Chinook salmon fishery in location codes 18 and 19, 2012.

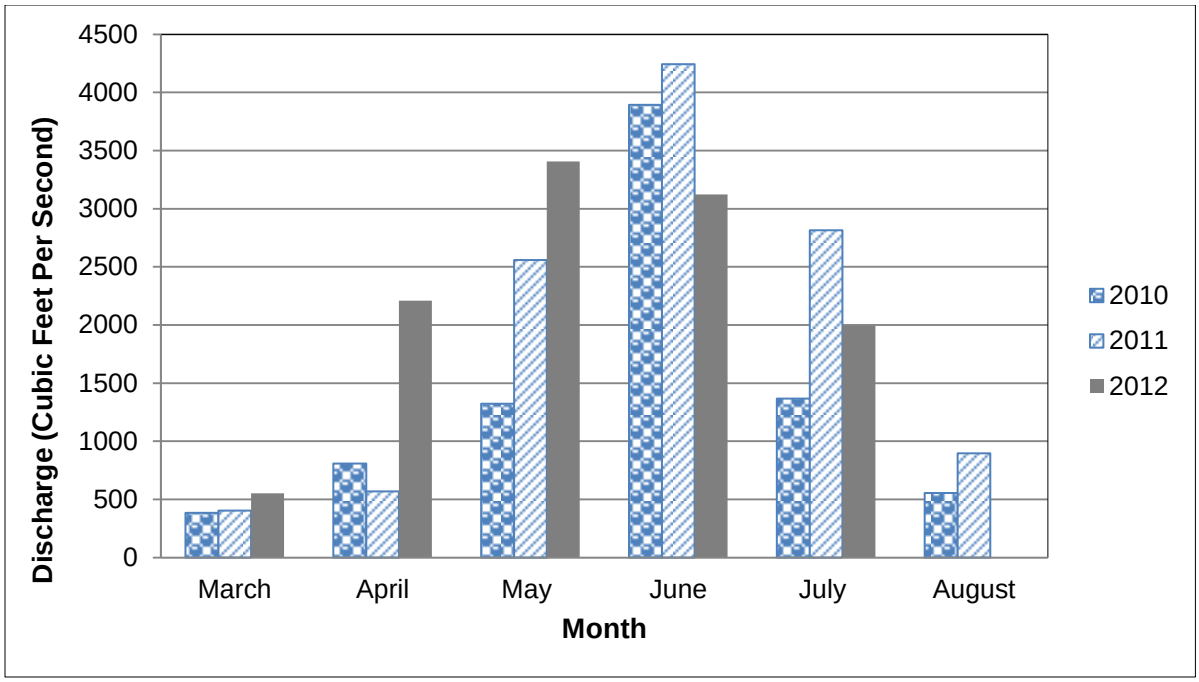

Figure 41. Salmon River mean monthly discharge below Yankee Fork, 2010, 2011, and 2012.

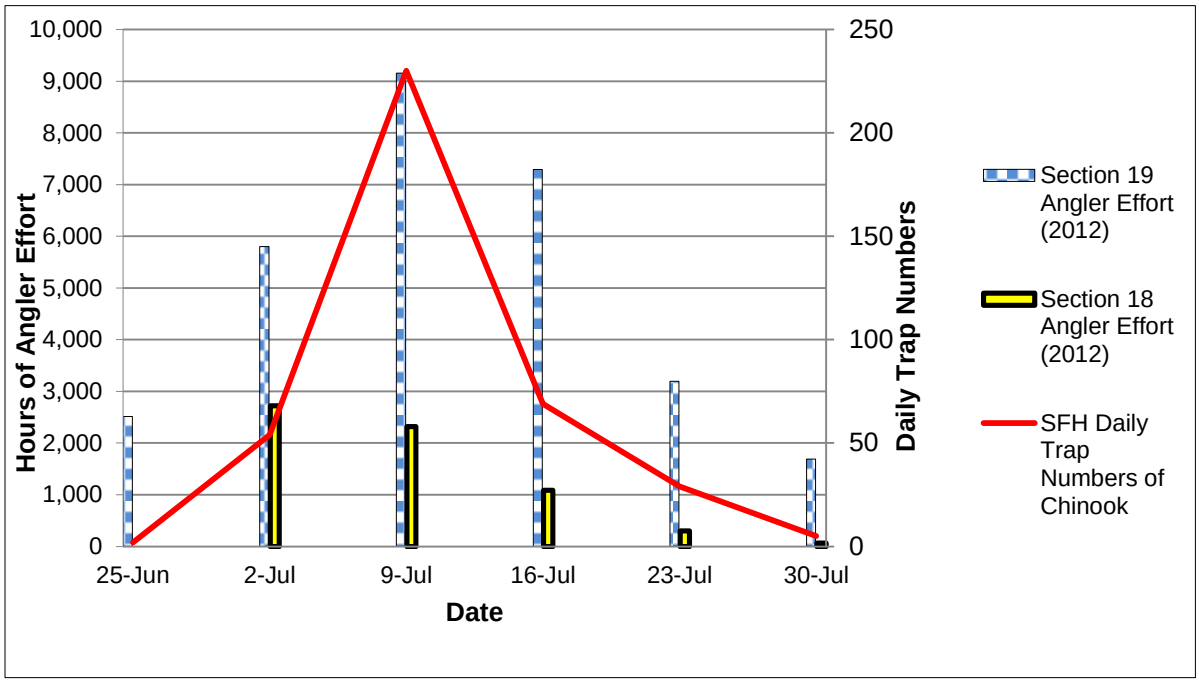

Figure 42. Chinook salmon fishery hours of angler effort in Salmon River location codes 18 and 19 and associated Sawtooth Fish Hatchery daily trap numbers of Chinook salmon, 2012.

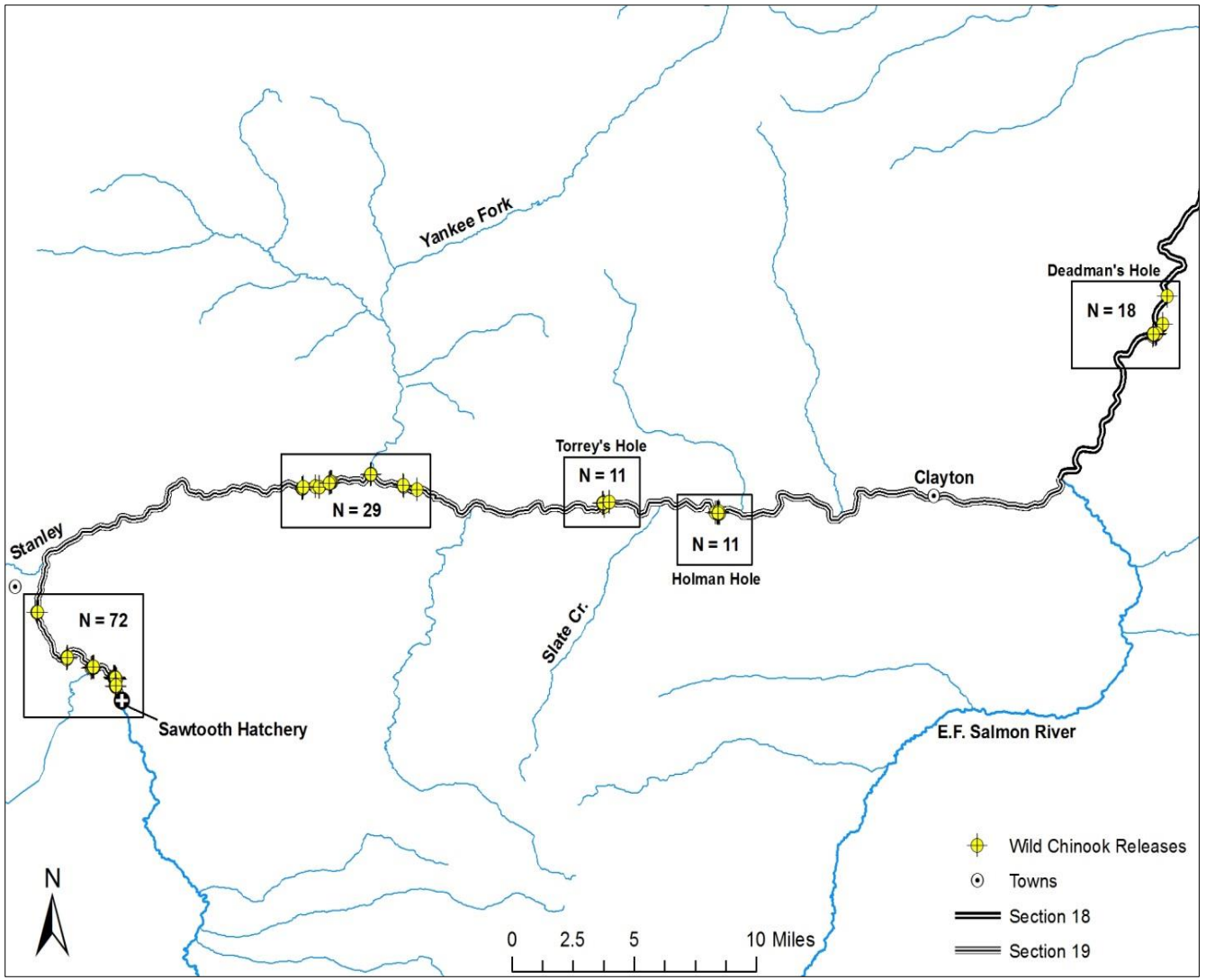

Figure 43. Map showing locations of angler releases of Chinook salmon with intact adipose fins during the upper Salmon River fishery, 2012.

SALMON REGION FISHERY MANAGEMENT 2012 ANNUAL REPORT

Upper Salmon River Steelhead Fishery, Fall 2011 and Spring 2012

ABSTRACT

Interviews were conducted to recover steelhead snouts bearing coded-wire tags and to collect angler effort and catch data. Sample rates of steelhead ranged from 4.3% to 27.9% and averaged 13.3%. Additionally, a roving creel was conducted in location codes 17 and 19 during the months of March and April.

Steelhead with intact adipose fins dominated the location code 14 fishery in both the fall and spring. Anglers in location code 14 released a greater proportion of steelhead compared to other upper river location codes during the 2011 run year. Steelhead with intact adipose fins comprised approximately 57% of the steelhead caught by anglers in location code 14.

Location code 15 supported the greatest amount of angler use and pressure in both fall and spring fisheries. Interviewed anglers caught 2,785 steelhead in location code 15 during the 2011 run year. Of the 2,785 fish caught, anglers kept 1,538 hatchery steelhead. Anglers released 192 hatchery fish and 439 fish with intact adipose fins. The catch rate for location code 15 was 10 hours per steelhead caught and 18 hours per steelhead kept during the 2011 run year.

Angler effort in location code 17 was 25,460 hours. In March, anglers caught 2,090 steelhead, kept 1,363 hatchery steelhead, and released 312 hatchery steelhead and released 415 steelhead with intact adipose fins. In April, anglers invested 16,506 hours of effort. Steelhead catch for April was estimated at 2,269 fish, with 1,133 hatchery steelhead kept, 980 hatchery steelhead released, and 156 steelhead with intact adipose fins released.

In location code 19, anglers invested 21,719 hours of effort in March. They caught 3,730 steelhead, kept 1,615 hatchery steelhead, and released 933 hatchery steelhead and 1,182 steelhead with intact adipose fins. In April, anglers invested 45,091 hours of effort, caught 9,352 steelhead, kept 3,571 hatchery steelhead, and released 2,127 hatchery steelhead and 3,654 steelhead with intact adipose fins.

Resident fish by-catch estimates were made in location codes 17 and 19. In location codes 17, anglers released an estimated 139 steelhead smolts, 42 wild rainbow trout, 7 cutthroat trout, 307 mountain whitefish, 440 suckers, 15 bull trout less than 30 cm, and 68 bull trout greater than 30 cm. Anglers harvested 7 mountain whitefish and 29 suckers. In location code 19, anglers released an estimated 24 cutthroat trout, 250 mountain whitefish, and 130 bull trout greater than 30 cm. Bull trout released in location code 19 consisted of fish larger than 30 cm total length compared to location code 17 where the greatest component of bull trout released were less than 30 cm total length. Anglers harvested 136 mountain whitefish in location code 19.

Authors:

Jon Hansen, Regional Fishery Biologist
Brent Beller, Regional Fishery Technician

INTRODUCTION

The 2011 harvest season for the upper Salmon River fall steelhead fishery opened on September 1. The fishery remained open until March 31, 2012 when it closed from the Lake Creek Bridge in location code 13 upstream to Long Tom Creek, approximately three-quarters of a mile upstream of the confluence with the Middle Fork Salmon River. Upstream of Long Tom Creek, the steelhead fishery remained open on the upper Salmon River until April 30, 2012. During the fall fishery, the daily limit for hatchery steelhead with clipped adipose fins was 3 fish with 9 fish in possession and a total of 20 fish for the season. In spring of 2012, the Idaho Fish and Game Commission increased the daily bag limit to 6 fish, with 18 fish in possession, and 40 fish for the season. The spring rule change only applied to Salmon River location codes 15 through19. Angler participation on the upper Salmon River was minimal during the catch-and-release portion of the fishery that opened on August 1, 2011. Angler pressure increased to a level that warranted interviews by the first week of October.

Two roving creel surveys with differing primary objectives and interview methods were used during the fall and spring steelhead seasons. The first method implemented was a roving creel survey conducted to obtain catch rate information and to collect steelhead snouts that contained coded-wire tags (CWTs). Catch rate information was disseminated to the public weekly on the IDFG website. The roving creel survey was conducted in location codes 14 through 17 during the fall and in location codes 14, 16, and 18 during the spring.

A second creel survey method was designed to generate estimated effort and catch on a monthly basis. The second roving creel methodology was similar to the type of creel used during the Chinook salmon season and was described in the Chinook salmon section of this report. The second survey method was used during the spring steelhead fishery in location codes 17 and 19.

OBJECTIVES

Assist with the development and implementation of a hatchery steelhead fishery for the upper Salmon River.

Create a monitoring plan for collecting angler catch and effort information and coded-wire tags from harvested fish.

Develop expanded estimated harvest of fish from roving creel data.

Answer angler questions pertaining to the fishery and provide weekend summary data to the IDFG website.

Provide enforcement personnel with information regarding possible violations.

Report any observations by field personnel of aquatic invasive species.

STUDY AREA AND METHODS

Salmon River Location Codes

Location Code 14

Salmon River location code 14 is located between the confluence of the Salmon River with the South Fork Salmon River and the confluence of the Salmon River with the Middle Fork Salmon River (MFSR) and is approximately 104 km in length (Figure 44). The only portion of location code 14 accessible by vehicle is located from the MFSR downstream to the Corn Creek boat ramp and is approximately 13 km in length. Downstream of the Corn Creek boat ramp location code 14 is inaccessible to vehicle travel and was primarily accessed by private and guided jet boats. Approximately 2 hours of vehicle travel time was required to traverse the distance between the IDFG Region 7 Office and the Corn Creek boat ramp.

Angler data collected during roving creel interviews consisted of total trip hours fished, the number and type of fish caught, kept, and released, and the number of fish checked for marks and scanned for coded-wire tags. Snouts were collected if they scanned positive for CWT and the angler granted permission to remove them. Steelhead were sexed and measured to fork length if a snout was collected. At the end of each fishing season, the collected CWT snouts were grouped by location code and sent to IDFG's Nampa Research office where CWT extraction occurred. Clerks followed the interview methodology described above in all river location codes where the snout collection roving creel was implemented.

Creel schedules and work hours in location code 14 required unique modifications compared to upriver location codes because vehicle access was limited, jet boats were frequently used by anglers, and commute time to the survey area was lengthy. Within location code 14, the creel clerk conducted a roving creel on bank anglers observed in the road accessible portion of the area. Additionally, the creel clerk was stationed at the Corn Creek boat ramp for considerable periods of time to intercept anglers returning to the ramp from fishing trips downstream in the section. Creel personnel from previous years observed that the majority of jet boats pulled out at the ramp during the last 2 hours of the day. Therefore, the clerk waited at the ramp until a half hour past dusk to reduce the number of boats that would be missed.

Creel clerks worked 10 hours per day, Friday through Monday, during the months of October and November, 2011. Clerks worked additional hours on Wednesday in location code 14 during the month of November in an effort to collect additional snouts. However, the additional work hours expended in location code 14 did not yield additional snouts. The work shift was 0800 hour to 1830 hour for October and November. By the end of November, the work shift was adjusted to account for shorter day lengths due to Daylight Savings Time.

Creel operations were postponed until March due to poor road conditions and limited angler activity during spring of 2012. Clerks worked 8 hours per day, Thursday through Monday, during the first part of March. The work shift was 1000 hour to1800 hour during the month of March. Creel activities ceased in location code 14 by March 19th because the creel position assigned to the area was vacated and staff was unable to hire and train a replacement before the end of the spring steelhead fishery.

Location Code 15

Salmon River location code 15 is 62 km in length and extends from the confluence of the MFSR and mainstem Salmon River upstream to the river's confluence with the North Fork Salmon River (NFSR). Anglers are offered easy bank accessibility as the Salmon River Road runs parallel to the river for its entire length within location code 15. Anglers use boats on many different portions of this area because of numerous boat ramps. Location code 15 received the largest proportion of angler effort during the fall and spring fisheries compared to all upper Salmon River location codes. Historically, the creel survey ceased by April because of low steelhead densities, low angler effort, and limited creel personnel funding resources.

Creel activities began at the start of October and ceased at the end of November during fall of 2011. The survey crew consisted of 1 creel clerk during fall 2011. A standard roving creel was conducted along the entire section. In spring 2012, interviews were collected from the end of February until the beginning of April. During the spring, 2 creel clerks worked in location code 15. The river reach downstream from the confluence of the Salmon River and Panther Creek was assigned to 1 clerk. The river reach upstream of the confluence with Panther Creek was assigned to a second clerk. All clerks followed the same roving creel methodology described above for location code 14 during the fall and spring fisheries.

Clerks worked Thursday through Monday during the fall and spring fisheries. Clerks worked an 8 hour shift with a varied start time that depended on the day length during different months. During October, the clerks worked from 1030 hour to 1900 hour. During November, the work shift start time was changed to 0930 hour to adjust for Daylight Savings Time. During March, the clerks worked from 1000 hour to 1800 hour for the first 10 days. Beginning March 11th, the shift start time was changed to 1100 hour to adjust for Mountain Standard Time.

Location Code 16

Salmon River location code 16 is 34 km in length and extends from the Salmon River's confluence with the NFSR upstream to the river's confluence with the Lemhi River. Location code 16 is the shortest in length compared to other location codes on the upper Salmon River. Location code 16 is one of the most popular river areas for anglers during the fall fishery. Anglers use boats on many different portions of the river because there is access to 8 maintained boat ramps. Location code 16 has gained popularity with spey rod anglers due to the river's many runs and riffles within the area. Additionally, the river is easily accessed by bank anglers because Highway 93 parallels the river for the majority of the location code.

One creel clerk was assigned to work both location codes 16 and 17 during October and November. The assigned work for location codes 16 and 17 was combined because of the short length of location code 16 and the minimal angler activity in location code 17 during the fall. In March, one creel clerk was assigned location code 16 and the portion of location code 15 situated upstream from Indianola. During April, the clerks assigned to work in location codes 15 and 16 were re-assigned upstream to location code 18 because angler effort declined in the downstream river areas. Clerks working in location code 16 during both the fall and spring followed the same interview process described above for location code 14. Clerks worked the same work week and work shifts as described above in location code 15. All clerks followed the same snout sampling roving creel methodology described above for location code 14 during the fall and spring fisheries.

Location Code 17

Salmon River location code 17 is 75 km in length and extends from the Salmon River's confluence with the Lemhi River upstream to the river's confluence with the Pahsimeroi River (Figure 44). Location code 17 is the longest location code on the upper Salmon River, followed closely by location code 19. The river was easily accessed by bank anglers because Highway 93 parallels the river for the majority of the area. Location codes 17, 18, and 19 typically attract the majority of angler effort during spring months compared to location codes 14, 15, and 16 that received similar amounts of angler effort during both fall and spring seasons.

The creel method used during the fall 2011 fishery was different compared to the spring 2012 fishery. In fall, the location code 16 clerk drove the entire length of location code 17 once or twice a week and checked for anglers. During the remaining days, the clerk worked into location code 17 (from location code 16) as far upstream as the Eleven Mile River Access. The clerk followed the same work schedule and snout sampling roving creel methodology described above for location code 14 during the fall fishery.

During March and April 2012, the clerk assigned to location code 17 conducted a roving creel designed to generate estimated effort and catch data on a monthly basis. The estimated effort and catch data was calculated so values could be compared to estimated effort and catch data generated by the statewide phone survey. For the intensive creel survey, clerks collected effort and catch data from anglers and conducted 3 randomly selected systematic angler counts during the day. One clerk was assigned to work in location code 17. The clerk worked 9 hours every day. The creel survey was conducted on all weekend days and 3 randomly selected week days each week. During March, the clerk worked from 1000 hour to 1800 hour. During April, the clerk worked from 1100 hour to 1900 hour because of the change to Mountain Standard Time. Angler effort and catch data was entered into the Creel Application Software (CAS) which then generated the expanded values. Estimated effort and catch values were generated for resident fish species for location codes 17 and 19. Estimated effort and catch values for resident fish were generated based on methods described in the Chinook salmon harvest section of this report.

Location Code 18

Salmon River location code 18 spans 67 km from the Salmon River's confluence with the Pahsimeroi River upstream to its confluence with the East Fork Salmon River (EFSR). Unlike other river location codes, a large portion of the river within location code 18 is not adjacent to Highway 93. Thus, bank angler access is limited and restricts anglers to a few popular fishing holes. Location code 18 has numerous boat ramps that allow anglers with boats access to many different river reaches.

Few anglers attempted to fish within location code 18 during the fall steelhead fishery, but there was significant angler pressure in the area during the spring fishery. Due to this, location code 18 was surveyed only in the spring during March and April. A creel clerk was assigned to location code 18 in mid-March and worked in the area until the end of April. While working in location code 18, the clerk followed the standard snout sampling roving creel methodology outlined above for location codes 14, 15, and 16. Work weeks and shifts were also the same as those for clerks working in location codes 14, 15, and 16.

Location Code 19

Salmon River location code 19 extends 74 km from the confluence of the Salmon River with the EFSR upstream to 100 m below the Sawtooth Fish Hatchery weir. The Yankee Fork Salmon River (YFSR) is a major tributary within location code 19 and its confluence with the Salmon River was one of the most popular fishing holes during the spring fishery. Similar to other river location codes, location code 19 contains numerous boat ramps. Unlike downstream river location codes, location code 19 contains many rapids and other river features that limit the number of drift boats used by anglers. Consequently, the creel clerk typically only interviews small numbers of boat anglers. Location code 19 is not surveyed during the fall season because of negligible angler pressure in the area and budget constraints. During the spring season, location code 19 receives heavy angler pressure and anglers are interviewed during March through the end of April.

During March and April 2012, the clerk assigned to location code 19 conducted a roving creel designed to generate estimated effort and catch data on a monthly basis. The clerk was stationed at the Sawtooth Fish Hatchery dorms. The roving creel methodology, work hours, and work shifts used in location code 19 during the spring fishery were the same as described above for location code 17.

RESULTS AND DISCUSSION

Salmon River Location Codes

Location Code 14

Creel staff interviewed 837 anglers in location code 14 during the 2011 fall fishery (Table 39). Anglers reported 3,569 hours of effort. Anglers kept 140 hatchery steelhead, and released 8 hatchery steelhead and 192 steelhead with intact adipose fins, for a combined total of 340 steelhead. The catch rates were 10 hours per steelhead caught and 25 hours per steelhead kept during the fall fishery.

Creel staff interviewed 265 anglers during the 2012 spring fishery (Table 40). Anglers reported 1,678 hours of effort. Anglers kept 107 hatchery steelhead, and released 12 hatchery steelhead and 157steelhead with intact adipose fins, for a combined total of 276 steelhead. The catch rates were 6 hours per steelhead caught and 16 hours per steelhead kept during the spring fishery.

Unique to location code 14, steelhead with intact adipose fins accounted for the majority of fish caught by anglers during both the fall and spring fisheries. Steelhead with intact adipose fins comprised approximately 57% of the total reported catch within location code 14 for the fall and spring fisheries combined (Table 41). Combining the fall and spring fisheries, anglers kept 247 hatchery steelhead and released 20 hatchery steelhead and 349 steelhead with intact adipose fins, for a total catch of 616 fish. Location code 14 was the only river location code to have more steelhead with intact adipose fins caught and released than harvestable steelhead. The catch rates were 9 hours per fish caught and 21 hours per fish kept for the combined fall and spring fisheries.

The statewide estimated steelhead harvest in Section 14 (September 2011 through March 2012) was 2,631 fish for the 2011 run year (Table 42). Based on angler reports, an estimated 63 steelhead were harvested during the month of April. However, that harvest was not included in any calculations because the fishery closed at the end of March.

A total of 170 steelhead were checked for CWTs in location code 14, and 18 CWTs were detected and collected (Table 41). Nine of the CWTs were collected during the fall fishery, and 9 were collected during March, 2012. The sample rates for the fall fishery were 4.3% for October and 10.2% for November (Table 42). In March 2012, the sample rate was 8.7%.

Location Code 15

Location code 15 received the greatest proportion of angler pressure compared to other upper Salmon River location codes during both the fall 2011 and spring 2012 fisheries. Creel staff interviewed 2,855 and 1,944 anglers during the fall 2011 and spring 2012 fisheries, respectively (Table 41). During the fall and spring fisheries, total angler effort (based on interview data only) in the upper Salmon River was 49,125 hours of which 22,346 of those hours (46%) were spent within location code 15. Anglers reported 11,965 and 10,381 hours of effort during the fall and spring fisheries, respectively, in location code 15. Anglers kept 541 and 997 hatchery steelhead, released 110 and 301 hatchery steelhead, and released 283 and 553 steelhead with intact adipose fins in the fall and spring, respectively. Anglers caught a combined total of 934 and 1,851 steelhead during the fall and spring fisheries, respectively. The catch rates were 8 hours per fish caught and 15 hours per fish kept for the 2011 run year. The statewide estimated steelhead harvest within Section 15 was 7,744 fish for the 2011 run year (Table 42).

The total number of steelhead checked for CWTs in location code 15 was 1,255 (Table 41). Of the fish checked, 193 CWT's were detected and 190 snouts were collected. Three anglers declined to have their steelhead's snout removed. Clerks collected 80 CWTs during the fall fishery and 110 CWTs during the spring fishery. The sample rates obtained during the fall fishery were 9.6% for October and 14.9% for November (Table 42). During the spring fishery the sample rates were 9.2% for February and 27.9% for March.

Location Code 16

The creel clerk in location code 16 conducted a total of 846 angler interviews during the fall 2011 steelhead fishery (Table 39). Anglers reported 3,532 hours of effort and a total catch of 307 steelhead. Anglers kept 191 hatchery steelhead and released another 40 hatchery steelhead. Additionally, anglers released 76 steelhead with intact adipose fins. The catch rates were 12 hours per steelhead caught and 18 hours per steelhead kept during the fall fishery.

Angler use of location code 16 did not change dramatically between the fall and spring fisheries. Clerks conducted a total of 552 angler interviews during March and April 2012, for which 2,436 hours of effort was reported (Table 40). Anglers reported 224 steelhead were caught for the spring season. Of the total catch, anglers kept 112 hatchery steelhead and released another 33. Additionally, anglers released 79 steelhead with intact adipose fins. The catch rates were 11 hours per steelhead caught and 22 hours per steelhead kept during the spring fishery.

The statewide estimated steelhead harvest within location code 16 was 2,010 fish for the 2011 run year (Table 42). During that time span, creel clerks checked 263 steelhead for CWTs

(Table 41). Of those checked, 55 snouts contained CWTs and were collected. Clerks collected 35 CWTs during the fall fishery and 20 during the spring fishery. During the fall fishery, clerks obtained a sample rate of 24.8% in October and 9.1% in November (Table 42). The sample rates obtained during the spring fishery were 21.4% in February, 14% in March, and 1.6% in April. Creel clerks were not stationed in location code 16 during April because of low angler effort. Regardless, a low monthly sample rate was reported for the month of April because one steelhead was inadvertently checked within the location code boundaries.

Location Code 17

A total of 193 angler interviews were made in location code 17 during fall of 2011 (Table 39). Anglers reported 539 hours of effort and a total catch of 44 steelhead. Anglers kept 24 hatchery steelhead and released another 8 hatchery steelhead. Additionally, anglers released 12 steelhead with intact adipose fins. The catch rates were 12 hours per steelhead caught and 22 hours per steelhead kept during the fall fishery.

Location code 17 received substantially more angler pressure during the spring fishery compared to the fall fishery (Table 40). Clerks conducted 1,344 angler interviews. The reported angler effort was 5,768 hours, which accounted for 19.2% of observed angler effort in all the USR location codes. The total reported catch was 602 steelhead. Anglers kept 342 hatchery steelhead and released another 176 hatchery steelhead. Additionally, anglers released 84 steelhead with intact adipose fins. The catch rates were 10 hours per steelhead caught and 17 hours per steelhead kept during the spring fishery.

The statewide estimated steelhead harvest within location code 17 was 2,541 fish for the 2011 run year (Table 42). The total number of steelhead checked for CWTs was 325 for the combined fall and spring fisheries (Table 41). Of the steelhead checked for marks, 38 were found to contain CWTs and their snouts were collected. Additionally, 2 CWTs were not collected because clerks were denied permission to collect the snouts. Four CWTs were collected during the fall fishery, while 34 CWTs were collected during the spring fishery. The sample rates for the fall fishery were 6.4% in October and 1.3% in November (Table 42). During the spring fishery, the obtained sample rates were 2.3% in February, 19.9% in March, and 17.6% in April.

In addition to the raw creel data collected in location code 17, estimated harvest was also generated for the months of March and April (Table 43). Based on results, total estimated angler effort was 25,460 hours for the month of March with a total catch of 2,090 steelhead. Anglers harvested 1,363 hatchery steelhead and released another 312 hatchery steelhead. Anglers released 415 steelhead with intact adipose fins. The estimated catch rates were 12 hours per steelhead caught and 19 hours per steelhead kept during the March fishery.

Estimated angler effort was 16,506 hours for the month of April with a total catch of 2,269 steelhead (Table 43). Anglers harvested 1,133 hatchery steelhead and released another 980 hatchery steelhead. Anglers released 156 steelhead fish with intact adipose fins. The estimated catch rates were 7 hours per steelhead caught and 15 hours per steelhead kept during the April fishery.

Resident fish by-catch was estimated based on angler data collected during the spring steelhead fishery (Table 44). Anglers caught and released an estimated 139 steelhead smolts, 42 wild rainbow trout, 7 cutthroat trout, 307 mountain whitefish, 440 suckers, 15 bull trout less than 30 cm, and 68 bull trout greater than 30 cm. Anglers harvested 7 mountain whitefish and 29 suckers. Various sucker species were the most caught non-target fish species.

Location Code 18

In the spring, clerks conducted a total of 794 angler interviews in location code 18 (Table 40). Anglers reported 3,649 hours of effort and a total catch of 342 steelhead. Spring anglers kept 100 hatchery steelhead and released another 128 hatchery steelhead. Additionally, anglers released 114 steelhead with intact adipose fins. The catch rates were 11 hours per steelhead caught and 36 hours per steelhead kept during the spring fishery.

The statewide estimated steelhead harvest in location code 18 was 875 fish for the 2011 run year (Table 42). Clerks checked 84 steelhead for CWTs (Table 41). Of those fish checked for marks, 18 had CWTs detected in their snouts and were collected. The sample rates obtained during the spring fishery were 5% in February, 7.1% in March, and 22% in April (Table 42).

Location Code 19

Creel clerks began working in location code 19 at the beginning of March and remained in the area until the end of April. During this time, clerks conducted a total of 1,296 angler interviews (Table 40). Anglers reported 6,124 hours of effort and a total catch of 1,041 steelhead. Anglers kept 431 hatchery steelhead and released another 260 hatchery steelhead. Additionally, anglers released 350 steelhead with intact adipose fins. The catch rates were 6 hours per steelhead caught and 14 hours per steelhead kept during the spring fishery.

As in location code 17, an intensive roving creel was conducted in Section 19 to generate estimated harvest of steelhead during the months of March and April. Total estimated angler effort was 21,719 hours for the month of March with a total catch of 3,730 steelhead (Table 43). Anglers harvested 1,615 hatchery steelhead and released another 933 hatchery steelhead. Anglers released 1,182 steelhead with intact adipose fins. The estimated catch rates were 6 hours per steelhead caught and 13 hours per steelhead kept during the March fishery.

Estimated angler effort for the month of April was 45,157 with a total catch of 9,352 steelhead (Table 43). Anglers harvested 3,571 hatchery steelhead and released another 2,127 hatchery steelhead. Anglers released 3,654 steelhead with intact adipose fins. The estimated catch rates were 5 hours per steelhead caught and 13 hours per steelhead kept during the April fishery.

The statewide estimated steelhead harvest within location code 19 was 2,619 fish during the 2011 run year (Table 42). During the spring fishery, clerks checked 377 steelhead fish for CWTs and collected 57 snouts containing CWTs (Table 41). None of the anglers denied permission for clerks to collect snouts. The sample rates obtained during the spring fishery were 21.6% in March and 11.3% in April (Table 42).

Resident fish by-catch was estimated based on angler data collected during the spring steelhead fishery (Table 44). Anglers caught and released an estimated 24 cutthroat trout, 250 mountain whitefish, and 130 bull trout greater than 30 cm. The bull trout caught in location code 19 were all larger than 30 cm total length. Anglers harvested 136 mountain whitefish.

MANAGEMENT RECOMMENDATIONS

1) Provide to managers roving creel expanded estimates of steelhead harvest for the purpose of conducting comparisons between values generated by roving creel methods and the statewide steelhead phone survey.

2) Implement a plan for collecting steelhead parental based genetic tagging samples in the creel.

3) Answer angler questions regarding the steelhead fishery and provide information to the IDFG website and Regional fishery staff as requested.

4) Enter data into the steelhead database. Assist Regional fisheries staff as needed.

Table 39. Summary of fall 2011 steelhead creel data (unexpanded) for Salmon River location codes 14 through 17

Location Code	Anglers	Hours	Hrs/ Angler	Steelhead Kept	Steelhead Released		Total Catch	Hrs/ Caught	Hrs/ Kept	Total Hatchery CPUE[b]
					Hatchery	Wild[a]				
14	837	3569	4.3	141	8	206	355	10	25	0.042
15	2855	11965	4.2	541	110	283	934	13	22	0.054
16	846	3532	4.2	191	40	76	307	12	18	0.065
17	193	539	2.8	24	8	12	44	12	22	0.059
Total	4666	19129	4.1	867	163	524	1554	12	22	0.054

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

Table 40. Summary of spring 2012 steelhead creel data (unexpanded) for Salmon River location codes 14 through 19.

Location Code	Anglers	Hours	Hrs/ Angler	Steelhead Kept	Steelhead Released		Total Catch	Hrs/ Caught	Hrs/ Kept	Total Hatchery CPUE[b]
					Hatchery	Wild[a]				
14	265	1678	6.3	107	13	166	286	6	16	0.072
15	1944	10381	5.3	997	301	553	1851	6	10	0.125
16	552	2436	4.4	112	33	79	224	11	22	0.060
17	1344	5768	4.3	342	176	84	602	10	17	0.090
18	794	3649	4.6	100	128	114	342	11	36	0.062
19	1296	6124	4.7	431	260	350	1041	6	14	0.113
Total	6189	29996	4.8	2086	910	1327	4323	7	14	0.100

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

Table 41. Summary of steelhead run year interview data (unexpanded) from the upper Salmon River (fall 2011 and spring 2012)

Location Code	Anglers	Hours	Hrs/ Angler	Steelhead Kept	Steelhead Released		Total Catch	No. Snouts in Creel			Hrs/ Caught	Hrs/ Kept	Total Hatchery CPUE[c]
					Hatchery	Wild[a]		Checked for Marks	CWT[b] Taken	CWT Not Taken			
14	1102	5247	4.8	248	21	372	641	170	19	-	8	21	0.051
15	4799	22346	4.7	1538	411	836	2785	1255	190	3	8	15	0.087
16	1398	5968	4.3	303	73	155	531	263	55	-	11	20	0.063
17	1537	6307	4.1	366	184	96	646	325	38	2	10	17	0.087
18	794	3649	4.6	100	128	114	342	84	18	-	11	36	0.062
19	1296	6124	4.7	431	260	350	1041	377	57	-	6	14	0.113
Total	10855	49125	4.5	2953	1073	1851	5877	2474	377	5	8	17	0.082

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

Table 42. Statewide steelhead harvest estimates and sample rates by location code and month for the upper Salmon River steelhead run, 2011-2012.

Location Code	Statistics	Fishery Statistics by Month								
		Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Total
14	Fish Checked for Marks	--	39	82	--	--	3	46	--	170
	Statewide Harvest Est.[a]	0	562	784	104	181	470	530	63[b]	2631
	Sample Rate	--	0.069	0.105	--	--	0.0064	0.087	--	0.065
15	Fish Checked for Marks	--	196	267	--	--	60	732	--	1255
	Statewide Harvest Est.	12	2046	1792	280	145	654	2626	189	7744
	Sample Rate	--	0.096	0.149	--	--	0.092	0.279	--	0.162
16	Fish Checked for Marks	--	94	64	--	--	28	76	1	263
	Statewide Harvest Est.	48	379	704	96	46	131	542	64	2010
	Sample Rate	--	0.248	0.091	--	--	0.214	0.140	0.016	0.131
17	Fish Checked for Marks	--	15	3	--	--	6	134	167	325
	Statewide Harvest Est.	0	233	237	108	83	259	673	948	2541
	Sample Rate	--	0.064	0.013	--	--	0.023	0.199	0.176	0.128
18	Fish Checked for Marks	--	--	--	--	--	4	36	44	84
	Statewide Harvest Est.	0	14	54	0	20	80	507	200	875
	Sample Rate	--	--	--	--	--	0.05	0.071	0.22	0.096
19	Fish Checked for Marks	--	--	--	--	--	--	181	196	377
	Statewide Harvest Est.	0	0	48	0	0	0	837	1734	2619
	Sample Rate	--	--	--	--	--	--	0.216	0.113	0.144

[a] Estimated harvest data from Statewide Harvest Survey, Thomas J. McArthur, IDFG (unpublished)

[b] Outside of legal fishing season and not included in calculations

Table 43. Summary of estimated steelhead harvested, fish released, success rates, and angler effort by location code for the upper Salmon River spring steelhead fishery, 2012.

			No. Steelhead Released			Angler Hours			Hours/Steelhead	
Location Code	Month	Harvest	Ad-clipped Adults	Non-Ad-clipped Adults	Total Caught	Boat	Bank	Total	Caught	Kept
17	March	1,363	312	415	2,090	7,487	17,973	25,460	12	19
17	April	1,133	980	156	2,269	5,030	11,476	16,506	7	15
19	March	1,615	933	1,182	3,730	0	21,719	21,719	6	13
19	April	3,571	2,127	3,654	9,352	66	45,091	45,157	5	13

Table 44. Summary of estimated resident trout harvest and release information generated from data obtained from steelhead anglers fishing in Salmon River location codes 17 and 19 during the spring fishery, 2012.

Fish Species	Location Code	Steelhead Angler By-Catch	
		Harvested	Released
Steelhead Smolt	17	0	139
	19	0	0
Wild Rainbow Trout	17	0	42
	19	0	
Cutthroat Trout	17	0	7
	19	0	24
Mountain Whitefish	17	7	307
	19	136	250
Sucker spp	17	29	440
	19	0	0
Bull Trout < 30 cm	17	0	15
	19	0	0
Bull Trout > 30 cm	17	0	68
	19	0	130

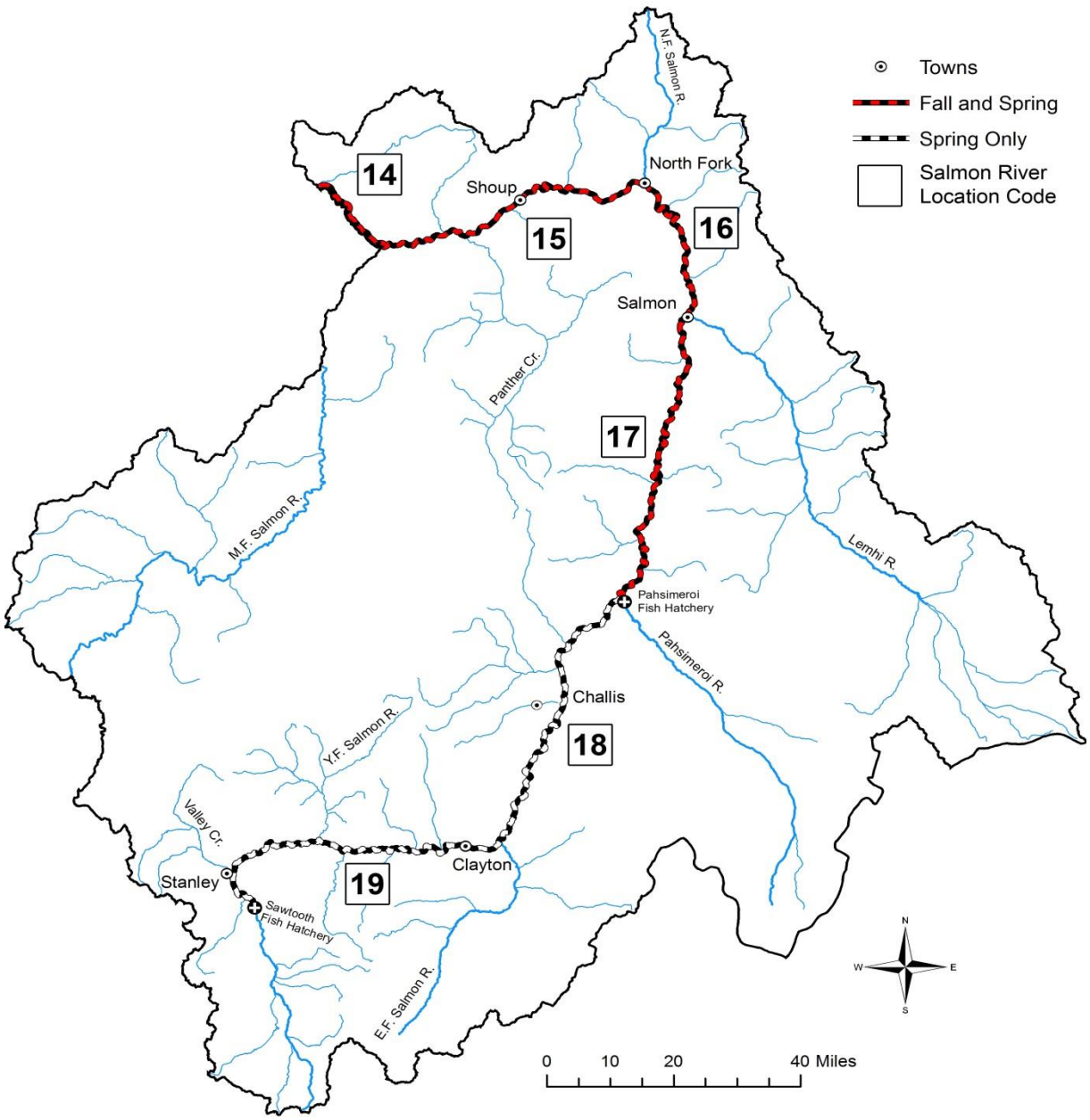

Figure 44. Map of the upper Salmon River IDFG steelhead fisheries and their associated location codes, fall 2011 and spring 2012.

APPENDICES

Appendix A. Location and physical characteristics of one mountain lake surveyed in the Salmon Region in 2012.

Lake Name	Location in Datum WGS84 Decimal Degrees Latitude °N	Longitude °W	Aspect	Spawning Potential	Bahls (1992) Impact Rating
Nez Perce Lake	44.50995	-113.39077	SE	None	Low

Appendix B. Locations and dimensions of mainstem traditional transects, Middle Fork Salmon River, surveyed in 2012.

Transect Name	River km[a]	Transect Length (m)	Visibility (m)	Visibility Corridor (m)	Transect Area (m^2)	Traditional Species[b]
Boundary	0.9	71.7	3.0	12.0	860.4	SB
Gardells Hole	4.6	126.0	2.7	10.8	1,360.8	C2, CK
Velvet	8.8	37.0	1.8	7.2	266.4	C2, CK
Elkhorn	14.1	68.0	2.3	9.2	625.6	SB
Sheepeater	21.3	102.0	2.3	9.2	938.4	SB
Greyhound	25.8	--	--	--	--	C2, CK
Rapid River	29.6	74.0	2.2	8.8	651.2	SB
Indian	40.8	137.0	2.2	8.8	1,205.6	SB
Pungo	45.1	77.0	2.3	9.2	708.4	C2, CK
Marble Pool	51.7	142.0	2.3	9.2	1,306.4	C2, CK
Skijump	52.3	--	--	--	--	SB
Lower Jackass	60.9	111.0	2.3	9.2	1,021.2	C2, CK
Cougar	65.9	50.0	2.3	9.2	460.0	SB
Whitie Cox	74.9	102.0	2.7	10.8	1,101.6	C2, CK
Rock Island	75.2	122.0	2.7	10.8	1,317.6	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	2.7	10.8	1,479.6	C2, CK
Flying B	106.6	75.0	2.1	8.4	630.0	C2, CK
Airstrip	108.6	110.0	2.1	8.4	924.0	SB
Survey	119.0	75.0	2.1	8.4	630.0	SB
Big Creek Bridge	124.6	185.0	2.1	8.4	1,554.0	C2, CK
Love Bar	127.0	100.0	2.1	8.4	840.0	SB
Ship Island	134.6	126.0	2.1	8.4	1,058.4	C2, CK
Little Ouzel	143.2	--	--	--	--	SB
Otter Bar	144.0	143.0	2.2	8.8	1,258.4	C2, CK
Goat Creek Pool	151.5	134.0	2.2	8.8	1,179.2	C2, CK
Goat Creek Run	151.8	122.0	2.2	8.8	1,073.6	SB

[a] River km readings start at Dagger Falls.

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

Appendix C. Locations and dimensions of mainstem Middle Fork Salmon River historical (Corley 1972) transects surveyed in 2012.

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	2.3	9.2	782.0	C2, CK
Mahoney Camp	67.4	50.0	2.5	10.0	500.0	SB,C2, CK
White Creek Pack Bridge	78.1	300.0	2.7	10.8	3,240.0	SB,C2, CK
Bernard Airstrip	109.4	100.0	2.1	8.4	840.0	SB,C2
Cliffside Rapids Hole	141.3	300.0	2.1	8.4	2,520.0	SB,C2
Hancock Rapids Hole	147.0	120.0	2.2	8.8	1,056.0	C2

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

Appendix D. Locations and dimensions of Middle Fork Salmon River tributary transects surveyed in 2012.

Transect Name	Transect Location	Transect Length (m)	Visibility (m)	Visibility Corridor (m)	Transect Area (m^2)	Traditional Species[a]
Pistol Creek Lower	125 m above pack bridge	28.0	2.2	8.8	323.0	SB,C2, CK
Pistol Creek Upper	100 m above lower site	40.0	2.2	8.8	650.0	SB,C2, CK
Indian Creek Lower	75 m above mouth	76.0	2.2	8.8	668.8	SB,C2, CK
Indian Creek Upper	300 m above mouth	50.0	2.2	8.8	440.0	SB,C2, CK
Marble Creek	Above pack bridge	64.0	2.3	9.2	886.4	SB,C2, CK
Loon Creek Lower[c]	Below pack bridge	52.0	1.5	6.0	312.0	SB,C2, CK
Loon Creek Upper[c]	360 m above pack bridge	36.0	1.5	6.0	252.0	SB,C2, CK
Camas Creek Lower	Below pack bridge	75.0	2.0	8.0	1,374.8	SB,C2
Camas Creek Upper	Above pack bridge	37.0	2.0	8.0	566.8	SB,C2, CK
Big Creek	360 m above mouth		--	--	--	SB,C2

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

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

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

LITERATURE CITED

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

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

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

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

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

Curet, T., B. Esselman, M. White, M. Biggs, J. Hansen, and B. Beller. 2013. Fishery Management Investigations, Salmon Region 2011. Idaho Department of Fish and Game, Boise.

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

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

Hamilton, S. 2012. Sawtooth Fish Hatchery 2012 spring chinook run report. Idaho Department of Fish and Game, Boise. Unpublished report.

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

Idaho Department of Fish and Game. 2013. Fisheries Management Plan 2013 – 2018. Boise, ID.

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

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

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

Liter, M. and J. R. Lukens. 1994. Federal Aid in Fish Restoration, Regional Fishery Management Investigations,Job Performance Report, Project F-71-R-17, Idaho Department of Fish and Game, Boise.

Liter, M. and J. R. Lukens. 1996. Federal Aid in Fish Restoration, Regional Fishery Management Investigations,Job Performance Report, Project F-71-R-18, Idaho Department of Fish and Game, Boise.

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

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

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

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

National Water Information System website, U. S. Geological Survey, Lemhi River at Lemhi, Idaho: http://nwis.waterdata.usgs.gov/id/nwis/uv?cb_00060=on&format=html&period=&begin_date=2011-06-01&end_date=2011-07-01&site_no=13305000 (February 2013).

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

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

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

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

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

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

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

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

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

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