FISHERY MANAGEMENT INVESTIGATIONS

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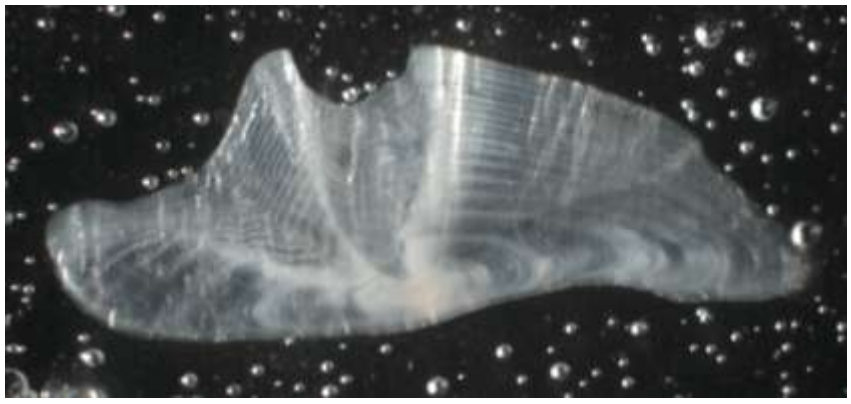

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MOUNTAIN LAKE SURVEYS

ABSTRACT

A statewide database and GIS project were developed to organize the high mountain lake survey data collected in the last decade. The mapping project developed templates for showing the lakes that had been surveyed, the fish species found, the amphibian species found and the fish species stocked. The maps were projected as fifth level hydrologic units as the standard.

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INTRODUCTION

To assist in analysis of high mountain lake (HML) data compilation the data were developed into a series of Graphic Information System (GIS) views. The GIS platform allowed us to categorize the data within hydrologic boundaries within IDFG regional jurisdictions of the state. We will use the GIS platform to assist in the development of a statewide HML Management Plan.

METHODS

In starting the project we collected all HML surveys from all administrative regions and placed all the data into a flat Excel file. Several data fields were categorized to allow projection in a GIS project. Data such as fish species presence, taxonomy of amphibians, species of fish stocked, or if a lake had been survey; were categorized. The statewide stocking database was also linked in the project. Fourth and fifth level hydrologic unit codes (HUCs) were chosen as the levels of organizational mapping for the categorized data. Base template maps were created that showed and named all lakes within an individual HUC5 that had mountain lakes.

RESULTS

The base maps were used to create a series of four separate maps that showed: the lakes that had been surveyed, the fish species found, the amphibian species found and the fish species stocked. Maps were then produced for all of the HUC5 watersheds that contained mountain lakes and compiled into books and provided to the regions. A database was created with all the collected survey information and is available for further analysis. The GIS project can project all data into HUC or other legal boundaries for help in development of a management plan.

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Lowland Lakes Surveys

ABSTRACT

A standard lowland lake survey was conducted on C. Ben Ross Reservoir in July 2010 Largemouth bass *Micropterus salmoides* were the most abundant fish in the reservoir in terms of numbers and biomass. The largemouth bass stock densities values were proportional (200, 300) 89, relative (200, 306-406) 32 and a relative (200,>406) of 17. Largemouth bass reached 305 mm in 3+ years. Relative weights (Wr) of largemouth bass have declined each survey since 1999.

The Payette Lake kokanee *Oncorhynchus nerka kennerlyi* population was surveyed using hydroacoustic gear and techniques. Total kokanee estimate was 218,758. Estimates by age group were: 179,671 fry, 36,690 age 1 and 2 kokanee (11/ha), and 2,397 age-3 kokanee. We also completed an intensive year around creel survey on Payette Lake. A total of 9,316 angler hours were spent to catch 5,305 fish of which 1,540 fish were harvested. Boat hours, shore angler hours and ice angler hours were 3,171; 4,447; and 1,698 hours, respectively. Anglers caught and released 1,349 lake trout *Salvelinus namaycush*, caught 2,022 rainbow trout *Oncorhynchus mykiss* (of which 993 were released) and 425 kokanee.

We investigated the feasibility of removing largescale sucker *Catostomus macrocheilus* and northern pikeminnow *Ptychocheilus oregonensis* from Little Payette Lake utilizing Merwin traps and completed population estimates for both species. We collected a total of 564 unmarked northern pikeminnow greater than 250 mm and 1,777 largescale suckers greater than 250 mm. The Schnabel multi-pass estimate for northern pikeminnow and largescale suckers was 1,622 (95% CI 1,942-1,393) and 8,357 (95% CI, 11,919 – 6,434) respectively. We marked 500 of the stocked rainbow trout to examine return rates to anglers. We had zero tags returned.

An investigation was conducted at Brundage Reservoir's to assess growth rates of stocked westslope cutthroat trout *Oncorhynchus clarkii lewisi* and wild rainbow trout. Wild rainbow trout from 315 mm to 371 mm were found to be four to six years old. Hatchery westslope cutthroat from 310 mm to 385 mm were five to seven years old and natural hybrids were 318 mm to 385 mm were four to seven years old.

We completed a summer long comprehensive creel survey in 2010 on Horsethief Reservoir to evaluate the return of stocked rainbow and brown trout and to examine angler use. The total angling pressure estimate was 21,941 hours of which 17,439 and 4,502 were shore angler and boat angler hours, respectively. Anglers caught an estimated 12,274 trout of which 11,971 and 303 were rainbow trout and brown trout *Salmo trutta,* respectively. Of the trout caught, 7,369 rainbow trout and 208 brown trout were harvested.

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OBJECTIVES

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

C. Ben Ross Reservoir

Introduction

We completed an IDFG standard lowland lake survey of C. Ben Ross Reservoir in 2010 to determine effectiveness of current fish management strategies. Specifically, the population effects of the quality bass rule, of no harvest before July 1st, and a two bass limit after July 1 none of which could be between 305 mm and 406 mm; were of particular interest. This rule had been in effect since 1994.

Methods

We set one floating and one sinking IDFG Standard Survey gill net and one standard trap net in C. Ben Ross Reservoir. Electrofishing sites were chosen at random, electrofishing for a total of 10 minutes per site and then moving to a new site. We electrofished a total of six, 10 minute transects. We collected length data from all fish and weights and otolith samples from up to five fish from each one-cm length group for all fish species collected. Otoliths were mounted in epoxy and sliced with a jewelers saw to 60 microns thickness. They were then aged with the aid of a dissecting scope.

We calculated largemouth bass Proportional Stock Densities (PSD) and Relative Stock Densities (RSD) for fish in the slot and for fish larger than the slot length. Therefore, the assigned stock, RSD-slot, and RSD->slot, total length ranges were 200 and 305 mm, 306 to 406 mm, and $\geq$ 406 mm respectively.

Results

We found that largemouth bass and bluegill *Lepomis macrochirus* were the most abundant fish in C. Ben Ross Reservoir in 2010 (Table 1). Largemouth bass were found to be the most abundant species in both total numbers biomass. We collected a total of five species of fish from C. Ben Ross Reservoir; bluegill, largemouth bass, black crappie *Pomoxis nigromaculatus*, white crappie *Pomoxis annularis*, and largescale sucker *Catostomus macrocheilus*. Length frequencies of each game fish species are presented in Table 2.

Largemouth bass grew to 305 mm in 3+ years. This was very similar to growth rates found in previous surveys as reported by Allen et. al. (2009). Largemouth bass Wr had declined overall since the 1999 and 2004 surveys (Figure 1). Largemouth bass Wr for most length groups less than 390 mm were over 100, while Wr of fish over 390 mm dropped below 100 (Table 2.).

We calculated largemouth bass PSD, RSD-SLOT, and RSD->SLOT to be 89, 71, and 17 respectively. This compares with RSD-SLOT of 0 in 1993 and 1996, 6 in 1999 and 61 in 2004. Maximum lengths of largemouth bass present in the lake have steadily increased each sample year since 1993.

Largemouth bass ages ranged from 2+ to 17+ (Table 4). Fish under 305 mm were aged at no more the 3+, fish in the slot limit (305 mm to 406 mm) were four to six years old and fish over 405 mm were found to be six to 17 years old (Figure 2).

Total bluegill and crappie biomass collected in 2010 was 2.7 kg or .6% of the total biomass of all species. This compares to bluegill and crappie biomass totals of 2.4 kg, 4.7 kg, and 20.8 kg collected with the same gear in 2004, 1999 and 1993 respectively (Allen et. al. 2009).

Discussion

The bass regulation initiated in 1994 continued to be effective at providing quality size bass. The large number of bass over the slot limit indicates minimal harvest. Largemouth bass were dying of old age before being harvested as evidenced by the presence of bass 13 to 17 years of age. Few bass would reach 508 mm in the lake if the regulations were changed to a 508 mm minimum due to slow growth after fish reach 400 mm and few bass over 406 mm would be protected as current harvest rates are minimal.

Low catch rates/abundance of forage species such as bluegill and crappie were of concern. Adult bluegill and crappie from other waters should be collected and transplanted into C. Ben Ross Reservoir over the next couple of years.

Management Recommendations

1. Collect and transplant adult bluegill and crappie from other waters into C. Ben Ross.
2. Maintain current quality bass regulation.
3. Survey the lake again in 2015.

Payette Lake - Kokanee Investigation

Introduction

Fishery management on Payette Lake was focused on maintaining the kokanee, rainbow trout, and trophy lake trout fisheries (IDFG, 2007). Rainbow trout were managed as a put-and-take fishery. Lake trout and kokanee management has been a dynamic balancing act between special lake trout rules and kokanee stocking with fairly extensive monitoring to evaluate the effects of each. The fact that kokanee were 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 2010 to help identify needs for future management changes to achieve fishery goals.

Methods

We monitored the kokanee population in 2010 by conducting a lake-wide, hydroacoustic survey of Payette Lake. The mobile survey was conducted using Southwest Region Fish

Management's 6.4 m Koeffler boat on the night of August 10th, 2010. Kokanee abundance was estimated using a Simrad EK60 scientific echosounder with a split-beam 120 kHz transducer. The echosounder was set to ping at 1.0 ping/s, 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 a 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 (Hardy et.al. 2010) were used again in the 2010 survey in order to maintain consistency in methods; southwest – 844 ha, east – 680 ha, and narrows – 82 ha (Figure 3). We also used transects previously established by Hardy et.al. in 2010 which followed a uniformly spaced, zigzag pattern traveling from shoreline to shoreline (Figure 3) (MacLennan and Simmonds 1992). All but one transect used were the same as in previous years. During the 2010 survey, we conduced one additional transect in the southwest section, between the end of the last transect in the narrows and the beginning of what was previously the first transect in the southwest section, for a total of 19 transects. Lastly, we maintained a boat speed of approximately 1.4 m/s.

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 4.90.64. Within the echogram, a box was drawn around the kokanee layer of each transect (on average, 5 m to 30 m deep), integrated to obtain the nautical area scattering coefficient (NASC), and analyzed to obtain the mean target strength (TS) of all returned echoes (Hardy et.al. 2010). This integration accounted for fish that were too close together to detect as a single target (MacLennan and Simmonds 1992). Densities were then calculated by the equation:

$$\text{Density (fish/ha)} = (\text{NASC}/4\pi 10^{TS/10})0.00292$$

Where: NASC = total backscattering (m^2/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. Next, we combined expected kokanee age-at-length knowledge with the target strength frequency distribution to approximate the kokanee age class breaks (Figure 4). Love's equation (1971) was used to calculate fish lengths at each break between age classes. These age class breaks were subsequently used to generate age-specific abundance and density estimates.

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 -34.0 dB were thought to be too large to be kokanee, and were most likely lake trout.

All kokanee targets between -60.0 dB [approximately 16 mm total length (Love 1971) and -46.0 dB (86 mm), were defined as kokanee fry. Fish targets between -45.9 and - 34.0 dB were defined as age 1 – 3 kokanee (Figure 4). In previous surveys, we separated kokanee age classes based on their percentage within the trawl catch. However, trawling was not conducted on Payette Lake in 2010, therefore we separated age classes based upon fish target strength frequency distribution and historic length at age ranges of Payette Lake kokanee. Age-1

consisted of target strengths from -45.9 to –42.0 dB, age 2 from -41.9 to -38.0 dB, and age-3 kokanee included targets between -37.9 and -34.0 dB.

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

Results

A total of 278 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 4 and Table 5). Analyses of all three transects in the 'Narrows' were combined due to low numbers of fish targets observed. Approximately 75% of fish targets had target strengths within the kokanee fry range. Across all transects collected on Payette Lake in 2010, kokanee densities ranged from 0 to 647 fish/ha (Table 6). The highest densities of each age class were mostly found on the eastern side of the lake.

We estimated a total kokanee abundance of 218,758 fish (136 fish/ha) in Payette Lake. Of that total there were 179,671 fry (112/ha); 27,308 age-1 (17/ha); 9,382 age-2 (6/ha); and 2,397 age-3 kokanee (1/ha) (Table 6).

Discussion

The total population estimate for kokanee in Payette Lake increased from 126,472 (79 kokanee/ha) in 2009 to 218,758 (136 kokanee/ha) in 2010 (Maiolie et al. *In press*). Fry abundance increased dramatically, and it appears both age-1 and age-2 abundance increased as well. However, age-3 abundance decreased from 4,818 (3 fish/ha) in 2009 to 2,397 (1 fish/ha) in 2010. Kokanee survival was generally poor during 2010 (August, 2009 – July, 2010). Survival of fry to age-1 was approximately 26%. We could expect about 60% annual survival rates for a population with little or no predation (Maiolie and Elam 1995). Even though age-1 and age-2 kokanee shared a combined abundance estimate and thus survival rate in 2009, it appears mortality was much higher in older kokanee than in younger kokanee during 2010.

Hydroacoustics provide a quick and reliable method to estimate kokanee abundance and densities in lakes and reservoirs, but like any method, still has limitations. During our survey we defined all fish targets within the acoustic target strengths of -60 dB to -34 dB (16 to 363 mm) as kokanee. Thus, it should be noted that other species may have been detected, thereby potentially inflating kokanee estimates. Species present that could have been incorporated include largescale suckers, mountain whitefish *Prosopium williamsoni*, northern pikeminnow, and rainbow trout. 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 -34.0 db) within pelagic areas were not counted as kokanee. Therefore, we are confident that very few non-kokanee were incorporated into these estimates.

The equipment, software, and analyses used to conduct this survey and analyze the data remained the same as in 2009; therefore we feel this data is directly comparable to last year's results. However, one transect (no. 13), which happened to have the highest density of fry of any transects, was new in 2010. Several improvements could be made to further enhance

these methods. Defining age class acoustic age class breaks solely by the survey acoustic target strength frequency is a large assumption and leaves some uncertainty to the true age class abundance and densities. Therefore, we recommend conducting an annual trawling survey in conjunction with hydroacoustics to improve age class estimates of kokanee as well as provide a comparison to hydroacoustic estimates. Trawl sampling provides extensive age-at-length data, and results in more accurate age class-specific population estimates than using hydroacoustics because it provides definitive data on the size break between kokanee ages (Stark and Stockner, 2006). Also, maintaining a minimum ping rate of 0.3 sec/ping (3.3 pings/sec) would increase the precision of adjusted fish target strengths, thereby reducing the likelihood of including fish outside of the kokanee TS range.

If we assume this year's kokanee fry will achieve at least 26% survival to age-1 (2010's rate), this would leave approximately 46,714 age-1 kokanee next year (29 fish/ha). Therefore, assuming survival doesn't dip any lower than in 2010, abundance of all age classes of kokanee is likely to increase during 2011. In summary, kokanee densities started to rebound in 2010, which if survival shows some increase should result in increased forage for lake trout and higher densities of adult kokanee in 2011. These conditions set the stage for what should be a better kokanee fishery during 2011 – 2012, and heavier, faster growing lake trout.

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 the last two years' fry abundance, which although increasing is still low, we would recommend increasing the stocking rate if possible.

Management Recommendations

1. Continue with annual hydroacoustic surveys to monitor effects of recent stocking activities to restore kokanee numbers and fishery.

2. Use mid-water trawl to sample kokanee to determine lengths at age to assign ages to hydroacoustic estimates.

3. Continue annual kokanee fingerling stocking.

4. Investigate feasibility of transplanting Deadwood Reservoir, Idaho kokanee spawners in North Fork Payette River spawning grounds in 2012.

Payette Lake – Creel Survey

Introduction

The last intensive creel survey on Payette Lake was completed in 1995. Since that time lake trout angling has increased and the lake trout regulations have changed twice. A year-around creel survey was completed in 2010 to document angler use and fish catch on the lake.

Methods

Payette Lake creel survey sampling was stratified by weekends and weekdays. An average of seven days was sampled each month. Each weekend and weekday day and first angler count times were chosen randomly. A second angler count was made four hours later. Six to eight hours were spent on the lake completing counts and interviews. All fishing boats and shore anglers were counted at each count time. Anglers were interviewed between counts. Anglers were asked how long they had fished that day and what fish species they had caught, harvested, and released. They were also asked how far they had traveled to fish and what species (including any) they were targeting.

Results

The creel survey was conducted from May 18, 2009 through May 31, 2010. During this time period we sampled 41 weekend and holiday days and 42 weekday days and completed 245 interviews. We estimated that 9,316 angler hours were spent to catch 5,305 fish of which 1,540 were harvested (Table 7). Boat, shore and ice anglers spent 3,171; 4,447; and 1,698 hours respectively. Anglers caught and released 1,349 lake trout, caught 2,022 and harvested 1,029 rainbow trout, and 425 kokanee (Table 8). All kokanee caught and harvested were by shore anglers (Table 9). There were 1,292 northern pikeminnow caught.

Rainbow trout catch rates were 0.04 and 0.43 fish per hour for boat and shore anglers respectively. However, catch rates for rainbow trout for boat (boat catch rate) and shore anglers targeting rainbow trout were 0.96 and 1.01 fish per hour respectively (Table 10). Lake trout catch rates were 0.19 and 0.35 fish per hour for boat and ice anglers respectively but increased to 0.42 and 1.27 fish per hour respectively for boat and ice anglers targeting lake trout. None of the boat anglers contacted were targeting kokanee and no kokanee were recorded being caught by boat anglers. Boat and shore angling effort peaked in July at 865 and 1,582 hours respectively (Table 11). Catch estimates by fish species and month are presented in Table 12. Over 50 % of Payette Lake anglers had traveled over 75 miles and 40% were local anglers (Table 13).

Discussion

Kokanee fishing has been very inconsistent on Payette Lake. It appears to have been dependent on kokanee fry/fingerling stocking for several years prior to good kokanee fishing success. The first known angler survey completed in 1966 indicated that fishing pressure was very light and not a single kokanee was observed in the harvest (Welsh 1972). Interestingly, no kokanee had been stocked the previous 8 years. The next angler surveys were made in 1971 and 1972 when 7,000 kokanee were harvested each year (Welsh 1972 and 1973) (Table 14). It should be noted that large numbers of kokanee had been stocked the previous 6 years. The following angler survey in 1987 indicated a harvest of only 420 kokanee and again no kokanee had been stocked the previous 10 years (Scully and Anderson 1989).

In 1995, anglers harvested only 480 kokanee even though we had a near record number of kokanee spawners (55,000) (Janssen et. al. 2000) and large numbers of kokanee had been stocked between 1988 through 1992. Only 8,000 angler hours were spent fishing on Payette Lake in 1995.

Management Recommendation

1. Monitor the harvest of lake trout the first month of ice-out in 2011 to help evaluate impacts of new lake trout harvest regulation of “one fish under 762 mm (30 inches)” per day.

Payette Lake – Lake Trout Survey

Introduction

Due to the large drop in numbers of kokanee in Payette Lake over the last four years (See Payette Lake kokanee, Lake and Streams sections, this report) a lake trout harvest rule was proposed. The intent of this proposed new rule change was to reduce the number of small lake trout therefore reducing predatory pressure on the kokanee until their numbers had recovered. To help determine what the maximum harvest size and number of lake trout should be for this rule we completed a lake wide lake trout population survey.

We also examined changes in the lake trout population structure since the last population survey in 2006 and monitoring survival of the 1998, 2002, and 2003 lake trout stockings. All of these fish were marked with an adipose fin clip.

Methods

We set a total of 19, 45.7 m standard IDFG lake survey sinking and experimental gill nets in seven areas of the lake. Six of these sites have been routinely sampled for lake trout in previous surveys and included; Luck’s Point, Huckleberry Bay, S.E. of Cougar Island, N.E of Channel Island, Sheppard’s Point and Duck Bay (Janssen et. al. 2010). The new sample site was known locally as Picnic Point and is the first major point southwest of Sheppard’s Point. Nets were set in the afternoon, allowed to fish overnight and then pulled early the next morning. All lake trout collected were checked for marks, measured to the nearest mm, weighed to the nearest 10 g and then released.

Results

We collected a total of 33 lake trout ranging in size from 398 mm to 1,010 mm of which 84% were found to be greater than 70 cm, 42% greater than 76 cm, 16% greater than 91 cm and 3% greater than 100 cm (Table 15 and Figure 5). Lake trout Wr averaged 79.6 and ranged from 51.7 to 110.8. No marked fish were observed in the sampling.

Discussion

This survey indicated that the Payette Lake lake trout population is still an old growth population. Very little change was observed in the population length structure since the 2006 survey (Figures 5 and 6). However, we noted that length: weight relationships of lake trout have steadily declined since 1994 (Figure 7). This decline is attributed to and tracks closely with the decline in kokanee numbers in the lake (See “North Fork Payette River above Payette Lake, Kokanee Counts” section in this report”).

We found that approximately 42% of the lake trout in Payette Lake were less than 760 mm which was the final proposed length for the new lake trout harvest regulation. This length

break provided protection for the old growth trophy component while providing a good number of harvestable fish. The harvest regulation of one lake trout less than 760 mm per day was adopted beginning in January, 2011. The new regulation in conjunction with the reinstatement of the kokanee stocking program hopefully will insure the increase in kokanee stocking survival thereby restoring the kokanee fishery and maintaining the trophy lake trout fishery. Of concern with the new regulation is the over-harvesting of the less than 760 mm component and thereby reducing recruitment of trophy size lake trout. Angler willingness to harvest lake trout is unknown at this time and should be examined next spring just after ice-out by monitoring harvest rates by boat anglers.

We observed no marked lake trout from the 1998, 2002, and 2003 stockings indicating that survival of those fish was low.

Management Recommendation

1. Complete spot creel surveys in May of the next two to three years to monitor harvest of lake trout.

Little Payette Lake Northern Pikeminnow and Largescale Sucker Investigation and Removal

Introduction

Little Payette Lake has a long history as a "put and take" rainbow trout fishery. Historical data indicate that, with the exception of a couple periods of good fishing as a result of chemical fish restoration treatments, the lake has always been a fairly poor fishery due to its low productivity and relatively large populations of largescale suckers and northern pikeminnow. Currently, angler use on the lake is much lower than it could potentially be. Because the lake sits within a mile of the City of McCall the potential as a family fishery is huge. A rainbow trout fishery developed and maintained on this lake would result in a dramatic increase in angler use and provide another quality fishery in the McCall area similar to Horsethief Reservoir.

The lake was chemically treated with rotenone in 1987 to remove northern pikeminnow and largescale sucker populations with intent to produce a trophy rainbow trout fishery. A trophy trout fishery was established by 1989 and in 1990 angler use was estimated to be 9,360 angler hours or 2,674 angler days (3.5 hrs per day) from Memorial Day weekend through Labor Day weekend (Janssen and Anderson, 1992). Estimated value of 1990 fishery = 2,674*$180, (2003 IDFG Economic Sport Fishing Survey, IDFG Publication) = $481,371. However, by 1993 largescale sucker and northern pikeminnow biomass exceeded game fish biomass in gill net surveys (Janssen et al. 1997). Rainbow trout survival and angling success declined rapidly as a result of the increased number of northern pikeminnow and largescale sucker.

We investigated the feasibility of removing largescale sucker and northern pikeminnow from the lake utilizing Merwin traps. Specifically, we completed a population estimate on these two species and evaluated catch efficiency with Merwin traps.

We investigated the return to creel rates of stocked, catchable size, rainbow trout in the lake.

Methods

We utilized three, 3.7 m deep Merwin traps with 30.5 m leads to collect all fish for this investigation. Merwin traps were placed in water at least 3.7 m in depth and leads were attached to the shoreline.

We completed population estimates on adult (>250 mm) northern pikeminnow and largescale suckers. We used both Peterson single mark-recapture and Schnabel repeated mark-recapture models to make population estimates. We used fish marked in June and July as the total number of marked fish and used the August catch as the recapture event for the Peterson population estimate. We used each months (June, July, and August) catch as a sample/marking event for the Schnabel population estimate. The first 500 largescale suckers and 500 northern pikeminnow were marked with a pectoral fin clip and then released back into the lake. After marking 500 fish all fish collected were examined for a mark, recorded as such and then either released if marked or killed if unmarked. All fish collected were identified to species and counted. The non-target species were then released back into the lake.

To evaluate return to the creel of stocked catchable size rainbow trout we Floy tagged 500 of the 10,000 stocked into the lake in May 2010.

Results

The traps were placed in the lake on June 8 and 18, 2010. We placed traps in three locations which were the west shoreline, the south shoreline approximately 350 m west of the dam, and the third trap approximately 350 m northeast of the dam on the east shoreline. Traps were fished 24 hours a day, seven days a week and checked twice a week.

We collected a total of 564 unmarked northern pikeminnow (NPM) greater than 250 mm and 1,777 largescale suckers (LSS) greater than 250 mm. We collected 913 young-of-year to adult smallmouth bass *Micropterus dolomieu* and 104 tiger muskie *Esox lucius x E. Masquinongy.* Total catch by species and month is given in Table 16 We marked a total of 504 adult NPM and 530 adult LSS. Of the total number of marked fish, 478 NPM and 530 LSS were marked in June and July and this number was used as the number marked for the Peterson population estimate. We killed a total of 60 NPM and 1,247 LSS.

The Peterson mark recapture estimate was 1,556 +/- 442 NPM (487 marked in June and July, 103 fish collected in August, 31 recaptures in August) and 5,841 +/- 2,818 LSS (530 marked in June and July, 153 captured in August, 13 recaptures in August).

The Schnabel multi-pass estimate for NPM was 1,622 (95% CI 1,942-1,393) and 8,357 (95% CI, 11,919 – 6,434) LSS. Based on the above population estimates we collected approximately 35% of the NPM and 25% of the LSS present in the lake with the Merwin traps.

We had zero tags returned from the 500 rainbow trout stocked in 2010. Very few trout anglers were observed on the lake over the summer. Fishing was primarily limited to boats as the entire shoreline was covered with logs and woody debris. The logs were remnants of timber left standing in the reservoir basin when the dam was installed and the basin flooded in 1926.

Management Recommendation

1. Operate Merwin traps in 2011 to evaluate their effectiveness at removing northern pikeminnow and largescale suckers.

Brundage Reservoir Trout Investigation

Introduction

Brundage Reservoir was stocked five times over the last ten years with westslope cutthroat trout on top of a wild, reproducing rainbow trout population. Growth of trout, both stocked and wild fish appeared to be slower than expected when compared to other area waters. We sampled fish in Brundage Reservoir in 2010 to examine age and growth rates of all trout.

Methods

We set a total of four sinking experimental gill nets in the afternoon, fished them overnight and pulled them the next morning. All fish were identified to species, measured and weighed. Otoliths were collected from each fish to determine age. Whole otoliths were placed on a flat black plate and covered with a glycerin and salt water solution to help clear them. They were then aged with the aid of a dissecting microscope and an adjustable side light.

Results

We collected a total of seven westslope cutthroat, six rainbow trout, and nine westslope cutthroat x rainbow trout hybrids. Fish ranged in length from 130 mm to 417 mm and ranged in age from two to seven years old (Table 17). Wild rainbow trout from 315 mm to 371 mm were found to be four to six years old. Hatchery cutthroat trout from 310 mm to 385 mm were five to seven years old and natural hybrids were 318 mm to 385 mm were four to seven years old. Condition factors (Ktl) averaged 0.96, 0.95, and 0.94 for westslope cutthroat trout, rainbow trout, and rainbow X cutthroat hybrids, respectively.

Discussion

Trout growth was slow in Brundage Reservoir. It took an average of four to five years for fish of all species to reach 315 mm. With the slow growth rates and the current regulation of no harvest of trout over 356 mm the number and or frequency of stocked cutthroat trout should be reduced significantly or eliminated to maximize growth and stocking efficiency of both wild and stocked trout.

Horsethief Reservoir Creel Survey

Introduction

Horsethief Reservoir was stocked with 24,900 catchable-sized rainbow trout in 2010 prior to Labor Day weekend. Approximately 10,000 brown trout have been stocked each of the last four years. To evaluate the return of stocked rainbow and brown trout and to examine angler use we completed a summer long comprehensive creel survey in 2010. The previous summer creel survey was completed on Horsethief Reservoir in 1994.

Methods

We utilized IDFG's Horsethief Reservoir camp host to complete the creel survey. Sampling was stratified by weekends and weekdays. Angler counts and interviews were made on randomly picked weekend and weekday days. Angler count times were also chosen randomly on the given survey day. Anglers on the lake were asked how many people were in their party, how long they had fished that day, and how many fish by species they had all caught and released that day. The creel program CAS was utilized to make estimates of total angler hours and number of fish caught by month.

Results

The camp host completed counts and interviews on 28 days from May 28 thru September 6, 2010. The total angling pressure estimate was 21,941 hours of which 17,439 and 4,502 were shore angler and boat hours respectively (Table 18). We observed an average of 2.25 anglers per fishing boat. Total boat hours expanded to boat angler hours equaled 12,232.

An estimated 12,274 trout were caught of which 11,971 were rainbow trout and 303 brown trout, respectively. Of the trout caught, 7,369 rainbow trout and 208 brown trout were harvested (Table 19). The reservoir received the most angling pressure and yielded the most fish during the month of June (Tables 20 and 21) with 9,163 hours and 6,374 rainbow trout being caught. No yellow perch *Perca flavescens* were recorded caught however, they were observed in the lake.

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LAKE CASCADE YELLOW PERCH FISHERY RESTORATION MONITORING AND INVESTIGATION

ABSTRACT

We continued monitoring the yellow perch population in Lake Cascade following the yellow perch restoration work from 2004 through 2006. We collected an average of 59 yellow perch in each bottom trawl samples in 2010. We aged yellow perch from 70 mm to 315 mm and found ages ranging from one to five.

We completed the annual holiday angler trend counts on Lake Cascade and observed a decrease in number of anglers from 2009.

We completed a year-around intensive creel survey on Lake Cascade in May 2010. An estimated 70,589 hours were spent to catch 96,736 fish. Totals were 29,316 boat angler hours, 23,305 shore angler hours, and 17,968 ice angler hours. An estimated 58,649 yellow perch, 123,991 smallmouth bass, and 8,036 rainbow trout were caught of which 38,055, 5,503, and 2,845 yellow perch, rainbow trout, and smallmouth respectively, were harvested. Return rates of stocked rainbow trout and Coho salmon *Oncorhynchus kisutch* were approximately 3.6% and 1%.

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INTRODUCTION

Since the mid 1990's survival of juvenile yellow perch had been poor, resulting in the collapse of this fishery. Northern pikeminnow numbers and subsequent predation on juvenile yellow perch were determined to be preventing yellow perch recovery and were probably the direct cause of the population collapse.

The two-treatment restoration plan entailed stocking large numbers of yellow perch adults to overwhelm predators in the lake (primarily adult northern pikeminnow) and secondly to physically reduce the number of predators (northern pikeminnow) in the lake. We transplanted over 860,000 adult yellow perch and removed an estimated 75% of the northern pikeminnow population in the lake from 2004 through 2006 (Janssen et al. 2008). Since 2006 we have annually monitored the response of fish populations to the treatments and we continued this monitoring in 2010.

We began angler counts on holidays in 1998 to track changes in angler use. We completed a year around intensive creel survey 2010. This was the first intensive creel survey since 1992 and this data was also incorporated into this year's Holiday angler counts (See Holiday Angler Counts section, this report).

Yellow Perch Population Trend Monitoring

Introduction

A bottom trawl has been utilized since 1998 to monitor changes in yellow perch population structure and abundance. The trawl has been effective in monitoring changes in population size and survival of juvenile yellow perch. The trawl sampling effort was competed again in 2010.

We collected and aged otoliths from yellow perch to determine age and growth rates and to help us interpret trawl sampling results.

Methods

We continued to use the same lake area divisions (east, west, north, and south), effort and transect sites that were developed in 1998 and 1999 and described by Janssen et al. (2003). Trawl transect locations were as close as possible to the established sites. Exact sites change due to water levels and macrophyte bed development. Trawl sites are moved into deeper water to avoid dense macrophyte beds that foul the trawl. We have abandoned trawl sampling in the north area due to the large numbers of submerged stumps that snag the trawl. We counted all yellow perch collected and inventoried a representative sample of yellow perch from each sample area. Collected fish were measured for total length to the nearest 1 mm and weighed to the nearest 0.1 g.

Results

We completed 63 trawl transects in 2010, trawling a total of 314 minutes, collecting 3,690 yellow perch. We averaged 37, 111, and 28 yellow perch per five minute transect in June, August and October respectively which equals approximately 59 per trawl sample (Tables 22 and 23). Length frequencies of fish collected in June, August and October are presented in Table 24.

Length frequency data and otolith ageing indicate the majority of yellow perch collected in the June trawl samples were age-1. Age-0 fish dominated the catches in the August and October samples. The strong 2008 year class, observed over the last two years, was not observed after the June trawling. A number of larger adults were collected this year in the October trawling samples (Table 24). Average lengths of age-0 fish in October increased from 40 mm in 2009 to 65 mm this year (Table 25). We observed a similar increase in lengths of age-1 fish, from 63 mm in 2009 to 105 mm this year.

Discussion

While sampling with the trawl seemed to be efficient at monitoring young-of-year and yearling age class strengths, it did not appear to be effective at monitoring recruitment of the juvenile age classes into catchable size fish. We are unsure if this was a result of too small a sampling effort/area compared to the overall size of the lake or if it was due to yellow perch actually avoiding the trawl. However, the trawl does catch yellow perch of all sizes and age classes. The yellow perch population should be sampled in 2011 using both trawl and gill nets and the resulting length frequencies generated by each gear type should be examined and compared. This would help us evaluate the effectiveness and therefore the value of the trawling effort in describing the yellow perch population in Lake Cascade.

Management Recommendations

1. Continue the annual trawling of Lake Cascade to monitor changes in age class structure and growth of yellow perch in 2011.

2. Sample the yellow perch population with gill nets in 2011 and compare length frequencies of fish collected from both gill nets and trawl.

Holiday Angler Counts

Introduction

The last comprehensive angler survey was completed on Lake Cascade in 1991 and 1992. Holiday angler counts were begun in 1996 as a relatively inexpensive way to track changes in angling pressure trends until the next comprehensive survey was completed. However, due the collapse of the yellow perch fishery and subsequent drop in angling pressure to near zero in the mid 2000's, no comprehensive creel survey was ever scheduled. These angler counts happened to start just prior to the collapse of the yellow perch fishery. They have served as a tool to monitor changes in angling pressure before, during, and after the fishery collapse. They have also been valuable in monitoring changes in angler use during and after the application of the yellow perch fishery restoration treatments from 2004 through 2006. We completed these angler counts again in 2010.

We completed a comprehensive creel survey in 2010 on Lake Cascade. Results of that survey were incorporated into the holiday angler count summary table (Table 26).

Methods

We conducted holiday angler counts at 0900 and 1400 hrs. in 2010 using a fixed wing airplane on Memorial Day, July 4th and Labor Day. A fixed wing aircraft was used to count all fishing boats and shore anglers. All shore anglers and boat counts were then averaged for a yearly average.

Results

Angler counts were completed on Memorial Day, July 4th and Labor Day in 2010. The counts averaged 22.5 boats and 22 shore anglers (Table 26). Boat angler counts were the lowest since 2003 and shore angler counts were the lowest since 2005. However, weather conditions were not very "angler friendly" on both Memorial Day and Labor Day. The average counts on July 4th were 49 boats and 26 shore anglers.

Discussion

The holiday angler counts appeared to be very effective at indicating overall annual angling pressure on Lake Cascade. Figure 8 presents the linear regression results of the four years when both holiday angler counts of shore anglers and boats and actual intensive creel survey angling pressure estimates were made. The r^2 values for average shore angler counts versus total estimated shore angling pressure and average boat counts versus total estimated boat pressure were 0.77 and 0.81, respectively.

Management Recommendation

1. Continue holiday angler counts to monitor angler use and compare results with future creel survey studies.

Lake Cascade Creel Survey

Introduction

Since the decline of the yellow perch fishery and the implementation of the recovery strategy and subsequent partial recovery described by Janssen et al. (2008), angling pressure and fish harvest have changed dramatically. Since 1992, angling pressure had been monitored with holiday angler counts on Memorial Day, July 4th, and Labor Day. No estimates of fish harvest had been made since 1992. We completed a year around creel survey in 2009 and 2010.

Methods

Lake Cascade was split into two zones, north and south, for the creel survey due to its large size. During ice free months, separate monthly angling pressure and fish catch estimates were made for each area independent of the other. The boundary between the two areas was a straight, east to west line across the lake that just touched the north end of Sugarloaf Island. During months of ice cover the entire lake was counted and sampled and monthly angling pressure and catch estimated for the entire lake.

Sampling was stratified by weekends and weekdays. An average of nine days was sampled each month. Four weekend and five weekday days, first count times and zone were chosen randomly. After the first count a second count was made four hours later. A total of eight hours was spent on the lake completing counts and interviews. All fishing boats and shore anglers were counted at each count time. Anglers were interviewed between counts. Anglers were asked how long they had fished that day and what fish species they had caught, harvested, and released. They were also asked how far they had traveled to fish and what species if any they were targeting. Catch rates for boat anglers were reported as individual catch rates. However, catch rates for boats targeting a specific species were reported as catch rates for the boat and not individual anglers.

Results

We estimated a total of 70,589 angler hours were spent on Lake Cascade of which 29,316 were boat anglers, 23,103 were shore anglers and 17,968 were ice anglers (Table 27). Anglers spent an estimated 21,286 hours in the upper lake zone and 31,335 in the lower zone. (Table 28). Boat and shore angling pressure was 14,354 and 6,932 hours respectively in the upper zone compared to 14,961 and 16,374 respectively in the lower zone (Table 29).

Yellow perch were the most frequently caught species with an estimated 58,649 perch landed and 38,055 harvested. Smallmouth bass were the second most caught fish with 23,991 landed and 2,846 harvested (Table 30). Anglers also harvested 5,503 rainbow trout and 1,312 Coho salmon.

Coho salmon, rainbow trout, smallmouth bass, and yellow perch monthly catch rates by angler type are presented in Table 31. Harvest rates peaked for yellow perch for both shore and boat anglers in October at 1.00 and 0.85 fish/hour, respectively. Rainbow trout harvest

rates peaked for boat anglers in July at 0.10 and in May at 0.11 for shore anglers. Yellow perch and rainbow trout harvest peaked in July with 9,137 and 2,483 fish respectively (Table 32). Harvest rates for the year for Coho salmon, rainbow trout and yellow perch were 0.01, 0.04, and 0.29 respectively (Table 33). Mean total lengths and weights of harvested fish by month are presented in Table 34. Monthly average total lengths of harvested yellow perch ranged from 225 mm to 303 mm in March and October, respectively, and rainbow trout ranged from 334 mm to 437 mm in September and March, respectively.

Discussion

Angling pressure has not returned to anywhere near what it was prior to the "crash" in the yellow perch fishery in the mid 2000's. Total angling pressure in 1986 and 1992 was 385,000 and 321,000 angler hours, respectively, compared with 70,589 in 2009/10 (Janssen et. al. 1994a).

Rainbow trout and Coho salmon catch rates were poor which helps explain the low angling pressure on the lake. Reasons for the poor salmonid catch rates are probably a direct result of poor survival of stocked rainbow trout and salmon. Lake Cascade was stocked with 153,500 catchable size rainbow trout in 2009 and 241,000 in 2008. The total harvest estimate for rainbow trout during the survey was 5,503 or 3.6 % of fish stocked in 2009. A total of 123,200 Coho salmon fingerling were stocked in 2008 and zero in 2009. The total harvest estimates for Coho salmon was 1,312 or 1.0% of fish stocked in 2008. These return rates of stocked salmonids are unacceptable and stocking rates need to be reduced or solutions found to improve stocking survival and catch rates to justify the expense of these stockings.

Rainbow trout and yellow perch harvest rates have varied greatly over the last three Lake Cascade creel surveys. In 1991 and 1992 harvest rates for rainbow trout for all anglers were 0.08 and 0.13 fish/hour, respectively, compared to 0.04 in 2009 (Janssen et.al. 1994b). Yellow perch catch rates were actually higher in 2009 at 0.29 than the 0.20 observed in 1992. The yellow perch catch rate in 1992 was higher than both at 0.48.

A change noted from previous creel surveys was the large increase in smallmouth bass catch and harvest compared with previous years. Smallmouth bass are not listed among the species caught or harvested in the creel survey results of 1986 (Anderson et. al. 1987). There were 172 smallmouth bass reported harvested in 1991 and 1,427 in 1992. This compares to 23,991 smallmouth bass caught and 2,846 harvested in 2009. We had several bass tournaments on Lake Cascade in 2009 as well.

Management Recommendation

1. Repeat the creel survey in 5 to 10 years to monitor change in angler use and catch rates of managed species as outlined in the current 5-year Fish Management Plan.

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RIVERS AND STREAMS INVESTIGATIONS

ABSTRACT

We completed a total of twenty IDFG standard stream surveys in nineteen streams in the North Fork Payette River and South Fork of the Salmon River drainages in 2010.

The 2010 kokanee *Oncorhynchus nerka kennerlyi* spawning run in the North Fork Payette River (NFPR) above Payette Lake was estimated to be 1,055 fish. The lowest estimate since counts began in 1988.

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Standard Stream Surveys

Introduction

The purpose of our standard stream surveys was to document the fish species presence and physical habitat of the NFPR drainage. The 2010 season concentrated its standard stream survey work mostly in the NFPR drainage with some surveys completed in the South Fork Salmon River drainage. The majority of streams in the NFPR drainage had never been surveyed and so baseline data was needed for these areas.

Methods

Our crew utilized the standard stream survey methodology presented by the August 15, 1994 memorandum by Bill Horton of IDFG to conduct the surveys. Physical habitat data was recorded and biological information was documented only from streams where water was present. Water quality data was also collected from each stream as an addition to the standard stream methodology. Physical habitat data was characterized through the length, width, depth, and percent gradient of each transect. The percent substrate class by area, percent habitat type, and channel types were also noted. Any other additionally instructive comments were recorded. The stream flow was calculated using dye time and other stream measurements to determine the CFS flow. Water quality was analyzed using pH, alkalinity, and hardness. Electrofishing included one pass for every 100 m stream transect and a second pass was conducted if the first pass yielded any fish. Our surveys were mostly compiled of one transect passed twice. Fish collected were identified and total length measured to the nearest mm. Population estimates were calculated using the Seber-LeCren 2 Sample, equal effort estimate:

$$N_{est} = C^2_{1st}/(C_{1st} - C_{2nd}),\ q_{est} = 1- (C2/C1)$$

where: C_{1st} = # captured in first sample, C_{2nd}= # captured in second sample, and q = Probability of capture.

Results

Our crew completed a total of 20 IDFG standard stream surveys in 17 streams located in the North Fork Payette River drainage and two in the South Fork Salmon River drainage. GPS coordinates of stream survey locations are presented in Table 35 and an account of the presence/absence of species in Table 36. Specific habitat data for these surveys can be found in the Department Standard Stream Survey Database.

Brook trout *Salvelinus fontinalis* and rainbow trout were found in 15 and 10 streams, respectively, of the 20 streams surveyed (Table 36). Bull trout *Salvelinus confluentus* were found in Josephine and Camp Creeks. Westslope cutthroat trout and brook trout were found in Pearl Creek and only westslope cutthroat trout were found in Deep Creek.

Discussion

Camp Creek is a very small stream that flows into Upper Payette Lake and only one bull trout was collected. More work is needed to determine extent of bull trout numbers and distribution in the stream. No streams in the NFPR drainage are known to contain endemic westslope cutthroat trout. Pearl Creek has the mountain lake, Pearl Lake, in its headwaters and is stocked with westslope cutthroat trout. Deep Creek flows into the NFPR approximately 300 m downstream from the mouth of Pearl Creek. The Deep Creek survey sight was within 200 m of the confluence. Therefore, the origin of the Deep Creek cutthroat trout is thought to be from Pearl Creek. We do not know how far up Deep Creek cutthroat trout are found or if they have colonized it. More work is needed to examine distribution of cutthroat trout in this stream.

Management Recommendations

1. Continue stream surveys in the NFPR and South Fork Salmon River drainages in 2011.

2. Expand the survey in Camp Creek to determine extent of bull trout distribution.

3. Expand the survey in Deep Creek to determine extent of westslope cutthroat trout.

North Fork Payette River above Payette Lake - Kokanee Spawner Counts

Introduction

The spawning run of kokanee in 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 2010.

Methods

We completed kokanee spawner counts by walking the entire stretch of river utilized by spawning kokanee and counting all live spawners. Three counts were completed during the spawning run. Counts were made 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 counted 420, 610, and 480 live kokanee spawners on September 9, 13, and 17, respectively. The total spawning run estimate was 1,055 (610*1.73) fish (Table 37). Average total length of spawners was 416 mm.

Discussion

Kokanee spawner counts continued to decline to the lowest count ever made on Payette Lake. Reasons for the decline are probably due to the lack of kokanee stocking from the mid 1990's to the mid 2000's. Lake trout surveys completed in 2010 indicated no obvious increases in lake trout numbers or changes in length frequencies (see "Payette Lake –Lake trout survey" section this report). However, we did observe a drop in Wr of lake trout from previous surveys. We stocked 87,500, 460,000, 263,265, and 383,500 kokanee fingerling in 2007, 2008, 2009 and 2010, respectively. As noted by Janssen et al. (2010*)* stocked kokanee do not show up as spawners until the fourth year following the year stocked (Figure 8). Therefore, we do not expect the spawning kokanee run size to increase significantly until at least the year 2011. However, the small number of fish stocked in 2007 may not recruit a large number of spawning fish in 2011. Kokanee population estimates must be completed in each of the next several years to monitor the effectiveness of the kokanee stockings.

Management Recommendation

1. Continue annual kokanee spawner counts as this is the most accurate method of monitoring kokanee numbers and stocking success in Payette Lake.

TABLES

Table 1. Percent abundance and relative biomass of all species of fish collected August 5, 2010 from C. Ben Ross Reservoir (all gear types combined).

Species	# Caught	% of Catch	Total Biomass (kg)	% of Total Weight
Bluegill	14	6.7	.36	0.6
Largemouth Bass	177	85.1	50.0	90.4
Black Crappie	1	.5	.5	0.6
White Crappie	14	6.7	1.9	3.5
Largescale sucker	2	1.0	2.5	4.6

Table 2. Number, weights, and relative weights of largemouth bass, bluegill, black crappie, and white crappie collected August 5, 2010 from C. Ben Ross Reservoir.

Total Length (CM)	Largemouth Bass				Bluegill				Black/White Crappie			
	# Coll.	% of Total	Average Weight	Relative Weight	# Collected	% of Total	Average Weight	Relative Weight	# Collected (B/W)	% of Total	Average Weight	Relative Weight
30	8	4.5	--						0/5	28.6	--	--
40	21	11.9	--						0/5	35.7	--	--
50	9	5.1	--									
60	7	3.9	--		2	14.3						
70	20	11.3	--		2	14.3						
80	21	11.9	--		1	7.1						
90	10	5.6	--									
100	2	1.1	11	94.5	3	21.4	23	116.7				
110	0	0			2	14.3	25	100.6				
120	1	0.6	28	106.7	3	21.4	34.3	99.1				
130	2	1.1	35	120.2	1	7.1	35	80.9				
140	0	0	--									
150	5	2.8	50	115.0								
160	1	1	50	95.9								
170	0	0	--									
180	0	0	--									
190	0	0	--									
200	0	0	--									
210	1	0.6	130	104.7								
220	0	0	--									
230	1	0.6	210	118.1								
240	0	0										
250	0	0										
260	1	0.6	390	149.5								
270	3	1.7	308	109.1								
280	0	0										
290	2	1.1	325	89.5								
300	1	0.6	400	102.1					0/1	14.3	410	97.1
310	2	1.1	470	103.2					1/0	100/0	485	93.5
320	6	3.4	522	106								
330	3	1.7	557	101.9					0/2	14.3	470	85.6
340	8	4.5	627	104.2					0/1	7.1	558	87.6
350	8	4.5	672	103.3								
360	8	4.5	715	101.0								
370	3	1.7	743	95.5								
380	4	2.3	858	101.0								
390	4	2.3	848	94.2								
400	6	3.4	895	90.2								
410	0	0	--									
420	3	1.7	1030	89.7								
430	1	0.6	1190	97.3								
440	2	1.1	1300	98.8								
450	3	1.7	1105	78.3								

Table 3. Total length frequencies of largemouth bass collected from C. Ben Ross Reservoir in 1993, 1996, 1999, 2004, and 2010.

Total Length (mm)	YEAR				
	1993	1996	1999	2004	2010
30	0	0	4	4	8
40	0	0	1	15	21
50	0	0	0	10	9
60	0	0	1	4	7
70	0	1	0	1	20
80	0	0	0	4	21
90	26	3	0	2	10
100	1	1	2	1	2
110	6	2	3	0	0
120	14	2	0	0	1
130	6	0	7	0	2
140	7	2	10	2	0
150	4	0	6	0	5
160	2	0	8	1	1
170	2	0	2	1	0
180	6	0	3	0	0
190	5	0	3	1	0
200	5	0	4	0	0
210	20	1	8	0	1
220	12	0	3	1	0
230	9	2	1	0	1
240	9	1	2	0	0
250	7	0	1	0	0
260	5	2	1	1	1
270	6	4	3	6	3
280	14	5	7	2	0
290	8	4	9	4	2
300	7	1	4	0	1
310	9	2	2	2	2
320	1	1	0	3	6
330	0	3	1	3	3
340	2	1	2	0	8
350	0	1	2	4	8
360		3	1	6	8
370		1	3	13	3
380		0	1	7	4
390			2	9	4
400			0	5	6
410				1	0
420				0	3
430					1
440					2
450					3

Table 4. Total lengths and ages of largemouth bass collected from C. Ben Ross Reservoir August 2010.

Total Length	Age
136	1
150	1
155	1
160	1
210	2
235	2
265	2
270	2
270	2
275	2
291	2
296	2
340	5
350	4
350	4
350	4
385	5
390	6
400	6
420	13
440	13
450	17
450	6

Table 5. 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 10, 2010.

Transect Number	Number of Pings Analyzed	NASC	Mean Target Strength (dB)	Kokanee Density (number/ha)				
				Fry	Age 1	Age 2	Age 3	TOTAL
1	690	34.59	-48.3	430	94	21	0	546
2	350	6.04	-54.6	408	0	0	0	408
3	333	10.23	NA	0	0	0	0	0
4	698	9.58	-43.6	32	8	4	4	47
5	859	12.61	-47.2	102	41	10	0	154
6	511	8.51	-48.3	103	30	0	0	133
7	815	15.23	-45.7	90	18	24	0	132
8	935	26.16	-44.5	123	15	28	3	169
9	658	30.88	-42.0	77	3	17	6	102
10,11,12	1307	3.43	-51.5	106	6	0	0	112
13	782	7.44	-51.9	234	33	0	0	267
14	773	12.24	-47.4	103	39	13	0	155
15	966	8.43	-37.5	9	2	0	0	11
16	1335	2.27	-50.2	44	11	0	0	55
17	1153	2.39	-51.5	79	0	0	0	79
18	1350	2.18	-48.8	32	6	0	0	39
19	1475	16.06	-43.5	60	0	0	12	72

Table 6. Density and abundance estimates of kokanee in Payette Lake from a hydroacoustic survey on August 10, 2010.

Section (area)	Kokanee Age	Density (fish/ha)	Population Estimate
Southwest (844 ha)	Fry	80	67,691
	Age 1	13	11,028
	Age 2	2	1,560
	Age 3	2	1,448
	Total	97	81,726
Narrows (82 ha)	Fry	106	8,685
	Age 1	6	482
	Age 2	0	-
	Age 3	0	-
	Total	112	9,167
East (680 ha)	Fry	152	103,295
	Age 1	23	15,798
	Age 2	12	7,822
	Age 3	1	949
	Total	188	127,864
TOTAL (1,606 ha)	Fry	112	179,671
	Age 1	17	27,308
	Age 2	6	9,382
	Age 3	1	2,397
	TOTAL	136	218,758

Table 7. Payette Lake total fishing pressure, catch, and, average catch rate by angler type in 2009/2010.

Angler Type	Total pressure	95% CI	Total Catch	95% CI	Total Catch Rate	95% CI
Boat	3,171	924	904	304	0.29	0.17
Shore	4,447	1,252	3765	1,773	0.85	0.62
Ice	1,698	1,001	636	489	0.37	0.51
Total	**9,316**		**5,305**		**0.50**	

Table 8. Payette Lake total catch, harvest, and release rates in 2009/10.

Species	Catch		Harvest		Release	
	N	95% CI	N	95% CI	N	95% CI
Pikeminnow	1292	1689	86	61	1206	1688
LS Sucker	197	262	0	0	197	262
Rainbow	2022	633	1029	435	993	482
Kokanee	425	0	425	0	0	0
Yellow Perch	19	47	0	0	19	47
Lake Trout	1350	493	0	0	1350	493
Total	**5305**	**1987**	**1540**	**472**	**3765**	**1891**

Table 9. Payette Lake estimated fish catch, harvest and release by angler type and fish species in 2009/2010.

		Catch		Harvest		Released	
Angler Type	**Species**	**N**	**95% CI**	**N**	**95% CI**	**N**	**95% CI**
Boat	Pikeminnow	163	94	86	61	77	72
	Rainbow	124	91	52	55	72	54
	Kokanee	0	0	0	0	0	0
	Lake Trout	617	256	0	0	617	256
	Boat Total	**904**	**304**	**138**	**84**	**766**	**280**
Shore	Pikeminnow	1,091	1,682	0	0	1,091	1,682
	Sucker	197	262	0	0	197	262
	Rainbow	1,898	624	977	433	921	476
	Kokanee	425	0	425	0	0	0
	Yellow Perch	19	47	0	0	19	47
	Lake Trout	134	174	0	0	134	174
	Shore Total	**3,765**	**1,773**	**1,402**	**433**	**2,363**	**1,706**
Ice	Pikeminnow	37	125	0	0	37	124
	Lake Trout	598	384	0	0	598	384
	Ice Total	**636**	**489**	**0**	**0**	**635**	**489**

Table 10. Payette Lake estimated catch, harvest, and release rates by species and angler type for all anglers and boats targeting specific fish species in 2009/2010 (Targeted boats are boat catch rates).

			Catch			Harvest			Release		
Angler Type	**Estimate Type**	**Species**	**CPE**	**SE**	**95% CI**	**HPE**	**SE**	**95% CI**	**RPE**	**SE**	**95% CI**
Boat	All Anglers	Pikeminnow	0.05	0.02	0.03	0.03	0.01	0.02	0.02	0.01	0.02
	All Anglers	Rainbow	0.04	0.02	0.03	0.02	0.01	0.01	0.02	0.01	0.02
	All Anglers	Lake Trout	0.19	0.07	0.13	0.00	0.00	0.00	0.19	0.07	0.13
Total			**0.29**	**0.08**	**0.17**	**0.04**	**0.01**	**0.03**	**0.24**	**0.08**	**0.15**
	Targeted boats	Rainbow	0.96	0.01	0.01	0.61	0.31	0.61	0.35	0.01	0.01
	Targeted boats	Lake Trout	0.42	0.07	0.14	0.00	0.00	0.00	0.42	0.07	0.14
	Targeted boats	Any	1.46	0.07	0.14	0.02	0.02	0.03	1.44	0.08	0.16
Shore	All Anglers	Pikeminnow	0.25	0.22	0.42	0.00	0.00	0.00	0.25	0.22	0.42
	All Anglers	Sucker	0.04	0.03	0.06	0.00	0.00	0.00	0.04	0.03	0.06
	All Anglers	Rainbow	0.43	0.13	0.26	0.22	0.08	0.16	0.21	0.07	0.14
	All Anglers	Kokanee	0.10	0.01	0.03	0.10	0.01	0.03	0.00	0.00	0.00
	All Anglers	Yellow perch	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.01
	All Anglers	Lake Trout	0.03	0.02	0.04	0.00	0.00	0.00	0.03	0.02	0.04
Total			**0.85**	**0.32**	**0.62**	**0.32**	**0.08**	**0.16**	**0.53**	**0.26**	**0.51**
	Targeted boats	Rainbow	1.01	0.05	0.10	0.63	0.22	0.42	0.38	0.04	0.07
	Targeted boats	Lake Trout	0.33	---	---	0.00	0.00	0.00	0.33	---	---
	Targeted boats	Any	1.03	0.22	0.44	0.57	0.25	0.50	0.47	0.22	0.44
Ice	All Anglers	Pikeminnow	0.02	0.04	0.07	0.00	0.00	0.00	0.02	0.04	0.07
	All Anglers	Lake Trout	0.35	0.23	0.44	0.00	0.00	0.00	0.35	0.23	0.44
Total			**0.37**	**0.26**	**0.51**	**0.00**	**0.00**	**0.00**	**0.37**	**0.26**	**0.51**
	Targeted	Lake Trout	1.27	0.21	0.41	0.00	0.00	0.00	1.27	0.21	0.41

Table 11. Payette Lake angling pressure by month and angler type in 2009/2010.

Month	Angler Type	Total Hours	95% CI
May 18-31, 2009	Boat	364	281
	Shore	698	557
June, 2009	Boat	462	223
	Shore	1096	497
July	Boat	865	688
	Shore	1582	871
August	Boat	513	251
	Shore	510	409
September	Boat	375	217
	Shore	243	190
October	Boat	212	234
	Shore	136	154
November	Boat	0	0
	Shore	0	0
December	Boat	0	0
	Shore	0	0
January 2010	Boat	0	0
	Shore	0	0
	Ice	310	509
February	Ice	663	547
March	Ice	726	666
April	NA	0	0
May	Boat	379	298
	Shore	182	155
Total		**9316**	**6747**

Table 12. Payette Lake estimated fish catch, harvest, and release by month and fish species in 2009/2010.

Month	Angler Type		Catch		Harvest		Released	
		Species	N	95% CI	N	95% CI	N	95% CI
May 18-31, 2009		Lake Trout	92	---	0	0	92	---
	shore	Rainbow	279	243	274	242	6	10
		Pikeminnow	6	15	0	0	6	15
June	boat	Rainbow	8	14	4	7	4	7
		Lake Trout	65	80	0	0	65	80
June	shore	Pikeminnow	96	108	0	0	96	108
		LS Sucker	45	57	0	0	45	57
		Rainbow	296	177	166	183	131	155
July	boat	Pikeminnow	22	47	0	0	22	47
		Lake Trout	130	201	0	0	130	201
July	shore	Pikeminnow	952	1678	0	0	952	1678
		LS Sucker	144	255	0	0	144	255
		Rainbow	637	324	240	222	397	297
		Lake Trout	116	172	0	0	116	172
August	boat	Pikeminnow	24	37	0	0	24	37
		Rainbow	74	76	41	52	34	37
		Lake Trout	78	61	0	0	78	61
	shore	Pikeminnow	44	31	0	0	44	31
		Rainbow	87	157	87	157	0	0
		Yellow Perch	19	47	0	0	19	47
September	boat	Pikeminnow	112	71	86	61	26	37
		Rainbow	35	39	7	17	28	26
		Lake Trout	66	111	0	0	66	111
	shore	LS Sucker	9	20	0	0	9	20
		Rainbow	318	382	80	122	238	329
		Lake Trout	18	27	0	0	18	27
October	boat	Rainbow	6	28	0	0	6	28
		Lake Trout	27	44	0	0	27	44
	shore	Rainbow	267	151	117	76	150	76
November		No Anglers	0	0	0	0	0	0
December		No Anglers	0	0	0	0	0	0
January 2010	ice	Lake Trout	90	157	0	0	90	157
Feb. (ice)	ice	Lake Trout	386	164	0	0	386	164
Mar (ice)	ice	Pikeminnow	37	124	0	0	37	124
		Lake Trout	122	309	0	0	122	309
April		No Anglers	0	0	0	0	0	0
May	boat	Lake Trout	159	25	0	0	159	25
	shore	Rainbow	14	33	14	33	0	0
		Kokanee	425	--	425	--	--	--
Total			5305	5464	1540	1170	3765	4771

Table 13. Distance traveled by anglers on Payette Lake by angler type in 2009/10.

Distance Traveled	Boat Anglers		Shore		Ice	
	Number	Percent (%)	Number	Percent (%)	Number	Percent (%)
0	53	39.85	34	40.00	16	80.00
25	1	0.75	1	1.18	0	0
50	2	1.50	1	1.18	0	0
75	6	4.51	5	5.88	0	0
100	62	46.62	30	35.29	3	15.00
125	1	0.75	1	1.18	0	0
150	1	0.75	1	1.18	0	0
200	1	0.75	2	2.35	0	0
275	0	0.00	0	0.00	1	5.00
350	2	1.50	1	1.18	0	0
450	1	0.75	1	1.18	0	0
475	1	0.75	1	1.18	0	0
525	1	0.75	1	1.18	0	0
750	1	0.75	1	1.18	0	0
1,575	0	0	1	1.18	0	0
1,775	0	0	1	1.18	0	0
1,850	0	0	1	1.18	0	0
2,575	0	0	1	1.18	0	0
2,600	0	0	1	1.18	0	0

Table 14. Payette Lake angling pressure and catch estimates from surveys completed in 1971, 1972, 1987, 1995, and 2009/10.

Year of Survey	Survey Duration	Total Hours		Estimated Catch					
		Boat Hours	Shore Hours	Rainbow Trout	Kokanee	Lake Trout	Cutthroat	Yellow Perch	Northern Pikeminnow
1971	5/29-9/3	14,509	3,109	5,155	7,217	244	0	0	950
1972	5/27-9/8	16,934		7,209	6,811	427	0	142	1,475
1987	5/1-9/30	11,540	1,574	2,858	424	470	0	253	?
1995	4/30-9/30	8,124	209	120	479	40	20	0	?
2009/10	5/18/09-5/31/10	2,579	4,129	2,022	425	1,349 Released	0	0	130

Table 15. Total length, weight, and relative weights of lake trout collected from Payette Lake in summer 2010.

Length(mm)	Weight(g)	Wr
398	450	78.5
460	670	73.1
461	740	80.1
594	1830	87.0
610	1850	80.7
708	3150	84.7
725	3200	79.7
732	3400	82.1
735	3250	77.4
738	3550	83.5
755	3750	81.9
755	4100	89.5
765	3450	72.2
770	4250	87.1
780	4000	78.6
793	4450	82.9
795	2800	51.7
810	3850	66.9
826	4200	68.5
835	5200	81.9
840	3750	57.9
845	4750	72.0
855	5800	84.6
861	7300	104.1
861	4620	65.9
867	6250	87.1
870	6100	84.1
873	4550	62.0
873	5200	70.9
920	9600	110.4
975	9900	94.3
999	6100	53.7
1010	13050	110.8
	Average Wr	79.6

Table 16. Little Payette Lake Merwin trap catch and treatment by species and size by month.

Species and Size	Treatment	June	July	August	Total
Northern pikeminnow (NP) >250 mm	Marked	219	259	26	504
NP >250 mm	Removed	5	9	46	60
NP >250 mm	Recaptured	48	111	31	190
Largescale Sucker (LSS) >250 mm	Marked	530	0	0	530
LSS >250 mm	Removed	612	495	140	1,247
LSS >250 mm	Recaptured	51	30	13	94
Rainbow trout	Released	245	24	1	270
Smallmouth bass	Released	8	22	883	913
Tiger muskie	Released	30	46	28	104

Table 17. Total lengths and age of wild rainbow trout, stocked cutthroat trout, and hybrids collected from Brundage Reservoir in June 2010.

Species	Length (mm)	Weight (g)	Age (years)	KTL
Westslope Cutthroat Trout	329	325	5	0.91
	335	350	7	0.94
	322	340	5	1.02
	385	500	7	0.88
	261	190	5	1.07
	351	355	6	0.82
	310	340	5	1.14
Hybrid Cutthroat-Rainbow	285	210	2	0.91
	332	330	4	0.90
	417	680	7	0.94
	340	339	7	0.86
	316	310	4	0.98
	380	430	5	0.78
	329	350	5	0.98
	326	350	4	1.01
	318	350	4	1.09
Rainbow Trout	315	290	4	0.93
	293	225	4	0.90
	327	400	5	1.14
	371	445	6	0.87

Table 18. Horsethief Reservoir total fishing pressure (shore angler and boat hours), catch, average catch rate by angler type and total catch of rainbow trout and brown trout by angler type from May 26 through September 6, 2010.

Angler Type	Total pressure	95% CI	Rainbow Trout Catch	Brown Trout Catch	Total Catch	95% CI	Total Catch Rate	95% CI
Boat	4,502 (boat hours)	2,414	5,275	41	5,306	1,980	1.18	0.55
Shore	17,439	5,274	6,696	262	6,958	4,669	0.40	0.35
Total	21,941	7,688	11,971	303	12,264	6,649	0.56	

Table 19. Horsethief Reservoir total catch, harvest, and release estimates by species from May 26 through September 6, 2010.

	Catch		Harvest		Release	
Species	N	95% CI	N	95% CI	N	95% CI
Rainbow trout	11,970	6,738	7,161	4,434	4,809	2,653
Brown trout	303	201	208	211	95	94
Total	12,274		7,369		4,904	

Table 20. Observed (shore and boat hours) and total fishing hour (shore and boat angler hours) estimates by time period for Horsethief Reservoir.

Time Period	Observed Angler Hours (shore and boat hours)		Total Angler Hours (shore and boat angler hours)	
	N	95% CI	N	95% CI
5/24-5/31/10	976	---	1,040	---
June	7,887	4,396	9,163	5,328
July	4,644	2,770	9,166	7,213
August	7,039	3,476	8,839	4,406
9/1-9/6/10	1,395	1,323	1,462	1,367
Total	21,941	11,965	29,671	18,314.

Table 21. Total estimate of fish catch, harvest, and release by time period for Horsethief Reservoir.

		Catch		Harvest		Release	
Time Period	**Species**	**N**	**95% CI**	**N**	**95% CI**	**N**	**95% CI**
5/24-5/31/10	Rainbow trout	1,523	---	1,076	---	---	---
June	Rainbow trout	6,374	6,627	3,187	2,843	4,347	1,296
	Brown trout	177	177	148	130	198	35
July	Rainbow trout	1,471	1,067	1,204	349	533	302
	Brown trout	34	72	34	47	72	0
August	Rainbow trout	2,425	568	1,535	441	674	250
	Brown trout	39	62	0	0	0	32
9/1-9/6/10	Rainbow trout	178	161	160	116	177	9
	Brown trout	53	4	27	7	10	7
		12,274	8,738	7,371	3,933	6,011	1,931

Table 22. Total and mean catch of yellow perch by area collected in June, August and October 2010 with a bottom trawl from Lake Cascade with 95% confidence intervals (+/-).

	June			August			October		
AREA	**Number of Transects**	**Total Number Perch**	**Average Catch per Transect**	**Number of Transects**	**Total Number Perch**	**Average Catch per Transect**	**Number Transects**	**Total Number Perch**	**Average Catch per Transect**
South	7	451	64 (+/-73)	7	251	36 (+/36)	7	195	28 (+/-28)
West	7	151	22 (+/-21)	7	338	48 (+/-45)	7	21	3 (+/-13)
East	7	172	25 (+/-20)	7	1,743	249 (+/-354)	7	368	53 (+/-110)
Totals/Averages	21	774	37	21	2,332	111	21	584	28

Table 23. Average yellow perch catch per trawl transect for all transects and areas in Lake Cascade from 1998 through 2010.

YEAR	Average Yellow Perch Catch per 5 Minute Trawl	Dominant October Age Class
1998	2	0
1999	21	0
2000	10	0
2001	18	0
2002	7	0
2003	12	0
2004*	93	0
2005*	220	0
2006*	436	0
2007	651	0
2008	1,140	0
2009	1,029	1
2010	59	1

* Years with adult yellow perch introductions and northern pikeminnow removal

Table 24. Length frequencies and ages of yellow perch collected with a bottom trawl from Lake Cascade in June, August, and October 2010.

Total length	June	August	October	October ages (trawl and fishery)	Year age class produced
10	0	0	0		
20	0	0	0		
30	0	368	0	0	
40	0	1258	17	0	2010
50	231	622	129	0,1	
60	285	13	254	0,1	“
70	152	26	78	0,1	2009
80	64	17	9	0,1	
90	17	19	9	1	“
100	2	1	27	1	2009
110	3	1	11	1,2	
120	3	1	5	2	
130	3	1	4	2	2008
140	0	0	3	2,	
150	5	0	2	2	
160	5	0	0	3	2008
170	1	0	0	-	
180	2	0	0	-	
190	0	0	1	3	2007
200	0	1	0	-	
210	0	0	0	-	
220	0	0	0	-	
230	0	0	0	-	
240	0	0	1	4,5	2006
250	0	0	2	4,5	“
260	0	0	1	5	2005
270	0	0	0	3,4,5	“
280	0	0	2	5	2004
290	1	0	0	4,5	
300	1	1	4	5	“
310	0	1	6	5	“
320	0	1	10	5,6	2004
330	0	0	4	5,6	
340	0	1	2	-	
350	0	0	1		
360	0	0	1		
370	0	0	1		
380	0	0	0		
TOTALS	775	2332	584		

Table 25. October total lengths of age 0 and 1 yellow perch collected with the trawl in Lake Cascade from 1998 through 2010.

Year	Age-0 Total length (mm)	Age-1 Total length (mm)
1998	72	120
1999	71	125
2000	71	135
2001	75	135
2002	72	145
2003	71	145
2004*	54	115
2005*	52	114
2006*	42	81
2007	47	73
2008	44	81
2009	40	63
2010	65	105

* Years with adult yellow perch introductions and northern pikeminnow removal

Table 26. Average boat and shore angler counts on Lake Cascade on three major holidays; Memorial Day, July 4th, and Labor Day, in 1982, 1991, 1992, and 1996 through 2009 with corresponding intensive creel survey angler hour estimates for 1982, 1991 and 1992.

	Holiday Counts		Estimated Angler Hours (hours * 1000)		
Year	Ave. # Boats	Ave. # Shore Anglers	Boat Anglers	Shore Anglers	Total Pressure[1]
1982	154	85	255.6	129.8	385.4
1986	na	na	212.8	128.2	340.9
1991	41.5	32	135.2	102	237.2
1992	52.5	116	144.2	177.3	321.5
1996	35	27	--	--	--
1997	36.5	19	--	--	--
1998	58	39.5	--	--	--
1999	27	31	--	--	--
2000	15	12	--	--	--
2001	11	12	--	--	--
2002	16.5	12	--	--	--
2003	17	6	--	--	--
2004	23	8.5	--	--	--
2005	28	12.5	--	--	--
2006	25	23	_	_	_
2007	24	28	_	_	_
2008	34	37	_	_	_
2009[2]	29	29	29.2[2]	23.1[2]	52.3[2]
2010	22.5	22	--	--	--

[1] Does not include ice fishing hours.
[2] Creel survey from May 15, 2009 thru May 30, 2010

Table 27. Lake Cascade total fishing pressure estimate by angler type from May 15, 2009 through May 30, 2010.

Angler Type	Total pressure	95% CI
Boat	29,316	6,108
Shore	23,305	5,055
Ice	17,968	5,911
Total	70,589	17,074

Table 28. Lake Cascade total fishing pressure by zone from May 15, 2009 through May 30, 2010.

Zone	Total Pressure	80% CI	95% CI
Upper	21,286	3,576	5,467
Lower	31,335	3,926	6,002
Ice (All Lake)	17,968	3,866	5,911

Table 29. Lake Cascade total fishing pressure by zone and angler type from May 15, 2009 through May 30, 2010.

Zone	Angler Type	Total Pressure	80% CI	95% CI
upper	Boat	14,354	2,975	4,548
upper	Shore	6,932	2,471	3,778
lower	Boat	14,961	2,666	4,076
lower	Shore	16,374	2,196	3,357
all (ice)	Ice	17,968	3,866	5,911
Total		70,589		

Table 30. Lake Cascade total catch, harvest, and release estimates by species and angler type in 2009/10.

Angler Type	Species	Catch	Harvest	Release
		N	N	N
Boat	Black bullhead	723	76	647
	Channel Catfish	63	0	63
	Tiger Muskie	22	0	22
	Coho salmon	1,359	1,157	202
	Rainbow trout	5,618	3,737	1,882
	Kokanee	30	31	0
	Pumpkinseed	30	31	0
	Smallmouth bass	21,306	2,183	19,121
	Largemouth bass	51	0	51
	Black crappie	564	488	76
	Yellow perch	38,897	24,980	13,915
	Northern pikeminnow	524	70	455
	Total	69,187	32,753	36,434
Shore	Black bullhead	2,046	107	1,939
	Coho salmon	88	31	58
	Rainbow trout	1,145	510	635
	Pumpkinseed	193	132	61
	Smallmouth bass	2,657	633	2,024
	Largemouth bass	23	0	23
	Black crappie	31	31	0
	Yellow perch	10,704	4,476	6,227
	Total	16,887	5,920	10,967
Ice	Black bullhead	58	30	28
	Coho salmon	124	124	0
	Rainbow trout	1,272	1,256	17
	Smallmouth bass	29	29	0
	Largemouth Bass	128	128	0
	Yellow perch	9,050	8,598	451
	Total	10,661	10,154	497

Table 31. Lake Cascade monthly catch and harvest rates by species, angler type, and estimate type from May 15, 2009 through May 31, 2010.

			Species							
			Coho		Rainbow Trout		Smallmouth Bass		Yellow Perch	
Month	Angler Type	Estimate	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest
May	Boat	All Anglers	0.00	0.00	0.01	0.00	0.73	0.04	0.47	0.29
		Targeted**	0.00	0.00	0.00	0.00	2.45	0.01	2.09	1.42
	Shore	All Anglers	0.00	0.00	0.02	0.00	0.11	0.00	0.82	0.12
		Targeted**	0.00	0.00	0.43	0.00	0.69	0.00	3.21	0.54
Jun	Boat	All Anglers	0.01	0.01	0.05	0.01	0.66	0.05	0.24	0.15
		Targeted**	0.00	0.00	0.00	0.00	1.95	0.09	1.56	0.88
	Shore	All Anglers	0.00	0.00	0.04	0.00	0.11	0.02	0.16	0.04
		Targeted**	0.00	0.00	0.00	0.00	1.59	0.16	0.19	0.13
Jul	Boat	All Anglers	0.03	0.03	0.11	0.10	0.25	0.04	0.43	0.30
		Targeted**	0.68	0.68	0.99	0.78	2.56	0.14	2.56	1.83
	Shore	All Anglers	0.00	0.00	0.00	0.00	0.17	0.03	0.32	0.22
		Targeted**	0.00	0.00	0.00	0.00	1.19	0.27	0.64	0.60
Aug	Boat	All Anglers	0.02	0.02	0.09	0.07	0.13	0.01	0.38	0.34
		Targeted**	0.05	0.05	0.41	0.29	1.02	0.13	2.05	1.89
	Shore	All Anglers	0.00	0.00	0.00	0.00	0.02	0.00	0.39	0.18
		Targeted**	0.00	0.00	0.00	0.00	0.00	0.00	1.99	0.96
Sep	Boat	All Anglers	0.01	0.01	0.09	0.05	0.21	0.01	0.83	0.61
		Targeted**	0.00	0.00	0.30	0.26	1.51	0.02	3.48	2.64
	Shore	All Anglers	0.01	0.01	0.00	0.00	0.14	0.00	0.52	0.26
		Targeted**	0.00	0.00	0.00	0.00	0.85	0.00	1.51	1.05
Oct	Boat	All Anglers	0.00	0.00	0.04	0.04	0.49	0.06	0.85	0.77
		Targeted**	0.00	0.00	0.15	0.15	1.98	0.10	5.08	4.86
	Shore	All Anglers	0.03	0.00	0.05	0.03	0.02	0.02	1.00	0.51
		Targeted**	0.27	0.00	0.14	0.06	0.00	0.00	1.93	1.02
Dec	ICE	All Anglers	0.00	0.00	0.06	0.05	0.00	0.00	0.64	0.64
		Targeted**	0.00	0.00	0.23	0.23	0.00	0.00	3.11	3.06
May	Boat	All Anglers	0.02	0.00	0.06	0.01	0.14	0.03	1.22	0.49
		Targeted**	0.00	0.00	0.34	0.09	0.33	0.04	3.68	2.67
	Shore	All Anglers	0.00	0.00	0.22	0.11	0.14	0.09	0.57	0.16
		Targeted**	0.00	0.00	0.53	0.53	0.00	0.00	2.00	2.00
Jan/10	ICE	All Anglers	0.01	0.01	0.07	0.07	0.00	0.00	0.60	0.55
		Targeted**	0.00	0.00	1.22	1.22	0.00	0.00	2.35	2.13
Feb/10	ICE	All Anglers	0.00	0.00	0.09	0.09	0.01	0.01	0.31	0.30
		Targeted**	0.00	0.00	0.62	0.62	0.00	0.00	0.93	0.86
Mar/10	ICE	All Anglers	0.00	0.00	0.05	0.05	0.00	0.00	0.00	0.00
		Targeted**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

** Targeted boat catch and harvest rates are fish/boat hours.

Table 32. Lake Cascade total catch and harvest estimates by species, month, and angler type from May 15, 2009 through May 31, 2010.

		Species							
		Coho		Rainbow trout		Smallmouth Bass		Yellow Perch	
Month	Angler Type	Total Catch	Total Harvest	Total Catch	Total Harvest	Total Catch	Total Harvest	Total Catch	Total Harvest
May/09	Boat	26	0	103	0	5,355	257	3,437	2,137
	Shore	0	0	53	0	235	0	1,812	272
	Total	26	0	157	0	5,589	257	5,249	2,409
Jun	Boat	48	48	339	95	4,405	330	1,586	985
	Shore	0	0	126	0	368	63	508	126
	Total		48	465	95	4,773	392	2,094	1,111
Jul	Boat	880	880	2,984	2,483	6,396	1001	11,219	7,728
	Shore	0	0	0	0	1,049	172	2,050	1,408
	Total		880	2,984	2,483	7,445	1173	13,269	9,137
Aug	Boat	177	177	788	569	1,102	122	3,289	2,972
	Shore	0	0	0	0	44	0	794	377
	Total		177	788	569	1,146	122	4,083	3,350
Sep	Boat	89	53	867	456	1,976	78	7,703	5,650
	Shore	31	31	0	0	371	0	1,382	701
	Total		84	867	456	2,347	78	9,085	6,352
Oct	Boat	0	0	79	79	935	117	1,632	1,478
	Shore	58	0	90	56	39	39	1,887	959
	Total	0	0	169	135	974	155	3,519	2,437
Nov		No Anglers							
Dec	ICE			261	244			2,997	2,974
Jan	ICE	109	109	507	507			4,531	4,132
Feb	ICE	14	14	462	462	29	29	1,521	1,492
Mar	ICE	0	0	43	43				
Apr		No Anglers							
May/10	Boat	140	0	458	55	1,136	279	10,030	4,029
	Shore	0	0	876	455	552	360	2,271	633
	Total	140	0	1,334	510	1,689	639	12,302	4,662
Totals		1,571	1312	8,037	5,503	23,991	2,846	58,649	38,055

Table 33. Lake Cascade annual catch, harvest, and release rates for all species encountered during May 15, 2009 through May 31, 2010 creel survey.

Species	Catch Rate	Harvest Rate	Release Rate
Black Bullhead	0.026	0.002	0.024
Channel Catfish	0.001	0.000	0.001
Tiger Muskie	0.000	0.000	0.000
Coho Salmon	0.014	0.012	0.002
Rainbow trout	0.073	0.050	0.023
Kokanee	0.000	0.000	0.000
Pumpkinseed	0.002	0.001	0.001
Smallmouth Bass	0.219	0.026	0.193
Largemouth Bass	0.002	0.001	0.001
Black Crappie	0.005	0.005	0.001
Yellow Perch	0.536	0.348	0.188
Northern Pikeminnow	0.005	0.001	0.004

Table 34. Mean total length and weight of harvested fish by month and species from May 2009 through May 2010from Lake Cascade.

Month-Year	Species	Mean Total Length (mm)	Mean Weight (g)
Aug-09	Black Bullhead	265	292
Dec-09		305	---
May-09	Black Crappie	268	72
Jun-09		267	81
Aug-09		268	25
Sep-09		268	72
Jun-09	Coho Salmon	381	735
Jul-09		412	811
Aug-09		350	529
Sep-09		389	699
Jan-10		390	691
Mar-10		390	691
Aug-09	Kokanee	308	363
Jun-09	Rainbow Trout	343	410
Jul-09		380	570
Aug-09		346	514
Sep-09		334	511
Oct-09		371	362
Dec-09		404	---
Jan-10		405	---
Mar-10		437	---
Apr-10		418	---
May-10		379	298
May-09	Smallmouth Bass	360	240
Jun-09		376	657
Jul-09		351	627
Aug-09		338	740
Sep-09		356	564
Oct-09		361	586
Mar-10		357	567
May-10		365	602
May-09	Yellow Perch	272	76
Jun-09		282	280
Jul-09		276	241
Aug-09		261	257
Sep-09		267	320
Oct-09		303	417
Dec-09		262	---
Jan-10		250	---
Mar-10		225	---
Apr-10		254	---
May-10		277	280

Table 35. UTM Coordinates of IDFG Standard Stream Survey Sites Completed in 2010.

Stream	Parent Drainage	Site Number	Easting UTM Coordinate (WGS 84)	Northing UTM Coordinate (WGS 84)
Box Creek	NF Payette	1	575138	4987494
Camp Creek	NF Payette	1	576382	4997476
Cloochman Creek	NF Payette	1	579961	5005144
Copet Creek	NF Payette	1	573938	4987169
Cougar Creek	NF Payette	1	576843	4990619
Dead Horse Creek	NF Payette	1	572884	4981206
Deep Creek	NF Payette	1	575491	4994548
Fisher Creek	NF Payette	1	574144	4987637
Josephine Creek	SF Salmon	1	582539	5008802
Landing Creek	NF Payette	1	571614	498544
NF Deep Creek	NF Payette	North Fork	577237	4993715
NF Lake Fork	NF Payette	1	582656	4979864
NF Payette River (Squaw)	NF Payette	Squaw Meadows	578148	5003971
NF Payette River (Trail/Cloochman)	NF Payette	Trail/Cloochman	578559	5003466
Pearl Creek	NF Payette	1	576375	4993867
Ruby Creek	SF Salmon	1	587978	5010551
Twenty Mile Creek	NF Payette	1	577720	4997879
Tyee Creek	NF Payette	1	578799	4974389
Wilson Creek	NF Payette	1	578993	5001129

Table 36. Fish presence/absence data for IDFG Standard Stream Survey sites completed in 2010.

Stream	Easting UTM Coordinate (WGS 84)	Northing UTM Coordinate (WGS 84)	Rainbow Trout	West Slope Cutthroat	Brook Tout	Bull Trout	Brook/Bull Hybrid	Sculpin	Tailed Frog	Idaho Giant Salamander	Speckled Dace
Box Creek	575138	4987494	Y	N	Y	N	N	N	N	Y	N
Camp Creek	576382	4997476	N	N	Y	Y	N	N	N	Y	N
Cloochman Creek	579961	5005144	N	N	Y	N	N	N	N	Y	N
Copet Creek	573938	4987169	Y	N	Y	N	N	Y	Y	N	N
Cougar Creek	576843	4990619	Y	N	Y	N	N	N	N	Y	N
Dead Horse Creek	572884	4981206	Y	N	Y	N	N	N	N	N	N
Deep Creek	575491	4994548	N	Y	N	N	N	N	N	N	N
Fisher Creek	574144	4987637	N	N	N	N	N	Y	N	N	Y
Josephine Creek	582539	5008802	N	N	Y	Y	Y	N	Y	Y	N
Landing Creek	571614	498544	N	N	Y	N	Y	N	N	N	N
NF Deep Creek	577237	4993715	Y	N	N	N	N	N	N	N	N
NF Lake Fork Creek	582656	4979864	Y	N	Y	N	N	Y	Y	N	N
NF Payette River (Squaw Meadows)	578148	5003971	N	N	Y	N	N	N	Y	N	N
NF Payette River (Just below Trail/Cloochman Creeks confluence)	578559	5003466	Y	N	Y	N	N	N	N	Y	N
Pearl Creek	576375	4993867	N	Y	Y	N	N	N	N	Y	N
Ruby Creek	587978	5010551	Y	N	Y	N	N	Y	Y	Y	N
Twenty Mile Creek	577720	4997879	Y	N	Y	N	N	Y	N	N	N
Tyee Creek	578799	4974389	No Fish Present								
Wilson Creek	578993	5001129	Y	N	Y	N	N	N	N	Y	N

Table 37. Payette Lake kokanee spawner counts and estimated spawning run size and biomass in the North Fork Payette River from 1988 through 2010.

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	34,994	59,310[a]	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	36,300[e]	64,891[d]	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	15,690[g]	30,144[f]	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	--		--	416

[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.

FIGURES

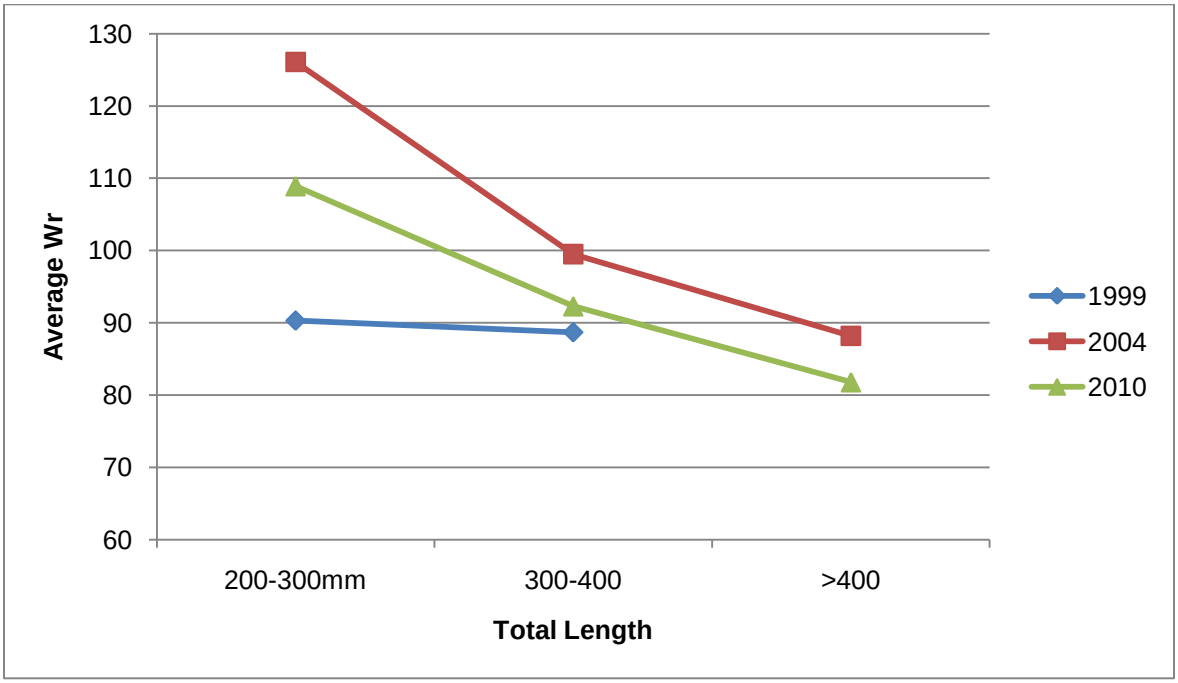

Figure 1. Relative weights of largemouth bass collected with electrofishing boat from C. Ben Ross Reservoir in 1994, 2004, and 2010.

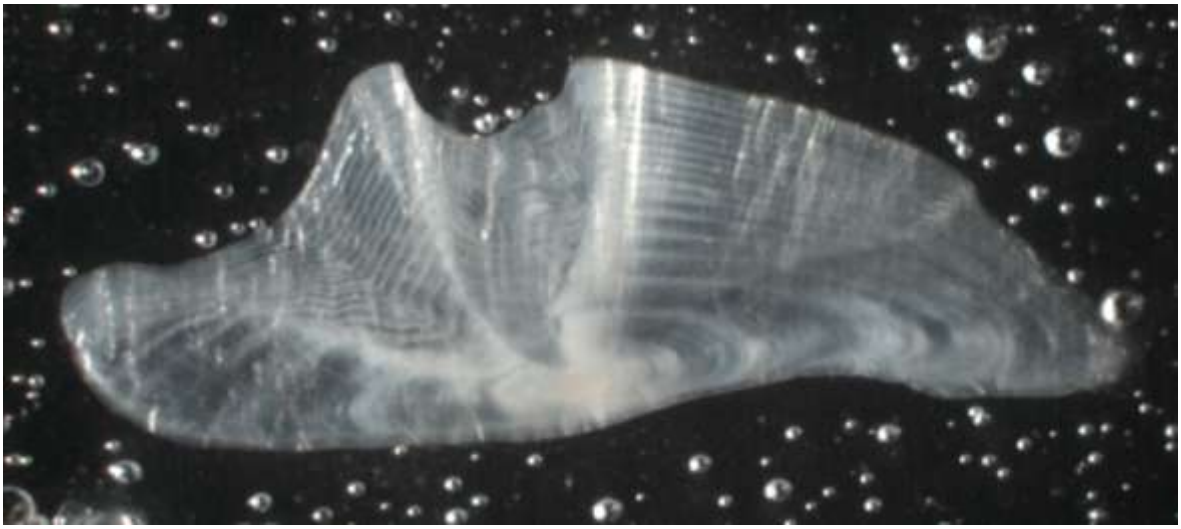

Figure 2. Largemouth bass otolith collected from C. Ben Ross Reservoir in August 2010 sectioned, magnified, and aged at 17 years old.

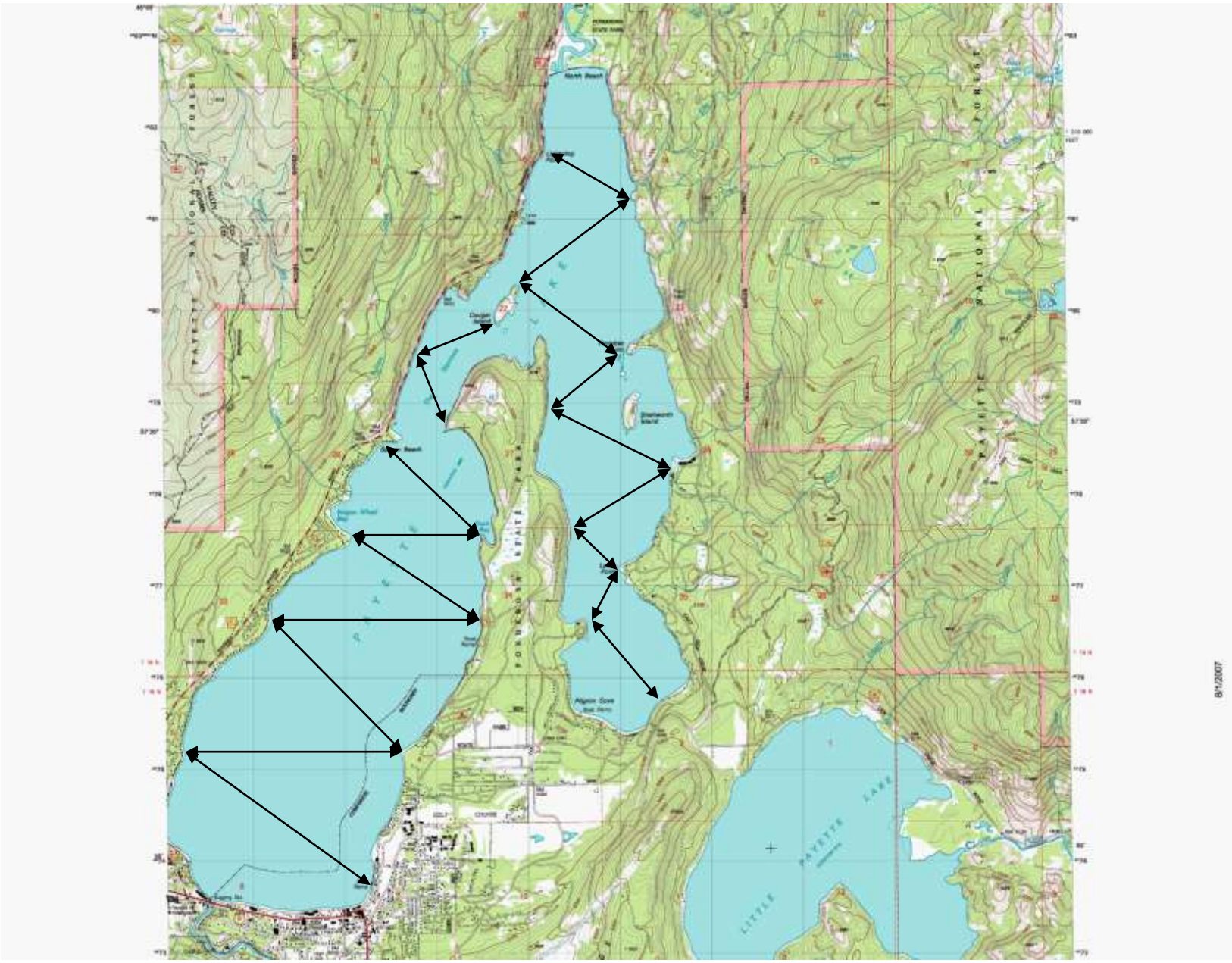

Figure 3. Hydroacoustic survey transects completed on Payette Lake on August 10, 2010.

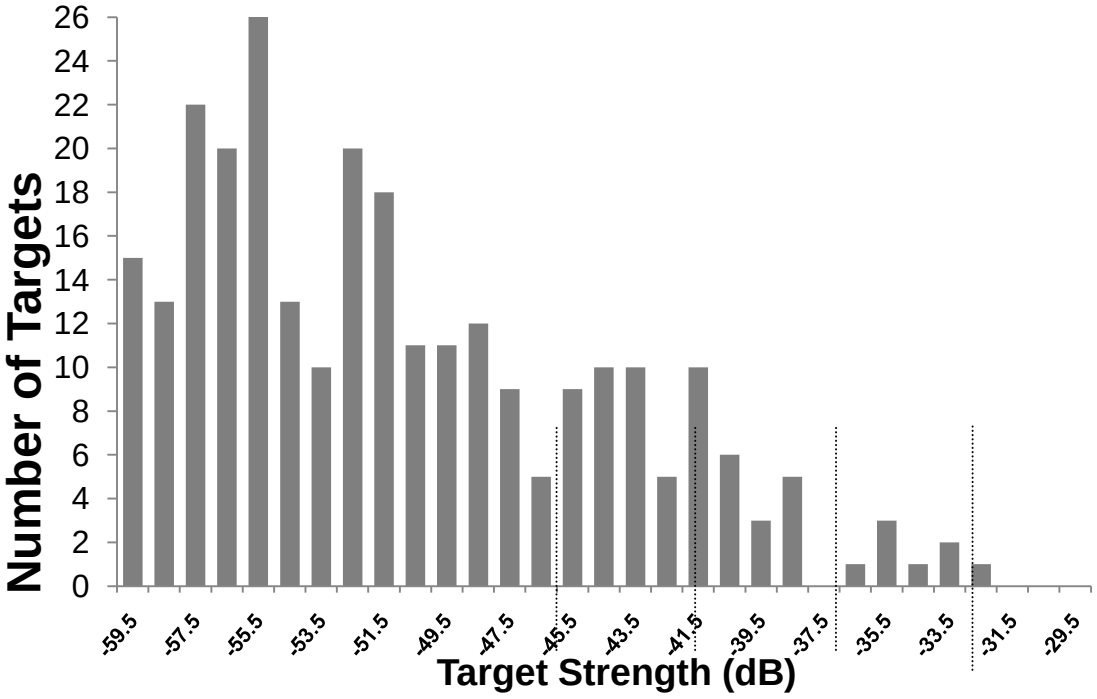

Figure 4. Frequency distribution of all fish target strengths recorded in hydroacoustic transects in the pelagic area of Payette Lake, August, 2010.

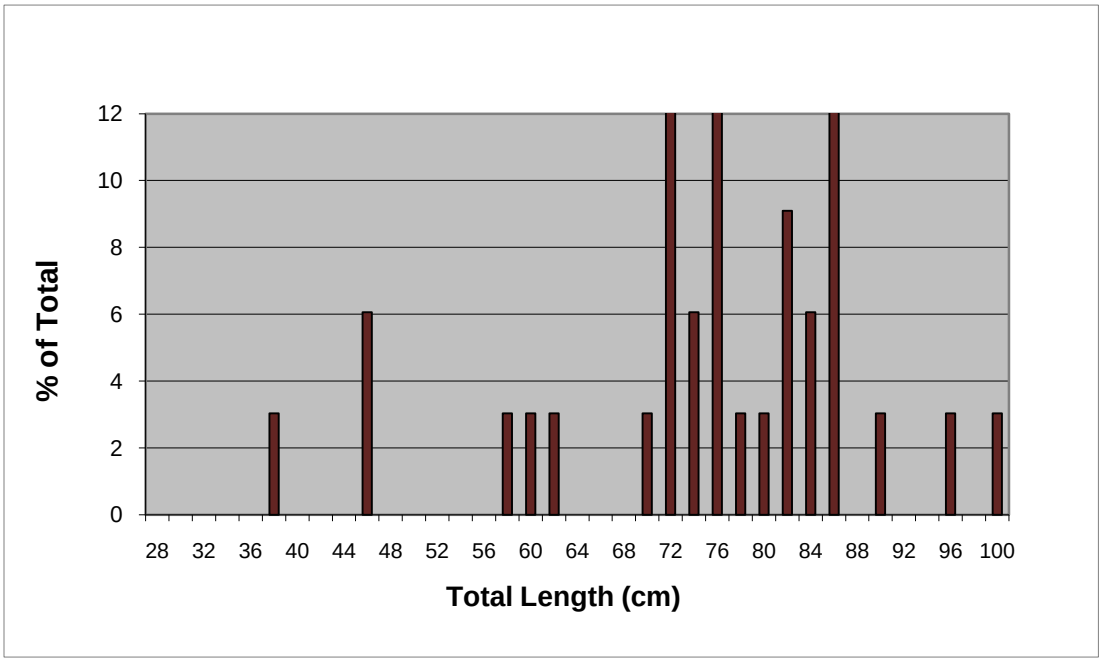

Figure 5. Lake trout length frequencies collected with gill nets from Payette Lake in July, 2010.

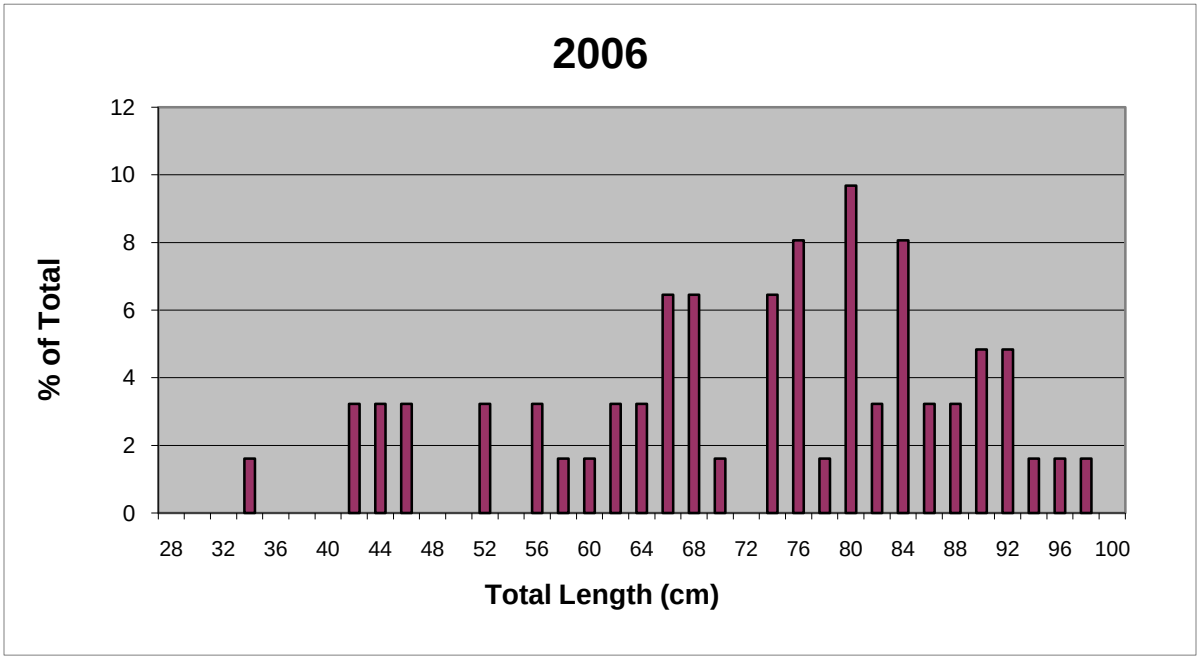

Figure 6. Length frequencies of Payette Lake lake trout collected with gill nets in summer 2006.

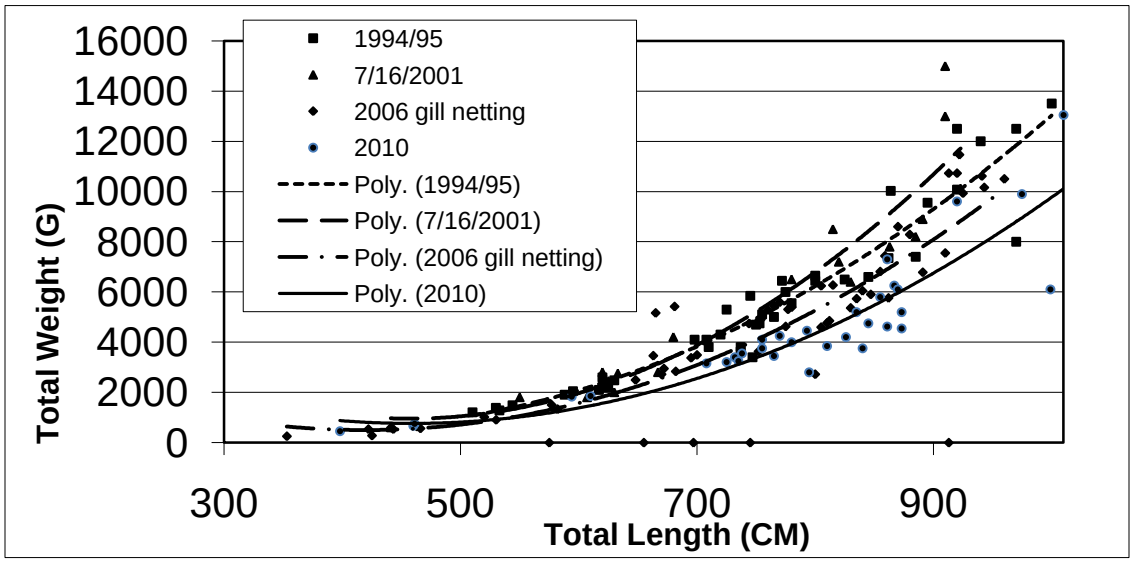

Figure 7. Relative weights of lake trout collected with gill nets in 1994/1995, 2001, 2006, and 2010.

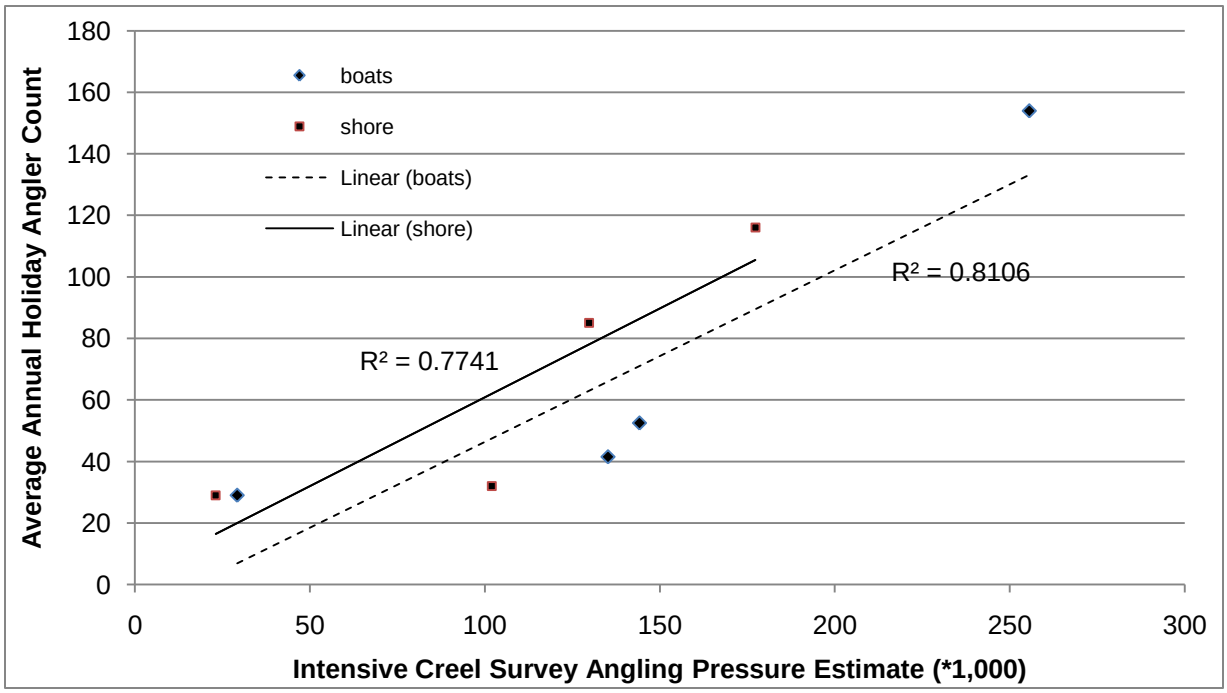

Figure 8. Lake Cascade average holiday (Memorial Day, July 4th, and Labor Day) angler counts versus creel survey angling pressure estimates for 1982, 1991, 1992, and 2009/2010.

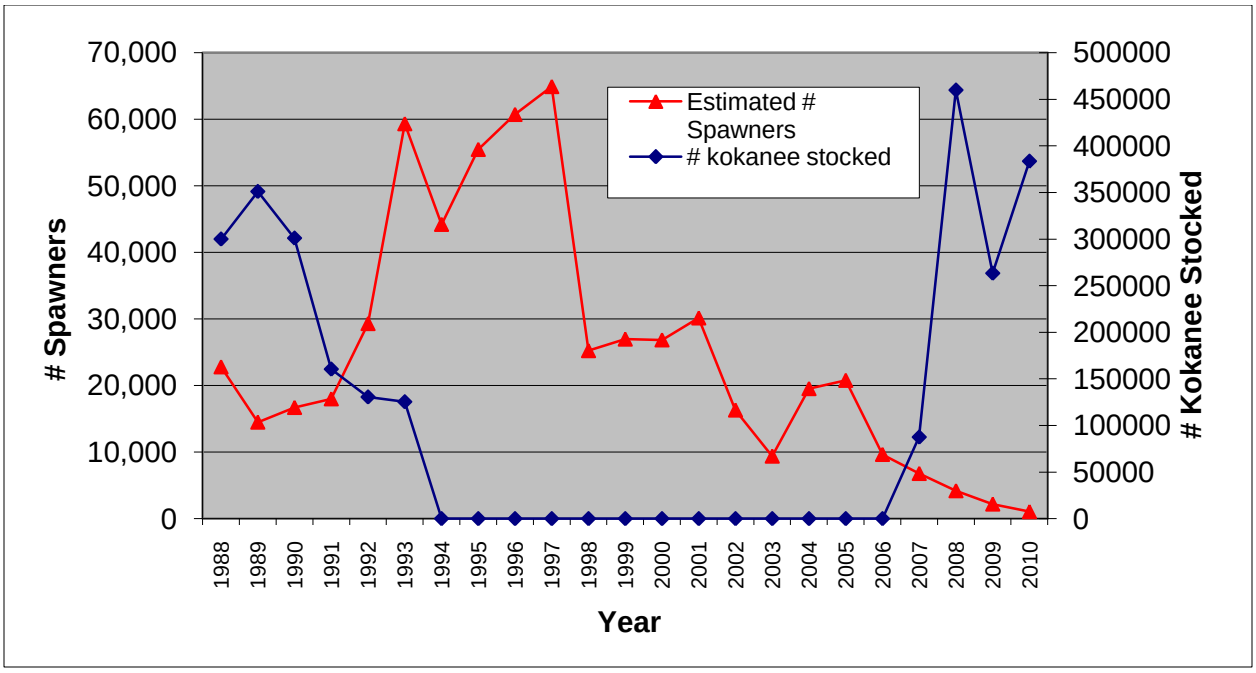

Figure 9. Number of kokanee stocked in Payette Lake vs. number of kokanee spawners in the North Fork Payette River since 1988.

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