FISHERY MANAGEMENT INVESTIGATIONS

IDAHO DEPARTMENT OF FISH AND GAME
FISHERY MANAGEMENT ANNUAL REPORT

Virgil Moore, Director

SOUTHWEST REGION - MCCALL
2013

By

Paul Janssen, Regional Fishery Biologist

Jacob Johnson, Fishery Technician

Eric Stark, Senior Research Biologist

Dale Allen, Regional Fishery Manager

December 2014

IDFG 14-105

2013 Southwest Region - McCall

Annual Fishery Management Report

Table of Contents

MOUNTAIN LAKES SURVEY 1
- Abstract 1
- Methods 2
- Results 2
- Management Recommendations 2

LOWLAND LAKES 3
- Abstract 3
- Objectives 5
- Lake Cascade Fishery Survey 5
  - Introduction 5
  - Methods 5
  - Results 5
  - Management Recommendation 6
  - Lake Cascade Rainbow Trout Fingerling Stocking Evaluation 6
  - Introduction 6
  - Methods 6
  - Results 7
  - Discussion 7
  - Management Recommendation 8
- Yellow Perch Exploitation Study 8
  - Introduction 8
  - Methods 8
  - Results 9
  - Discussion 9
  - Management Recommendation 9
- Payette Lake Lake Trout Survey 9
  - Introduction 9
  - Methods 10
  - Results 11
  - Discussion 11
  - Management Recommendations 12
  - Introduction 13
  - Methods 13
  - Results 14
  - Discussion 14
- Brundage Reservoir Trout Survey 16
  - Introduction 16
  - Methods 16
  - Results 16
  - Discussion 16
  - Management Recommendations 16
- Little Payette Lake Survey 17

Introduction 17
Methods 17
Results 17
Discussion 17
Management Recommendations 17
Northwest Passage Pond Angling Pressure Survey 18
Introduction 18
Methods 18
Results 18
RIVERS AND STREAMS 18
Abstract 18
Objectives 19
Standard IDFG Stream Surveys and South Fork Salmon River Lamprey Survey 19
Introduction 19
Methods 19
Results 20
North Fork Payette River Kokanee Spawner Counts 20
Introduction 20
Methods 20
Results 20
Discussion 21
LITERATURE CITED 22
TABLES 23
FIGURES 37

2013 Southwest Region McCall – Fishery Management Report

MOUNTAIN LAKES SURVEY

Abstract

Thirteen high mountain lakes were surveyed for fish and amphibian presence in 2013. Only one of the lakes (Blackwell Lake in the North Fork Payette drainage) was on our fish stocking rotation; the remaining lakes had never before been surveyed. Blackwell Lake contained Rainbow Trout *Oncorhynchus mykiss* with two year classes being captured by gill net. Eight of 13 lakes contained native amphibians.

Author:

Dale Allen
Regional Fishery Manager

Methods

We surveyed fish and amphibian populations in high mountain lakes (HML) in three drainages, the Gold Fork River (six lakes), Johnson Creek (six lakes) and North Fork Payette River (one lake). Fish populations were sampled using Idaho Department of Fish and Game (IDFG) standard survey, sinking gill nets. We used one net for each lake if it was over several m deep. If the lake was shallow no gill nets were set. Fish gathered in the nets were weighed and measured. Measurements were recorded as total length (TL) to the nearest mm, and weight to the nearest gram. If fish were present a random selection of two fish from each lake was sacrificed, dissected, and analyzed for gut contents. Amphibian and reptile populations were noted using a visual encounter survey (VES) method (Crump and Scott, 1994) where the surveyor walked the entire shoreline of each lake and counted the number of each species present by life stages (egg, larvae, juvenile, adult). Temperature, conductivity and pH were also measured at each site. These chemical parameters were measured along the shoreline of the lake, and are representative of surface conditions. Data were entered into the IDFG Lakes and Reservoirs database.

Results

Blackwell Lake in the North Fork Payette River drainage was the only lake sampled in 2013 on the stocking rotation and Rainbow Trout *Oncorhynchus mykiss* were captured (Table 1). A group of small lakes in the Gold Fork River drainage, a tributary to the North Fork Payette River was selected because of no previous surveys. These lakes did not support fish and were very shallow. Also a group of lakes draining into the Johnson Creek drainage of the South Fork Salmon River were investigated for fish and amphibians. No fish were observed or captured but most lakes contained one or more amphibian species (Table 1).

Management Recommendations

1. Continue to stock Blackwell Lake on current rotation.
2. Hire a dedicated 2 person HML crew for 2014 season.
3. Concentrate HML surveys on unsurveyed lakes in the South Fork Salmon and Middle Fork Salmon drainages.

2013 Southwest Region McCall – Fishery Management Report

LOWLAND LAKES

Abstract

We completed the annual fall gillnetting in Lake Cascade. Yellow Perch *Perca flavescens* were the most abundant species collected and comprised 41% of total catch. Largescale Sucker *Catostomus macrocheilus* and Black Bullhead *Ameiurus melas* were the second and third most abundant fish species caught. Largescale Sucker biomass was the highest of all species collected at 481 kg followed by Rainbow Trout *Oncorhynchus mykiss* biomass at 161 kg. Yellow Perch and Northern Pikeminnow *Ptychocheilus oregonensis* biomass were 145 kg and 105 kg respectively. For Yellow Perch 200 mm and 300 mm in total length averaged ages were III+ and VI+.

In 2012 and 2013 the more economical to produce, fingerling Rainbow Trout (Hayspur diploids) were stocked in Lake Cascade. In 2013, stocked fingerlings were split into two different groups; Cascade City boat ramp release site and Poison Creek Boat ramp release site. Each group was differentially marked with fluorescent grit prior to release. Lake Cascade was gillnetted following stocking to monitor their fate. We collected one, 2013, Poison Creek Boat ramp released fingerling during summer gillnetting and six in the fall gillnetting survey. We observed zero green marked fish in 2013. We also collected 22 marked fish from the 2012 fingerling Rainbow Trout stockings.

As the Yellow Perch population continued to increase from its low in the mid 2000's, so had angling pressure. We completed a harvest exploitation study in 2009 and began another in 2013. Yellow Perch greater than 250 mm were Floy tagged in May 2013. Total exploitation through March of 2014 was 15.6% and harvest exploitation was 13.9%. This compared to 16% and 14% respectively in 2009.

To evaluate the Lake Trout fishery in Payette Lake we completed a lake wide, comprehensive population survey in 2013. We sampled a total of 21 random/shoreline sites and six historical survey sites. Lake Trout length frequency data from the historical sites revealed no gross changes in population size or structure since 1988. Lake Trout less than 762 mm made up 41% of the total catch. However, Lake Trout collected from the new random/shoreline sites revealed a very different population size structure with 69.5% of the catch being less than 762 mm.

We monitored the Kokanee population in 2013 by conducting a lake-wide, hydroacoustic survey of Payette Lake. We estimated a total of 44,342 of the smallest size class (90% CI +/- 14,431), 12,607 size class two fish (90% CI +/- 6,233), 2,686 size class three (90% CI +/- 1,665), and 1,844 size class four Kokanee (90% CI +/- 1,100) in Payette Lake. The abundance of all Kokanee was estimated at 61,478 fish (90% CI +/- 19,041).

Brundage Reservoir is a quality trout water with a special, 2 fish under 14" harvest and no bait rule. Prior to 2009 the lake was stocked with Westslope Cutthroat Trout *Oncorhynchus clarkii lewisi* fry on top of a natural Rainbow Trout population. The 2013 gillnetting catch revealed that relative weights were low and averaged 87.8 for all trout. Trout ranged in size from 135 mm to 405 mm. Trout over 355 mm made up 23% of the catch.

Little Payette Lake is managed as a Tiger Muskie *Esox lucius x E. masquinongy* and Smallmouth Bass *Micropterus dolomieu* fishery. A fall gillnetting survey in 2013 collected three Tiger Muskie, 14 Kokanee, 63 Largescale Suckers, 48 Northern Pikeminnow, and one Mountain Whitefish *Prosopium williamsoni*. The Tiger Muskies were 615 mm, 950 and 993 mm in total length.

Northwest Passage Pond is a new pond constructed by the IDFG and sits on the Northwest Passage camping area of Ponderosa State Park. It was completed in fall 2012 and was stocked with catchable Rainbow Trout in the spring of 2013. We used a trail camera to estimate total angling hours. Total angler use for the pond's first season was 982 hours. Angler hours by month were 263, 417, and, 237 for June, July, and August respectively and 65 hours in September.

Authors:

Paul Janssen
Regional Fishery Biologist

Eric Stark
Senior Fishery Research Biologist

Jacob Johnson
Fishery Technician

Dale Allen
Regional Fishery Manager

Objectives

To conduct investigations and implement management strategies on lowland lakes and reservoirs to protect, maintain, and enhance McCall area fish and fisheries.

Lake Cascade Fishery Survey

Introduction

Since the Yellow Perch *Perca flavescens* restoration treatments were completed in 2004, 2005, and 2006 (Janssen et al. 2008) fish management activities on Lake Cascade have been directed at monitoring the results of those efforts and overall changes in fish communities. Specific objectives listed in the IDFG 2013-2018 Fisheries Management Plan (IDFG 2012) included monitoring abundance, size, and age trends of the Yellow Perch and Northern Pikeminnow *Ptychocheilus oregonensis* populations.

To protect the Yellow Perch fishery from excessive Northern Pikeminnow predation impacts Northern Pikeminnow numbers and size must be monitored. A trend towards a majority of Northern Pikeminnow greater than 350 mm indicates the need for control measures to be implemented (Allen et al. 2009).

We continued these monitoring efforts using an intensive gill netting survey in fall 2013 using gillnetting sites established 2012 (Janssen et al. 2014). The gillnetting survey also aides monitoring of all other fish species trends in the lake.

Methods

We gillnetted 15 sites in 2013. Three of the 2012 sites were changed slightly in 2013 and all 15 site coordinates are presented in Table 2. At each sample site we set one sinking and one floating, standard IDFG lake survey gill net. At shoreline sites, sinking gill nets were attached to or near the shore. The floating net was set in a minimum of 3 m deep water as close to the shoreline set as possible. Mid-lake sets were simply set in near proximity to each other. Nets were fished overnight and pulled the next day. All fish were identified, measured total length to the nearest mm and a sub sample weighed to the nearest gram.

Results

We sampled all 15 sites from October 7 through October 15, 2013. We collected 1,778 fish of 13 species (Table 3). Yellow Perch were the most abundant species netted and comprised 41% of total catch. Largescale Sucker *Catostomus macrocheilus* and Black Bullhead *Ameiurus melas* were the second and third most abundant fish caught. Rainbow Trout *Oncorhynchus mykiss gairdneri* and Northern Pikeminnow catches were equal for the fourth most abundant catch. Largescale Sucker biomass was the highest of all species collected at 481 kg followed by Rainbow Trout at 161 kg. Yellow Perch and Northern Pikeminnow biomass was 145 kg and 105 kg respectively.

Yellow Perch length frequency data revealed that 200 mm and 300 mm fish averaged three and six and one half years of age respectively (Figure 1). There were three larger age classes (2, 3 and 4) of perch present, averaging 155, 205, and 235 mm in length respectively. Perch greater than 250 and 300 mm made up 27.2% and 13.5% respectively of all perch sampled.

The Northern Pikeminnow population structure was similar to that found in 2012 with 67% less than 350 mm, which compared to 62% in the 2012 fall gill netting survey (Figure 2). The IDFG standard lake survey gill nets were ineffective at capturing Yellow Perch less than 140 mm and Northern Pikeminnow less than 160 mm. Length frequencies of all fish collected are presented in Table 4.

Management Recommendation

1. Continue annual fall gillnetting fish survey to monitor Yellow Perch and Northern Pikeminnow populations to identify need to reduce adult Northern Pikeminnow population size. This data also gives valuable insight into the populations and fishery status of stocked salmonids and other game fish.

Lake Cascade Rainbow Trout Fingerling Stocking Evaluation

Introduction

Recent tagging studies (Casinelli 2014) indicated that returns of stocked, catchable Rainbow Trout in Lake Cascade were less than one percent with some stocked groups having no tag returns. Approximately 100,000 to 150,000 catchable size Rainbow Trout had been stocked in Lake Cascade annually in recent years. Due to rising costs of catchable size Rainbow Trout and their historically poor returns in Lake Cascade the stocking request for these fish was dropped from 150,000 to 75,000 beginning in 2012. In lieu of the catchable Rainbow Trout stockings fingerling Rainbow Trout were stocked in Lake Cascade.

We began a fingerling survival study in 2012 (Janssen et al. 2014) to evaluate the success of the fingerling plants and we continued that study in 2013. A prior Rainbow Trout fingerling stocking evaluation on Lake Cascade in 1990 and 1991 indicated a survival rate less than 0.7% for all fish less than 250 mm at stocking (Janssen and Anderson 1994).

Methods

We fluorescent grit marked Hayspur strain fingerling Rainbow Trout stocked in Lake Cascade in 2013. The fish were reared and marked at IDFG's Hagerman Fish Hatchery. We used two different colors (red and chartreuse) to differentiate between two stocking sites; Poison Creek boat ramp and Cascade City boat ramp. The grit marking technique is described in Janssen et al. (2013).

A sample of marked live fish of each color was held at the hatchery for one month, post marking, to allow time for grit not embedded in the fish to slough off. After one month a sample of approximately 100 fish from each color group was collected. Each fish was examined under a black light for the presence of the fluorescent mark to determine percent of fish permanently marked by color group.

Following stocking, gillnets were used to sample marked fingerling in the lake. The gill nets were designed and built to maximize catch of Rainbow Trout from 150 mm to 350 mm. Each net was 0.91 m tall by 61 m long with four, 15.25 m long panels of different mesh sizes. The square mesh sizes of the different panels were 7.4 mm, 15.9 mm, 19 mm, and 25.4 mm.

We used one floating gill net and one or two sinking gill nets at each sample site depending on water depth. Two sites were sampled each day and selected so that all five nets could be deployed. The sinking nets were set to sample mid water depths by suspending them with either 0.91 m or 1.82 m long ropes below 3 floats tied equal distance along the float line in addition to the anchor/float end ropes. To avoid large catches of Yellow Perch, Black Bullheads and Largescale Suckers all sample sites were located far enough offshore to ensure that the lead line of the deepest suspended sinking net was a minimum of 0.5 m above the lake bottom.

The lake was systematically sampled from north to south over a weeks' time, sporadically over the summer months. Two sites were sampled in each of the North, Sugarloaf Island, Crown/Vista points, and Cascade City/Cabarton general areas. Actual sites varied from month to month and were arbitrarily selected in an attempt to find these fish. Fingerling data were also collected in October in conjunction with an intensive fishery survey (see "Lake Cascade Intensive Fishery Survey" section of this report).

All Rainbow Trout collected were taken to the lab to be examined with a black light in complete darkness for presence of the fluorescent mark. All Rainbow Trout were sorted by mark and measured for total length and weighed.

Monthly weighted catch rates were calculated by dividing the total number of fish of each color group gillnetted by the total number of actually marked fish stocked. This number was then multiplied by 100,000 and divided by effort (number of net nights).

Results

We grit marked and stocked a total of 550,000 Hayspur strain fingerling Rainbow Trout into Lake Cascade in 2013. A total of 278,470 red marked fish were released at the Poison Creek boat ramp from and 271,740 green marked fish were released at the Cascade City boat ramp. Release site, dates and numbers of fish stocked at each site by color are presented in Table 5. We obtained a marking rate of 86% for the red group and 77% for the green group therefore, the actual number of marked fish released was 239,000 red and 209,240 green (Table 6).

We collected one red and zero green marked fish in the summer gillnetting efforts. During the October 2013 fall fishery survey we collected six red and zero green marked fish from the 2013 releases. We caught nine, seven, and six of the red, orange, and, green marked fish respectively, from the 2012 releases (Figure 3, Table 7). The six, 2013 released, red marked fish averaged 208 mm. The 2012 released red, orange, and green Rainbow Trout averaged 424, 394, and 426 mm respectively. The weighted catch rate for 2013 red marked fish was 0.08/net night. The weighted catch rates for the 2012 released red, orange, and green fish were 0.2, 0.7 and 0.15 respectively from the fall survey.

Discussion

Fishery survey data revealed that the 2013 fingerling stockings survived at a much lower rate than did the 2012 fingerling stockings. Relative catch rates of all three groups of 2012 fingerling stockings were higher in 2013 than that of both 2013 fingerling stockings. No fish released at the Cascade City boat ramp in 2013 were collected in all our sampling. Blue Heron boat ramp was our preferred south reservoir release site however; the Cascade city boat ramp was used instead due to road construction. The Cascade City boat ramp is located

approximately 1,000 m down the shoreline from the dam making entrainment a valid concern. From past experience we've learned that in some years large portions of salmonids stocked at that location are entrained in the dam outlet.

It should be noted that as was the case in 2012, the entire group of diploid Hayspur fingerling (red and green) were infected with IHN for several weeks prior to stocking. Fish marking in 2013 was delayed a month to allow fish to cycle through the disease outbreak and respond to treatment. This resulted in some fish not being stocked until July, at the Cascade City boat ramp, when surface temperatures were measured in excess of 19° C.

Predation on fingerling has intuitively increased as Northern Pikeminnow continued to grow in numbers and in size of individual fish. In 2012, 42% of all Northern Pikeminnow collected in the fall survey were greater than 300 mm and in 2013, 50% were larger than 300 mm.

Yellow Perch were documented as prey items for fingerling in 2012. Therefore, timing of fingerling stockings in Lake Cascade with the hatching of perch eggs may be critical to fingerling survival. In June, age zero perch are similar in size to zooplankton present in the lake. Therefore, if stocked early enough in the year, fingerling can begin feeding on these small perch and adapt to preying on larger and larger perch as they grow through the summer. However, due to the late stocking of the 2013 fingerlings, age zero perch may have been too large to be identified and utilized as prey items. Age zero perch are probably a more consistent food source from year to year in June than are zooplankton numbers.

The fall 2013 gill net catch rates of the Hayspur triploid fingerling group stocked in 2012 was 4.5 times greater than any other group stocked in 2012 or 2013. Fingerlings stocked in 2012 had much higher growth rates than those stocked in 2013. Total lengths of all marked Rainbow Trout collected in 2012 and 2013 are presented in Figure 4.

Management Recommendation

1. Stock fingerlings in 2014 with Hayspur diploids and triploids at 50:50 rate and repeat fingerling evaluation.

Yellow Perch Exploitation Study

Introduction

As the Yellow Perch population continued to increase from its low in the mid 2000's, so has the number of anglers pursuing Yellow Perch. To examine the level of harvest of this fledging Yellow Perch population, we completed an angler harvest exploitation study in 2009 and began another in 2013.

Methods

Standard IDFG lake survey trap nets were used to collect Yellow Perch from multiple locations around the lake. Fish collected were measured to the nearest mm and all fish larger than 250 mm were tagged with a bright orange Floy tag anterior to the dorsal fin. We utilized the statewide IDFG fish exploitation tag return program "Tag, You're It" administered by the IDFG Fishery Research office to collect and summarize tag return data. Methods utilized to determine exploitation rates of tagged fish are presented in Meyer et al. (2012).

Results

We collected and tagged 494 Yellow Perch from April 30 to May 8, 2013. Tagged fish ranged in size from 250-397 mm and averaged 306 mm. Between May 8, 2013 and March 27, 2014 we had 46 tags returned of which 41 were harvested. Tag loss and non-reward tag return rates, determined from double tagged perch in a previous study, were 1.2% and 58.5% respectively (Meyer et al. 2012). Total exploitation in 2013 through winter 2014 was 15.6% and harvest exploitation was 13.9%. This compares to 16% and 14% respectively in 2009. The reporting rate for non-reward tags was calculated to be 62%.

Discussion

Yellow Perch exploitation rates were low given the high interest in perch during the 2013/2014 ice fishing season when three state records were harvested through the ice. Given the present harvest rate of 13.9% it would take four to five years to harvest 50% of the perch greater than 250 mm. Harvest rates are low on adult perch, therefore, special rules are not warranted at this time.

Management Recommendation

1. Repeat the exploitation study in 2015 when the Yellow Perch population should be at or near maximum capacity for Lake Cascade. This would allow us to document changes in exploitation rates and allow us to address public comments suggesting creel limits on large Yellow Perch.

Payette Lake Lake Trout Survey

Introduction

Payette Lake fish management is focused on Kokanee, Lake Trout and Rainbow Trout fisheries (IDFG Fish Management Plan). The Rainbow Trout fishery is accomplished via the stocking of catchable size fish directly from the hatchery and from fish grown and released from net pens.

Lake Trout and Kokanee management is much more involved and is a balancing act between special rules and stocking. The primary goal for these two species is to maintain both Kokanee and trophy Lake Trout fisheries. The methods to achieving this goal are confounding since Kokanee are also the primary forage fish for Lake Trout in Payette Lake.

Lake Trout and Kokanee have co-existed in Payette Lake since the early 1940's. Trophy Lake Trout management started in 1996 with a one fish over 36 inches harvest rule. The harvest rule was changed in 2000 to catch and release only for Lake Trout.

Kokanee stocking in Payette Lake was suspended in 1994 as a result of IDFG research studies indicating that hatchery stocked Kokanee fry and fingerlings contributed little to this population (IDFG unpublished). Since that time, Kokanee spawner numbers have declined approximately 50% with each subsequent generation (Janssen et al. 2013).

Kokanee spawner numbers have declined from a high of 65,000 in the mid 1990's to 526 in 2013 (See Payette Lake Kokanee, Lake and Streams sections, this report). Lake Trout

condition has also declined as Kokanee diminished. Due to these declines we reinstated annual Kokanee fingerling stockings in 2007. IDFG has stocked 87,000 to 460,000 Kokanee fry/fingerling annually since 2007.

IDFG research studies in the early to mid-1990's indicating little to no contribution of stocked kokanee to total population numbers in Payette Lake were inaccurate. As recently as the mid 1990's an increase in numbers of stocked Kokanee fingerlings in Payette Lake resulted in large increases in the number of adult spawning Kokanee four years later (Janssen et al. 2012). However, annual Kokanee fingerling stockings since 2007 have not increased numbers of adult spawning Kokanee. Lack of response in adult Kokanee probably indicates an increase in Lake Trout numbers and a corresponding increase in predation on Kokanee in recent years. Concerns over Lake Trout predation impacts on Kokanee numbers over the last several years led to a new Lake Trout harvest rule of one fish less than 30" in 2010.

We completed a lake wide, comprehensive Lake Trout population survey in 2013 to examine the effects of this rule change, examine population structure changes since the first population work was completed in 1988, and changes in population size since 1995. Since 1988 we have completed Lake Trout surveys on Payette Lake approximately every five years. During those surveys we sampled the same six sites using standard IDFG experimental gill nets.

Methods

We sampled six historical sites with two sets of nets at each site. One set included two IDFG experimental sinking nets connected together end to end, and the second set consisted of three IDFG experimental sinking nets connected end to end. As in previous surveys, one net night of effort equaled all five nets on the historical sites. The six historical sites included; Luck's Point, Huckleberry Bay, S.E. of Cougar Island (Shellworth Is.), N.E of Channel Island, Sheppard's Point and Duck Bay (Janssen et. al. 2010).

Nets were set in open water on the flats associated with each historical site. Nets were set in the afternoon, fished overnight, and pulled the next morning. All live Lake Trout collected were checked for marks, measured to the nearest mm, weighed to the nearest 10 g, floy tagged and released. Lake Trout mortalities were measured and weighed, and otoliths were removed for ageing.

We selected 21 new random/shoreline (r/s) gillnetting sites on Payette Lake in 2013. The first shoreline site was randomly chosen and then each consecutive site was located one mile down the shoreline from the previous site. Each site was sampled with two; 45.7 m long, IDFG experimental sinking nets, tied end to end and set perpendicular to shore. The nets were set in the afternoon, fished overnight, and pulled the next morning. All fish were identified and measured to the nearest 10 mm and weighed to the nearest gram. All live Lake Trout were floy tagged and released. Otoliths were removed from all Lake Trout mortalities for ageing.

In addition to the surveys of r/s sites and historical sites we gillnetted numerous other random sites to capture Lake Trout for tagging. These data are not included in the survey summaries

Otoliths were mounted in epoxy and then sectioned with a jewelers saw to a width of 0.60 mm. Otolith sections were immersed in a glycerin and saline solution and placed under a

microscope equipped with a camera that projected the magnified image onto on a computer monitor. This magnified image was used to age each otolith.

Results

We sampled a total of 21 r/s sites and the six historical sites. We collected a total of 109 Lake Trout from the 21 shoreline sites and 73 Lake Trout from the six historical sites (Nine net nights). Corresponding catch rates were 5.2 Lake Trout per 2 net night for r/s sites and 3.2 Lake Trout per 2 net night (8.1 fish per 5 nets) on historical sites.

Lake Trout total lengths ranged from 259 to 956 mm and averaged 600 mm at the r/s sites (Figure 5). Total lengths of fish collected at the historical sites ranged from 255 mm to 987 mm and averaged 758 mm (Figure 6). Total lengths of all fish combined are presented in Figure 7. Length to weight and relative weight relationships for fish over 500 mm improved slightly from the lowest values measured in 2010 (Figure 8 and Figure 9).

We aged 70 Lake Trout ranging from 2 to 34 years (Table 8). Ages of Lake Trout collected from r/s and historical sites averaged 12.6 and 17.5 years of age respectively. Lengths at age of all Lake Trout collected from all sites are shown in Figure 10 and lengths at age of r/s and historical sites are depicted in Figure 11 and Figure 12. Lake Trout collected from historical sites were generally larger than those collected from the r/s sites. Lake Trout aged at 15 years old, collected from the r/s sites averaged approximately 625 mm in total length and fish collected from the historical sites averaged approximately 725 mm.

We set 100 gillnets in 2013 and collected 212 Lake Trout. We floy tagged 130 Lake Trout and observed zero recaptures therefore no population estimate could be made. We had one tag returned by an angler. Total Lake Trout gill net mortality was 38.7%.

Discussion

Lake Trout length to weight and length to relative weight relationships as well as Kokanee numbers have declined markedly since the mid 1990's (Figure 8 and Figure 9), (Table 14). The 2013 Lake Trout length frequency data from the historical sites revealed no gross changes in population size or structure since 1988 (Figure 13). However, data from the new random/shoreline (r/s) sites revealed an entirely different scenario as Lake Trout less than 600 mm made up 52.5% of the r/s sites catch (Figure 5) and 11% of the historical sites catch.

Lake Trout recruitment in Payette Lake appears low, however once a fish reaches 250 – 300 mm or age 5-6, survival rates are excellent. They are very slow growing and long lived compared to other lakes in the region. At both Lake Pend Oreille, Idaho (Figure 15) and Blue Mesa Reservoir, Colorado (Figure 14) Lake Trout rarely exceed 20 years of age while Payette Lake Lake Trout were aged up to 34 years (Table 8). Average age of a 700 mm fish in Payette Lake was 13.5 years compared to 11 and 7 years old in Lake Pend Oreille and Blue Mesa Reservoirs respectively.

Because only the historical sites had been sampled since 1988 we can only speculate that numbers of Lake Trout in other areas of the lake have increased since the mid 1990's. An increase in Lake Trout numbers with the corresponding increase in predation on Kokanee in recent years could explain the recent decline in Kokanee numbers and Lake Trout condition. Kokanee population studies in Payette Lake also suggest that their decline was predation related (see Payette Lake Kokanee Hydroacoustic Population Survey, this report).

Catch curve data suggest there has been little mortality over the last 16 years (Figure 16). This coincides with the trophy trout rules initiated 17 years ago, which inadvertently protected virtually all small Lake Trout. Harvest rules since 1996 include; one fish over 914 mm, catch and release, and presently a one fish harvest under 762 mm. Nearly all Lake Trout less than 17 years old are also less than 762 mm, indicating these fish have realized virtually no fishing mortality.

It appeared that larger Lake Trout had an affinity for certain locations or they exclude or consume smaller Lake trout from the historical sites indicated by differences in length frequencies between survey site groups. The majority of Lake Trout angling pressure has been focused on the areas covered by the historic sample sites.

To improve Lake Trout condition and recover the Kokanee population mortality of Lake Trout less than 762 mm must be increased significantly.

Management Recommendations

1. Remove as many Lake Trout under 762 mm as possible to reduce predation pressure on Kokanee to a sustainable rate.
2. Complete a population estimate on Lake Trout greater than 762 mm and compare it to the estimate made in 1995 to determine if their numbers need to be reduced as well.
3. Liberalize the Lake Trout harvest rule to allow more harvest.

Payette Lake Kokanee Hydroacoustic Population Survey

Introduction

Fishery management on Payette Lake is focused on maintaining the Kokanee, Rainbow Trout, and trophy Lake Trout fisheries (IDFG 2012). Rainbow Trout are managed as a put and take fishery. Lake Trout and Kokanee management has been a dynamic balancing act between special Lake Trout regulations and Kokanee stocking with fairly extensive monitoring to evaluate the effects of each. The fact that Kokanee are the primary forage fish for Lake Trout in Payette Lake makes the methods to achieving this goal all the more confounding. Lake Trout and Kokanee have co-existed in Payette Lake since the early 1940's and management of the trophy Lake Trout fishery started in 1996. We surveyed Payette Lake Kokanee densities in 2013 to help identify needs for future management changes to achieve fishery goals.

Methods

We monitored the Kokanee population in 2013 by conducting a lake-wide, hydroacoustic survey of Payette Lake. The mobile survey was conducted using Region 3 McCall Fish Management's 6.4 m Koeffler boat on the night of August 2, 2013. Kokanee abundance was estimated using a Simrad EK60 scientific echosounder with a split-beam 120 kHz transducer. The echosounder was set at 3.3 pings/second, and the transducer was mounted to a pole off the port side of the boat. The transducer when lowered was about 0.5 m below the surface. Prior to the survey, we calibrated the echo sounder using a 23 mm copper calibration sphere, with target strength (TS) of -40.4 decibels (dB), to set the gain and adjust for signal attenuation to the sides of the acoustic axis. We used Simrad's ER60 software to determine, and input, the calibration settings.

Three previously established lake sections (Janssen et al. 2011) were used again in the 2013 survey in order to maintain consistency in methods; Southwest – 899 ha, East – 724 ha, and Narrows – 90 ha (Figure 17).

We also used the transects previously established by Hardy et al. (2010) which followed a uniformly spaced, zigzag pattern traveling from shoreline to shoreline (MacLennan and Simmons 1992). During the 2013 survey, all transects used were the same as in 2012, for a total of 18 transects. However, transects 12 and 13 in the Southwest section were combined during analyses. We maintained a boat speed of approximately 1.5 m/s during the survey.

Echo integration techniques were used to estimate Kokanee abundance from hydroacoustic files (echograms). Echogram data was viewed and analyzed using SonarData's Echoview software, version 5.0.78. Within the echogram, a box was drawn around the Kokanee layer of each transect (on average, 5 m to 35 m deep), integrated to obtain the nautical area scattering coefficient (NASC), and analyzed to obtain the mean target strength (TS) of all returned echoes. This integration accounted for fish that were too close together to detect as a single target ((MacLennan and Simmons 1992). Densities were then calculated by the equation:

Density (fish/ha) = (NASC /4π10TS/10) 0.00292
Where:NASC = total backscattering (m2/nautical mile)
TS = mean target strength in dB for the area sampled

The target strength data from all returned echoes that qualified as single fish targets were binned into 1 dB intervals (adjusted target strength) for each transect. We then graphed a frequency distribution of fish target strengths from all survey transects. Single fish targets were categorized into Kokanee or non-Kokanee groups based upon their TS. All single targets less than -60.0 dB were considered too small to be Kokanee fry. Targets greater than -31.0 dB were thought to be too large to be Kokanee, and were most likely Lake Trout.

In 2013, no trawl survey was conducted; therefore Kokanee ages and length-at-age were not determined. However, Kokanee lengths were measured during spawner counts in September, 2013 and ranged from 395 to 510 mm, but with two distinct spawner size classes (Figure 18). The first class was 390 mm to 470 mm and the other group from 470 to 510 mm TL. Since definitive age information was not available, fish target strengths were binned into size classes strictly on the reservoir wide target strength frequency of all detected fish targets in the Kokanee range. Next, we combined expected Kokanee age-at-length knowledge with the target strength frequency distribution to approximate Kokanee class breaks. Love's equation (Love 1971) was used to calculate fish lengths at each break between classes.

All fish targets between -60.0 dB [approximately 16 mm total length (TL); (Love 1971) and -31.0 dB (522 mm), were defined as Kokanee (Figure 19), and within this range Kokanee were partitioned into four size classes. Thus, class one consisted of target strengths from -60.0 to -48.0 dB (16-67 mm), class two were -47.9 to –41.0 dB (68-156 mm), class three were -40.9 to -35.0 dB (157-322 mm), and class four Kokanee included targets between -34.9 and - 31.0 dB (323-522 mm). These class breaks were subsequently used to generate class-specific abundance and density estimates.

Mean density of each size class of Kokanee in each lake section was calculated and multiplied by the area of that section to obtain size class abundance estimates per reservoir section. Abundance estimates for each reservoir section were totaled to obtain total size class population estimates and the size class estimates were totaled to obtain total Kokanee abundance in the entire lake.

Results

A total of 243 echo returns were recorded from fish within the Kokanee layer of all hydroacoustic transects. Fish target strengths from returned echoes ranged between -60 and -30 dB (Figure 19). Across all transects collected on Payette Lake in 2013, total Kokanee densities ranged from 5 to 83 fish/ha (Table 9). The highest densities of all age class were mostly found on the northeastern end of the lake.

We estimated a total of 44,342 of the smallest size class (90% CI +/- 14,431), 12,607 class two fish (90% CI +/- 6,233), 2,686 class three (90% CI +/- 1,665), and 1,844 class four Kokanee (90% CI +/- 1,100) in Payette Lake (Table 10). The abundance of all Kokanee was estimated at 61,478 fish (90% CI +/- 19,041).

Discussion

The total population estimate for Kokanee in Payette Lake decreased about 25%, from 81,617 (51 Kokanee/ha); (Janssen et al. 2014) in 2012 to 61,478 (38 Kokanee/ha) in 2013 (Table 11). Although total abundance of Kokanee decreased, size classes 2 and 4 exhibited slight increases from 2012. But, overall Kokanee survival was only 21% during 2013 (August 2012 – August 2013). Although slightly improved in contrast to 2012 (13%), survival was still

poor for all size classes. Survival of size classes two, three, and four was 20%, 24%, and 31%, respectively (Table 11). We could expect about 60% annual survival rates for a population with little or no predation (Maiolie and Elam 1995). Therefore, it appears predation severely impacted the survival of all age classes during 2013. We would expect predation to be highest on the most abundant size class, with no real preference based on size alone, especially predation by Lake Trout.

Hydroacoustic surveys provide a quick and reliable method to estimate Kokanee abundance and densities in lakes and reservoirs, but like any method, still have limitations. During our survey we defined all fish targets within the acoustic target strengths of -60 dB to -31 dB (16 to 522 mm) as Kokanee. Thus, it should be noted that other species may have been detected, thereby potentially inflating Kokanee abundance estimates. Species present that could have been incorporated include Largescale Suckers *Catostomus spp*., Mountain Whitefish *Prosopium williamsoni*, Northern Pikeminnow *Ptychocheilus oregonensis*, and Rainbow Trout *Oncorhynchus mykiss*. Although all of these species could overlap with Kokanee in size (TS), none of these fish are known to be pelagic, especially at night. In addition, all shallow, near-shore targets of all sizes were excluded from analyses. And larger fish targets (greater than -31.0 dB) within pelagic areas were not counted as Kokanee. Therefore, we are confident that few non-target species were incorporated into these estimates.

The equipment, software, and analyses used to conduct this survey and analyze the data remained the same as in 2011 and 2012; therefore we feel data are directly comparable to results from those years. Several improvements could be made to further enhance these methods. In 2013, defining acoustic size class breaks solely by acoustic target strength frequency data was not preferred, which leaves some uncertainty regarding the true size class abundance and densities. Thus, we recommend continuing annual trawl surveys in conjunction with hydroacoustics to improve size class estimates of Kokanee, as well as to provide a comparison to hydroacoustic estimates. Trawl sampling provides age-at-length data, even if only a small sample size is obtained, and results in more accurate age class-specific population estimates than using hydroacoustics alone (Stark and Stockner 2006).

If we apply this year's size/age class survival rates (Table 11), to the 2013 abundances; we would expect only 8,803 class two Kokanee (5.1 fish/ha), 3,050 class three (1.8 fish/ha), and 839 class four (0.5 fish/ha) fish in August 2014. During 2013, survival of all size classes was low, but it is not clear what sources of mortality caused this decline. Although natural mortality could be quite high, a great deal of total annual mortality is likely due to predation. Predation is likely to continue to decrease Kokanee abundance until natural reproduction is virtually eliminated. If this happens, the only means of maintaining Kokanee in Payette Lake will be through stocking hatchery Kokanee. If overall survival doesn't increase dramatically in 2013, the Kokanee population in Payette Lake will effectively collapse.

Although neither predation rates nor fishing mortality of Kokanee are currently estimated on Payette Lake, long term trends in abundance and density of Kokanee may provide insight into potential sources of mortality. In addition, estimates of egg-to-fry survival from naturally spawning adults in conjunction with fry stocking numbers would also help define when and where most mortality is occurring. Lastly, based upon this years' extremely low Kokanee abundance, management actions are likely limited to either large hatchery Kokanee stockings or elimination of stocking altogether. Stocking may provide sufficient Kokanee to allow natural reproduction, or they may all be predated upon and none escape to spawn. Alternatively, stocking could be discontinued and the natural Kokanee population allowed to crash, with the hope that the loss of prey would subsequently crash the predator population as well.

Brundage Reservoir Trout Survey

Introduction

Brundage Reservoir is quality trout water with a daily bag limit of 2 fish less than 14" and no bait allowed. Prior to 2009 the lake was stocked with Westslope Cutthroat Trout *Oncorhynchus clarkii lewisi* fry to supplement a natural Rainbow Trout population. Previous surveys revealed that growth of trout, both stocked and wild, was slower than expected when compared to other area waters (Janssen et al. 2011). Maximum size of Trout collected in prior surveys was approximately 400 mm. To improve growth rates of previously stocked and wild fish no fish had been stocked since 2008. We sampled Brundage Reservoir again in 2013 to re-examine trout growth.

Methods

We set two floating and two sinking IDFG experimental gill nets in the afternoon, fished overnight and pulled the next morning. All fish were identified to species, measured to nearest mm and weighed to nearest 10 g.

Results

We collected 43 Westslope Cutthroat Trout, 36 Rainbow Trout, and nine Westslope Cutthroat Trout x Rainbow Trout hybrids. Westslope Cutthroat Trout ranged in length from 135 mm to 405 mm of which 19% were equal or greater than 14" (355 mm) (Table 12). Relative weight averaged 80. Natural Rainbow Trout ranged from 145 mm to 395 mm of which 17% were equal or greater than 14". Relative weight averaged 87.8. Natural hybrids ranged from 295 mm to 385 mm of which 66% were equal or greater than 14" (No Wr formula for Wct xx Rbt hybrids). Trout over 355 mm made up 23% of the catch.

Discussion

Trout condition continued to be low in Brundage Reservoir with relative weights averaging 84.0. We would have expected maximum size of trout to exceed 400 mm with the special harvest rule in place. A more liberal harvest limit for fish under 355 mm and/or a physical control of trout spawning in tributary streams may be warranted to reduce densities of fish and thereby improve growth rates.

Management Recommendations

1. Consider rule change to allow harvest of more trout under 14".
2. Investigate the possibility of blocking the trout spawning run into the main Reservoir tributary.

Little Payette Lake Survey

Introduction

Rainbow Trout stockings in Little Payette Lake (LPL) were discontinued in 2013 as trout angler success was minimal and stocked Rainbow Trout were ideal prey items for the Tiger Muskie *Esox lucius x E. masquinongy* present in the lake (Janssen et al. 2014). Historically, Kokanee and trout growth and survival were poor in LPL due to low productivity, predation by Northern Pikeminnow and competition with Largescale Suckers and Northern Pikeminnow.

Tiger Muskies have been stocked semiannually in LPL since 1998. Smallmouth Bass reproduce in LPL but between slow growth rates and suspected Northern Pikeminnow predation, survival of young of year bass through the first winter is virtually zero. Therefore, adult Smallmouth Bass were collected semiannually from Oxbow Reservoir and transplanted into LPL. The Tiger Muskie and Smallmouth Bass in LPL utilize non-game fish as prey and have provided a unique fishery to the area. An Idaho state and world record Tiger Muskie was caught in LPL by an angler on 8/6/2013. This fish was 20.12 kg and measured 13.33 cm. Smallmouth Bass harvest has been restricted with a bag limit of two bass, none under 20", per day. Angler catches of Smallmouth Bass up to 483 mm have been common. LPL was surveyed again in 2013 to examine the status of the fish community.

Methods

We set two sinking and two floating IDFG experimental gill nets in the lake. The two floating nets were set mid lake and the two sinking nets were set attached and perpendicular to shore. They were set in the afternoon, fished all night and pulled the next morning. All fish collected were identified, measured, and weighed.

Results

We pulled gill nets on 10/1/13 and collected three Tiger Muskie, 14 Kokanee, 63 Largescale Suckers, 48 Northern Pikeminnow, and one Mountain Whitefish. Tiger Muskies were 615 mm, 950 and 993 mm in length. Length frequencies of all fish are presented in Table 13.

Discussion

The gill netting survey revealed little in terms of game fish information. No smallmouth Bass were collected and only three tiger Muskie. Gill nets were not the ideal fishing gear to collect these two species as they typically remain stationary in specific locations. In most lakes the addition of electrofishing would give a more realistic view of the fish community. However, given the low conductivity of the lake, at 15 – 20 umos, electrofishing is not an effective tool.

Management Recommendations

1. Continue with the semiannual stocking of tiger Muskie and smallmouth Bass.
2. Investigate efficiency of new Midwest Lakes Management, Inc. electrofishing pulsator in Little Payette Lake.

Northwest Passage Pond Angling Pressure Survey

Introduction

Northwest Passage Pond is a new pond in the McCall area constructed by the IDFG and sits on the Northwest Passage camping area of Ponderosa State Park North of North Beach. It was completed in fall 2012 and covers 0.3 ha. It was stocked with catchable Rainbow Trout in the spring of 2013. The ribbon cutting/grand opening was held on June 29, 2013. To document use of the pond in its first year in existence we completed an angling pressure survey in 2013.

Methods

We used a digital trail camera mounted on a tree in a location that afforded a complete camera view of the entire pond. The camera was set to take one photograph every hour for the entire angling season. Photographs were downloaded to a computer every two weeks. The numbers of anglers present in each hourly photograph were summed for each month which equaled the total hours fished each month.

Results

We took the first pictures on June 12, 2013 and continued through September 13th. Total angler use for the pond's first season was 982 hours. Angler hours by month were 263, 417, and, 237 for June, July, and August respectively and 65 hours in September.

2013 Southwest Region McCall – Fishery Management Report

RIVERS AND STREAMS

Abstract

.

We completed nine IDFG standard stream surveys, three in the North Fork Payette River drainage upstream of Payette Lake and six in main stem Salmon River tributaries. We collected both Rainbow Trout and Brook Trout *Salvelinus fontinalis* in Rapid Creek and only Brook Trout in Kennally and Powelson Creeks. Juvenile Chinook Salmon *Oncorhynchus tshawytscha*, Westslope Cutthroat Trout, Bull Trout *Salvelinus confluentus*, Rainbow Trout, Longnose Dace *Rhinichthys cataractae* and Mountain Whitefish were all found in California Creek. Idaho Giant Salamanders *Dicamptodon aterrimus* were found in Polly, Mann, Long Tom, and Rabbit creeks. Pacific Lamprey *Entosphenus tridentata* were found in two of four beach sample sites on the main Salmon River.

The 2013 Kokanee *Oncorhynchus nerka kennerlyi* spawning run estimate in the North Fork Payette River above Payette Lake was 526 fish, one third of the 2012 estimate.

Authors:

Jacob Johnson
Fishery Technician

Dale Allen
Regional Fishery Manager

Paul Janssen
Regional Fishery Biologist

Objectives

To conduct investigations and implement management strategies to protect, maintain, and enhance fish and fisheries in McCall Sub-Region's rivers and streams.

Standard IDFG Stream Surveys and South Fork Salmon River Lamprey Survey

Introduction

Standard stream surveys were conducted in 2013 to document fish species and physical habitat of streams in the North Fork Payette River drainage and tributaries of the Salmon River. Surveys were also completed on the main Salmon River to determine presence and abundance of Pacific Lamprey *Entosphenus tridentata*. Streams in the North Fork Payette River drainage were previously surveyed for baseline data, and were sampled again in 2013. Many of the tributaries on the mainstem Salmon River had been snorkeled previously, but single electrofishing passes were done to verify species presence and composition.

Methods

We utilized the standard stream survey methodology presented by the August 15, 1994 memorandum by Bill Horton of Idaho Department Fish and Game for surveys in the North Fork Payette River drainage and Salmon River tributaries. Physical habitat data were not recorded for sites on the Salmon River main stem targeting Pacific Lamprey.

Fish were collected using a backpack electrofisher, identified to species or genera, measured to the nearest ten millimeter length range, and released. Electrofishing included one pass until a reasonable sample size was collected, or it was determined that fish were not present. Survey reaches were then measured.

Four cross-sections were completed along each section sampled to determine average width and depth. Substrate was classified as sand, gravel, rubble, boulder, or bedrock and percentage of each was determined at ¼, ½, and ¾ of the stream width at each transect. Percent gradient/vertical drop was calculated for entire sample reach using a pocket level and wading rod. Water temperature and conductivity were recorded at the beginning of each survey. Water quality data (i.e. pH, alkalinity, and hardness) was collected from each stream, along with

any other instructive information, as an addition to the standard stream methodology. Genetic samples were taken from all Pacific Lamprey collected.

Results

We completed three IDFG standard stream surveys in the North Fork Payette River drainage and six in the Salmon River drainage. Specific streams and site locations are presented in Table 15 and presence/absence of species in Table 16.

We collected both Rainbow Trout and Brook Trout *Salvelinis fontinalis* in Rapid Creek and found only Brook Trout in Kennally and Powelson Creeks.

We found only Rainbow Trout in Mann, Long Tom, Rabbit and Warren creeks. Juvenile Chinook Salmon *Oncorhynchus tshawytscha*, Westslope Cutthroat Trout, Bull Trout *Salvelinus confluentus*, Rainbow Trout, Longnose Dace *Rhinichthys cataractae* and Mountain Whitefish were all found in California Creek. Idaho Giant Salamanders *Dicamptodon aterrimus* were found in Polly, Mann, Long Tom, and Rabbit creeks. All fish and habitat data for these surveys were archived in the Department Standard Stream Survey Database.

Pacific Lamprey survey sites were limited to narrow sections (1-2 meters wide) of sandbars along the main stem Salmon River. We completed surveys at four different sites: Chucker Bar, James Ranch Beach, Shepp Ranch Beach, and an unnamed beach on the south bank above Cottontail Rapid. Of these only Chucker Bar and James Ranch Beach produced Pacific Lamprey. A total of 17 Lamprey were collected with a mean length of 82 mm (range= 31-126 mm), and 14 were captured at Chucker Bar alone.

North Fork Payette River Kokanee Spawner Counts

Introduction

The spawning run of Kokanee into the NFPR from Payette Lake has been enumerated since 1988 to assess spawning escapement and to serve as a method of validating Kokanee population/density estimates and survival estimates from in-lake population work. This estimate was completed again in 2013.

Methods

We completed Kokanee spawner counts by walking the entire stretch of river utilized by spawning Kokanee and counting all live spawners. Counts were made twice weekly until a peak count was established. The total run estimate was made by multiplying the largest daily count by 1.73 (Frost and Bennett 1994).

Results

We completed three Kokanee spawner counts on the NFPR. The highest live Kokanee spawner count was 304 fish on September 9, 2013. The total spawning run estimate was 526 (304*1.73)

fish (Table 14). There were two obvious age classes of spawners in 2013 and they averaged 384 and 458 mm in total length.

Discussion

Kokanee spawner counts were one third of that made in 2012. Hydroacoustic population estimates (this report) suggest a continued decline in Kokanee spawner numbers over the next three years.

LITERATURE CITED

Allen, D. B., P. Janssen, K. Apperson et al. 2009. Fishery management annual report. Southwest Region-McCall. 2004-2005. Idaho Department of FIsh and Game. Boise.

Casinelli, J. 2014. Project 4: Hatchery trout evaluations. Grant # F-73-R-36. Report period July 1, 2013 to June 30, 2014. Idaho Department of Fish and Game. Boise.

IDFG. 2012. Idaho Department of Fish and Game. Fisheries Management Plan 2013-2018. IDFG. Boise.

Janssen, P. J., D. B. Allen, K. Apperson et al. 2008. Fishery management annual report, Southwest Region - McCall, 2006. Idaho Department of Fish and Game. Boise.

Janssen, P. and D. Anderson. 1994. Regional fishery management investigations. Federal aid in fish restoration. Job Performance Report, Program F-71-R-16. Idaho Department of Fish and Game. Boise.

Janssen, P., J. Messner, E. Stark, and D. Allen. 2014. Fishery management annual report. Southwest Region-McCall. 2012. Idaho Department of Fish and Game. Boise.

Janssen, P., E. Stark , and D. Allen. 2012. Fishery management report. Southwest Region - McCall. 2011. Idaho Department of Fish and Game. Boise.

Janssen, P. J., E. Stark, and D. B. Allen. 2011. Fishery management report. Southwest Region, McCall. 2010. Idaho Department of Fish and Game. Boise.

Janssen, P. J., E. Stark, and D. Allen. 2013. Fishery management annual report. Southwest Region - McCall. 2011. Idaho Department of Fish and Game. Boise.

Love, R. H. 1971. Dorsal-aspect target strength of an individual fish. Journal of the Acoustic Society of America 49: 816-823.

MacLennan, D. N. and E. J. Simmons. 1992. Fisheries Acoustics. Chapman and Hill, New York.

Maiolie, M. M. and S. Elam. 1995. Dwarshak dam impacts assesment and fisheries investigations project. Report No. 92-25. 1993 Annual Report. Prepared for Bonneville Power Administration, Project No. 1987-099-00. Idaho Department of Fish and Game. Boise.

Meyer, K. A., S. F. Elle, J. A. Lamansky et al. (2012). A reward -recovery study to estimate tagged-fish reporting rates by Idaho Anglers. North American Journal of Fisheries Management 32: 4, 696-703.

Stark, E. J. and J. G. Stockner. 2006. Dworshak kokanee population and reservoir productivity monitoring; Dworshak Dam impacts assessment and fisheries investigations project. Report No. 06-35. 2004 Annual Report. Prepared for Bonneville Power Administration, Project No. 1987-099-00. Idaho Department of Fish and Game. Boise.

TABLES

Table 1. Location of mountain lakes and species found during surveys in 2013.

Drainage	Lake Name/LID	Survey Date	Fish Observed	Amphibians Observed
Gold Fork River	Milton's Lake	8/3/13	none	CSF
	1157958447399	8/3/13	none	CSF
	1157961447406	8/3/13	none	none
	1157968447416	8/4/13	none	none
	1157998447470	8/4/13	none	none
	1158006447477	8/4/13	none	none
North Fork Payette River	Blackwell Lake	7/18/13	RBT	CFS, LTS
Johnson Creek	Ned's Lake	8/7/13	none	CSF PCF
	1154326447722	8/6/13	none	CSF LTS PCF
	1154353449006	8/6/13	none	CSF LTS
	1154356447746	8/6/13	none	CSF
	1154485448993	8/7/13	none	CSF
	1156059448019	8/01/13	none	none

CSF=Columbia Spotted Frog, LTS=Long-toed Salamander, PCF=Pacific Chorus Frog, RBT=Rainbow Trout

Table 2. Fishery survey gill netting site locations with GPS coordinates (WGS 84) on Lake Cascade used October 2013.

Site Name/Location	**Latitude**	**n**	**Longitude**	**w**	**WPT Name**
Lake Fork-North Fork Point	44.6977	N	116.1127	W	GN1
Buttercup Campground	44.6833	N	116.1136	W	GN2
Boulder Creek Point	44.6768	N	116.0982	W	GN3
Railroad Trestle	44.6793	N	116.0785	W	GN4
Point South of Arrowhead Point	44.6550	N	116.0918	W	GN5
Bank NW of Sugarloaf Is.	44.6324	N	116.1106	W	GN6
North side of Sugarloaf Island	44.6148	N	116.0848	W	GN7
Sugarloaf Point	44.0754	N	116.0754	W	GN8
Mid Lake West of Sugarloaf Boat Ramp	44.5892	N	116.1006	W	GN9
West Bank from Sugarloaf Boat Ramp	44.6000	N	116.1363	W	GN10
Deer Creek	44.5658	N	116.1414	W	GN11
Vista Pt.	44.5625	N	116.0706	W	GN12
Pt. N. of Crown Pt.	44.5361	N	116.0674	W	GN13
Van Wyck Creek	44.5407	N	116.1169	W	GN14
Cabarton Recreation Area	44.4978	N	116.0630	W	GN15

Table 3. Fishery survey gill net catch by species, number and weight in Lake Cascade in October 2013.

Species	Number	% Total Catch	Weight (kg)	% Total Weight
Yellow Perch	737	41	145	14
Largescale Sucker	283	16	481	46
Black Bullhead	226	13	73	7
Rainbow Trout	214	12	161	15
Northern Pikeminnow	214	12	103	10
Smallmouth Bass	38	2	42	4
Mountain Whitefish	25	1.4	6	0.7
Kokanee	15	0.8	11	1.0
Largemouth Bass	9	0.6	5.2	0.6
Black Crappie	9	0.6	2.7	0.4
Pumpkinseed	3	0.2	0.9	0.1
Tiger Muskie	3	0.2	12	1.1
Bridgelip Sucker *C. columbianus*	2	0.2	0.7	0.1
Total	1778	100	1043.5	100

Table 4. Length frequencies of fish collected with gill nets from Lake Cascade from October 7 through October 15, 2013.

Total Length (MM)	Yellow Perch	Northern Pikeminnow	Rainbow Trout	Largescale Sucker	Kokanee**	Smallmouth Bass	Black Bullhead	Black Crappie	Bridgelip Sucker	Largemouth Bass	Mountain Whitefish	Pumpkinseed	Tiger Muskie
90-99	0	0	0	0	0	0	0	0	0	0	0	1	0
100-109	0	0	0	0	0	0	0	0	0	0	0	0	0
110-119	0	0	0	0	0	0	0	0	0	0	0	0	0
120-129	0	0	0	0	0	0	0	0	0	0	0	0	0
130-139	6	0	0	0	0	0	0	0	0	0	0	0	0
140-149	36	0	0	0	0	0	0	0	0	0	0	1	0
150-159	46	0	0	0	0	0	1	0	0	1	0	1	0
160-169	43	1	0	0	2	0	0	0	0	1	0	0	0
170-179	29	3	2	3	0	0	1	0	0	0	0	0	0
180-189	34	8	1	0	0	0	6	0	0	0	0	0	0
190-199	60	6	3	0	1	0	3	0	0	0	0	0	0
200-209	73	8	0	1	0	0	9	0	0	0	0	0	0
210-219	49	8	1	2	0	0	4	0	0	0	0	0	0
220-229	52	7	1	1	1	0	7	3	0	0	0	0	0
230-239	63	5	1	5	0	0	15	3	0	0	1	0	0
240-249	45	6	1	2	0	0	19	0	0	0	0	0	0
250-259	20	10	0	5	0	0	26	0	0	0	1	0	0
260-269	27	10	0	3	0	0	20	1	1	1	0	0	0
270-279	20	15	1	0	0	0	22	0	0	1	3	0	0
280-289	19	11	1	4	1	0	28	0	0	0	6	0	0
290-299	16	7	0	2	1	2	16	0	0	0	3	0	0
300-309	12	10	2	3	0	0	12	0	1	1	3	0	0
310-319	15	6	0	3	0	0	12	2	0	0	0	0	0
320-329	17	9	6	8	0	1	6	0	0	0	1	0	0
330-339	15	5	11	2	1	1	5	0	0	1	2	0	0
340-349	10	9	15	2	0	0	3	0	0	1	1	0	0
350-359	10	4	15	6	0	1	2	0	0	1	0	0	0
360-369	7	8	18	7	0	3	3	0	0	0	0	0	0
370-379	8	6	23	0	0	3	1	0	0	0	1	0	0
380-389	4	4	23	2	0	5	1	0	0	0	2	0	0
390-399	1	4	8	1	0	2	2	0	0	0	1	0	0
400-409	0	3	6	2	0	2	1	0	0	0	0	0	0
410-419	0	0	9	3	0	3	0	0	0	0	0	0	0
420-429	0	6	9	6	0	4	0	0	0	0	0	0	0

Table 4. Cont.

Total Length (MM)	Yellow Perch	Northern Pikeminnow	Rainbow Trout	Largescale Sucker	Kokanee**	Smallmouth Bass	Black Bullhead	Black Crappie	Bridgelip Sucker	Largemouth Bass	Mountain Whitefish	Pumpkinseed	Tiger Muskie
430-439	0	3	10	5	0	3	0	0	0	0	0	0	0
440-449	0	7	7	11	0	1	1	0	0	0	0	0	0
450-459	0	2	7	5	0	3	0	0	0	0	0	0	0
460-469	0	3	5	8	1	2	0	0	0	1	0	0	0
470-479	0	1	7	8	0	0	0	0	0	0	0	0	0
480-489	0	3	5	11	3	1	0	0	0	0	0	0	1
490-499	0	5	3	6	1	0	0	0	0	0	0	0	0
500-509	0	6	2	11	0	0	0	0	0	0	0	0	0
510-519	0	0	1	19	2	0	0	0	0	0	0	0	0
520-529	0	0	4	16	1	0	0	0	0	0	0	0	0
530-539	0	0	3	19	0	0	0	0	0	0	0	0	0
540-549	0	1	0	15	0	1	0	0	0	0	0	0	0
550-559	0	2	1	18	0	0	0	0	0	0	0	0	0
560-569	0	0	1	10	0	0	0	0	0	0	0	0	0
570-579	0	0	0	10	0	0	0	0	0	0	0	0	0
580-589	0	0	1	10	0	0	0	0	0	0	0	0	0
590-599	0	1	0	6	0	0	0	0	0	0	0	0	0
600-609	0	1	0	7	0	0	0	0	0	0	0	0	0
610-619	0	0	0	3	0	0	0	0	0	0	0	0	0
620-629	0	0	0	8	0	0	0	0	0	0	0	0	0
630-639	0	0	0	2	0	0	0	0	0	0	0	0	0
640-649	0	0	0	2	0	0	0	0	0	0	0	0	0
~ ~ ~ ~'	0	0	0	0	0	0	0	0	0	0	0	0	0
*850-859	0	0	0	0	0	0	0	0	0	0	0	0	1
*1000-1009	0	0	0	0	0	0	0	0	0	0	0	0	1
Totals	737	214	214	283	15	38	226	9	2	9	25	3	3

** Kokanee greater than 450 mm were mature adult spawners.

Table 5. Number and size of Rainbow Trout fingerling stocked by mark, release site, date and average length in Lake Cascade in 2013.

Mark Color	Fish Strain	Release Site	Date of First Stocking	Number Stocked	Average Length at Stocking (mm)
Red	Hayspur	Poison Cr. BR	6/17/13	77,250	137
Red	(Diploid)	(North lake)	7/8/13	201,220	127
Green	Hayspur	Cascade City BR	6/17/13	108,500	127
Green	(Diploid)	(South lake)	7/8/13	163,240	127

Table 6. Percent grit mark retention by color group and total number of each color group of Rainbow Trout stocked in Lake Cascade in June and July 2013.

Stocking Site	% Marked	Number Stocked	Estimated Number of Marked Fish Stocked
Poison Creek Boat Ramp	86	278,470	239,500
Cascade City Boat Ramp	77	271,740	209,240

Table 7. October gill net catch, weighted catch per net night (CPUE), and growth since stocking of fingerling Rainbow Trout by strain and stocking site, stocked into Lake Cascade in May and June 2012 and June and July 2013.

Sample Month	Strain, Stocking Site	Year Stocked	Number Collected	Weighted CPUE**	Mean Total Length (mm)	Growth From Stocking (mm)
Oct 2012	Hayspur Diploid, Blue Heron Boat Ramp	2012	16	**0.4**	271	118
	Hayspur Triploid, Blue Heron Boat Ramp	2012	7	**1.0**	275	143
	Hayspur Diploid, Poison Cr. Boat Ramp	2012	22	**0.7**	239	93
Oct 2013	Hayspur Diploid, Blue Heron Boat Ramp	2012	9	**0.08**	424	271
	Hayspur Triploid, Blue Heron Boat Ramp	2012	7	**0.69**	394	262
	Hayspur Diploid, Poison Cr. Boat Ramp	2012	6	**0.13**	426	280
Oct 2013	Hayspur Diploid, Cascade City Boat Ramp	2013	0	**0.0**	---	--
	Hayspur Diploid, Poison Cr. Boat Ramp	2013	6	**0.4**	208	78

** (# caught / # marked fish stocked x 100000)/# net nights.

Table 8. Ages of Lake Trout by sample site type collected with gill nets from Payette Lake in 2013.

	Historical Sites									Random/New Sites																				
	Age									Age																				
Length Group	**6**	**12**	**14**	**15**	**16**	**20**	**24**	**30**	**34**	**3**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**19**	**20**	**24**	**25**	**28**	**34**
250-259	1									1																				
290-299												1	1																	
310-319											1			1																
330-339												1																		
340-349												1																		
370-379												1																		
380-389												1																		
400-409												1					1													
430-439													1			1				1										
440-449														2		2	1													
450-459														1																
460-469																2	2	1	1											
480-489													1					1												
490-499														1																
500-509																		2												
510-519															1	1						1	1							
520-529																	1													
560-569					1													1												
570-579																		1	1											
580-589		1																												
600-609																									1					
610-619																				1										
640-649																					1	1								
650-659																				1										
660-669																	1													
670-679																									1					

Table 8. Cont.

	Historical Sites									Random/New Sites																				
	Age									Age																				
Length Group	**6**	**12**	**14**	**15**	**16**	**20**	**24**	**30**	**34**	**3**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**19**	**20**	**24**	**25**	**28**	**34**
690-699			1																										
700-709		1		1																									
720-729																						1							
730-739			1																					1					
740-749																						1							
750-759				1																									
780-789																				1									
790-799					1																		1						
810-819							1																						
830-839						1																							
860-869																								1					
880-889																													1
890-899								1																					
900-909																											1		
910-919																										1			
920-929																												1	
930-939									1																				
980-989																											1		
Grand Total	**1**	**2**	**2**	**2**	**2**	**1**	**1**	**1**	**1**	**1**	**1**	**6**	**3**	**5**	**1**	**6**	**6**	**6**	**2**	**4**	**1**	**4**	**2**	**2**	**2**	**1**	**2**	**1**	**1**

Table 9. Hydroacoustic survey transect data including number of pings analyzed, nautical area scattering coefficient (NASC), mean target strength (dB), and density estimates (no./ha) of Kokanee in each transect in Payette Lake, August 2-3, 2013.

Transect Number	Number of Pings Analyzed	NASC	Mean Target Strength (-dB)	Kokanee Density (number/ha)				
				Class 1	Class 2	Class 3	Class 4	TOTAL
1	1860	7.21	40.7	15	0	2	2	20
2	1029	18.11	30.6	2	0	0	2	5
3	1139	6.38	44.4	26	10	5	0	41
4	2015	10.56	44.8	44	24	7	0	74
5	2561	3.57	43.8	10	7	3	0	20
6	1700	8.58	41.7	23	0	2	4	30
7	2415	6.44	47.0	51	18	6	0	75
8	2612	13.52	37.8	14	2	0	3	19
9	1684	4.32	49.2	55	28	0	0	83
10	1382	1.68	51.2	40	11	0	0	51
11	1338	14.72	38.4	0	14	7	3	24
12 & 13	2114	1.88	50.5	42	7	0	0	49
14	2673	0.61	54.6	41	0	0	0	41
15	3908	3.08	39.1	5	0	0	1	6
16	3402	2.63	49.9	46	13	0	0	60
17	4022	5.58	41.4	11	3	1	3	18
18	3992	4.87	41.7	9	6	1	1	17

Table 10. Density and abundance estimates of Kokanee in Payette Lake from a hydroacoustic survey on August 2-3, 2013.

Section (area)	Kokanee Size Class	Density (fish/ha) Estimate	Density (fish/ha) 90% CI (+/-)	Abundance Estimate	Abundance 90% CI (+/-)
East (726 ha)	**Class 1**	27	-	19,464	-
	Class 2	10	-	7,189	-
	Class 3	3	-	2,004	-
	Class 4	1	-	932	-
	Total	41	-	29,589	-
Narrows (90 ha)	**Class 1**	20	-	1,793	-
	Class 2	12	-	1,123	-
	Class 3	3	-	305	-
	Class 4	2	-	153	-
	Total	37	-	3,374	-
Southwest (899 ha)	**Class 1**	26	-	23,085	-
	Class 2	5	-	4,295	-
	Class 3	0	-	376	-
	Class 4	1	-	759	-
	Total	32	-	28,515	-
TOTAL (1,715 ha)	**Class 1**	**28**	8	**44,342**	14,431
	Class 2	**8**	4	**12,607**	6,233
	Class 3	**2**	1	**2,686**	1,665
	Class 4	**1**	1	**1,844**	1,100
	TOTAL	**38**	11	**61,478**	19,041

Table 11. Size class specific abundance, density, and survival estimates of Kokanee in Payette Lake from hydroacoustic surveys, 2009-2013. Size class estimates were combined in years when discerning acoustic size class breaks was not possible.

			Abundance (x 1,000)		
Year	**Class 1**	**Class 2**	**Class 3**	**Class 4**	**Total**
2009	104.5	17.2		4.8	126.5
2010	191.9	29.1	10.0	2.6	233.6
2011	84.7	37.0	14.4	3.8	139.9
2012	63.5	11.1	5.9	1.2	81.6
2013	44.3	12.6	2.7	1.8	61.5
			Density (kokanee/ha)		
Year	**Class 1**	**Class 2**	**Class 3**	**Class 4**	**Total**
2009	65	11		3	79
2010	112	17	6	1	136
2011	49	22	8	2	82
2012	40	7	4	1	51
2013	28	8	2	1	38
			Survival (%)		
Year	**Class 1**	**Class 2**	**Class 3**	**Class 4**	**Total**
2009	N.A.	N.A.	N.A.	N.A.	36%
2010	N.A.	28%	73%		32%
2011	N.A.	19%	49%	38%	24%
2012	N.A.	13%	16%	8%	13%
2013	N.A.	20%	24%	31%	21%

Table 12. Length frequencies and relative weights (Wr) of Rainbow Trout, Cutthroat Trout, and Rbt xx Cutthroat Trout collected with gill nets from Brundage reservoir in August 2013 (No Wr formula for Cutt xx Rbt).

	Total Number			Average Wr	
Length Group (mm)	Cutthroat Trout	Rainbow Trout	Rbt x Cutt	Cutthroat Trout	Rainbow Trout
140-149	1	2			
150-159	1	2		97.6	98.9
160-169		2			88.2
170-179	1	3		70.2	94.1
190-199	1	2		72.3	91.6
200-209	1			92.0	
210-219	2			76.2	
230-239	2	1		77.5	101.5
240-249	5			74.1	
250-259	3	2		95.2	85.1
260-269		1			99.5
270-279	3	1		80.1	80.0
280-289	1	1		74.9	87.7
290-299	1	2	1	84.2	87.2
300-309	2	1	1	81.5	77.9
310-319	3	3		77.6	88.8
320-329	1	5		76.9	82.5
330-339	4	2		80.3	79.8
340-349	3		1	78.1	
350-359	2	1	2	73.1	84.0
360-369	3	3		77.2	83.9
370-379	1	1	2	80.9	85.5
380-389	1		2	67.8	
390-399		1			68.3
400-409	1			73.6	
Grand Total	43	36	9	80.0	87.8

Table 13. Length frequencies of fish collected with gill nets from Little Payette Lake on November 1, 2013.

Length Group (mm)	Species				
	Kokanee (Early Spawner)	Largescale Sucker	Mountain Whitefish	Northern Pikeminnow	Tiger Muskie
170-179	1				
180-189	2				
190-199	5				
200-209	3			1	
210-219	1				
220-229	1				
260-269				1	
270-279				3	
280-289		2		9	
290-299	1			4	
300-309		1		5	
310-319				3	
340-349				1	
350-359		1	1	1	
360-369				1	
380-389		1		3	
390-399		1		1	
400-409				1	
410-419				1	
420-429				3	
430-439				1	
440-449				1	
450-459		1		1	
460-469		1			
470-479		2			
480-489		5			
490-499		3			
500-509		10			
510-519		3		1	
520-529		6		1	
530-539		6		2	
540-549		9			
550-559		5		1	
560-569		4		2	
570-579		1			
590-599		1			
610-619					1
950-959					1
990-999					1
Grand Total	14	63	1	48	3

Table 14. Payette Lake Kokanee spawner counts and estimated spawning run size and biomass from 1988 through 2013 in the North Fork Payette River.

Year	Peak Count	Estimated Number of Spawners	KG/Lake HA[1]	Number/Lake HA[1]	Average Spawner Weight (g)	Average Spawner Total Length (mm)
1988	13,200	22,800	4.6	13.3	346	--
1989	8,400	14,500	2.9	8.4	349	--
1990	9,642	16,700	3.5	9.7	358	--
1991	10,400	18,000	5.3	10.5	505	365
1992	16,945	29,300	6.4	17.1	377	
1993[a]	34,994	59,310	8.5	34.6	245	--
1994	25,550	44,200	5.5	25.8	214	--
1995	32,050	55,450	4.8	32.3	147	260
1996	35,090	60,707	5.7	35.4	162 [c]	--
1997[d]	36,300[e]	64,891	5.6	37.8	148	265
1998	14,585	25,232	2.1	14.7	143	254
1999	15,590	26,971	2.9	15.7	184	276
2000	15,520	26,850	2.9	15.6	188	286
2001[F]	15,690[g]	30,144	4.4	17.6	250[b]	--
2002	9,430	16,314	--	9.5	--	--
2003	5,430	9,394	1.5	5.5	279	--
2004	11,290	19,532	--	11.4	--	--
2005	11,780	20,780	--	12.1	--	--
2006	5,580	9,650	--	5.6	--	317
2007	3,925	6,790	1.6	4.0	401	340
2008	2,425	4,195	--	2.4	--	336
2009	1,290	2,232	--	1.3	--	405
2010	610	1,055	--	0.6	--	416
2011	435	753	--	0.4	--	390
2012	852	1,475	--	0.8	--	376/440[h]
2013	304	526	--	0.3	--	384/458[h]

[1] 1,717 ha usable Kokanee habitat in Payette Lake (Area with depth greater than 40 feet).
[a] Estimate made from stream and weir counts (Frost and Bennett, 1994)
[b] From gill net data of captured spawners in Payette Lake during lake survey.
[c] From trawling collections made in September 1996.
[d] Includes 2,092 fish spawned and removed by Nampa Fish Hatchery.
[e] Does not include 2,092 fish spawned and removed by Nampa Fish Hatchery.
[f] Includes 3,000 fish spawned and removed by Nampa Fish Hatchery.
[g] Does not include 3,000 fish spawned and removed by Nampa Fish Hatchery.
[h] Two distinct age classes.

Table 15. Stream names and locations of IDFG standard stream surveys completed in 2013.

Stream	Parent Drainage	Site Number	Easting UTM Coordinate (WGS 84)	Northing UTM Coordinate (WGS 84)
Kennally Creek	North Fork Payette	2	-115.87430	44.78128
Rapid Creek	North Fork Payette	1	-115.92902	44.80604
Powelson Creek	North Fork Payette	2	-115.89881	44.78069
California Creek	Salmon River	1	-115.76157	45.44836
Polly Creek	Salmon River	1	-115.67345	45.42778
Mann Creek	Salmon River	1	-115.58602	45.39418
Long Tom Creek	Salmon River	1	-115.88018	45.45908
Rabbit Creek	Salmon River	1	-115.65217	45.42462
Warren Creek	Salmon River	1	-115.59426	45.39651

Table 16. Presence/absence data for McCall area stream surveys completed in 2013.

Stream	Rainbow Trout	Brook Trout	Bull Trout	Sculpin sp.	Mountain Whitefish	Chinook Salmon	Longnose Dace	Westslope Cutthroat	Idaho Giant Salamander	Tailed Frog
Kennally Creek		X								
Rapid Creek	X	X		X						
Powelson Creek		X								
California Creek	X		X	X	X	X	X	X		
Polly Creek									X	X
Mann Creek	X			X					X	
Long Tom Creek	X								X	
Rabbit Creek	X								X	
Warren Creek	X			X			X			

FIGURES

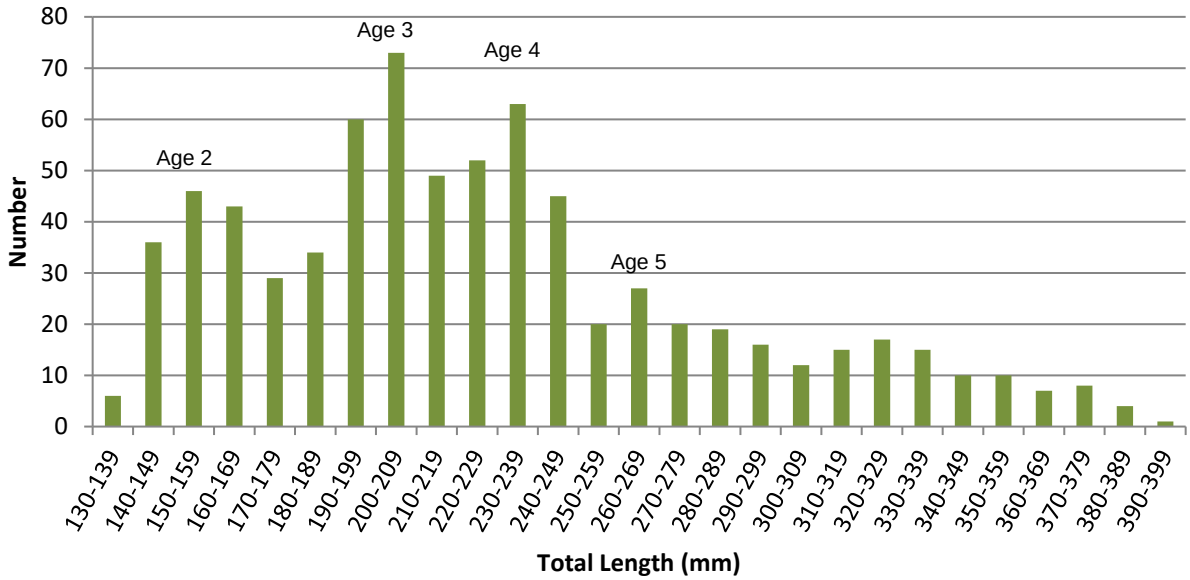

Figure 1. Length frequencies of Yellow Perch collected with gill nets from Lake Cascade from October 7 through October 15, 2013.

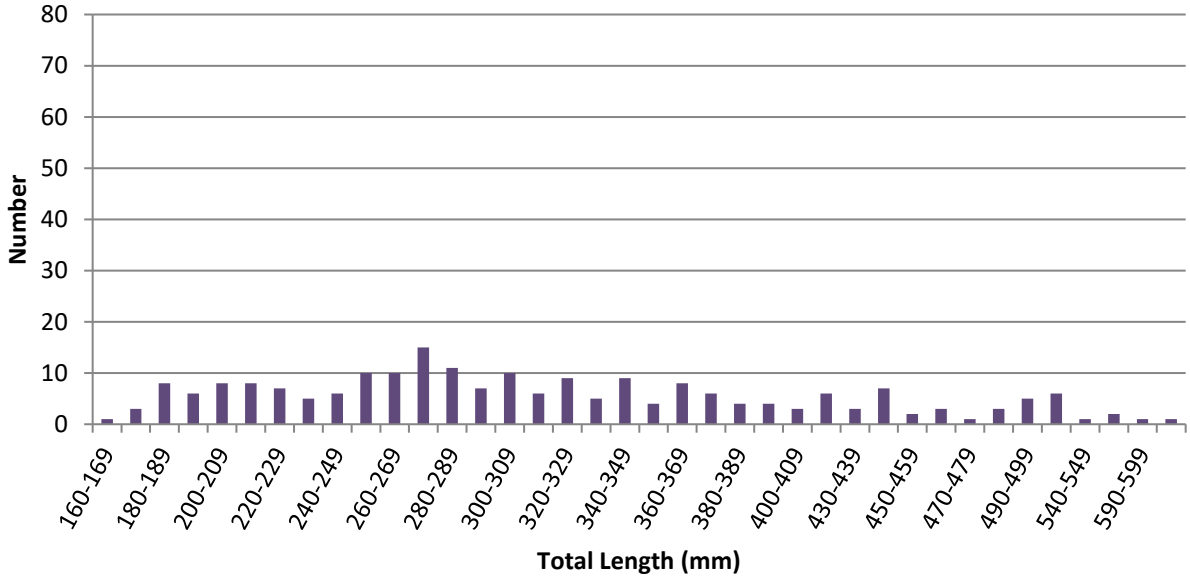

Figure 2. Length frequencies of Northern Pikeminnow collected with gill nets from Lake Cascade from October 7 through October 15, 2013.

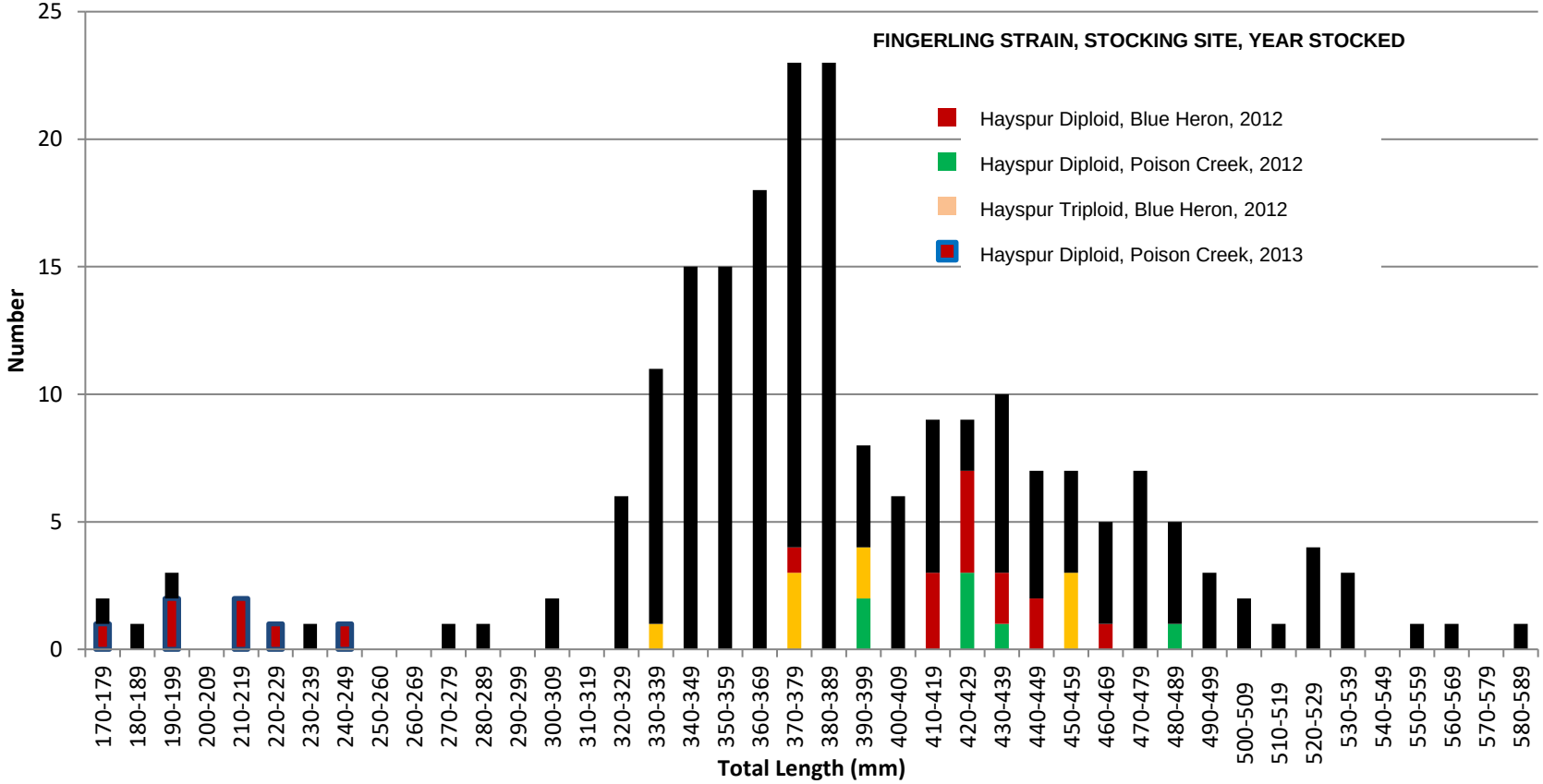

Figure 3. Length frequencies of hatchery Rainbow Trout and grit marked fingerling origin fish collected with gill nets from Lake Cascade from October 7 through October 15, 2013. (Numbers of marked fish are weighted to include the percent of unmarked fish by color and length group that would have been expected to be marked if 100% marked (See Table 6 for percentages).

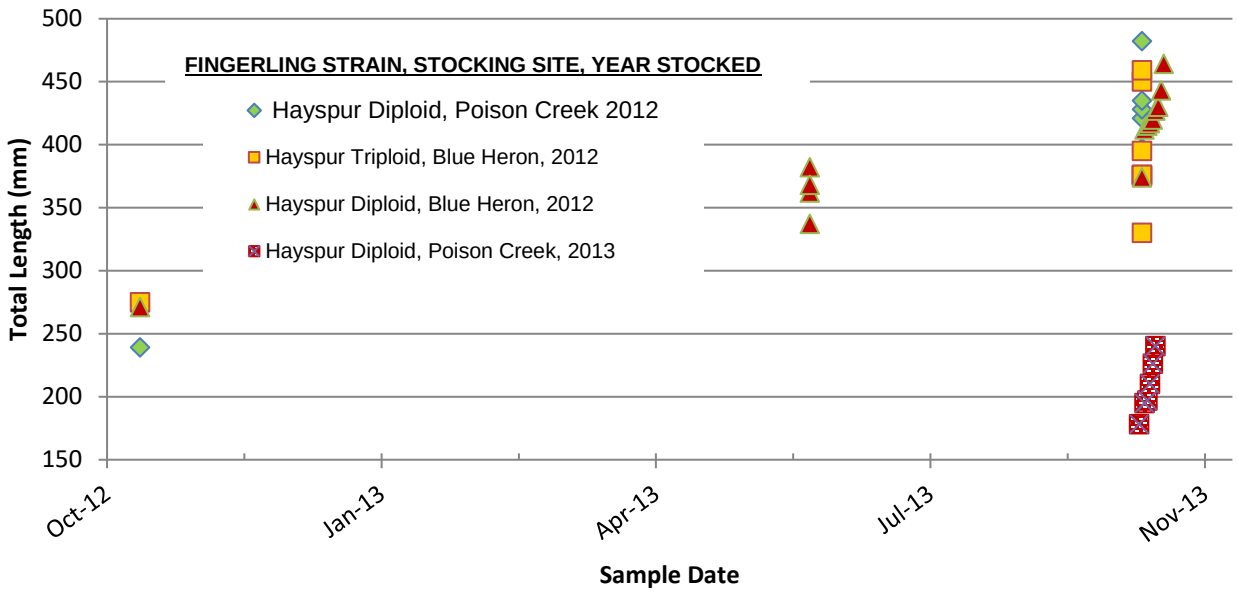

Figure 4. Total lengths of four groups of grit marked Rainbow Trout stocked as fingerling by gill net sample date in Lake Cascade in 2012 and 2013.

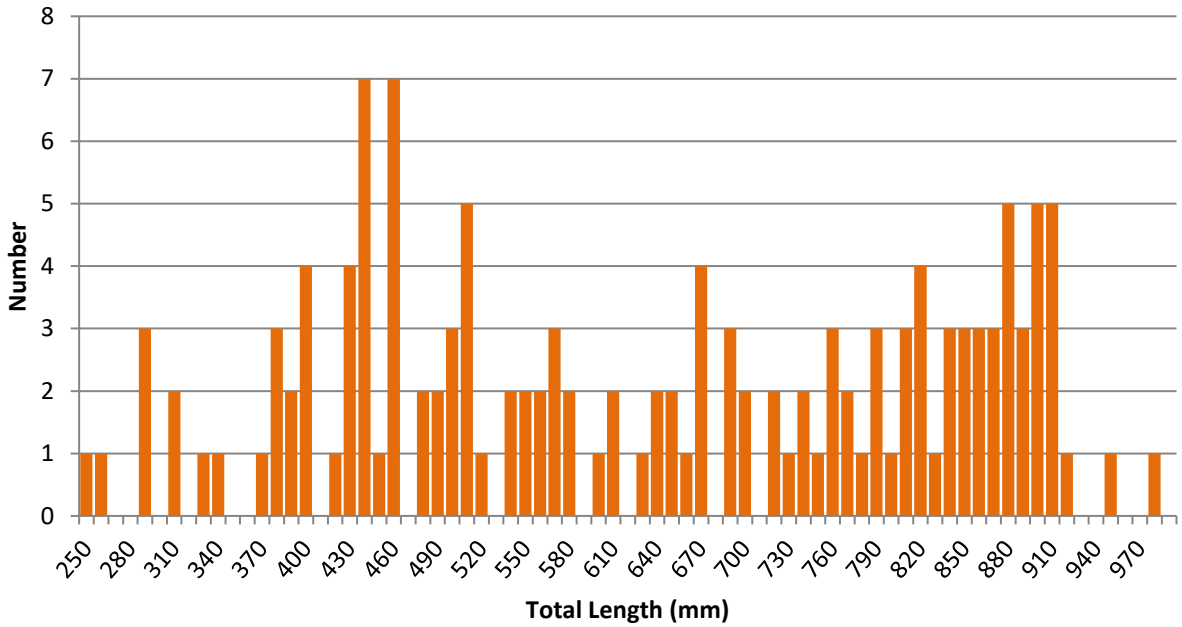

Figure 5. Length frequencies of Lake Trout collected with gillnets from random shoreline sites in Payette Lake in 2013.

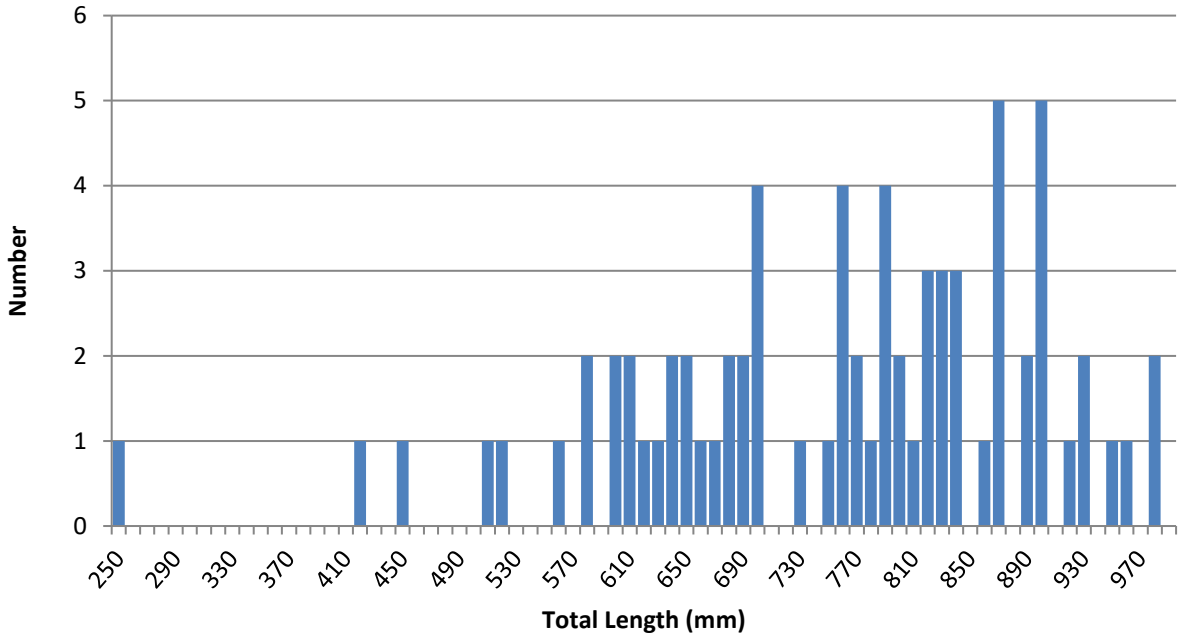

Figure 6. Length frequencies of Lake Trout collected with gillnets from historical sites in Payette Lake in 2013.

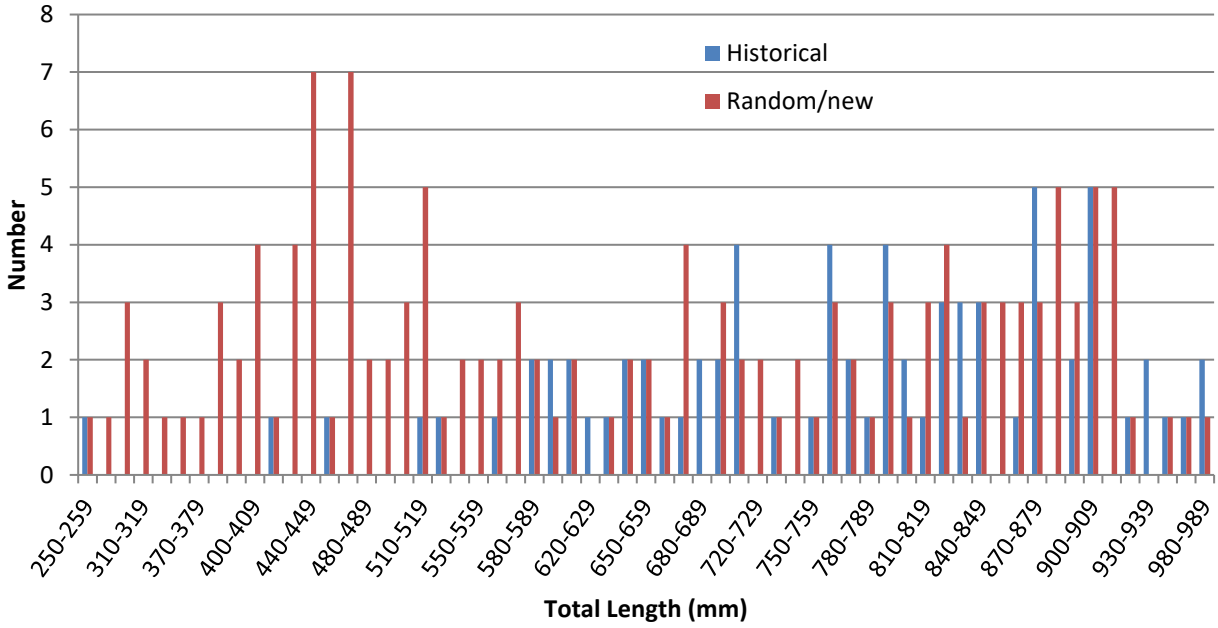

Figure 7. Length frequencies of Lake Trout collected with gillnets from all sample sites in Payette Lake in 2013.

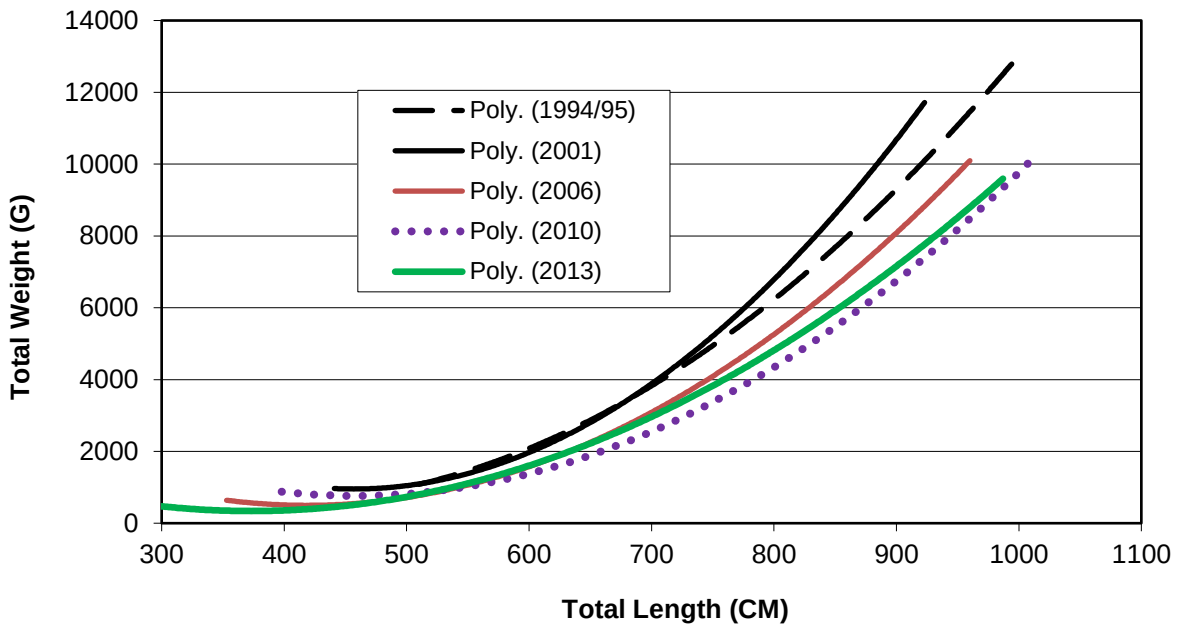

Figure 8. Length-weight relationship polynomial trenlines of Lake Trout collected from Payette Lake in 1995, 2001, 2006, 2010, and 2013.

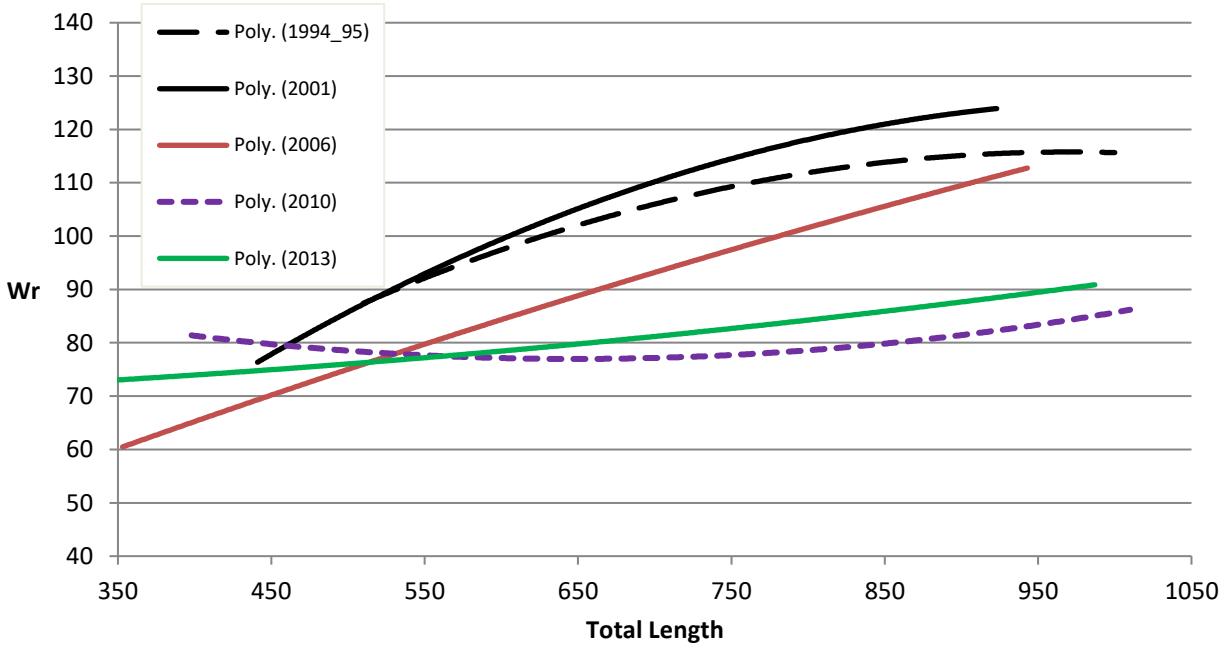

Figure 9. Relative weight polynomial trendlines of Lake Trout collected from Payette Lake in 1995, 2001, 2006, 2010, and 2013.

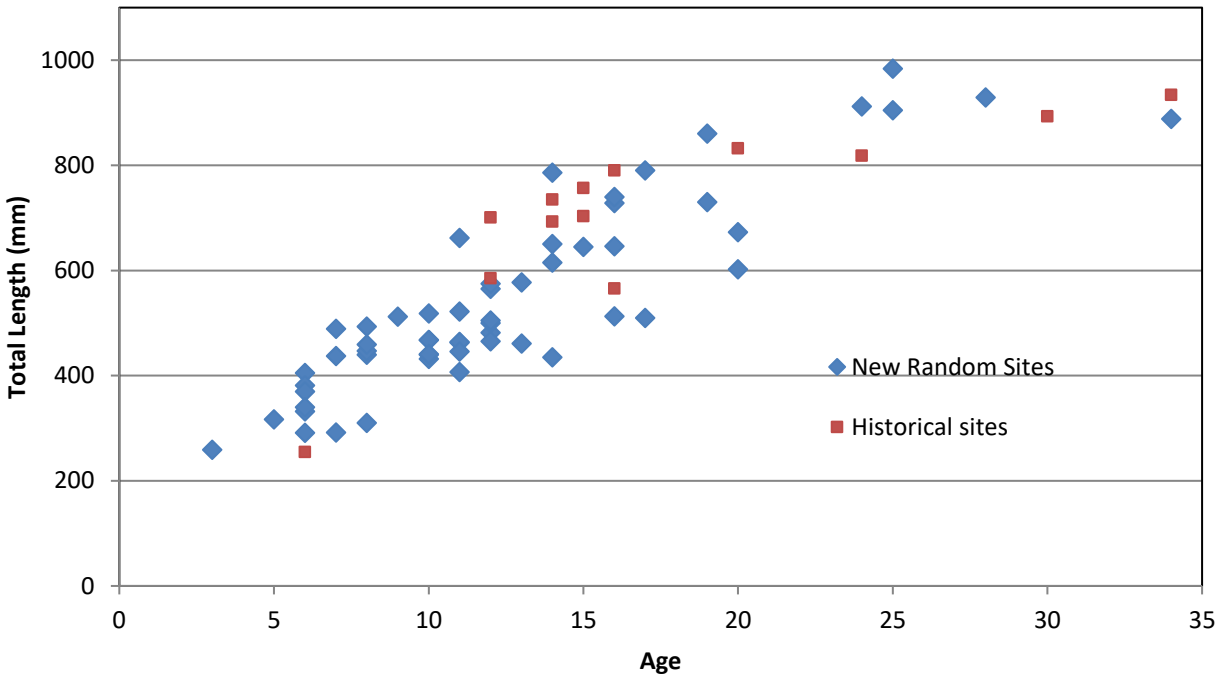

Figure 10. Lengths at age of Lake Trout collected from historical and random sites from Payette Lake in 2013.

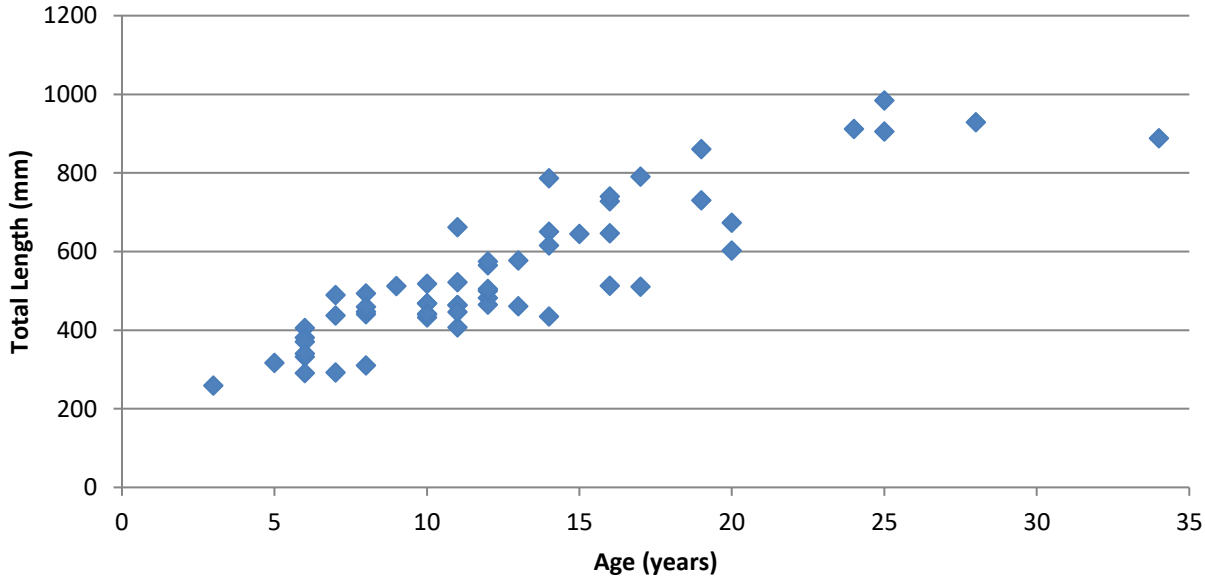

Figure 11. Lengths at age of Lake Trout collected with gillnets from random shoreline sites in Payette Lake in 2013.

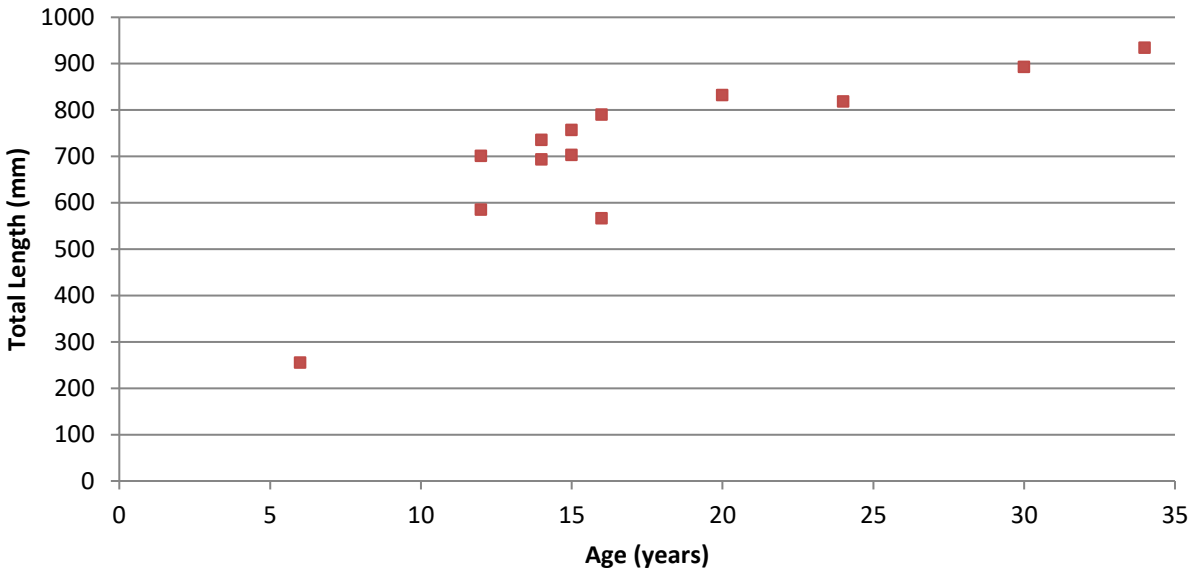

Figure 12. Lengths at age of Lake Trout collected with gillnets from historical sites in Payette Lake in 2013.

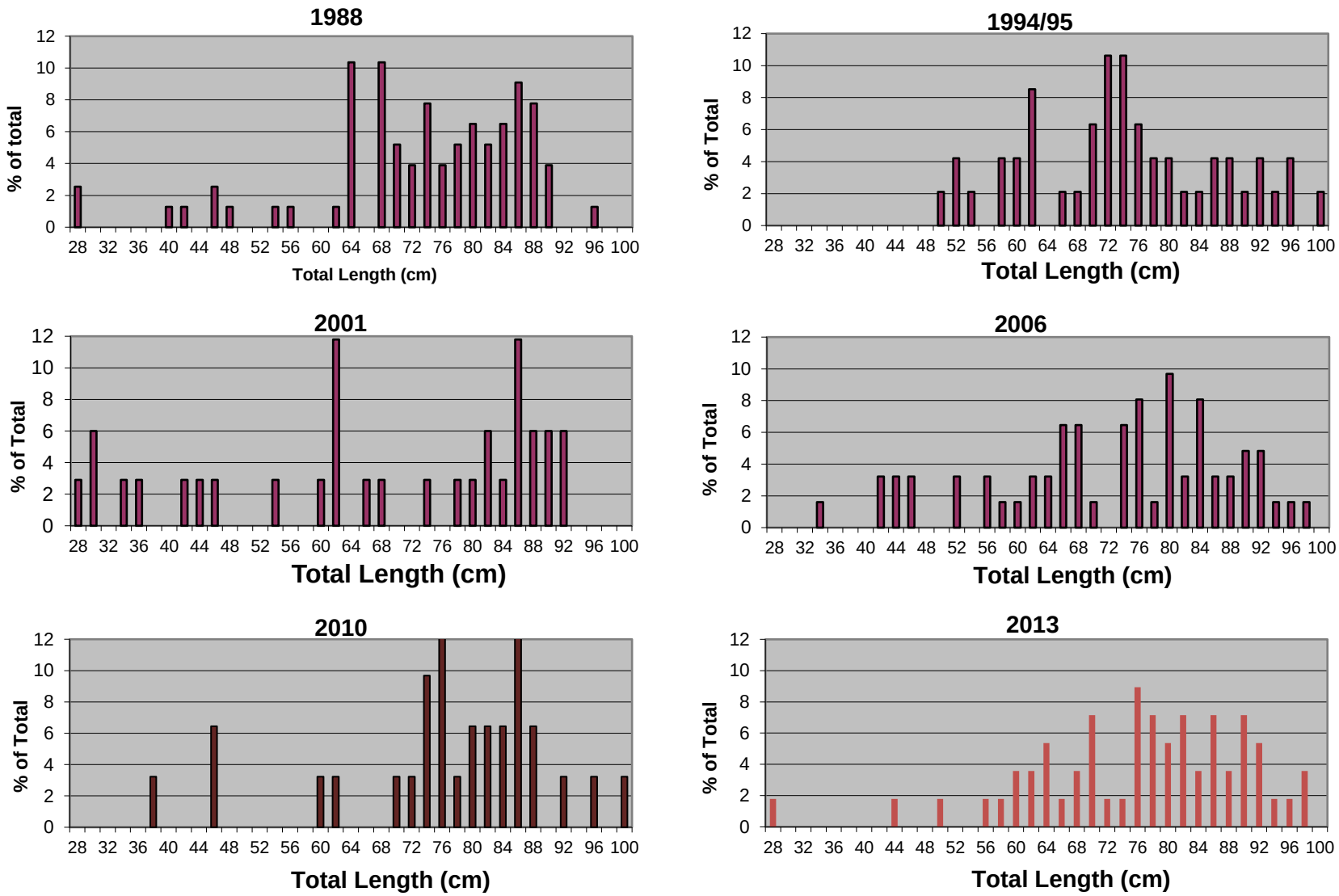

Figure 13. Length frequencies of Lake Trout collected from historic gill netting sites from Payette Lake in 1988, 1994/95, 2001, 2006, 2010, and 2013.

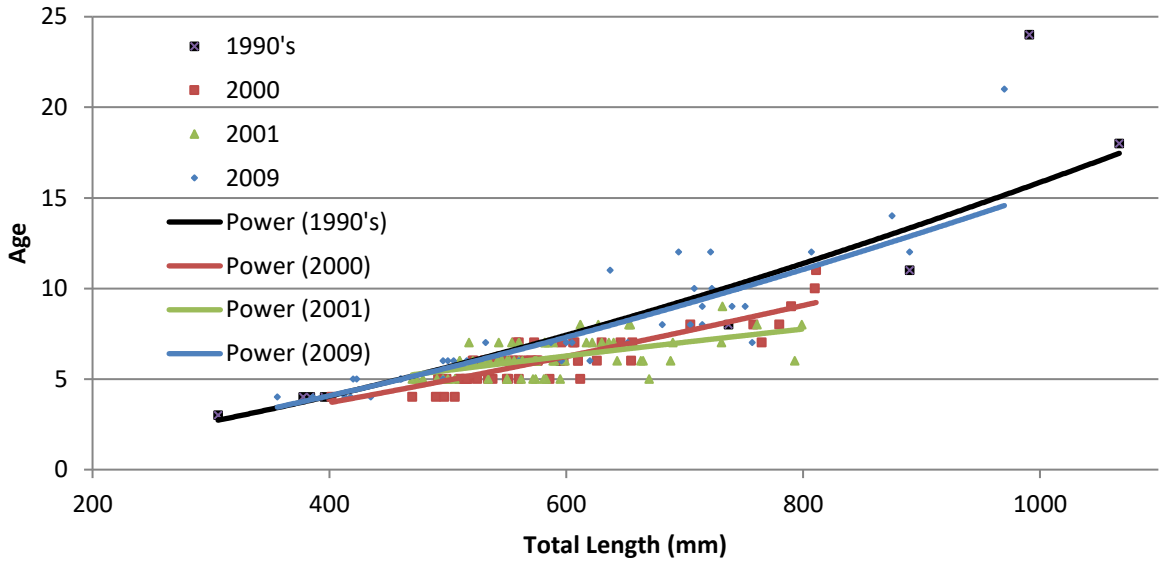

Figure 14. Age at length of Lake Trout collected from Blue Mesa Reservoir, Colorado in 1990's, 2000, 2001, and 2009.

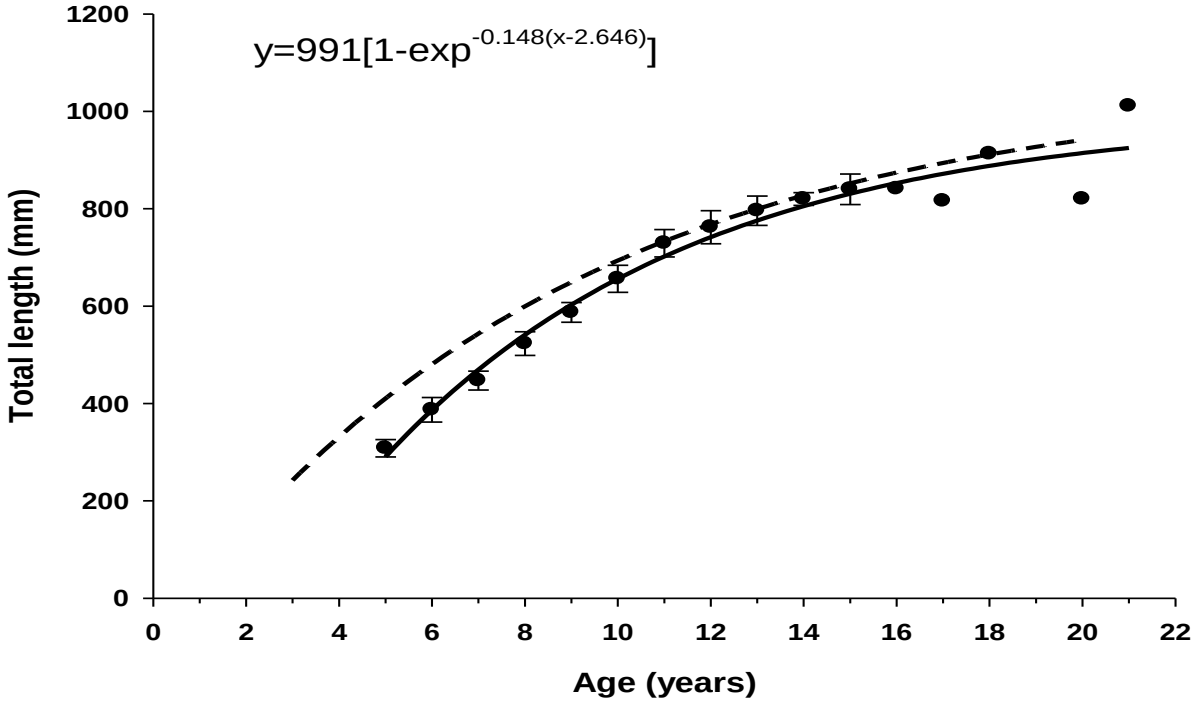

Figure 15. Mean total length-at-age with 95% confidence intervals for Lake Trout captured during Spring 2012 in Lake Pend Oreille. Confidence intervals were not calculated for fish over age-15 because of low sample size. Growth is described by the fitted von Bertalanffy growth model (solid line). The dashed line represents the Lake Trout growth curve developed for Lake Pend Oreille in 2004.

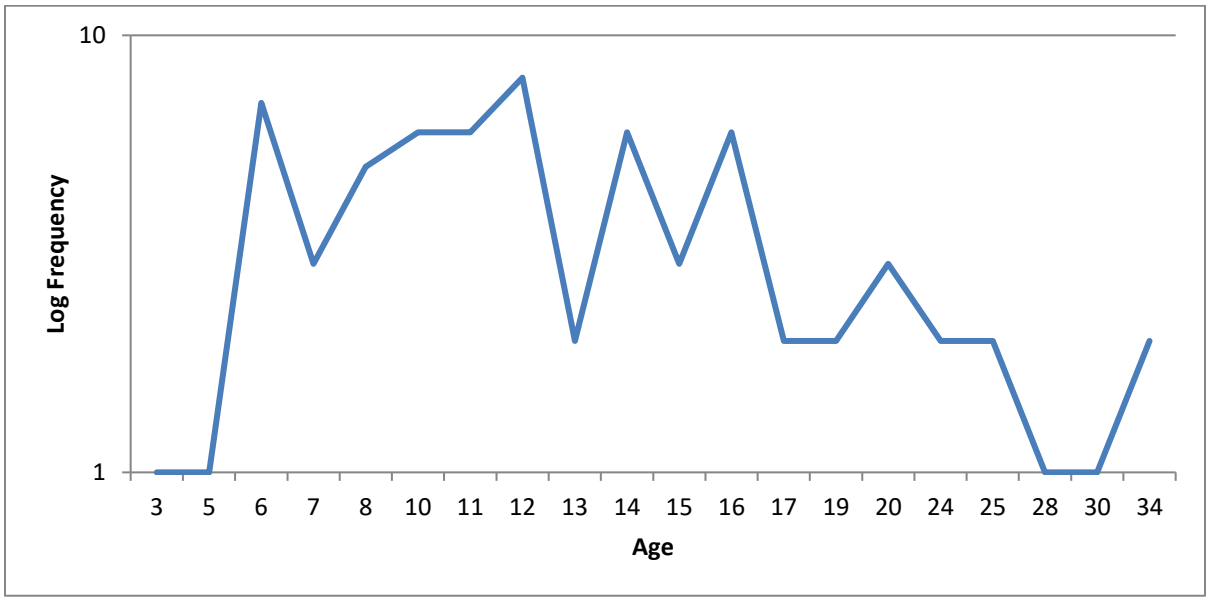

Figure 16. Catch curve of Lake Trout collected with gill nets in Payette Lake in 2013.

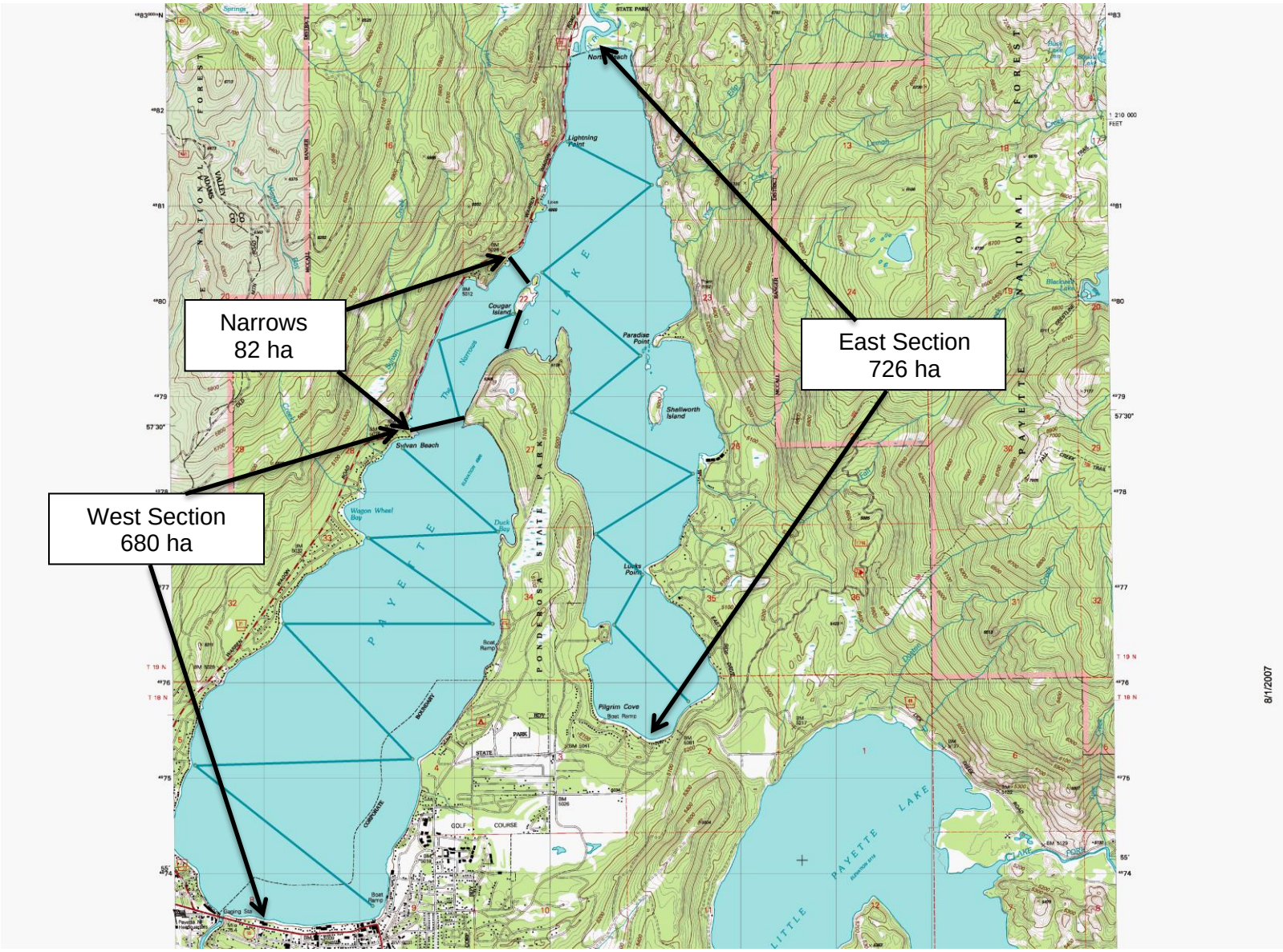

Figure 17. Hydroacoustic survey transects completed on Payette Lake on August 3, 2013.

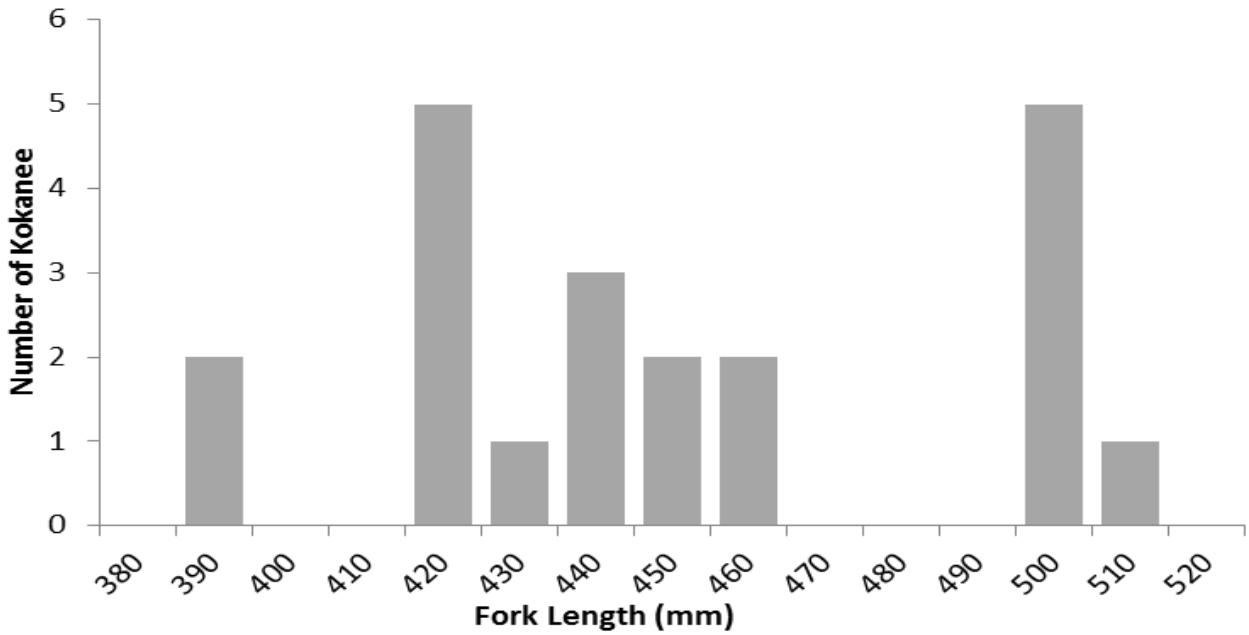

Figure 18. Fork lengths (mm) of spawning Kokanee collected from the North Fork Payette River upstream of Payette Lake in September, 2013.

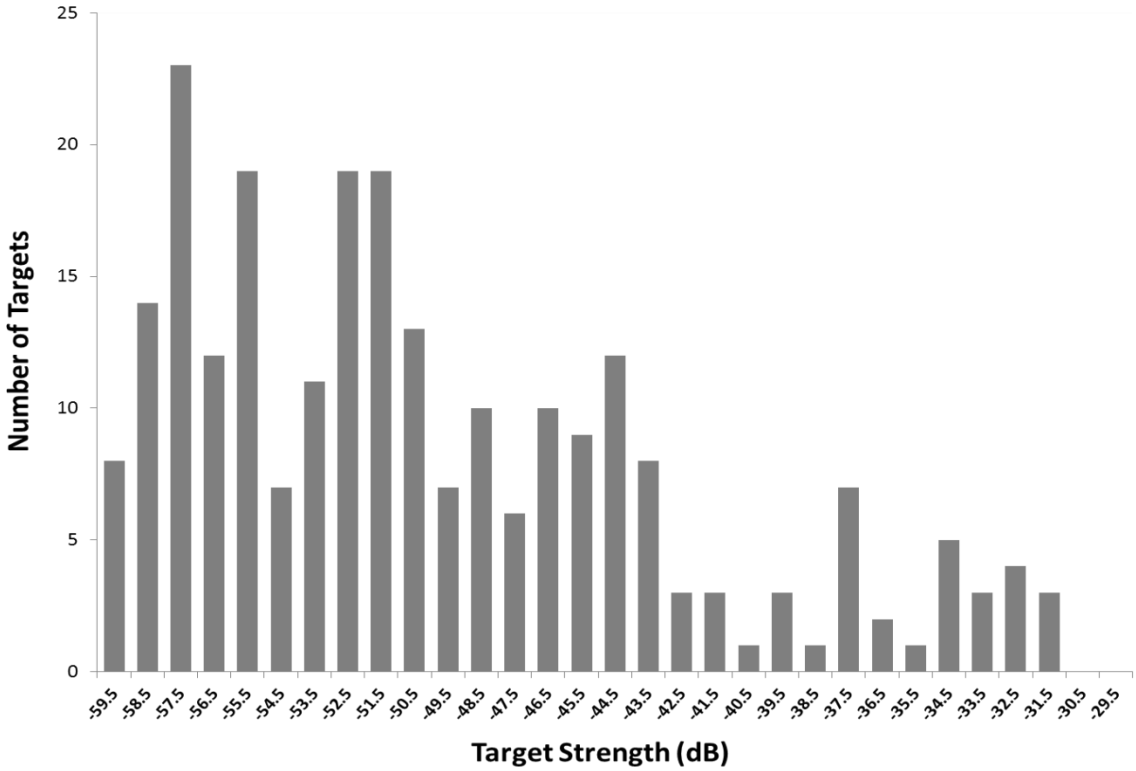

Figure 19. Frequency distribution of all fish target strengths recorded in hydroacoustic transects from the pelagic area of Payette Lake, August 2-3 2013.

Prepared by:

Dale B. Allen
Regional Fishery Manager

Paul J. Janssen
Regional Fishery Biologist

Eric Stark
Senior Research Biologist

Jacob Johnson
Fishery Technician

Approved by:
IDAHO DEPARTMENT OF FISH AND GAME

_____
Edward B. Schriever, Chief
Fisheries Bureau

_____
Jeff Dillon
State Fishery Manager