FISHERY MANAGEMENT INVESTIGATIONS

IDAHO DEPARTMENT OF FISH AND GAME

FISHERY MANAGEMENT ANNUAL REPORT

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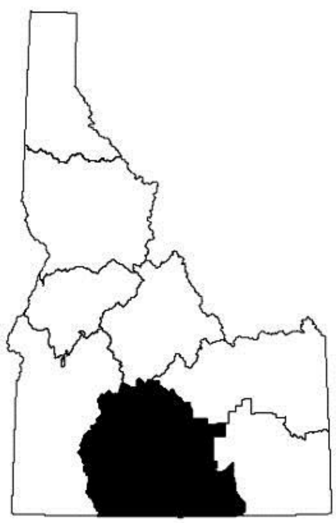

MAGIC VALLEY REGION

2008

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TABLE OF CONTENTS

Page

LAKES AND RESEVOIR INVESTIGATIONS

GENERAL METHODS

Lowland Lake Surveys

Lowland lake surveys are conducted using IDFG standardized protocols. One unit of effort under standard protocol consists of one trap-net night, one sinking gill-net night, one floating gill-net night and one hour of nighttime electrofishing. Minimum units required are determined by fishery surface area, where one sampling unit is required per hectare. Sample locations are typically randomly selected. All sampling effort geo-reference data are presented in Appendix A. A description of equipment used in lowland lake surveys is listed in Appendix B and species names and abbreviations are found in Appendix C.

Lowland lake surveys direct equal effort for collection of all fish species present. Fish sampled during lowland lake surveys are identified and measured to total length (mm), with a subsample weighed (g). Within the subsample, a minimum of 100 fish from each species are collected and should represent the observed range of fish sizes. Fish are recorded by species specific group counts when time is limited. In all cases, all sampled fish from each species collected should be measured from at least one unit of each gear type used. Data are summarized by species for length, weight, relative abundance, relative biomass, and catch per unit of effort. Population indices including proportional stock densities (PSD), relative stock densities, and relative weights (Wr) are calculated as described by Anderson and Newman (1996) when appropriate. Catch-by-age is determined loosely by analysis of length frequency or more definitively by otolith analysis from a representative collection of fish. When otoliths are sampled, five otoliths are taken from each available centimeter length group of a sampled species.

Water quality measures typically collected include: temperature, dissolved oxygen, specific and ambient conductivity, secchi depth, total alkalinity, and total hardness. Water quality measures are collected during day time hours. Zooplankton samples are collected from three locations distributed throughout the lake or reservoir. Zooplankton quality index (ZQI) is determined from collected samples as described by Teuscher (1999). ZQI is used to evaluate productivity in the given water body.

Bass Monitoring

Bass monitoring is conducted to monitor smallmouth and largemouth bass population trends among fisheries and over time within fisheries. Bass monitoring includes collection of data necessary for evaluation of relative population abundance, stock structure, fish condition, growth, and survival. Population trends in monitoring should be used to evaluate regulation scenarios and changes in angler exploitation or effort.

Fish are sampled using boat electrofishing equipment as described in the lake and reservoir general methods. Electrofishing samples consist of 15 minute units (power on) of effort beginning at randomly chosen sample sites throughout the reservoir. All sampling is conducted at night in the spring. Two netters are used and only the target species is sampled. Relative abundance is measured as average catch per unit effort. Sample size goals for electrofishing units are established based on the variance between units encountered during the sampling effort. A sample size estimator is incorporated into a PDA data recorder for infield use as described in the Field Data Collection section of this document. Bass monitoring is conducted in the spring with water temperatures between 12.8 °C and 18.3 °C.

All bass collected are measured (TL, mm) and weighed in grams (g). Growth is estimated from mean length-at-age using the von Bertalanffy growth function generated in FAST (Fisheries Analysis and Simulation Tools, Version 2.1).

Otoliths are collected from a representative sample to estimate length-at-age. Otoliths are prepared for age estimation by breaking centrally, burning or browning the broken edge with an alcohol burner, and viewing the broken edge with a dissecting microscope at 30X – 40X. Otoliths are coated with mineral oil to improve viewing clarity. Mean length-at-age is calculated from a representative sub-sample.

Stock structure and condition indices are generated in FAST (Fisheries Analysis and Simulation Tools, Version 2.1, Anderson and Neumann 1996). Proportional stock density (PSD) is calculated to represent the available size structure of the present populations. Relative weights are typically calculated in FAST and are summarized as the mean within a designated size group.

Mortality and survival are estimated to evaluate the effects of exploitation and other limiting factors. Annual mortality and survival are estimated using a catch curve (Van Den Avyle 1993). Catch curves are generated in FAST (Fisheries Analysis and Simulation Tools, Version 2.1).

Kokanee Monitoring

Trends in Anderson Ranch Reservoir kokanee abundance and size are monitored using nighttime trawling techniques described by Rieman (1992). Sample dates are selected on or around a new moon period prior to the spawn. Selected dates generally fall during late July and early August. Designated sampling strata follow historical protocol (Partridge and Warren 1995).

Trawling tows are completed using a 4.46 m^2 framed trawl net pulled at approximately 1.59 m/s. Net hauls are conducted in 180 second intervals per depth level fished. Net hauls are made at three meter depth strata generally encompassing the entire kokanee layer. Seven tows are completed within each reservoir section.

Kokanee sampled during trawl efforts are measured (TL mm) and weighed (g). Otoliths and/or scales are collected from representative centimeter groups (5 per group if possible). Ages are estimated from otoliths and/or scales. Otoliths should be viewed in whole and/or in half in the lab using a dissecting microscope under 10X – 40X magnification. Scales are placed between two glass slides and viewed with a microfiche reader.

Abundance, relative density, and standing crop are estimated by age group using an EXCEL spreadsheet developed by IDFG fisheries research personnel (Bill Harryman, IDFG, personal communication). Kokanee densities are calculated using strata area determined by measuring area within the current reservoir water elevation. Water elevation is taken from the States Department of Interior, Bureau of Reclamation website (www.usbr.gov). Area is estimated from rule curve standards generated from measured area within elevation contours. Population estimates taken from incomplete samples are expanded making the assumption of uniform distribution.

Standard Trout Monitoring

Reservoir trout monitoring is conducted in an effort to evaluate reservoir population trends and better understand population dynamics in relation to stocking strategies, habitat suitability, and associated angler catch rates. Trout monitoring is conducted in early spring with water temperatures less than 15.5 °C, when trout are distributed throughout the water body and are vulnerable to floating gill nets used to sample fish. Floating gill nets follow the specification of the standard lowland lake floating gill net. CPUE by species and/or by out-plant group are used to describe the fishery. Sample size goals for net nights are established based on the variance between units encountered during the sampling effort. A sample size estimator is incorporated into the PDA recording devise for infield use as described in the Field Data Collection section of this document.

Data collected are used to describe the relative proportion of the fishery each present hatchery out plant or natural component makes up. To describe the fishery and various out plants, lengths and weights are collected on all trout. By-catch is also recorded. All fish are evaluated for marks if marked fish are present, to identify individual out-plants.

Walleye Index Monitoring

Fall walleye index netting (FWIN) was initiated to monitor walleye population trends and better understand population dynamics. FWIN data will also be used in future regulation evaluations. Standard FWIN protocol described in the Manual of Instructions – Fall Walleye Index Netting (Morgan 2002) were used in sampling efforts (Appendix B). A biological threshold of 300 walleye was set prior to sampling. Sampling was discontinued when either sample size or biological threshold were met. Gillnets were eight panel monofilament nets 1.8 m deep, 61.0 m long, with 7.6 m panels measuring 25 mm, 38 mm, 51 mm, 64 mm, 76 mm, 102 mm, 127 mm, and 152 mm stretched mesh. Net locations were randomly selected and are listed in Appendix A. Sample locations. Net sets were equally split between two depth strata including 2-5 m and 5-15 m depths. All nets were placed perpendicular to the shoreline. Netting was conducted when water temperatures were between 15 °C and 10 °C.

All walleye collected were measured (TL, mm) and weighed (g). All by-catch species were measured, with a sub-sample weighed. Otoliths were collected from all walleye and prepared for age estimation by breaking centrally. Otolith evaluation was contracted to Ron Brooks, University of Illinois. Growth rates are evaluated by estimating mean length-at-age by sex. Changes in growth have been used to characterize exploitation in walleye fisheries (Gangl and Pereira 2003).

Mortality and survival were estimated to evaluate the effects and interaction of exploitation and natural limiting factors on the fishery. Walleye annual mortality and survival were estimated using a catch curve (Van Den Avyle 1993). Catch curves were generated in FAST (Fisheries Analysis and Simulation Tools, Version 2.1).

Condition indices were generated from collected walleye to describe the general health of the population. Visceral fat was removed and weighed to measure condition as a visceral fat index. The visceral fat index was calculated as the ratio of visceral fat weight to total body weight and described as a percentage. Gonads were removed and weighed to estimate a gonadal somatic index value for each fish. The gonadal somatic index value was calculated as ratio of gonad weight to body weight and described as a percentage. Relative weights were calculated and summarized by angler perspective stock size groups in FAST (Anderson and Neumann 1996).

All walleye were evaluated for sexual maturity (Duffy et al. 2000). Total length and age at 50% maturity was determined using logistic regression (Quinn and Deriso 1999). A female diversity index value was estimated, based on the Shannon diversity index, to describe the diversity of the age structure of mature females (Gangl and Pereira 2003). The female diversity index has been shown to be sensitive to exploitation and may provide indications of overexploitation (Gangl and Pereira 2003). Ovaries were collected from mature females for an estimation of fecundity. Fecundity estimates were generated for a sub-sample of eggs that were weighed and counted from each fish. Fecundity estimates will be used in future population modeling.

Benchmark classifications developed for Ontario walleye management (George Morgan, Laurentian University Sudbury, Ontario, personnel communication) were applied to Oakley reservoir data. Benchmarks were used to classify the relative condition of the walleye population. Classification parameters included: CPUE for walleye ≥ 450 mm, number of age classes present, maximum age, and female diversity index. Parameters represented measures of abundance, growth, age structure, and recruitment potential. Parameters were scored from one to three, three reflecting a healthy stable population. The average score among all parameters reflected the overall health of the population.

ANDERSON RANCH RESERVOIR

Abstract

Standard smallmouth bass monitoring was implemented at Anderson Ranch Reservoir. A total of 327 smallmouth bass were collected among all locations. Fish lengths in the catch ranged from 66-450 mm TL. The average smallmouth bass CPUE was 20 ± 5 (80% C.I.). Bass achieved 305 mm TL at age seven and averaged 280 mm TL by age five.

Kokanee abundance and density was estimated using trawl techniques. Total abundance of kokanee among all strata and age groups was estimated at 1,396,130 fish, representing a density of 895 fish/ha. Reservoir densities of age zero, one, two, and three kokanee were estimated at 751; 26; 98; and 20 fish/ha, respectively. The reservoir standing crop was estimated as 19.0 kg/ha.

Angler effort and catch was surveyed to evaluate future fishery impacts with respect to escapement control efforts. A roving-roving creel survey was conducted on Anderson Ranch Reservoir from May 24, through August 13, 2008. We estimated anglers put forth 40,413 hours of effort to catch 127,201 kokanee, 53,661 smallmouth bass, and 461 rainbow trout. Kokanee catch rates were estimated at about 3 fish/ hr which exceed management goals of 1 fish/hr.

Introduction

Anderson Ranch Reservoir is a Bureau of Reclamation (BOR) impoundment on the South Fork Boise River in Elmore, County. Maximum reservoir storage capacity is 60,833 hectares, of which 3,575 ha are considered dead storage (USGS 1996). Anglers fishing Anderson Ranch Reservoir target primarily kokanee, rainbow trout, smallmouth bass, and yellow perch. Bull trout and several non-game fish species are also present. Kokanee are managed for a consumptive fishery with a daily bag limit of 25 fish and a possession limit of 50 fish.

Anderson Ranch Reservoir kokanee abundance and escapement monitoring was continued in 2008 in an effort to identify management options for maintaining a quality fishery. Trawl estimates have been conducted annually since 1993. These data will be used for monitoring purposes and to predict high escapement years where escapement control measures could be implemented to reduce density dependent competition. Kokanee escapement efforts are described in the South Fork Boise River section of this report.

Anderson Ranch Reservoir has become an increasingly popular bass tournament fishery. The current status of the smallmouth bass fishery is unknown. Anglers have expressed concern regarding a perceived increase in angling pressure and the effects on the quality of the fishery.

In 2008, a smallmouth bass population monitoring program was continued on Anderson Ranch Reservoir. The 2008 survey was conducted as a follow up to a 2007 survey which was believed to be biased by survey timing and sampling locations. The 2008 smallmouth bass population monitoring survey incorporated an earlier survey time and a larger sample size to capture a more representative sample.

The overall objective of this sampling effort was to establish long term monitoring, and to describe the overall population health of the smallmouth bass fishery and address regulation proposals across all IDFG Region 4 bass fisheries. Information gathered from this survey and future surveys will be used to provide insight on smallmouth bass population dynamics in relation to increasing angling pressure by tournament/non-tournament anglers and influences of reservoir water level management, as it applies to associated population management.

Methods

Smallmouth Bass Monitoring

Electrofishing sampling followed standard bass population monitoring methods as described in the Standard Methods section. Sampling occurred at randomly chosen sites throughout the reservoir (Appendix A).

Kokanee Abundance

Trends in Anderson Ranch Reservoir kokanee abundance were monitored using nighttime trawling techniques described by Rieman (1992) and described in the general methods. Sampling strata followed historical protocol (Partridge and Warren 1995).

Angler Creel Survey

A roving-roving creel census was conducted from May 24 to August 13, 2008. The fishery was scheduled to be surveyed on two randomly selected weekdays and two weekend days in a 14-day period (n=28 creels). Day periods were not stratified and effort estimates were generated based on mean angler counts and average daylight hours during the creel period (average =12 hrs).

Two counts were conducted on each survey day and interviews were completed in between counts. Clerks counted boats and individual shoreline anglers and boat counts were expanded to angler counts using the average anglers per boat encountered during interviews. During angler interviews, anglers were asked to report their residency status, hours fished, catch, harvest, gear type, angling methods and whether their trip was completed.

Data were analyzed using techniques described in Pollock et al. 1994. Essentially, interview (effort, harvest, catch) and count data were converted to averages/day and applied to all days within the creel period. Harvest data were only compiled for kokanee, smallmouth bass, and rainbow trout since other fish species were rarely observed.

Results

Smallmouth Bass Monitoring

A total of 327 smallmouth bass were collected among all sample locations. The average CPUE was 20 ± 5 (80% C.I.)

Total length of sampled fish in the catch ranged from 66-450 mm TL (Figure 1). Average total length was 197 mm (SD 104) and mean weight was 163 g (SD 146) and ranged from 3-1,306 (g).

A subsample of 39 smallmouth bass was aged documenting five age classes. Observed average length at age-5 was 280 mm. (Figure 2).

Population and conditional indices suggest the Anderson Ranch Reservoir smallmouth bass population is dominated by stock and sub-stock fish of good relative condition. The Proportional Stock Density was 36 % (Table 1). Mean relative weights were 92 % for stock and 71 % for quality smallmouth bass, respectively.

Kokanee abundance

The Anderson Ranch Reservoir kokanee fishery was surveyed on July 28-30, 2008. The reservoir elevation on sample dates was approximately 1,275 m which is equivalent to approximately 363,290 acre ft. of stored water. Maximum water storage (i.e. full pool) occurs at 1,279 m.

We completed the prescribed sampling effort (21 transects) resulting in a catch of 1,033 kokanee. Kokanee catch per trawl averaged 43 ± 14 (95% CI) fish and ranged from 2-170 fish. Kokanee lengths ranged from 40-290 mm (Figures 3 and 4).

The total reservoir abundance of kokanee among all age groups was estimated at 1,396,130 fish, representing a density of 895 fish/ha. Reservoir densities of age zero, one, two, and three kokanee in 2008 were estimated at 751, 26, 98, and 20 fish/ha, respectively. The standing crop estimate for 2008 was 19 kg/ha. (Table 2).

A non-random subsample of kokanee was collected and aged (n=181). Otoliths were collected from at least ten fish within each 1 cm length group for kokanee > 100 mm. Kokanee less than 100 mm were assigned to the Young-of-year age class and all others were aged from otoliths. The average length-at-age within the subsample was 200 ±8 (95% CI), 244 ±11, and 265 ±12 for age 1, 2, and 3 kokanee, respectively.

Angler Creel Survey

Two hundred and twenty three anglers were interviewed during the census period. The majority of those anglers contacted had not completed their fishing trip (complete=30, incomplete=193). The average fishing trip for surveyed anglers who completed their trip was 3.7 ± 4.1 hrs (95% CI). Based on interview data, the average number of anglers per boat was 2.1 + 1.6 anglers (95% CI). The majority of anglers contacted were trolling (89%) followed by shore anglers (6%) and still-boat anglers (5%).

We estimated anglers applied 40,977 hrs of angling effort during the creel census period (Table 3). Near equal total angler effort was estimated for both weekday (20,090 hrs) and weekend (20,887 hrs) periods despite unequal availability (82 weekdays; 34 weekend days).

Anglers caught an estimated 181,323 fish throughout the creel period. More specifically, anglers caught approximately 127,201 kokanee, 53,661 smallmouth bass, and 461 rainbow trout (Table 4). Species specific catch rates were determined from the proportion of the estimated species catch and estimated total effort. Catch rates were 0.01, 1.33, and 3.15 fish/hr for rainbow trout, smallmouth bass, and kokanee, respectively. Yellow perch were caught infrequently and were not included in the analysis.

Discussion

Smallmouth Bass Monitoring

Observed length at age-5 in 2008 (280 mm) was less than most past estimates which have fluctuated over time. Length at age-5 increased in 2008 as compared to 2007 but is still below the statewide average (300 mm) reported by Dillon (1992). Past observed length at age-5 was 298, 365, 263 and 269 mm in 1985, 1991, 2001 and 2007 (Dillon 1992; Warren et al. 2001; Ryan et al. 2008).

The smallmouth PSD has increased when compared to past estimates. The PSD was calculated at 36 % in 2008 whereas the PSD has been reported at 18% in both 1997 and 2007. This apparent doubling of the PSD may reflect changes in habitat more suitable for bass growth or simply reflect a strong recruitment year. However, no habitat assessment has been conducted to substantiate this theory.

Smallmouth bass CPUE decreased in 2008 as compared to 2007. Given there are only two comparable estimates available, it is uncertain what this decrease means. One explanation would be the differences were efficiency and sampling period related. The sampling period was chosen to intercept bass frequenting the shallow water (spawn ground) during the later portion of the smallmouth bass spawning window. It's possible we sampled before fish moved into shallower water and the larger bass could not be efficiently sampled. Additionally, many bass spawn offshore in the flats near Curlew boat ramp making them difficult to sample. Support of efficiency bias would include the fact that relatively few preferred and trophy-sized bass were caught which did not correlate well with bass lengths reported by tournament participants.

Future sampling efforts should occur later and be validated by water temperatures. Potential biases within the sampled population may reflect the timing and/or sample locations used in the survey. The timing of sample efforts was designed to encounter as many size classes as possible during the spawning period. It is recommended that smallmouth bass monitoring be repeated in three years to better describe the current status of the smallmouth bass fishery and address potential sampling biases.

Kokanee Abundance

The 2008 density estimates are among the highest reported since 1993 (Table 5). This high density kokanee fishery will likely result in angling experiences in 2009 outside those described in the 2007-2012 Fisheries Management Plan (IDFG 2007). Management direction is to provide a kokanee fishery with catch rates of one kokanee an hour with mean lengths of 305-356 mm. We expect fish size in the creel to fall below the preferred 12 inch TL.

It appears there was substantial mortality between 2007 and 2008 when cohort abundance + 1 year are compared; however overall densities remained well above the 15-year average (490 kokanee/ha).

The boom and bust kokanee abundance cycles found in Anderson Ranch Reservoir are driven in large part by factors outside Department control such as variable reservoir storage levels, spawning habitat conditions, and winter survival of deposited eggs. However, the Department can use supplementation, controlled harvest, and prescribed escapement to impact kokanee abundance

Reservoir abundance estimates have been made annually since 1993; however, no correlations have been established between SFBR kokanee escapement and reservoir recruitment and overall abundance. Ideally, SFBR kokanee escapement can be moderated in high potential recruitment years to mitigate overabundance. The Department can operate a complete migration barrier weir to monitor and/or control kokanee escapement on the SFBR. To accomplish this goal, a correlation should be established between escapement and year-class strength in Anderson Ranch Reservoir to estimate the optimal escapement levels. The Department could accomplish this objective by annually monitoring SFBR kokanee escapement with the weir and correlating those results with reservoir year-class strength. Management goals for escapement could be roughly modeled based on that correlation.

Angler Creel Survey

The total angler effort estimate from this study was considerably lower than those reported from past creel surveys on Anderson Ranch Reservoir. The estimated effort in 2008 (~41K hrs) is nearly half the effort documented in 1985 (~79K hrs) and 1997 (~80K hrs). This decreased effort estimate may be partially explained by dissimilar creel designs (overall survey period). All three creels started approximately the same time (mid to late May); however, the

2008 creel ended earlier than the previous two efforts. We would expect a slight decrease in estimated effort, but kokanee angling effort typically declines in September and the lack of late season effort data in the 2008 creel would not fully account for a two-fold difference. A decrease in effort might also be explained by fish size or poor reservoir conditions (i.e. low pool); however, age-2 kokanee were relatively small in both years and averaged about 260 mm in 1997 and 235 mm in 2008 and reservoir levels were normal in 2008.

The estimated kokanee catch was substantially higher from those estimated in past creel surveys. In 2008, we estimated anglers caught approximately 181,000 fish of which about 127,000 were kokanee. This catch estimate represents a 3-4 fold increase from those reported in 1985 (34,000) and 1997 (29,000).

Estimated angler effort and catch in 1997 and 2008 don't closely reflect those predicted based on kokanee density. Rieman and Maiolie (1995) described the relation between kokanee densities (catchable-sized kokanee / ha) and angler effort and angler catch. Essentially, Rieman and Maiolie (1995) presented a model that demonstrated angler effort and catch rates can be predicted using kokanee density. In the model, they demonstrated effort and catch rates increases until reservoir densities reached 50 kokanee/ha and then began to decline. Based on his model, we would expect both effort and catch rates in 1997 with lower densities (4 kokanee/ha of age-2) to be substantially lower than those of 2008 with higher densities (118 kokanee/ha of age 2-3). However, estimated angling effort decreased in 2008 at higher densities and estimated catch was poorly predicted in both years (Table 6). In both years, kokanee catch was 2-3 times that of those predicted. Rieman and Maiolie (1995) indicated the relation between catch rates, angler effort, and kokanee densities would vary and depend upon unique reservoir characteristics. We suggest Anderson Ranch Reservoir's is likely more productive than some kokanee fisheries and could drive the optimal kokanee density higher than the recommended 50 kokanee / ha.

Rainbow trout catch and harvest rates demonstrate an apparent poor return on stocked hatchery rainbow trout. Approximately 15,000 rainbow trout are stocked into Anderson Ranch Reservoir annually. Only an estimated 461 rainbow trout were caught during the creel period which represents a gross return rate of approximately three percent. This return rate does not likely represent the total rainbow trout catch given the short survey period (< 3 months) and the fact the survey did not cover early spring and late fall angling efforts. However, the return rate does represent the catch during the season when most angling occurs on the fishery since angling pressure is greatest from early April to late July when large kokanee still reside in the fishery prior to the fall spawn. No solid conclusions can be made; however, it appears as though the existing trout stocking program is inefficient. Exploitation estimates would provide more information to help evaluate the current stocking efficiency.

The angler catch composition differed from a previous creel survey. In 2008, the estimated yellow perch catch and harvest rates were low, whereas Warren et al. (1997) reported an estimated yellow perch harvest of 20,000 from May 12 to September 28, 1997. In 1997, the combined harvest of yellow perch and kokanee made up 90% of the total harvest. The 2008 survey documented incidental yellow perch catch rates (i.e. very low harvest) and an increased harvest of smallmouth bass (1997=312; 2008=4,638). Smallmouth bass catch rates increased similarly with rates estimated at 0.07 and 1.3 bass/hr in 1997 and 2008, respectively. If the inverse relation between smallmouth bass and yellow perch catch rates reflects population shifts, then there might be circumstantial evidence the smallmouth bass are expanding and may be impacting the perch population.

Caution should be applied when directly comparing the smallmouth bass catch rates between years as Warren et al. (1997) indicated the smallmouth bass catch rates in the 1997 estimate were derived only from anglers that were targeting that species. Additionally, the 2008 creel estimates were based on relatively few interviews where anglers had completed their fishing trips (~13% completed trips) which may result in overestimates of effort, catch and harvest (Pollock et al. 1994).

Management Recommendations

1. Estimate kokanee escapement on the SFBR at the Pine weir.
2. Use past data to determine optimal kokanee escapement based on fecundity, deposition estimates, and egg-to-fry (or age-1) survival estimates.
3. Modify smallmouth bass sampling to better accommodate fishery-specific spawning periods. Reevaluate length-at-age and catch-curve mortality estimates using a more comprehensive sample.

LOWER SALMON FALLS RESERVOIR

Abstract

Largemouth bass monitoring was initiated at Lower Salmon Falls Reservoir (Bell Rapids) in 2008. A total of 92 largemouth bass (n= 92) were collected from 12 units of standard bass monitoring effort at randomly selected sites around the fishery. Abundance indices (CPUE) were estimated at 7 $\pm$ 2 bass / sample unit.

Introduction

Lower Salmon Falls Reservoir (Bell Rapids) was created by the construction of Lower Salmon Falls Dam on the Snake River upstream from Bliss in 1907, at the site of a natural falls. A new dam, constructed at the site in 1949, increased the reservoir volume impounding water upstream for a distance of 11 km. The reservoir has a surface area of approximately 340 hectares and a maximum depth of about 12 m. While dominated by non-game species such as carp and suckers, the reservoir supports a fishery for largemouth bass, smallmouth bass, and stocked rainbow trout. Since 1996, Lower Salmon Falls Reservoir has been managed for quality bass with seasonal catch-and-release from January 1 to June 30 and a 2-fish, none between 305-406 mm rule from July 1 to December 31.

In 2008, a bass population monitoring program was initiated on Bell Rapids. Information gathered from this survey and future surveys will be used to provide insight on bass population dynamics, as related to increasing angling pressure by tournament/non-tournament anglers, in addition to evaluating the utility of existing restrictive angling regulations. The overall objective of this sampling effort was to establish long term monitoring, and to describe the overall population health of the largemouth bass fishery and address regulation proposals across all IDFG Magic Valley Region fisheries.

Methods

See General Methods

Electrofishing samples followed standard bass population monitoring methods at randomly chosen sample sites throughout the reservoir (Appendix A). Twelve units of sampling were conducted, on May 19-20, 2008.

Results

The largemouth bass monitoring of Lower Salmon Falls Reservoir (Bell Rapids) was completed on May 19-20, 2008. A total of 92 largemouth bass were collected with 12 effort units resulting in a mean CPUE of 7 $\pm$ 2 (80% C.I.).

Bass lengths averaged 276 mm TL (SD 190) and ranged from 125 - 349 mm. Mean weight was 294 g (SD 186) and ranged from 4 - 1,198 (g). Bass PSD was 33.

A subsample of largemouth bass were aged (n=75) and nine age classes were documented. The average length-at-age 5 was 301 mm (Figure 5; Table 1). Theoretical maximum age, as determined by catch curve regression, was estimated at 9 years and total annual mortality was estimated at 30% (FAST software). Regression models were supported by raw age data in that only one fish collected in the sample was determined to be age-10 (Figure 6).

Discussion

Observed length at age-5 in 2008 was comparable to Ryan et al. 2005 where estimated mean length at age-5 was 286 mm representing a minor increase. In itself, this slight difference may be explained by sampling variation and does not suggest a major population shift; however, based on CPUE it does appear as though densities may be decreasing.

The mean CPUE in 2008 (7 bass/hr) represents an approximate 42% decrease compared to previous estimates. Largemouth bass abundance indices (mean CPUE) in 2008 decreased from those determined in past monitoring efforts where average catch rates were 12 and 11 bass in 2005 and 2007, respectively (Ryan et al. 2005, Ryan et al. 2007). Despite the lack of statistical significance, this downward shift reinforced the downward trend of CPUE reported in Ryan et al. 2005.

The largemouth bass size structure also differed from the previous survey in 2005. In 2008, bass PSD was determined to be 33 whereas the PSD was 59 in 2005. The recorded shift in PSD represents about a 50% reduction. In 2008, 89% of the sample population was less than 305 mm and all of the sample population was less than 406 mm. Age estimates show largemouth bass reach 305 mm by age-5.

Evaluation of the current size structure of largemouth bass, under slot-limit restrictions in Lower Salmon Falls Reservoir suggested current regulations may not be biologically appropriate. Slot-limit length restrictions are typically recommended in populations with high recruitment and slow growth (Anderson 1996). Dillon (1992) suggested Idaho bass populations are limited by inconsistent recruitment related to regional weather patterns and water level management. Therefore, slot-limit length restrictions would not be suitable for most Idaho largemouth bass populations. Relative abundance of largemouth bass, by designated size groups in the catch indicated age-2 and age-3 fish made up 64% of the sample.

Anderson (1996) stated that the proper function of length slot-limits was to increase numbers of size protected fish, promote growth of smaller fish by reducing interspecific competition through angler harvest, and increase production of trophy fish. However, in the 2008 sample, the length distributions of the catch did not reflect this size structure (Figure 7). The relative percentage of size protected fish was generally high, but was not considered to be proportionally greater than the percentage of fish below the slot-limit. Slot-limit length restrictions in this system appear to function more as a 406 mm (16 inch) minimum length limit in a population where relatively few bass can achieve lengths greater than 406 mm (i.e. catch-and-release)(Figure 7).

Exploitation of largemouth bass in this system is believed to be minimal. Ongoing research designed to estimate exploitation of largemouth bass in this system will help to better define the current level. Low exploitation levels may generally limit the need and/or utility of length restrictions in this system. To date, no angler comments have been received that express discontent regarding current Lower Salmon Falls Reservoir largemouth bass regulations and/or size structure. It is recommended that population trends and angler satisfaction be monitored periodically to identify any changes over time. Due to the ineffectiveness of the current regulation and limited exploitation, changes may be warranted and acceptable provided a desire for increasing angler satisfaction and/or rules simplification exists.

Potential biases in the 2008 sampling effort could be that we sampled the fishery pre spawn and the catch was low due to the bass still in deep water and the fish were not recruited to the electrofishing gear. Angler catch information is also limited for Bell Rapids.

Management Recommendations

1. Re-implement monitoring in a few years
2. Evaluate angler use and exploitation on the bass fishery

MAGIC RESERVOIR

Abstract

The yellow perch population was surveyed in the early winter months to evaluate relative abundance and size structure. Three standard six panel experimental gill nets (sinking) were set overnight on Magic Reservoir on November 12 and December 3, 2008. The combined two night effort yielded 29 yellow perch. Brown trout redds were counted in the Big Wood River upstream of Magic Reservoir. We documented 201 redds which is higher than the historical average.

Introduction

Magic Reservoir is located approximately 48 km north of Shoshone, Idaho, within the Big Wood River drainage. The earthen dam was first constructed in 1909 and enhanced in 1917 to a maximum height of 34.4 m. Reservoir management includes irrigation, downstream flood control, hydroelectric power production, and recreation. The reservoir is approximately 1,529 ha when full, with a maximum storage of approximately 24 ha km. The reservoir is subject to extreme drawdown associated with irrigation needs. During high water years, water is passed over a spillway into the lower Big Wood River drainage.

The reservoir provides a year-round fishery for rainbow trout, brown trout, yellow perch, and smallmouth bass. A rainbow trout fishery is maintained by hatchery supplementation. Brown trout and rainbow trout natural recruitment occurs on a limited basis in the Big Wood River above the reservoir. Brown trout redd counts have been completed in the Big Wood River between Magic Reservoir and Bellevue, Idaho, annually since 1986. Counts are used to monitor trends in brown trout recruitment, and spawner abundance in this system.

The yellow perch winter fishery has not performed well in the recent past. The objective of this sampling effort was to establish an index to monitor yellow perch populations and to forecast the ice fishing conditions. The objective to the brown trout red sampling effort is to maintain an index to the brown trout productivity within Magic Reservoir.

Methods

Yellow Perch

The yellow perch population was surveyed in the early winter months to evaluate relative abundance and size structure. Three standard six panel experimental gill nets (sinking) were set overnight on Magic Reservoir on November 12 and December 3, 2008. Only the smaller sized mesh (19, 25, 32, 38 mm bar mesh) was fished and the two largest panels were stuffed in a bag to minimize by-catch. Fish were measured (TL mm) and otoliths were collected for age identification.

Brown Trout Redd Surveys

Brown trout redds were counted on November 15 from Sheep Bridge to a point north of Stanton Crossing on the Big Wood River above Magic Reservoir (Table 7). Redds were visually identified and counted. The 2008 redds were counted only if there was a clean depression in suitable gravel/cobble substrate with an associated pillow of substrate behind the depression. In cases where multiple redds were clustered, each discernible depression was typically considered one redd.

Results

Yellow Perch

The cumulative catch was made up of yellow perch (n=29), rainbow trout (n=61), brown trout (n=2), smallmouth bass (n=1), and bridge lip suckers (n=103).

The mean yellow perch length in the catch was 180 mm TL (SD=29) and fish sizes ranged from 121-265 mm TL. Despite the poor sample size, we could predict anglers should expect low catch rates of relatively small yellow perch (180 mm, 7 in).

Brown trout redd survey

A combined total of 201 brown trout redds were observed among the three reaches surveyed up-stream of Magic Reservoir (Table 7).

Discussion

Yellow Perch

The perch sampling effort was biased and inefficient. High winds dislodged some of the gill nets reducing their catch efficiency. Additionally, cold water temperatures may have minimized perch movements reducing their vulnerability to the gill nets. Despite these biases, we assumed the size diversity in the catch was representative of the size diversity at large in the fishery. The effort as a whole would not likely serve well to compare catch-per-unit-effort among years. We would recommend sampling the perch fishery earlier in the year to take advantage of warmer water temperatures (i.e. greater fish movement).

Brown trout redd survey

Brown trout redd counts increased in 2008 as compared to 2007, where only 100 redds were counted. This suggests increased recruitment to the brown trout fishery in both the lower Big Wood River and Magic Reservoir.

Management Recommendation

1. Refine yellow perch sampling methods: evaluate different gear types to survey the perch fishery, conduct the perch survey in August or September

OAKLEY RESERVOIR

Abstract

Walleye and walleye forage was surveyed on Oakley Reservoir in 2008. Data indicates adequate forage is available and walleye abundance and condition indices are showing a stable to positive trend in Oakley Reservoir. The mean CPUE was 37 walleye/net and ranged from 10 to 88 walleye and the overall benchmark FWIN rank was 2.5 indicating the walleye population was relatively stable and healthy. Raw (uncorrected) angler exploitation rates were estimated at 14%.

Introduction

Oakley Reservoir is a 548 hectare irrigation impoundment located in the lower reaches of the Goose Creek and Trapper Creek drainages. The fishery is managed for rainbow trout and walleye. Other species present include yellow perch, mottled sculpin, Utah sucker and spottail shiner. Spottail shiners were introduced in 1989 to provide additional walleye forage.

Standardized forage monitoring is conducted annually since 2005 in Oakley Reservoir to monitor walleye forage availability. Trends in forage availability are used to project related annual walleye population success. Forage abundance monitoring was continued in 2008.

The overall objective to this sampling effort was to evaluate the existing walleye population and the reservoir productivity with respect to walleye growth, abundance, forage availability, and harvest. Fall walleye index netting (FWIN) was implemented to implement a standardized fishery ranking and to allow between fisheries comparisons.

Methods

Walleye Index Netting

Fall walleye index netting was initiated from October 14-16, 2008. See general methods.

Forage Monitoring

A forage monitoring survey was conducted at Oakley Reservoir on August 21, 2008, following standardized protocol. Protocol consisted of 10 minutes of electrofishing (power on) at 10 standard locations. Sample location coordinates are listed in Appendix A. Forage fish were designated as fish ≤ 150 mm. Resulting data were used to follow trends in CPUE of forage species. Results from 2008 were compared to results from 2004 to 2007.

Walleye Exploitation

Walleye exploitation estimates were generated by capturing, tagging, and releasing walleye in the fishery and documenting angler catch of tagged fish (Butts et al. 2007). Walleye were captured using trap nets during the spawning period when they walleye were known to concentrate in the shallow water area. Ten trap nets were deployed overnight (n= 23 net nights) intermittently from April 7 to May 16, 2008. Walleye over 300 mm TL were Floy-tagged and released.

Corrected (adjusted) walleye exploitation and angler reporting rates will be reported in a resident research report in 2010. This effort was part of a three year study to determine fish tag reporting rates to aid the Department in estimating fish exploitation around the state.

Results

Walleye Index Netting

Fall walleye index netting (FWIN) was completed on October 15-16, 2008. A total of ten net-nights were implemented. This effort yielded a catch of 320 walleye. By-catch species collected included: largescale sucker, rainbow trout, yellow perch, and spottail shiner. The mean CPUE was 37 walleye / net and ranged from 10-88 walleye. The overall FWIN ranking was 2.50 on a scale of 1-3 with 3 being optimal (Table 8).

Proportional stock density (PSD; Anderson and Newman 1996) of the sampled population was 13.7 %. Stock density of the catch was 13.7, 3.9, 3.5, and 1.2 % for PSD, RSD-P, RSD-M, and RSD-T, respectively. Mean relative weights for each size class of walleye were 88, 82, 87, 90 78, and 99 % for substock, stock, quality, preferred, memorable, and trophy sized walleye. Female walleye represented 43% of the catch, and male walleye made up 57% of the total catch. Thirteen age classes were present in the sampled walleye and ages ranged from 0 to 17 (Figure 8). Mean total length of sampled walleye was 306 mm (SD 288). Total length ranged from 143-810 mm (Figure 9). Mean weight of sampled walleye was 345 g (SD 306).

Walleye annual mortality for combined sexes based on catch curve analysis was 26% (Figure 10). Both are slightly lower when compared to data collected in 2007, where annual mortality for combined sexes based on catch curve analysis was 29%.

Walleye growth varied by gender. Female growth, length-at-age was greater than male growth, when viewed over all age classes. Mean length at age-2 was 276 mm for males and 287 mm for females, respectively. Females made up most of the largest fish in the catch.

Sampled walleye were in good condition. Mean relative weight of preferred stock walleye was 90%. Walleye had a mean gonadal somatic index of 3 % for males and 45% for females. Mean visceral fat indices were 3% for male and 49% for female walleye.

Forage Monitoring

Nine standard forage sampling units were completed on August 21, 2008. Forage fish species sampled included: spottail shiner, walleye, yellow perch, mottled sculpin, and suckers (Table 9). Forage abundance continues to be highly variable (Ryan et al. 2004-in review; Ryan et al. 2005-in review; Ryan and Megargle 2006). Spottail shiner, YOY walleye, and yellow perch were the most abundant forage surveyed.

Walleye Exploitation

A total of 72 fish were tagged in Oakley Reservoir in 2008. Records indicate anglers caught 11 of those fish and released 1 for a total harvest of 10 fish (an uncorrected exploitation rate of 14%). Further details will be available in IDFG resident research 2008 report.

<u>Discussion</u>

Walleye Index Netting

FWIN survey results indicated walleye were abundant in Oakley Reservoir. FWIN survey results showed CPUE was, on average, 37 walleye per net. Observed catch rates in 2008 are comparable to catch rates observed in 2007 increasing slightly, where catch per unit effort was 26 walleye per net in 2007. Condition indices indicated walleye were healthy. Relative weight values showed average to above average weight for any given length. Relative weights increased with fish length, suggesting forage availability for larger fish may be greater.

Visceral fat content of walleye from all size classes was observed to be good. Benchmark classifications also identified for the Oakley Reservoir walleye population as healthy and stable.

Proportional stock density indicated a relative small proportion of the population is quality size or greater. Observed length and age frequencies demonstrated the population is dominated by age classes one to four. The observed PSD potentially reflects both inconsistent recruitment and survival. Annual mortality estimates suggest mortality is low. However, severe reservoir drawdowns, believed to increase mortality, are known to have occurred in the last 10 years, particularly in the summers of 2004-2006. Walleye populations in Oakley reservoir appear to be good with multiple age classes present; however there appears to be an unexplained missing age cohort in the population. Both the 2007 and 2008 sampling effort showed a week cohort in the 200-300 mm age class. This needs to be further evaluated through future FWIN sampling efforts.

Forage Monitoring

Forage availability has been suggested to be negatively correlated to walleye angler catch rates (VanDeValk et al. 2005). Forage monitoring indicated forage levels were up in 2005 and 2006. Results from the 2007 forage survey indicated a subsequent reduction in forage availability (Ryan and Megargle 2007). Information regarding angler catch rates has not been collected.

Forage monitoring results suggested forage was not overly abundant in 2008. The high variability among years makes conclusive statements regarding forage availability difficult. Despite indications that walleye forage may be relatively limited in 2008, walleye condition (described under FWIN section) was determined to be relatively good which suggests the current forage monitoring efforts may not be indicative of actual forage availability. Reasons for this lack of correlation may include variable sampling efficiencies do to variable impoundment water levels and/or the possibility the electrofishing technique is not sampling a critical forage item (e.g. crawfish).

We would recommend reevaluating the existing forage monitoring program to determine if there are better alternative techniques or consider eliminating the monitoring program altogether if the effort is not useful. The relationship between walleye catch rates, forage abundance, and walleye abundance should be evaluated to provide guidance in further walleye management and regulation setting activities.

Walleye Exploitation

Raw return rates indicate walleye are being harvested at a sustainable rate. Pending a formal walleye tag return correction (adjusted return), the Department has used dove band correction which essentially doubles the returns to approximate true harvest. Accordingly, we might assume the 14% returns rate would be adjusted to about 28 % which is not regarded to be an excessive harvest rate on a “stable and healthy” walleye population.

Understanding exploitation is important for determining the effects of harvest regulations on walleye population structure. It is recommended that further exploitation studies be conducted to better understand the impact of current fishing regulations. Exploitation sampling should be continued in 2009 to replicate the estimate with a larger sample size. Capture efficiency was poor using trap nets in the low storage water year and sample size may be increased using electrofishing capture techniques.

Management Recommendations

1. Continue FWIN surveys - annual data will provide a better understanding of the role of exploitation, angling regulations, and forage abundance in Oakley Reservoir walleye management.
2. Reevaluate the current forage monitoring program and either modify the program or eliminate it.
3. Replicate walleye exploitation and abundance estimates.
4. Use available trend data, following three years of sampling, to evaluate current and potential regulation scenarios and their effectiveness at providing angling opportunities.

SALMON FALLS CREEK RESERVOIR

Abstract

Walleye, and walleye forage monitoring, along with trout monitoring and standard bass monitoring, was conducted on Salmon Falls Creek Reservoir in 2008. Data indicates adequate forage continues to exist in Salmon Falls Creek Reservoir. A total of 287 walleye were collected. A total of 962 smallmouth bass were collected among all sample locations. Average CPUE was 68 ± 15 (80% C.I.) smallmouth bass. A total of 536 trout were caught resulting in mean CPUE of 25.00, 0.08, and 2.17 rainbow trout, brown trout and cutthroat X rainbow trout hybrids.

Introduction

Salmon Falls Creek Reservoir (SFCR) is a 1,376 hectare irrigation impoundment located on Salmon Falls Creek in Twin Falls County, ID. SFCR is unique to the Magic Valley Region in that during construction a large inactive storage capacity was created, inadvertently creating productive fish habitat even in low water years. SFCR is managed as a mixed species fishery for rainbow trout, walleye, kokanee, yellow perch, smallmouth bass, and black crappie. SFCR is one of only three waters in Idaho managed for a walleye fishery.

A standard reservoir trout survey was conducted on SFCR in April 2008 to identify relationships between rainbow trout stocking strategies and available abundance in the reservoir. The survey was also used to evaluate the persistence of stocked Yellowstone cutthroat trout x rainbow trout hybrids in stocked in 2006 and 2007. Walleye investigations were continued in 2008 to gather information on abundance, growth, mortality, reproduction, exploitation, and diet. Forage monitoring was also continued in 2008 to follow trends in forage abundance relative to walleye population dynamics. In 2008, a bass population monitoring program was initiated on SFCR. Information gathered from this survey and future surveys will be used to provide insight on bass population dynamics.

Methods

Standard Trout Monitoring

A standard reservoir trout survey was conducted on SFCR in April of 2008 to identify relationships between rainbow trout stocking strategies and available abundance in the reservoir. The survey was also used to evaluate the success of stocked Yellowstone cutthroat trout X rainbow trout hybrids in 2006 and 2007.

Refer to the General Methods sections for detailed methods.

Walleye Index Netting

Fall walleye index netting (FWIN) was conducted in October 2008 in an effort to monitor walleye population trends and better understand population dynamics. FWIN data will also be used in future alternative regulation evaluations. Standard FWIN protocol described in the Manual of Instructions – Fall Walleye Index Netting (FWIN, Morgan 2002) were used in sampling efforts.

Forage Monitoring

Forage monitoring surveys were conducted in August, 2008 at standard SFCR locations. Protocol consisted of 10 minutes of electrofishing at 10 standard locations. Location coordinates are listed in Appendix A. Forage fish were designated as fish equal to or less than 150 mm. Resulting data were used to follow trends in catch per unit effort (CPUE) of forage species since 2004.

Smallmouth Bass Monitoring

See General Methods

Results

Standard Trout Monitoring

Floating gill nets were set overnight from April 22-23, 2008. The effort yielded a total catch of 536 trout Overall CPUE on all trout, which included rainbow, brown, and cutthroat hybrids, was 27 (Table 12). Trout species specific CPUE was 25 for rainbow trout, 0.08 for brown trout, and 2.17 for cutthroat hybrids.   Average trout length was 350 mm (SD 65) and ranged from 230 mm – 440mm TL (Figure 12). Average trout weight across the entire catch was 240 g (SD 88).

Walleye Index Netting

Fall walleye Index Netting was completed on October 6-8, 2008. A total of 9 net nights were completed resulting in a total catch of 287 walleye. Catch per unit effort averaged 32 and ranged from 16 to 55 walleye per net. The overall FWIN ranking was 3.00 on a scale of 1-3 with 3 being optimal (Table 8).

Total length of sampled walleye ranged from 115 mm to 865 mm (Figure 11). Mean total length and weight was 370 mm (SD 96) and 691 g (SD 109), respectively. Average age of walleye sampled was 3.5 years and ages ranged from 0 to 15 years. Stock density of the catch was 35.6, 15.8, 6.8, and 1.4 % for PSD, RSD-P, RSD-M, and RSD-T, respectively. Eleven age classes were present in the sampled walleye and ages ranged from 0 to 17 (Figure 8).

Condition indices indicated walleye are not forage-limited. Walleye had a mean gonadal somatic index of 12.0 for males and 39.0 for females. Mean relative weights for each size class of walleye were 82, 83, 90, 96, and 76 % for stock, quality, preferred, memorable, and trophy sized walleye, respectively. Mean visceral fat indices were 19.0 for males and 36.0 for female walleye. Mean weight for males was 509 g (SD 129) and 961 g (SD 224) for females. Walleye annual mortality for combined sexes based on weighted catch curve analysis was eight percent.

Forage Monitoring

A total of ten forage sample units were completed on August 19, 2008. Forage fish that were sampled included: smallmouth bass, yellow perch, black crappie, and spottail shiner. Smallmouth bass and yellow perch continued to make up a major component of the forage sample. Results showed a decline in smallmouth bass and an increase in black crappie and yellow perch when compared to 2007 results (Table 10).

Smallmouth Bass Monitoring

Sixteen units of sampling effort were completed on June 6-8, 2008. A total of 962 smallmouth bass were collected among all sample locations. Average CPUE was 68 ± 15 (80% C.I.) smallmouth bass. Catch rates were above that of Anderson Ranch Reservoir, using comparable methods.

A subsample of 155 fish was aged. Total length of sub-sampled fish ranged from 86 mm to 402 mm (Figure 13). Average total length was 185 mm (SD 92) and seven age classes were documented. Observed average length at age-5 in 2008 was 225 mm (Figure 14).

Population and condition indices suggest the Salmon Falls Creek Reservoir (SFCR) smallmouth bass population is dominated by stock and sub-stock fish of moderate to poor relative condition with a PSD of 33. Mean relative weights were 91 and 64 respectively for sub-stock and stock smallmouth bass.

Estimated annual mortality of SFCR smallmouth bass was nine percent. Theoretical maximum age, based on weighted catch curve results, was 19 years (Appendix D, Figure 15).

Discussion

Standard Trout Monitoring

Trout monitoring results documented an abundant and diverse trout population in the reservoir. Rainbow trout dominated the catch as would be expected considering the rainbow trout emphasis in the hatchery trout supplementation program. Correlating actual outplant hybrid stocking history to fish present in the sample was not possible because fish were not marked prior to stocking. Hybrid trout were growing well and will provide the angler expanded opportunity for trout fishing on Salmon Falls Creek Reservoir in the future. Monitoring CPUE of hybrids over time will be useful for evaluating the hybrid stocking program.

Walleye Index Netting

FWIN survey results in 2008 showed walleye were relatively abundant in SFCR. When compared to the 2007 FWIN sampling effort on Salmon falls Creek Reservoir, the 2008 catch (CPUE) remained the relatively constant (CPUE=32-33). Assuming consistent walleye abundance, similar 2007-2008 results indicates the FWIN survey is sufficiently robust to accurately assess the walleye population. In most cases, the SFCR walleye CPUE exceed others documented in FWIN surveys in the United States and in Canada. FWIN survey results from Washington State lakes and reservoirs were somewhat comparable with an average CPUE of 19 (WDFW 2005). In contrast, CPUE from FWIN surveys conducted across the province of Ontario ranged from 2.8 to 10.7 fish per net (Ministry of Natural Resources (MNR) 2005).

The SFCR walleye fishery is dominated by stock and quality sized fish and condition indices indicated walleye are healthy. Walleye relative weights were generally below average but the relative weights by and large increased with fish length. This suggests smaller walleye (sub-stock, stock and quality sized) are somewhat forage limited but this limitation is overcome as they achieve larger sizes (preferred, memorable, and trophy sized) and taking advantage of larger forage. Interspecific competition with yellow perch, northern pikeminnow, smallmouth bass, and larger trout species may exacerbate the intraspecific competition for food resources.

A more thorough review of the FWIN results will be presented upon the completion of three consecutive years of FWIN survey in both walleye fisheries. It is our intent to sample three consecutive years in each fishery to establish a baseline from which pending surveys will be compared at five year intervals.

Forage Monitoring

As in Oakley Reservoir, the high variability among years makes conclusive statements regarding forage availability and walleye condition difficult. The mean forage CPUE was relatively low compared to past years; however, walleye sampled during the FWIN efforts (see Walleye Index Netting) were found to be in good to excellent condition. This result, similar to SFCR, further demonstrates there is a disconnect between the forage monitoring results and the walleye population.

The forage fish surveys may not accurately monitor walleye forage abundance. Sampling efficiency is influenced by littoral characteristics, water clarity, and differential species habitat preferences. These efficiency biases are directly influenced by reservoir water management and overall water years. Annual fluctuations in reservoir pool elevation directly influence the characteristics of the littoral zone (i.e. steep vs gradual slopes), algae loads (i.e. water clarity- netting efficiency), and species present at sample locations. It's more likely variation in forage abundance documented since 2004 is an artifact of variable habitat and respective sampling efficiencies. As in Oakley Reservoir, the lack of correlation between walleye condition (Wr) and forage catch rates suggests the forage surveys are inadequate to document walleye population limitations.

We recommend reevaluating the existing forage monitoring program to determine if there are better alternative techniques or consider eliminating the monitoring program altogether if the effort is not useful.

Smallmouth Bass Monitoring

Smallmouth bass monitoring efforts in Salmon Falls Creek Reservoir in 2008 indicate the population is dominated by sub-stock and stock sized fish. Very few fish in the sample were above the legal size limit. Catch rates in Salmon Falls Creek Reservoir smallmouth bass are high in comparison to the other smallmouth bass fisheries in the Magic Valley Region. For example, Anderson Ranch Reservoir CPUE samples generated a CPUE 50% lower than in Salmon Falls Creek Reservoir.

Smallmouth bass exploitation is unknown but believed to be low in the reservoir. Estimated harvest of 1,140 smallmouth bass in 1997 supports this assumption (Warren et al. 2001). Size-biased population sampling, as suggested by the previously reported sample age stratification and PSD, may have influenced the mortality estimate by eliminating or reducing present year classes used in the estimate. Mortality rates may have also been influenced by water level fluctuations common to the reservoir.

Monitoring the catch in future bass sampling efforts on Salmon Falls Creek Reservoir, will allow a comparison within the fishery itself. 2008 was the initial smallmouth bass sampling effort on Salmon Falls Creek reservoir. Good recruitment appears in the smallmouth bass fishery in Salmon Falls Creek reservoir, with many early age class fish present in the sample. This is most likely correlated with good spawn conditions and water levels present later in the season on Salmon Falls Creek Reservoir. Observed average length at age-5 in 2008 on salmon falls creek reservoir was 225 mm. When compared to other fisheries this is low, and possibly indicates slow smallmouth bass growth in the fishery, if we compare length at age-5 in Anderson Ranch reservoir to Salmon falls creek reservoir, it is noticed that Anderson ranch reservoir in 2008 showed mean length at age-5 bass at 280 mm as compared to 225 mm in salmon Falls creek reservoir (Table 1). This growth may be related to forage availability, and the overall abundance which is available in the fishery.

Weaknesses in the data could be that our electrofishing gear did not readily catch larger fish that may be at large in the fishery.

Management Recommendations

1. Continue hybrid trout monitoring in SFCR for the year 2009 to evaluate stocking program
2. Continue to evaluate the relationship between walleye catch rates, forage abundance, and walleye abundance to determine if walleye production could be modeled and adaptive harvest management could be implemented.
3. Reevaluate the smallmouth bass fishery with respect to the efficacy of the regulations currently in place.

SUBLETT RESERVOIR

Abstract

Standard lowland lake and reservoir survey was conducted on Sublett Reservoir in 2008. Catch (n = 878) was made up of Yellowstone cutthroat trout, brown trout, rainbow trout, mottled sculpin, and speckled dace. Results from the standard lowland lake sampling effort indicate the fish population has been relatively consistent with respect to the species assemblages; however there has been a substantial shift in relative abundance. Kokanee have been extirpated from the fish population which would be expected since the stocking program was curtailed in 1999. Rainbow trout continue to dominate the relative catch as was the case in 1998; however, there was a significant decrease in the rainbow trout catch rates.

Introduction

Sublett Reservoir is a 46 ha irrigation impoundment on a tributary to Raft River, located in the Sublett Mountains. The total area for the reservoir drainage basin is approximately 117 km^2. Sublett Reservoir fishery is currently managed under general season fishing regulations (Saturday of Memorial Day weekend through November 30) with a six trout bag limit in the reservoir and a two trout bag limit in the tributaries. Current stockings include fingerling Henry's Lake cutthroat trout and catchable-sized rainbow trout.

A standard lowland lake survey was completed on Sublett Reservoir in 2008 to describe the status of the fish population and evaluate general trends.

Methods

Based on acreage, it was determined that Sublett Reservoir would require two units of effort to sampling the fishery under the standard lowland lake survey protocol. The standard lowland lake sampling strategy is described in the general methods section of this report.

We did not fully implement the prescribed sampling effort. Two units of gill net effort were implemented; however, we only implemented one unit of electrofishing due to the small size of the impoundment. Gill nets were set overnight on April 29, 2008; however, electrofishing was conducted much later due to a boat break-down (June 23, 2008). No trap nets were fished because the species present in the fishery could be assessed efficiently using just the electrofishing and gill net sampling techniques.

Results

The catch was comprised of Yellowstone cutthroat trout, rainbow trout, brown trout, mottled sculpin, and speckled dace. In all, the effort yielded a catch of 808 fish which equated to 240 fish/unit effort. The catch was dominated by speckled dace, rainbow trout, and mottled sculpin. Trout species made up the majority of the standing crop with brown trout making up slightly less than half of the measured weight of the catch. Species specific catch and biomass per single unit of effort are presented in Table 13.

Trout sizes ranged from 111- 549 mm TL. Brown trout were the largest trout in the catch followed by rainbow trout and Yellowstone cutthroat trout. Juvenile rainbow and brown trout were documented; however no juvenile Yellowstone cutthroat trout were detected. Trout species proportional stock densities (RSD-Q) ranged from 55-91%. Only a small component of the catch reached preferred stock sizes (rainbow trout > 500 mm; Yellowstone cutthroat trout > 450 mm) with most trout residing in substock and stock size categories (Table 14; Figure 15).

Fish condition, as reported by relative weights, were generally close to national standards. Hatchery origin Yellowstone cutthroat trout were found to be in best condition (Ave=108%, SD=10) followed by resident brown trout (Ave=98%, SD=10) and rainbow trout (Ave=91%, SD=10) (Figure 16).

Discussion

Results from the standard lowland lake sampling effort indicate the fish population has been relatively consistent with respect to the species assemblages; however there has been a substantial shift in relative abundance. All species documented in 1998 were also documented in 2008 with the exception of kokanee. Kokanee have been extirpated from the fish population which would be expected since the stocking program was curtailed in 1999. Rainbow trout continue to dominate the relative catch as was the case in 1998 (Partridge and Warren 1998); however, there was a significant decrease in the actual rainbow trout catch rates. There were only 26 rainbow trout caught per unit effort in 2008 compared to 492 rainbow trout (hatchery and wild origin combined) caught in 1998. Warren (1998) also reported that rainbow trout made up 80% of the total biomass. In contrast, catch rates were identical between both efforts for Yellowstone cutthroat trout. Stocking rates and sampling dates do not explain the discrepancy in rainbow and Yellowstone cutthroat trout catch rates in that both surveys occurred early summer and stocking densities have not changed substantially since the late 1980's. Different water levels within the impoundment might influence sampling efficiencies, post-stock trout survival, and angler exploitation rates; however, we have no data to support this theory. It's possible there has been a drastic decline in resident (wild origin) rainbow trout contribution to the fishery.

The results of this survey confirm the presence of trout natural recruitment. Histograms of the 2008 catch indicate the presence of juvenile brown trout and rainbow trout. No stocking event could account for this cohort therefore we assume both species are spawning and contributing to the fish population. No juvenile-sized cutthroat trout were documented in 2008 which differs from the 1998 study where they did collect significant numbers. In both surveys, Yellowstone cutthroat trout fingerlings were stocked in the fall of the previous year at equal rates. We sampled Yellowstone cutthroat trout in 2008 that averaged 350 mm which likely originate from the fall out-plant two years prior (2006) which suggests the 2007 out-plant failed to recruit to the fishery.

The combined reduction in rainbow trout catch rates and evidence of failed recruitment (hatchery and natural origin) may be an artifact of poor reservoir storage in 2007. Minidoka County declared a drought emergency on July 18, 2007 which would suggest Sublett Reservoir water storage and associated tributary flows were relatively low. The Yellowstone cutthroat trout fry were stocked in August of that year which means the habitat was likely severely compromised during that time explaining the failed out-plant. The spring 2008 spawning conditions may have been severely impacted as well which may have resulted in decreased reservoir recruitment.

This shift in rainbow trout abundance and the apparent failure of the Yellowstone cutthroat trout stocking event in 2008 should be should further investigated by evaluating trout exploitation rates and/or consider replicating the lowland lake survey in a year not impacted by drought conditions.

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RIVERS AND STREAMS INVESTIGATIONS

GENERAL METHODS

River and stream fish population surveys are conducted using electrofishing equipment. Fish are typically sampled with pulsed direct current (DC). Four different electrofishing assemblies are commonly used to conduct surveys, depending on the size of river or stream sampled. Smaller wadeable streams are sampled with a backpack electrofishing unit. Sampling is conducted in an upstream movement with one or two netters. Sampled sections are blocked with nets on both ends when depletion population estimates are desired. Larger wadeable streams and rivers are sampled with a canoe or raft electrofishing assembly. Sampling is typically conducted in a downstream movement with multiple netters. Nonwadeable streams and rivers are sampled either with a drift boat mounted electrofishing assembly or a jet boat electrofishing assembly. Both methods consist of sampling in a downstream movement typically with two netters. A description of equipment used in standard stream surveys is listed in (Appendix B).

Quantitative streams surveys are completed using mark recapture, multiple mark recapture, or depletion estimate techniques. Mark recapture efforts are completed with one marking run and one recapture run separated by at least one week. Fish are marked by a single fin punch. Multiple mark recapture efforts are completed with multiple (typically three) passes separated by approximately one week. Fish are marked on all passes, except the final pass, with fin punches. Depletion estimates utilize multiple passes with removal. The sampled reach is blocked with nets during depletion estimates. Removal passes in depletion estimates are discontinued when no fish are captured or the number of fish capture in a single run is less than 25% of the total number captured. Data analysis typically includes population estimation by length group. Fish data are summarized by species for length (TL), weight, relative abundance, relative biomass, density and catch-per-unit-effort. Catch-by-age is determined loosely by analysis of length frequency or more definitively by otolith analysis from a representative collection of fish.

Upon capture, fish are identified, measured (TL), weighed (g), marked, and released. Weights were taken only during the marking run. Caudal fin clips are used to mark trout and whitefish equal or greater than 100 mm for identification in the recapture run. Salmonids are counted, measured, and observed for marks in the second (recapture) electrofishing pass.

Estimates of fish abundance are made using a modified Peterson mark-recapture estimator (Ricker 1975). Estimates are calculated in 100 mm increments for fish equal or greater than 100 mm total length. A minimum of five recaptures is required for estimates. Length groups are pooled when less than five recaptures are made within an individual length group.

LITTLEWOOD RIVER

Abstract

A temperature survey was conducted on the Little Wood River in three locations in 2008 to evaluate trout habitat limitations and to quantify trout thermal habitat. Water temperatures over 23.8 C were recorded in all but one location. The number of days where water temperatures exceeded 23.8 C ranged from 9-46 days which represented 7-38% of the days monitored.

Introduction

The Little Wood River originates in the Pioneer Mountain range of south central Idaho. The river flows south/southwest from its origin to its confluence with the Big Wood River west of Gooding, ID, where it forms the Malad River. The Little Wood River is impounded, creating the Little Wood Reservoir located northwest of Carey, ID. The river is used extensively for irrigation and no longer consistently maintains water in its channel below Little Wood Reservoir to its confluence with Silver Creek. The Little Wood River below the confluence with Silver Creek is also used heavily for irrigation.

The Little Wood River provides a popular fishery with angling opportunities for rainbow trout, brown trout, and mountain whitefish. The reach of the Little Wood River between the Silver Creek confluence and the town of Richfield is stocked annually with rainbow trout fingerlings. It is suspected that Silver Creek also naturally contributes rainbow trout and brown trout to this river reach. Fishing regulations vary by reach, with opportunities for fly-fishing, with catch-and-release only year-round, and general regulations.

Decreased flows combined with increased water temperatures have compromised trout habitat in the Little Wood River between Richfield, ID and the mouth of Silver Creek. Thermographs were placed to record water temperatures during the spring and summer months to document the severity and duration of water temperatures that exceed those preferred by rainbow and brown trout.

Methods

Four thermographs were deployed in the Little Wood River between Richfield, ID. and the confluence of the Little Wood River and Silver Creek. Thermographs were deployed on May 1, 2008 and retrieved by the end of September, 2008. Water temperatures were recorded every three hours. Locations and equipment are described in Appendix A and Appendix B, respectively. Data were uploaded and processed using Box Car Pro© software.

Results

Water temperatures over 23.8 ºC were recorded in all but one location. The thermograph placed in the most upstream location did not document water temperatures above trout's upper thermal limit (Table 15). The number of days where high water temperatures (>23.8 ºC) were recorded in sites 2-4, ranged from 9-46 (7-38%). High water temperatures were documented between June 21 and August 18, which also coincides with relatively low flows (Figures 17 and 18). Silver Creek flows were used as a surrogate to describe Little Wood River flows in this reach since the entire discharge in the area was provided solely by the Silver Creek drainage.

Discussion

The thermal profiles generated from the sampling effort documented stressful but not lethal thermal habitat conditions. Upper incipient lethal temperatures described for rainbow trout vary greatly but are generally described as temperatures between 25-30 C^{o} (Coutant 1977, Raleigh et al. 1984, Currie et al. 1998). Myrick and Cech (2000) described optimal growth for Eagle Lake and Mt. Shasta rainbow trout strains as maximum near 19 C^{o} and as progressively declining as temperatures exceed 19 C^{o} and approach 25 C^{o}. Brown trout upper incipient lethal temperatures are described at about 27 C° (Needham 1969) with optimal growth occurring between 12-19 C° (Frost and Brown 1967). Little Wood River summer water temperatures depict a thermal regime that would be considered stressful, less than optimal for growth, with lethal potential. We documented water temperatures above described lethal limits for both rainbow and brown trout, but we suspect these exposures were short-term not resulting in significant mortality. No fish kills were observed or reported during the survey period.

The number and severity of days with high water temperatures was not consistent with standard stream dynamics. Water temperatures typically increase downstream within a watershed. However, site 3 showed fewer and less extreme high water temperature days than adjacent sites. This may be explained by mechanical error, ground water contribution, or site specific conditions such as cover, connection to the main current, and sedimentation. Regardless of this anomaly, the data indicate this reach of the Little Wood River is less than optimal for trout species.

The current management strategy includes hatchery supplementation of catchable size brown trout. Brown trout supplementation ceased in 2000 but was reinstituted again in 2007. Sterile rainbow trout were supplemented in the interim, but failed to generate a suitable fishery. Their lack of performance may be directly related to high water temperatures in that triploid trout are reportedly less tolerant to high water temperatures than diploid rainbow trout. Brown trout supplementation has performed well in the past under similar conditions and the restoration of this program should improve fishing opportunity. Additionally, this reach of the Little Wood River likely recruits some rainbow and brown trout from upstream (Silver Creek) so rainbow trout should always be a component of the fishery despite a lack of hatchery supplementation.

Management Recommendation

1. Continue with brown trout supplementation program and monitor angler effort and success.

BIGWOOD RIVER

Abstract

A randomized creel survey was conducted on three reaches of the Big Wood River between Star Bridge and the North Fork of the Big Wood River from June 21 to September 12, 2008. Anglers put forth an estimated 8,761 (±925) hrs to catch 9,503 (±1,053) rainbow trout at a catch rate of 1.1 fish/hr (±0.18) for all reaches combined (Table 16). Angler effort per section by section was estimated at 2,015 (±544) hrs, 4,445 (±571), 2,302 (±484) hrs. in the Croy Creek Bridge to Star Bridge reach, the Box Car Bend to Red Top reach, and the Hulen Meadows Bridge to the North Fork Big Wood River, respectively. The highest catch rate was documented in the Croy Creek Bridge to Star Bridge reach (2.28 (± 0.64). Brown trout catch was incidental (<0.1 fish/hr) and no rainbow trout harvest was documented in any survey reach.

Introduction

The Big Wood River originates in the Smoky Mountain, Boulder Mountain, and Pioneer Mountain ranges of south central Idaho. The river flows south/southwest from its origin to its confluence with the Little Wood River west of Gooding, ID., forming the Malad River. The Big Wood River is impounded by Magic Dam, located west of State Highway 75, and forms Magic Reservoir. Downstream from the dam, the river is used extensively for irrigation and is often dewatered seasonally with the entire discharge being diverted in the Richfield Canal.

The Big Wood River provides a popular fishery with angling opportunities for rainbow trout, brown trout and mountain whitefish. The Big Wood River has been managed as a trophy wild rainbow trout fishery from the Glendale Diversion upstream to its headwaters since 1977. Restrictive regulations were expanded in 1990 to increase the trophy quality of the Big Wood River fishery. The Big Wood River fishery is currently managed with three regulation combinations including a slot-limit (two trout limit with none taken between 12" and 16"), catch-and-release, and general regulations. Hatchery supplementation is currently limited to the North Fork of the Big Wood River, Big Wood River upstream of the North Fork confluence, Trail Creek, Warm Springs Creek, Magic Reservoir, and intermittently below Magic Reservoir in the Richfield Canal section. These locations coincide with areas managed by general regulations.

A creel survey of the Big Wood River fishery above Magic Reservoir was completed in 2008 to quantify angler use and harvest. Angler comments have consistently indicated the fishery is used heavily and associated harvest is high. A need for conservative regulations has been suggested by anglers and contemporary creel data was needed.

Methods

A roving-roving creel survey was completed on the Big Wood River from June 21 to September 12, 2008. The survey was stratified by 14-day survey intervals and individual survey dates were stratified by day type (weekday, weekend/holiday). Angler counts were conducted on two weekday and two weekend/holiday days per interval. Survey dates and times were randomly selected between sunrise and sunset (daylight hours). Angler counts were collected by foot at available access sites along the river. Two counts were made per selected date separated by approximately 3 hours. Angler interviews were conducted on the ground throughout each survey section.

Three survey sections were selected for replication from previous survey years and included the following sections: Croy Creek Bridge to Star Bridge, Box Car Bend to Red Top, and Hulen Meadows Bridge to the North Fork Big Wood River. These reaches are further described by Thurow (1988) and Partridge and Warren (1993). These survey sections incorporated river sections managed under catch-and-release, slot-limit (2 fish limit, none 12" to 16") regulation, and general regulation scenarios, respectively. Big Wood River tributaries were not included in the survey.

Catch and harvest rates were obtained from angler interviews. Anglers were questioned about the length of time of their outing, method of angling, catch, and harvest. Angler effort, catch rate, and harvest were estimated using Creel Analysis Software (CAS). Harvested fish were identified to species and measured (total lengths).

Observed anglers were interviewed to provide information on angler effort, catch rates, harvest, and the duration of angling trips. Anglers whom had not completed a fishing trip at the time of the interview were given a post card to provide a final report. Requested information included dates and time fished, number of fish caught by species, number of fish harvested, and gear type used. Anglers were questioned as to whether they were inclined to harvest or catch-and-release during the outing in which they were encountered and if they were on a guided trip.

Results

Anglers put forth an estimated 8,761 (±925) hrs to catch 9,503 (±1,053) rainbow trout at a catch rate of 1.1 fish/hr (±0.18) for all reaches combined (Table 16). Angler effort per section was estimated at 2,015 (±544) hrs, 4,445 (±571), 2,302 (±484) hrs. in the Croy Creek Bridge to Star Bridge reach, the Box Car Bend to Red Top reach, and the Hulen Meadows Bridge to the North Fork Big Wood River, respectively. The highest catch rate was documented in the Croy Creek Bridge to Star Bridge reach (2.28 ± 0.64). Brown trout catch was incidental (<0.1 fish/hr) and no rainbow trout harvest was documented in any survey reach.

Discussion

Angler effort can't be directly compared across years because of unequal sampling periods; however, some general comparison can be made. The overall combined angler effort has declined since 1987 and has approached levels documented in 1986. Most of that decline has occurred in the Croy Creek Bridge to Star Bridge reach (catch-and-release rules) where effort has declined approximately 50%. We also documented a 40% decline of effort in the Hulen Meadows Bridge to North Fork Big Wood reach which is under general season rules. The Box Car Bend to Red Top reach showed comparable angler effort which has been fairly consistent since 1987. Changes in regulations do not explain this change in fishing effort since fishing rules have been consistent since 1988 when the existing rules were first implemented. Effort jumped considerably between 1986 and 1987 which may coincide with a substantial decrease in average annual discharge from 689 cfs to 283 cfs in 1986 and 1987, respectively. Mean flows in were relatively high in 1993 (618 cfs) and overall effort more closely resembled those in 1986 when flows were similar.

Catch rates in 2008 showed some substantial changes when compared to past creel surveys. Most notable is the doubling of trout catch rates in the Croy Creek Bridge to Star Bridge reach. Catch rates rose from 1.10 to 2.28 trout/hr despite a substantial decrease in angler effort. Additionally, there appears to be a consistent decreasing trend the overall catch and catch rates found in the Hulen Meadows Bridge to the North Fork Big Wood reach. Estimated catch rates have consistently decreased from 1.78, 0.30, and 0.23 trout/hr in 1987, 1993, and 2008, respectively. This reach is under general rules which present the most liberal harvest opportunity, and it is possible harvest is having an impact upon catch. However, we did not document any harvest during the creel survey which contradicts a harvest impact theory. This reach should be re-evaluated to better ascertain angling impacts and evaluate the need for more conservative regulations.

This was the first year we implemented the use of postcards to increase the number of completed angler interviews for the creel census estimates. Post-cards were presented to anglers who indicated they had not completed their trips and some were placed on vehicles we could associate with counted anglers. If the cards were issued to anglers directly, then they were numerically associated with that particular interview. Upon receipt of a post card, the original interview data were amended to reflect “completed” trip results. If the card were placed on a vehicle, then the data from a returned card would be recorded as a new interview. There is potential bias associated with this method where anglers may provide inaccurate data or exaggerate (positively or negatively) their results.

Management Recommendation

1. Resurvey the Hulen Meadows Bridge to North Fork Big Wood reach in the near future to substantiate what appears to be a declining angling opportunity.

SOUTH FORK BOISE RIVER

Abstract

A kokanee weir was constructed to control kokanee escapement from Anderson Ranch Reservoir into the preferred spawning habitat upstream in the South Fork Boise River. A total of 63,123 kokanee were passed through the weir. Female kokanee made up about 24,700 of those passed Actual escapement exceeded the goal of 17,700 females. A standard trout abundance estimate was completed in 2008. The total catch of target species included 398, 190, and 57 rainbow trout, mountain whitefish, and bull trout, respectively, for a total of 645 fish (n=645).

Introduction

The South Fork Boise River (SFBR) upstream of Anderson Ranch Reservoir (ARR) flows mostly through U.S. Forest Service lands in Elmore and Camas counties. Access between Pine and Big Smoky Creek is by a good paved and graded gravel road which follows the river most of its length. The fishery in the reach from the bridge at Pine upstream 39 km to the Beaver Creek confluence is managed with general fishing rules for rivers and streams. The 16 km reach from Beaver Creek upstream to the Big Smoky Creek confluence has been managed since 1992 with a two trout limit, none less than 14 inches long (356 mm) and fishing gear restricted to artificial flies and lures with a single barbless hook. The reach upstream from Big Smoky Creek including all tributaries is managed general rules. Both reaches that are managed with general rules are stocked with catchable-sized rainbow trout for a put-and-take fishery. Since January 1, 1996 there has been no open season for bull trout Salvelinus confluentus, which are known to be present in the South Fork Boise River. Kokanee Oncorhynchus nerka are also known to migrate upstream from Anderson Ranch Reservoir to spawn in the river from late August into early October.

We surveyed the stream fishery to monitor trout abundance associated with the restrictive regulations and to control kokanee escapement to mitigate an over-abundance of kokanee in the Anderson Ranch Reservoir. A standard stream section has been sampled every three years since 1991 to determine the population impact of the restrictive regulations (e.g. abundance and size of wild rainbow trout). Reservoir kokanee densities were determined to be high (117.5 age-2 and 3 kokanee/ha – see trawl summary, this report) and the population was demonstrating an apparent density dependent response (decreased size) which was not in line with existing management direction. We restricted escapement in hopes of reducing kokanee recruitment into the reservoir. The overall objective of these sampling efforts were to evaluate resident salmonid fisheries in the South fork Boise river with respect to management goals, and existing operations, and operating the weir was to restrict kokanee recruitment into ARR to meet kokanee size objectives.

Methods

Abundance estimate

Abundance of rainbow trout and mountain whitefish was estimated in the special regulation section of the SFBR above ARR on September 15th and 17th, 2008 for trend monitoring purposes. Due to time constraints, the marking run and recapture run were separated only by 48 hrs. which differs from the 7 day rest period described in General Methods. Sampling was completed using canoe electrofishing equipment methodology described in the general methods. Sample reach boundaries are listed in Appendix A. Modified Peterson mark – recapture protocol were followed to generate abundance estimates (Ricker 1975). Abundance and density estimates were derived for wild rainbow trout, mountain whitefish, and bull trout using FA+ software.

Kokanee escapement

A steel frame picket weir was constructed 1.5 km upstream from Pine, Idaho to control kokanee escapement from Anderson Ranch Reservoir into the preferred spawning habitat upstream in the South Fork Boise River. The weir was installed on August 6th and removed on November 1, 2008. The picket-weir was built on a pre-constructed cement foundation and represented a complete barrier to kokanee migration. A large trap box was integrated into the weir to allow fish to be trapped, evaluated, enumerated and ultimately passed through.

Kokanee were trapped, enumerated (either volumetrically or physically counted), and passed through the weir at a prescribe rate throughout the entire spawning run period. Female kokanee numbers were volumetrically estimated using a calibrated displacement technique. On predetermined release dates, kokanee were added to a water filled tub (consistently filled to a determined level) until the water level reached a graduated level to determine the fish to volume displacement estimate. Once the calibration was complete, kokanee were loaded into the displacement tub in large numbers and the level of displacement was used to estimate total fish. The fish were then passed through the weir by removing a 6 inch screw cap allowing the fish to be flushed upstream of the weir. Any male kokanee trapped while implementing the controlled female escapement protocol were visually estimated and allowed to pass through the weir. We allowed significantly more male kokanee to pass through the weir because their abundance was not directly related to overall recruitment and we desired to facilitate upstream nutrient transport.

We determined the appropriate number of female kokanee needed to produce sufficient recruitment to Anderson Ranch Reservoir. Sufficient recruitment was determined as the number of females needed to exceed prescribed reservoir densities (Reiman 1992). The escapement goal was determined using predicted fecundity, predicted egg deposition, and estimated annual mortality to ultimately predict age-1 abundance (density) in ARR.

$$\mathrm{Age} - 1\ (\mathrm{n}) = \left((\mathrm{f(n)} * \mathrm{fec}) * \mathrm{efs}\right) * \mathrm{YOY\ surv}$$

Where:

f(n)= number of females
fec= estimated fecundity of age-3 kokanee
efs= Egg to fry survival (mean = 0.16 or 16%)
YOY surv = survival from age-0 to age-1 (0.31)

Our target escapement was estimated to be approximately 17,700 females could produce approximately 1 million fry which, based on average survival, would ultimately result in approximately 313,700 age-1 kokanee (i.e. 212 fish/ha at full pool). This escapement goal was fairly liberal and total recruitment was not limited to the SFBR considering the significant (but not quantified) Lime Creek spawning run. Survival estimates were derived from past kokanee trawl estimates which generated YOY, age-1, age-2, and age-3 abundance estimates and annual mortality estimates derived from catch curves.

Kokanee were passed through the weir throughout the spawning run at proportions similar to the spawning migration pattern. Fish were released at increased amounts until the run peaked at which point they were gradually reduced until the spawning run was over. Efforts were made to pass fish throughout the entire spawning run to protect any unique spawn run timing behavior already present.

A sample of 20 kokanee per week were randomly were collected to asses sex ratio, lengths (TL mm), and fecundity. Otoliths were collected, sectioned and later aged in the lab.

Results

Abundance estimate

Abundance and density estimates were generated for rainbow trout, bull trout, and mountain whitefish >99 mm. Wild rainbow trout were most abundant 615 $\pm$ 107 (80% CI) followed by mountain whitefish 267 $\pm$ 70 (80% CI) and bull trout 60 $\pm$ 16 (80% CI) (Table 17). The rainbow trout estimate within the reach was similar to the past estimates; (Table 18).

The catch was made up of rainbow trout, mountain whitefish, bull trout, and spawning kokanee. The total catch of target species included 398, 190, and 57 rainbow trout, mountain whitefish, and bull trout, respectively, for a total of 645 fish. Bull trout were the largest fish in the catch (ave=286, Stdev=87) followed by mountain whitefish and rainbow trout (Figure 18). Average lengths (TL mm) were consistent between marking run indicating consistent sampling efficiencies (Table 19). Non-game fish species and spawning kokanee were not targeted for this sampling event

Kokanee escapement

The weir functioned as a complete barrier to upstream kokanee migration. No kokanee were observed passing through or over the picket weir throughout the season. No high water event either compromised the barrier or forced pickets to be removed until the final days of trapping.

A total of 63,123 kokanee were passed through the weir. Female kokanee made up about 24,700 of those passed (Table 20). Actual escapement exceeded the goal of 17,700 females.

A total of 100 Kokanee were randomly sampled throughout the trapping period. Kokanee averaged 261 mm TL (SD 11) with age classes dominated by age-2 kokanee (93%) with some age-3 (7%). The sex ratio at the weir was proportionately equal and average fecundity was determined to be 352 eggs (SD 140).

Discussion

Abundance estimate

Catch composition and abundance in the SFBR in 2008 standard stream survey is comparable to that of other surveys completed between 1991- 2005. Wild rainbow trout and mountain whitefish estimates compare to previous samples. The 2008 mountain whitefish sample was slightly above the 2005 sample effort, and the wild rainbow trout sample estimate was also above the 2005 sample estimate. No comparative bull trout estimate was available at the time of the 2008 sampling event. Historical trends indicate South Fork Boise River rainbow trout populations have experienced slow but steady population increase since a 1991 sampling, and mountain whitefish have experienced a steady decline since a 2002 sampling event.

Conservative regulations within the sample reach (2 trout limit none under 14 inches) would hopefully suggest the population would have relatively more fish > 406 mm TL than would be found normally. Sample results showed the largest fish sampled was 346mm. Most of the fish we handled in the sample were below the minimum harvestable size, with a large portion of the fish below 200mm, indicating good recruitment into the wild rainbow trout population. No fish handled in the sample were at or above the minimal harvestable size, possibly indicating fish reaching harvestable size are exploited from angling. Past spot creels have shown the fishery is performing well with conservative regulations and the data suggests a fishery dominated by catchable size fish, and strong recruitment.

Kokanee escapement

Long-term kokanee goals include developing a SFBR escapement model to predict ARR abundance and to use escapement control to manage kokanee abundance and growth rates in the reservoir. This was the first year of escapement estimates on the SFBR. Annual monitoring will be needed to further refine the model regardless if escapement control is implemented. Operational escapement goals varied from actual releases upstream of the weir based on ability to count every fish due to overabundance of fish at the trap. Average fish size at the weir correlated to fish size in the kokanee trawl in 2008. A total of 319 kokanee were randomly sampled throughout the trapping period at a rate of approximately twenty-five kokanee per week. Kokanee averaged 327 mm TL (SD = 23) and ranged from 201 -391 mm TL. Age classes were dominated by age-3 kokanee (88%) with some age-2 (12%) kokanee reaching the weir as well. The sex ratio at the weir was proportionately equal and average fecundity was determined to be 585 eggs.

Management Recommendations

1. Continue monitoring trout populations on the upper South Fork Boise River at three-year intervals.
2. Regulate kokanee escapement in the South Fork Boise River by operating the weir annually as funding allows.

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Table 1. Standard bass sampling indices among Magic Valley Region fisheries from 2005 to 2008.

			Year			
Fishery	Species	Measure	2005	2006	2007	2008
Anderson Ranch Res.	SMB	Ave. catch (CPUE)			88	20
		Ave length at Age-5			251	280
		PSD			17	36
		RSD			83	64
		Max. age (years)			5	6
Bell Rapids Res.	LMB	Ave. catch (CPUE)	44		11	7
		Ave length at Age-5	286		256	302
		PSD	59		17	33
		RSD	13		36	67
		Max. age (years)	11		9	10
Milner Res.	LMB	Ave. catch (CPUE)			63	
		Ave length at Age-5			315	
		PSD			28	
		RSD			72	
		Max. age (years)			9	
Salmon Falls Cr. Res.	LMB	Ave. catch (CPUE)				60
		Ave length at Age-5				220
		PSD				33
		RSD				67
		Max. age (years)				7
Lake Walcott	LMB	Ave. catch (CPUE)	99	92		
		Ave length at Age-5	420	418		
		PSD	15	17		
		RSD	85	83		
		Max. age (years)	13	13		

Table 2. Whole lake population estimates for Anderson Ranch Reservoir Kokanee, based on trawling in July 28-29, 2008.

Abundance Estimate

	"Age-0"	"Age-1"	"Age-2"	"Age-3"	Total
Sec. 1	832,507	19,180	60,335	8,533	
Sec. 2	276,705	19,796	61,321	7,995	
Sec. 3	62,874	1,736	31,093	14,056	
Whole Lake est.	**1,172,086**	**40,712**	**152,748**	**30,584**	**1,396,130**
Conf. Int. ±	431,171	13,533	41,558	10,915	
95%	36.79%	33.24%	27.21%	35.69%	
X / ha=	751.19	26.09	97.90	19.60	894.78
n =	21				
N_t =	25,722				
t-value =	2.086				
Area (ha)=	1,560				

Biomass Estimates (kg)

	"Age-0"	"Age-1"	"Age-2"	"Age-3"	Total
Sec. 1	1,330.71	1,387.23	7,936.65	1,348.71	12,003.29
Sec. 2	441.83	1,341.71	7,934.52	1,239.15	10,957.21
Sec. 3	100.87	119.39	4,432.36	2,405.31	7,057.93
Whole Lake est.	1,873.40	2,848.33	20,303.53	4,993.18	30,018.44

Standing Crop Estimates (kg/ha)

	"Age-0"	"Age-1"	"Age-2"	"Age-3"	Total
Sec. 1	2.15	2.24	12.80	2.17	19.36
Sec. 2	0.76	2.31	13.67	2.13	18.87
Sec. 3	0.28	0.33	12.33	6.69	19.63
Whole Lake est.	1.20	1.83	13.01	3.20	19.24

Table 3. Estimated angler effort in Anderson Ranch Reservoir from May 24, to August 13, 2008 derived using randomized roving creel survey design. Estimates were generated using an average of 12 daylight hours per day.

Effort	Weekdays	Weekends	All days
Creel days (n)	8	11	19
All days (n)	82	34	116
Relative sample (%)	10	32	16
Ave. counts / day	238	614	- - - -
VAR	1,296	7,345	- - - -
Estimated effort (E)	20,090	20,887	40,977
VAR	8,710,995	8,490,438	17,201,432
Lower Limit [a]	14,305	15,176	32,848
Upper Limit [a]	48,128	50,631	105,358

[a] 95% confidence

Table 4. Estimated angler catch, catch rate and harvest of kokanee, smallmouth bass, and rainbow trout from May 24 to August 13, 2008 in Anderson Ranch Reservoir, Idaho.

	Catch			Harvest	
Species	Est (#)	CL[a]	Rate (#/hour)[b]	Estimate (#)	CL[a]
Kokanee	127,201	32,215-190,343	3.1	92,940	52,738-133,142
Smallmouth bass	53,661	13,255-94,068	1.3	4,638	82-9,194
Rainbow trout	461	0-1,093	< 0.1	332	0-983
Total	181,323			97,910	

[a] 95 % confidence limit

[b] Based on the estimated catch and an estimated effort of 40,977 hr

Table 5. Kokanee densities (fish/ha) by age class (0-3) for years from 1993 to 2008 in Anderson Ranch Reservoir, Idaho.

Year	0	1	2	3	TOTAL
1993	238	2	1	1	242
1994	297	368	28	--	693
1995	2	11	25	--	38
1996	64	6	2	--	72
1997	497	23	4	--	524
1998	109	29	8	--	146
1999	1201	10	13	--	1224
2000	565	38	3	--	606
2001	41	78	35	--	154
2002	13	3	1	--	17
2003	12	6	3	1	21
2004	--	--	--	--	--
2005	348	25	8	14	396
2006	802	130	27	7	966
2007	554	673	78	53	1359
2008	751	26	98	20	895
MEAN	366	95	22	16	490
SD	358	185	29	20	452

Table 6. Comparison of estimated and predicted (Rieman and Maiolie 1995) angler catch rates and angler effort as related to reservoir densities for creel surveys in Anderson Ranch Reservoir in 1997 and 2008.

			Effort		Catch rate [a]	
Year	Density (fish/ha)	Age Classes	Predicted	Estimated	Predicted	Estimated
1997	4	Age-2	23,925	79,794	0.2	0.4
2008	118	Age 2-3	143,069	40,977	1.3	3.2

[a] Catch includes all kokanee across all age classes

Table 7. Brown trout redd counts on the Big Wood River and Rock Creek upstream of Magic Reservoir, ID since 1986.

	Big Wood River[a]					
Date	Reach 1	Reach 2	Reach 3	Reach 4	TOT.	Rock Creek
Nov. 19, 1986	--[d]	26	--[b]	96	122	--[d]
Nov. 19, 1987	104	62[c]	--[b]	30	196	--[d]
Nov. 15, 1988	13	75	31	39	158	--[d]
Nov. 18, 1989	6	20	33	8	67	1
Nov. 20, 1990	1	25	30	14	70	0
Nov. 15, 1991	3	30	38	15	86	0
Nov. 19, 1992	5	14	9	15	43	0
Nov. 24, 1993	1	28	--[b]	15	43	0
Nov. 16, 1994	9	27	56	5	97	0
Nov. 16, 1995	2	29	54	32	117	0
Nov. 11, 1996	--[d]	8	37	51	96	--[d]
Nov. 25, 1997	--[d]	44	53	23	120	--[d]
Nov. 23, 1998	--[d]	45	139	71	255	--[d]
Nov. 23, 1999	--[d]	104	209	130	443	--[d]
Nov. 17, 2000	--[d]	79	211	153	443	--[d]
Nov. 16, 2001	21	30	36	24	111	--[d]
Nov. 14, 2002	6	26	13	17	62	--[d]
Nov. 17, 2003	--[d]	16	30	30	76	--[d]
2004	no data	no data	no data	no data	no data	no data
Nov. 15, 2005	37	49	30	99	215	--[d]
Nov. 15, 2006	0	17	42	20	79	--[d]
Nov. 15, 2007	0	23	40	37	100	--[d]
Nov. 14 2008	0	60	110	31	201	--[d]

[a] Reach 1 - Rock Creek to Sheep Bridge, Reach 2 - Sheep Bridge to fence at U.S.G.S. station, Reach 3 - Fence to Stanton Crossing Reach 4 - Stanton Crossing to Davis Pond, and Rock Creek - Highway 20 to mouth

[b] Combined with previous reach

[c] A total of 42 female brown trout were trapped and spawned from this reach by Hayspur Hatchery in 1987

[d] Not surveyed

Table 8. FWIN overall ranking and parameter scores for Oakley Reservoir in 2008.

2008 Score	Benchmark classification		
Parameter	Value	Score	Note
CPUE≥450	1.11	1	Geomean with > 1 in sample
Age Classes	11	3	
Maximum age	17	3	
Shanon Div. Index	1.30	3	
	Score	2.5	

Parameter rank	Healthy/stable	Stressed/unstable	Unhealthy/collapsed
Score	3	2	1
CPUE≥450mm	≥2/net-1	0.44 to 1.99•net-1	≤0.43•net-1
No. of age classes	≥11 age classes	6 to 10 age classes	≤5 age classes
Maximum age	>16 years	14 to 16 years	≤13 years
Shannon Div. Index	≥0.66	0.56 to 0.65	≤0.55

Table 9. Walleye forage abundance index (mean CPUE) trends on Oakley Reservoir from 2004-2008.

Species	2004	2005	2006	2007	2008
Sucker spp.	<1	3	<1	0	0
Sculpin spp.	3	<1	0	1	<1
Spottail shiner	4	44	6	<1	18
Walleye	8	8	1	1	4
Yellow perch	21	55	87	14	4

Table 10. Walleye forage abundance index (mean CPUE) trends on Salmon Falls Creek Reservoir from 2004-2008,

Species	2004	2005	2006	2007	2008
Black crappie	2	34	2	0	4
Northern pikeminnow	0	<1	<1	0	0
Sculpin Spp.	0	1	0	0	0
Smallmouth bass	7	52	12	23	15
Spottail shiner	<1	5	1	0	1
Sucker Spp.	<1	<1	<1	0	0
Walleye	0	1	2	<1	<1
Yellow perch	2	115	98	1	9

Table 11. FWIN overall ranking and parameter scores for Salmon Falls Creek Reservoir in 2008.

Parameter	Value	Point	Note
CPUE≥450	7.11	3	Geomean with > 1 in sample
# Age classes	13	3	
Max. age	17	3	
Shanon Div. Index	1.89	3	
	Score	3.00	

Parameter rank	Healthy/stable	Stressed/unstable	Unhealthy/collapsed
Score	3	2	1
CPUE≥450mm	≥2/net-1	0.44 to 1.99•net-1	≤0.43•net-1
No. of age classes	≥11 age classes	6 to 10 age classes	≤5 age classes
Maximum age	>16 years	14 to 16 years	≤13 years
Shannon Div. Index	≥0.66	0.56 to 0.65	≤0.55

Table 12. Species catch per unit of effort during trout monitoring on Salmon Falls Creek Reservoir in 2008.

Species										
RBT	BRN	YP	NPM	LSS	BC	WE	HYB	BLS	CMC	*Total*
25.00	0.08	3.75	1.58	2.58	0.25	8.50	2.17	0.17	0.58	44.67

Table 13. Standard lowland lake survey catch data from a survey completed in Sublett Reservoir in April and June, 2008. Catch data are reported per one unit of effort.

	Catch [a]				Biomass (kg)			
		Gill net				Gill net		
Species	E-fish	Float	Sink	Total	E-fish	Float	Sink	Total
Brown trout	13	5	3	11	10.3	4.2	2.1	16.6
Rainbow trout	26	7	12	26	2.0	5.1	6.5	13.6
Yellowstone cutthroat trout	0	6	5	11	0.0	3.0	2.4	5.4
Mottled sculpin	72	0	0	18	0.7	0.0	0.0	0.7
Speckled dace	697	0	0	174	3.3	0.0	0.0	3.3
Total	808	18	20	240	16.3	12.3	11.0	39.6

[a] Effort Units: 1 electrofish, 2 sinking gill net, 2 floating gill net, 0 trap net

Table 14. Standard lowland lake survey catch characteristics by species from a survey completed in Sublett Reservoir in April and June, 2008.

		Length		Size categories [a]						
Species	Catch	Min.	Max.	S	Q	P	M	T	RSD-Q	RSD-P
Brown trout [b]	27	168	549	2	16	4	0	0	91	18
Rainbow trout	64	111	493	25	16	0	0	0	39	0
Yellowstone cutthroat trout	22	290	422	10	12	0	0	0	55	0
Mottled sculpin	72	63	115	- -	- -	- -	- -	- -	- -	- -
Speckled dace	697	33	105	- -	- -	- -	- -	- -	- -	- -
Total	882									

[a] S=Stock; Q=Quality; P=Preferred; M=Memorable; T=Trophy (Murphy and Willis 1996)

[b] Letic categories were not available for brown trout; used rainbow trout categories

Table 15. Summary of thermograph data recorded from four sites on the Little Wood River between Richfield, Idaho and the confluence of Silver Creek and the Little Wood River between May 1 and September 30, 2008.

	Site			
	1	2	3	4
Total days	122	122	122	122
Hot days *	0	46	9	35
Hot days (%)	0	38	7	29

* Days where at least one data point exceeded 23.8 ºC

Table 16. Estimated angler effort (hrs), catch rate (trout/hr), and catch (trout #'s) from three reaches of the Big Wood River in 1986, 1987, 1993, and 2008.

River section	Estimate	1986	1987	1993	2008
Croy Creek Bridge to Star Bridge	Effort	1,954 (565)	3,943 (1,026)	4,855 (1,737)	2,015 (830)
Catch-and-release	Catch rate	1.44	1.18	1.10	2.28 (1.14)
	Catch	2,813 (2,649)	4,662 (1,785)	5,182 (2,757)	4,821 (791)
Box Car Bend to Red Top Reach	Effort	2,769 (881)	4,255 (831)	3,925 (2,341)	4,445 (873)
Slot limit	Catch rate	1.60	1.18	0.60	0.93 (0.45)
	Catch	4,348 (1,955)	5,022 (2,074)	2,342 (1,930)	4,177 (1,401)
Hulen Meadows Bridge to NF Big Wood	Effort	3,635 (1061)	5,881 (1,484)	3,169 (1,500)	2,302 (741)
General season	Catch rate	1.04	1.78	0.30	0.23 (Na)
	Catch	7,088 (6,224)	10,462 (4,786)	1,011 (860)	504 (Na)
All reaches combined [a]	Effort	8,358	14,079	11,950	8,761 (1,415)
	Catch rate	1.36	1.38	2.0	1.06 (0.30)
	Catch	14,249	20,146	--	9,503 (1,609)

[a] 1986 and 1987 grand total represent the summed effort and catch, and mean catch rate

Table 17. Catch data and resulting abundance (Modified Petersen estimator) and density estimates of wild rainbow trout, bull trout, and mountain whitefish collected from the South Fork Boise River in September 2008.

						Abundance [a]		Density [b]	
Species	Length (mm)		M	C	R	Estimate	95% CI	Linear	Area
Wild rainbow trout	100-199		142	118	37	447	+/- 99	33.0	1.57
	200-399		75	57	25	169	+/- 39	12.2	0.60
		Total	217	175	62	615	+/- 107	44.4	2.17
Bull trout	200-299		19	19	8	43	+/- 15	3.1	0.15
	300-499		12	7	5	16	+/- 5	1.2	0.06
		Total	31	26	13	60	+/- 16	4.3	0.21
Mountain whitefish	100-199		44	23	11	89	+/- 30	6.4	0.31
	200-299		55	18	7	132	+/- 63	9.5	0.46
	300-399		29	10	6	46	+/- 17	3.3	0.16
		Total	128	51	24	267	+/- 70	19.3	0.94

[a] Fish/100 m
[b] Fish/100 m^2

Table 18. Trends in the abundance of rainbow trout, mountain whitefish, and bull trout in the South Fork Boise River from 1991 to 2008 as determined by mark/recapture estimators.

Species	Year	Est. (> 100 mm)	± 95% CI
Mountain whitefish	2008	411	97
	2005	336	63
	2002	399	147
	1998	683	272
	1994	377	107
	1991	735	231
Rainbow trout	2008	654	135
	2005	602	184
	2002	484	134
	1998	858	352
	1994	576	146
	1991	534	252
Bull trout [a]	2008	54	20

[a] Bull trout ≥ 200mm

Table 19. Length (total length mm) and weight (g) of catch data by species and run type from the South Fork Boise River in September 2008. Weights were not recorded for bull trout and mountain whitefish due to mechanical error.

Measure	Run	Species	Total (n)	Ave.	Stdev.	Min.	Max.
TL	Marking	Bull trout	31	291	73	205	480
		Mountain whitefish	138	226	82	85	366
		Wild rainbow trout	219	186	53	96	346
		TOTAL	388				
	Recapture	Bull trout	26	280	102	193	590
		Mountain whitefish	52	229	69	82	344
		Wild rainbow trout	179	181	55	97	341
			257				
Weight	Marking	Bull trout	- -	- -	- -	- -	- -
		Mountain whitefish	- -	- -	- -	- -	- -
		Wild rainbow trout	213	75	71	9	431
		TOTAL	213				
	Recapture	Bull trout	- -	- -	- -	- -	- -
		Mountain whitefish	- -	- -	- -	- -	- -
		Wild rainbow trout	106	66	72	11	344
		TOTAL	106				

Table 20. Kokanee escapement as managed through the weir on the South Fork Boise River from August 6th (weir closed) through November 1, 2008.

		Weekly escapement						
		Goal	Actual		Daily			
Week	Date	Female	Female	Males	Female	Male	Total	Comments
1	08/18/08	3,000	3,050	3,570	970	,200	2,170	
	08/19/08				410	600	1,010	
	08/20/08				750	900	1,650	
	08/21/08				0	0	0	
	08/22/08				670	870	1,540	
	08/23/08				250	0	250	
	08/24/08				0	0	0	
2	08/25/08	3,400	4,150	8,450	0	0	0	
	08/26/08				3,400	,500	7,900	
	08/27/08				0	0	0	
	08/28/08				0	,450	1,450	
	08/29/08				750	900	1,650	
	08/30/08				0	,550	1,550	
	08/31/08				0	50	50	
3	09/01/08	4,500	.0,043	.1,100	0	0	0	Wks 3 and 4 combined
	09/02/08				1,080	500	1,580	
	09/03/08				4,300	,500	9,800	
	09/04/08				3,800	,500	8,300	
	09/05/08				0	0	0	
	09/06/08				863	600	1,463	
	09/07/08				0	0	0	
4	09/08/08	3,500	2,110	5,798	0	,250	2,250	For week 5
	09/09/08				0	,240	1,240	
	09/10/08				0	0	0	
	09/11/08				1,650	,500	3,150	
	09/12/08				0	250	250	
	09/13/08				460	300	760	
	09/14/08				0	258	258	
5	09/15/08	2,500	0	3,214	0	714	714	
	09/16/08				0	,650	1,650	
	09/17/08				0	850	850	
	09/18/08				0	0	0	
	09/19/08				0	0	0	
	09/20/08				0	0	0	
	09/21/08				0	0	0	
6	09/22/08	2,000	2,900	2,459	0	0	0	Back on schedule
	09/23/08				2,900	,300	5,200	
	09/24/08				0	0	0	
	09/25/08				0	0	0	
	09/26/08				0	0	0	
	09/27/08				0	159	159	
	09/28/08				0	0	0	
7	09/29/08	1,000	1,007	2,000	1,007	,000	3,007	
	10/01/08				0	0	0	

Table 20. Continued

		Weekly						
		Goal	Actual		Daily			
Week	Date	Female	Female	Males	Female	Male	Total	Comments
	09/30/08				0	0	0	
	10/02/08				0	0	0	
	10/03/08				0	0	0	
	10/04/08				0	0	0	
	10/05/08				0	0	0	
8	10/06/08	500	500	600	0	0	0	
	10/07/08				500	600	100	
	10/08/08				0	0	0	
	10/09/08				0	0	0	
	10/10/08				0	0	0	
	10/11/08				0	0	0	
	10/12/08				0	0	0	
9	10/13/08	500	0	0	0	0	0	
	10/14/08				0	0	0	
	10/15/08				0	0	0	
	10/16/08				0	0	0	
	10/17/08				0	0	0	
	10/18/08				0	0	0	
	10/19/08				0	0	0	
10	10/20/08	0	972	1,200	0	0	0	
	10/21/08				0	0	0	
	10/22/08				972	200	172	
	10/23/08				0	0	0	
	10/24/08				0	0	0	
	10/25/08				0	0	0	
	10/26/08				0	0	0	
11	10/27/08	0	0	0	0	0	0	
	10/28/08				0	0	0	
	10/29/08				0	0	0	
	10/30/08				0	0	0	
	10/31/08				0	0	0	
	11/01/08				0	0	0	Trap opened [a]
	11/02/08				0	0	0	Trap opened
12	11/03/08	0	0	0	0	0	0	Trap opened
	11/04/08				0	0	0	Trap opened
	11/05/08				0	0	0	Trap opened
	11/06/08				0	0	0	Trap pulled
	Total	20,900	24,732	38,391	24,732	38,391	63,123	

[a] High flow event, heavy debris load forced the removal of pickets – few kokanee passed.

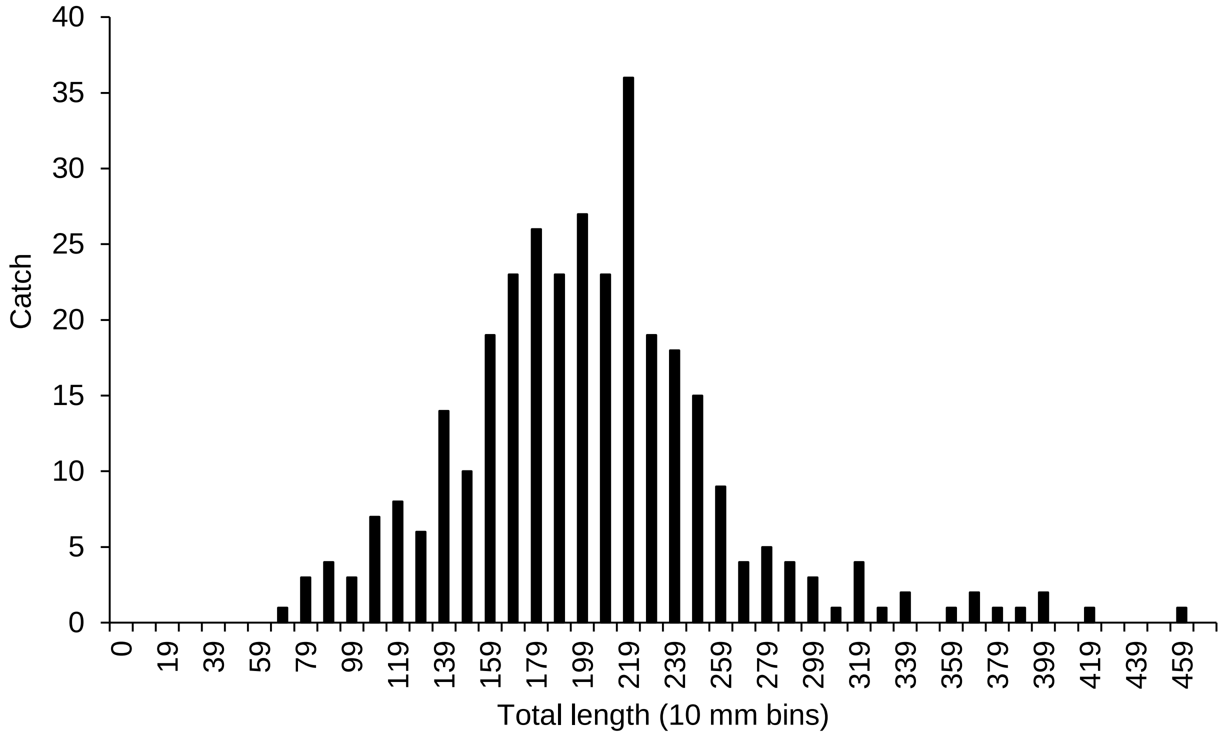

Figure 1. Length frequency histogram for Anderson Ranch Reservoir smallmouth bass sampling, 2008.

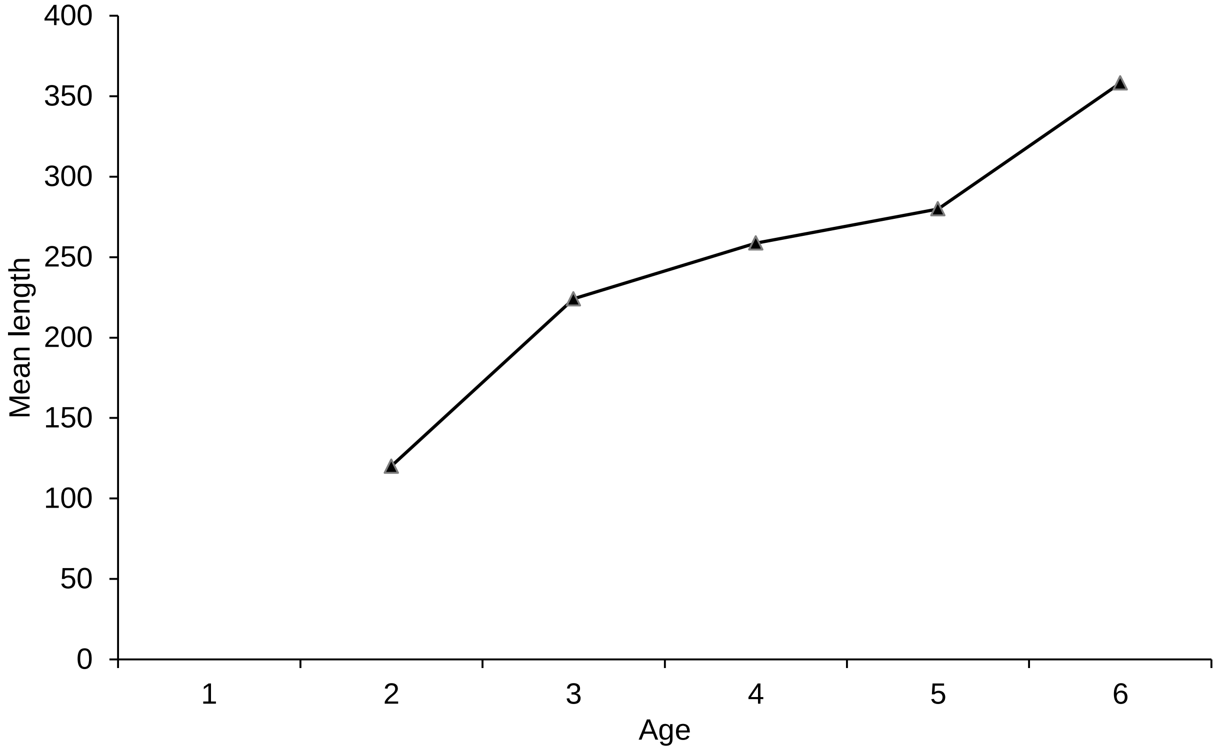

Figure 2 . Mean length-at-age for Anderson Ranch Reservoir smallmouth bass (n=39) sampled in 2008.

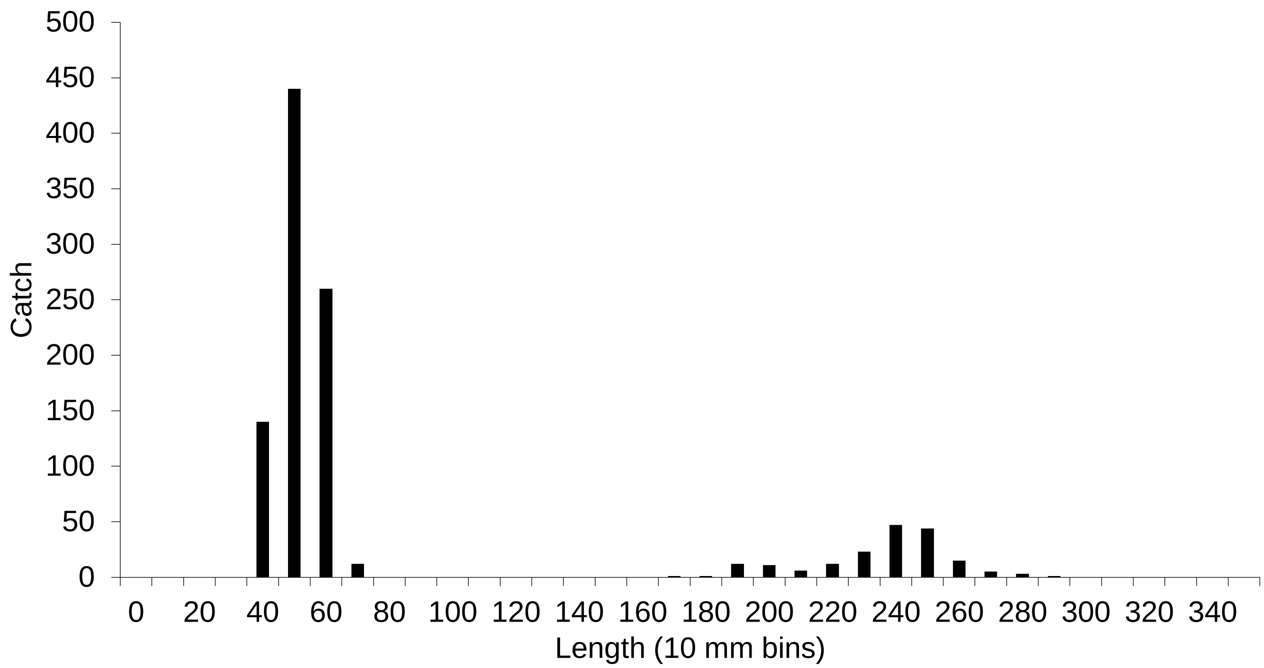

Figure 3. Length frequency histogram of kokanee caught in 21 trawls in Anderson Ranch Reservoir on July 28-30, 2008.

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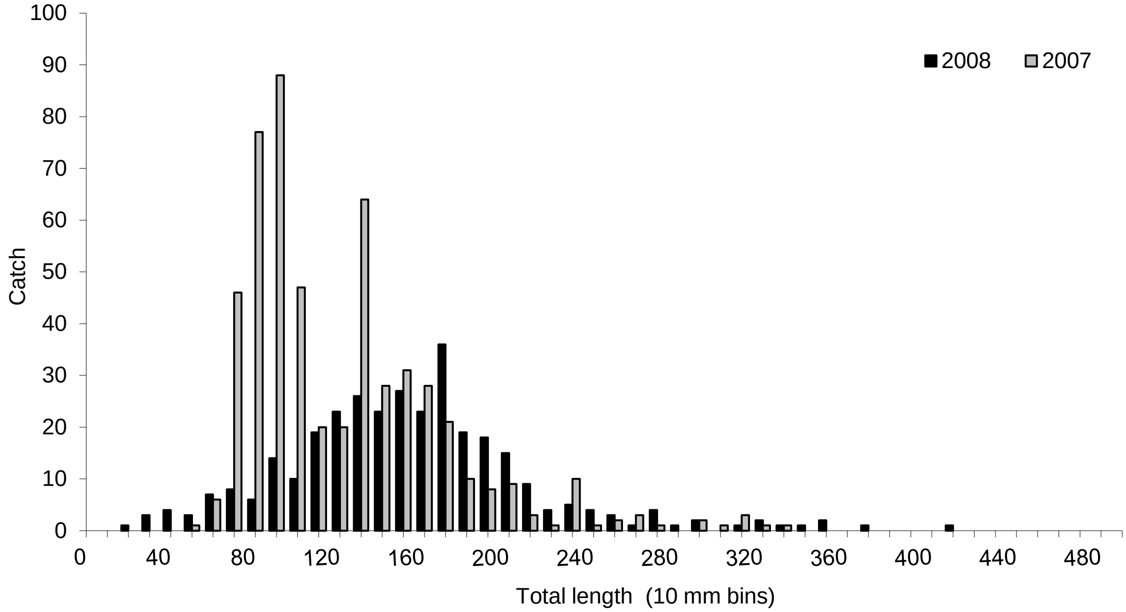

Figure 4. Comparative length frequency histogram for Anderson Ranch Reservoir smallmouth bass sampling in 2007 and 2008.

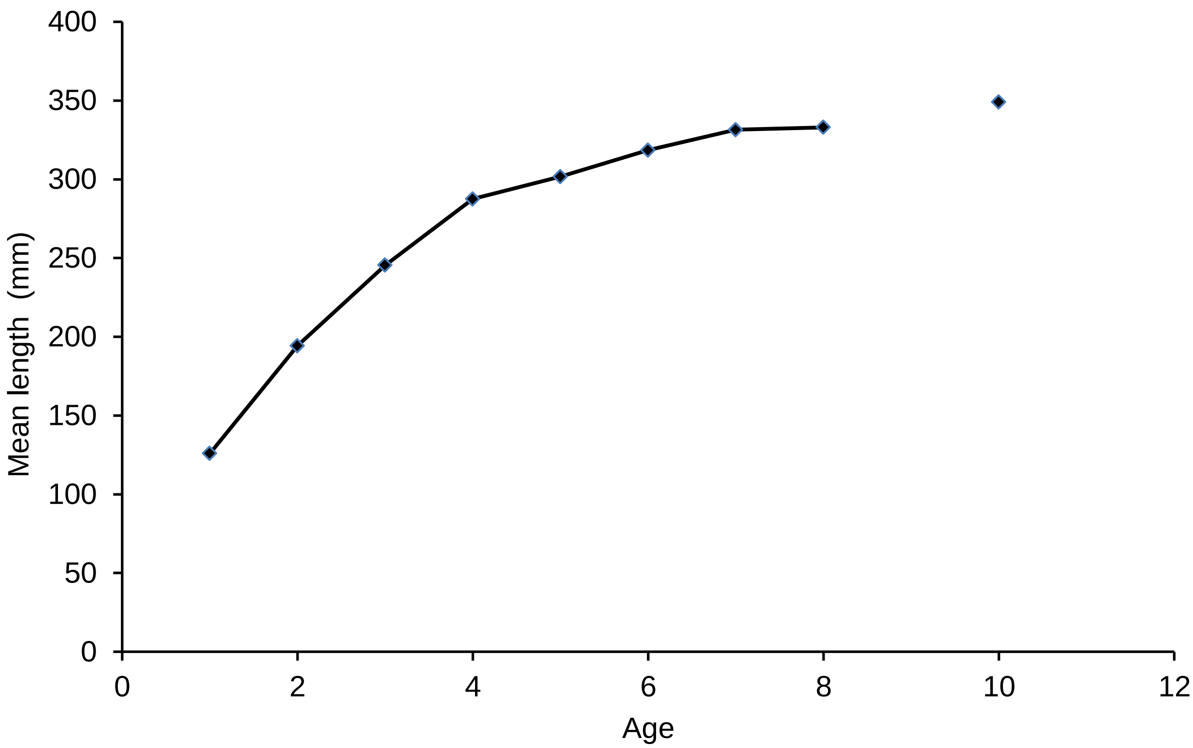

Figure 5. Mean length-at-age for largemouth bass sampled at Bell Rapids Reservoir in 2008.

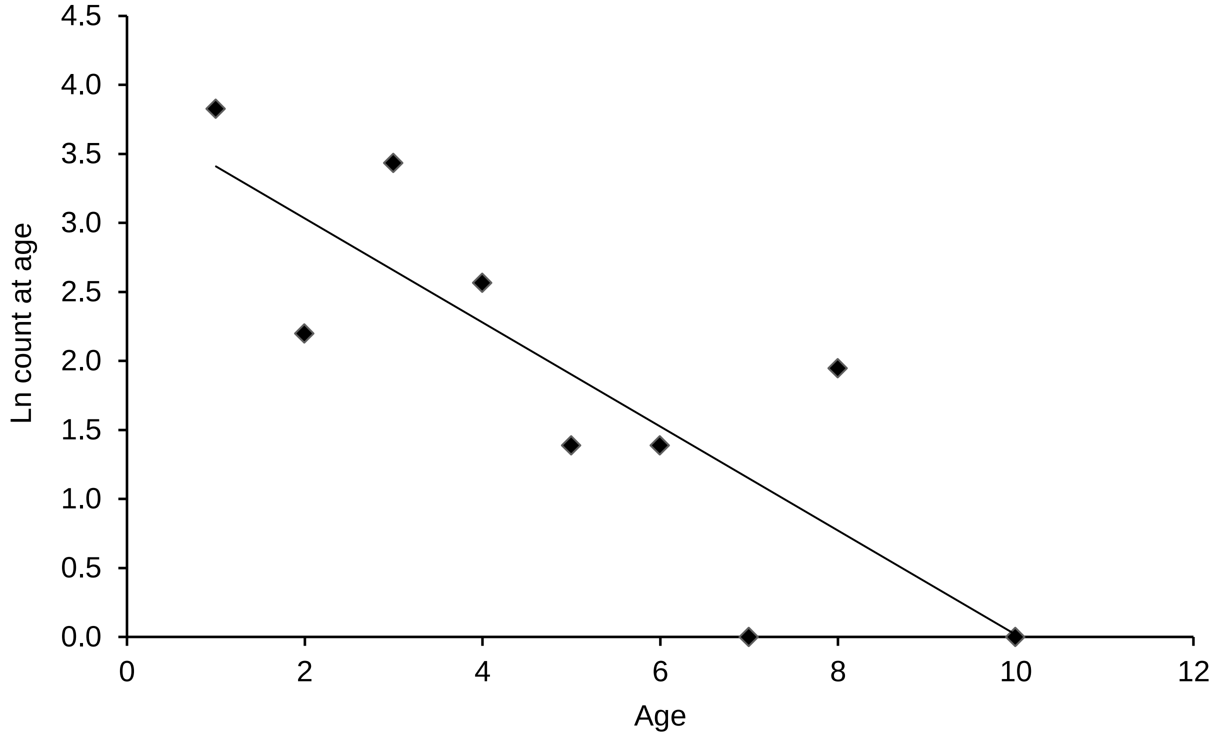

Figure 6. Weighted largemouth bass catch curve for Bell Rapids Reservoir sampling, 2008.

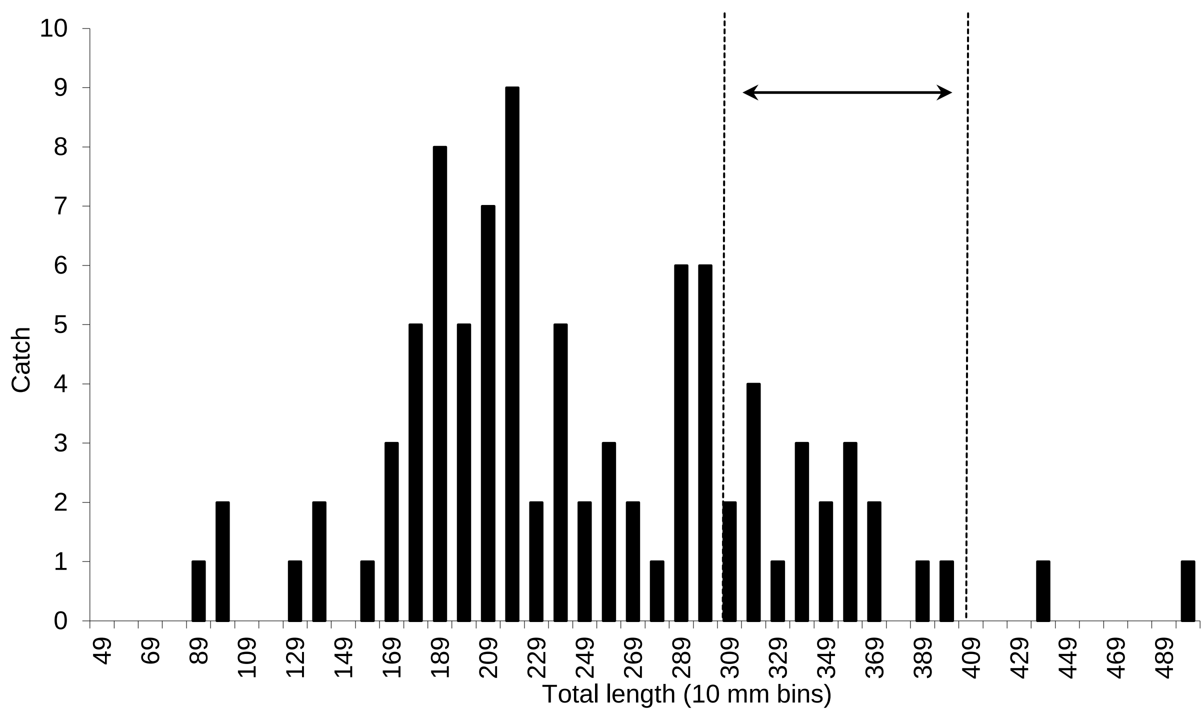

Figure 7. Largemouth bass length frequency histogram for 2008 sampling on Bell Rapids Reservoir. Dashed lines depict protected slot limit.

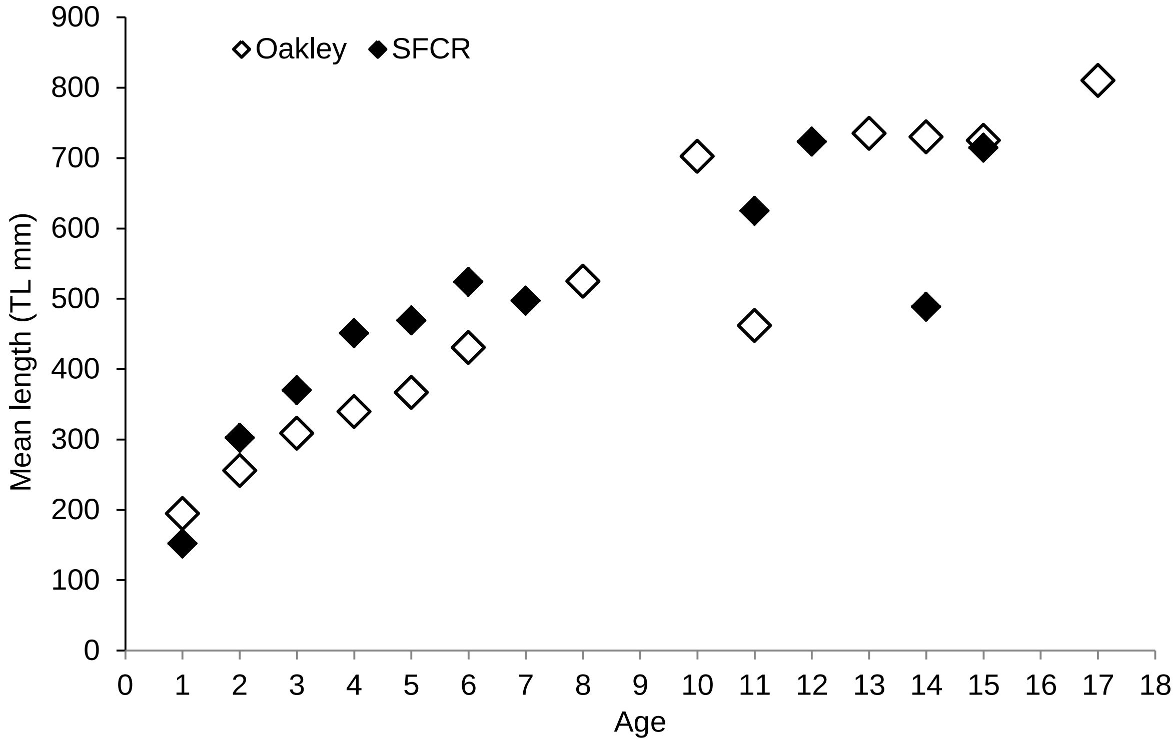

Figure 8. Mean length-at-age Walleye sampled from Oakley Reservoir and Salmon Falls Creek Reservoir (SFCR) in 2008.

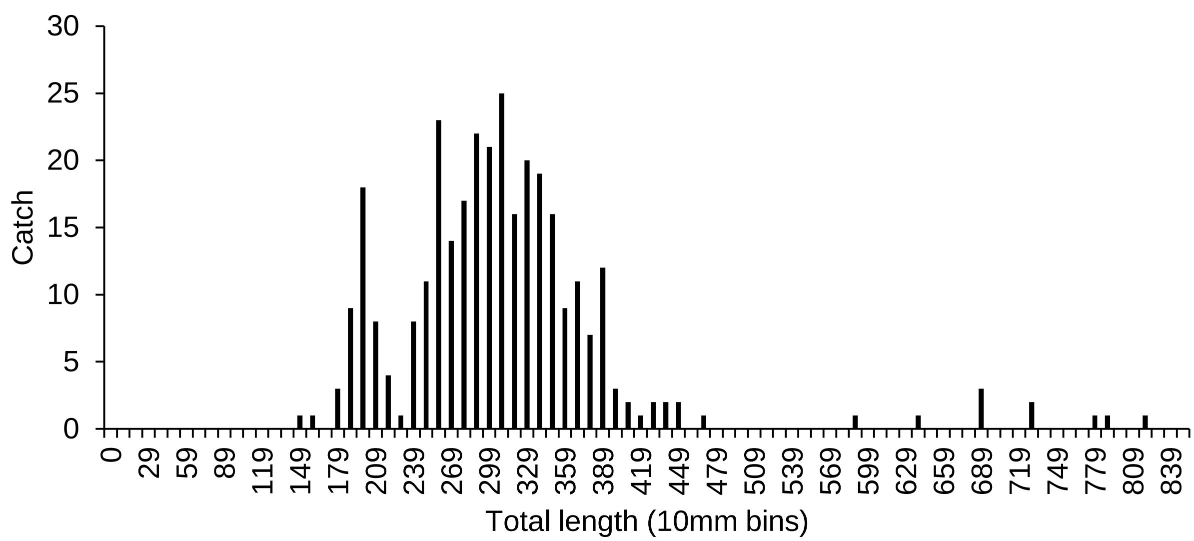

Figure 9. Walleye length frequency histogram for Oakley Reservoir sampling, 2008

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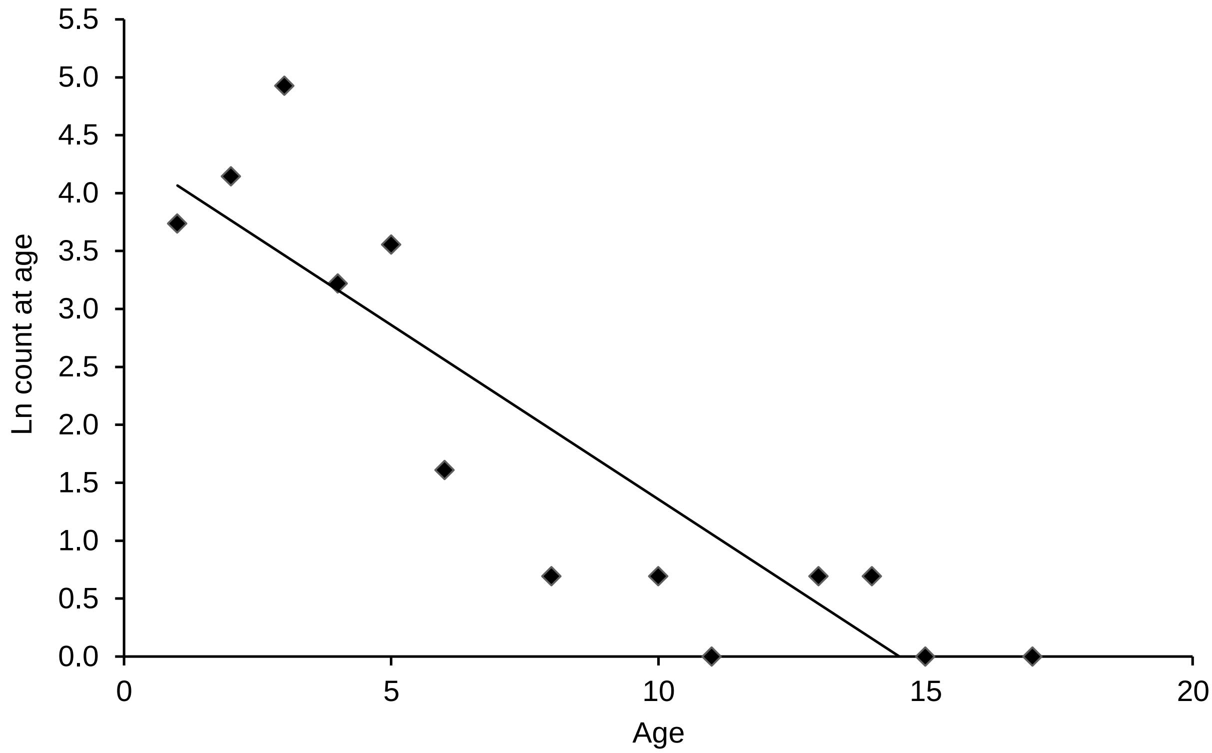

Figure 10. Weighted walleye catch curve for Oakley Reservoir sampling, 2008.

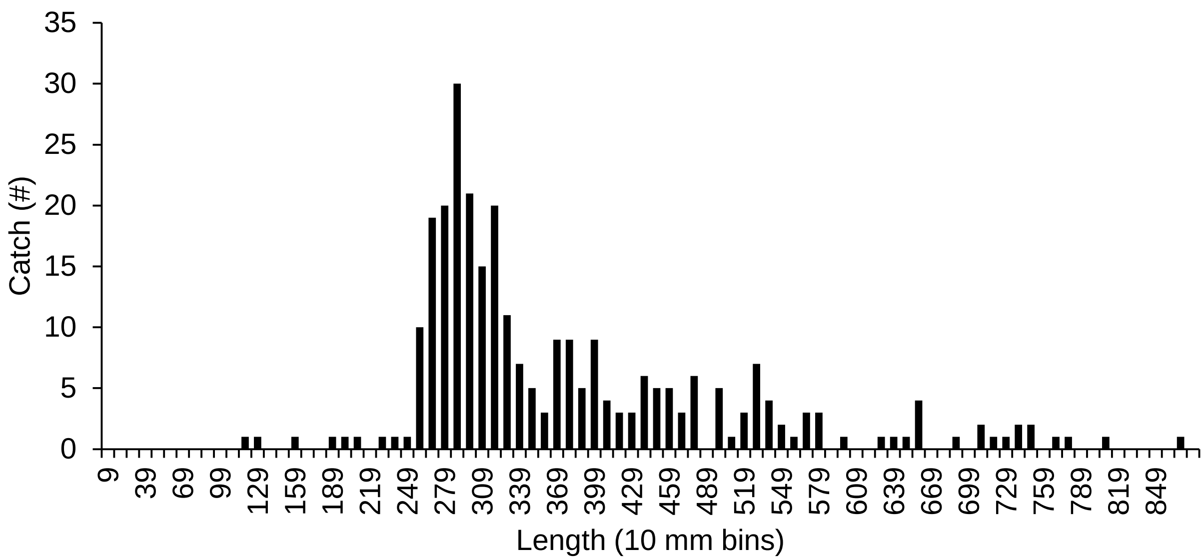

Figure 11. Walleye length frequency histogram for Salmon Falls Creek Reservoir sampling, 2008.

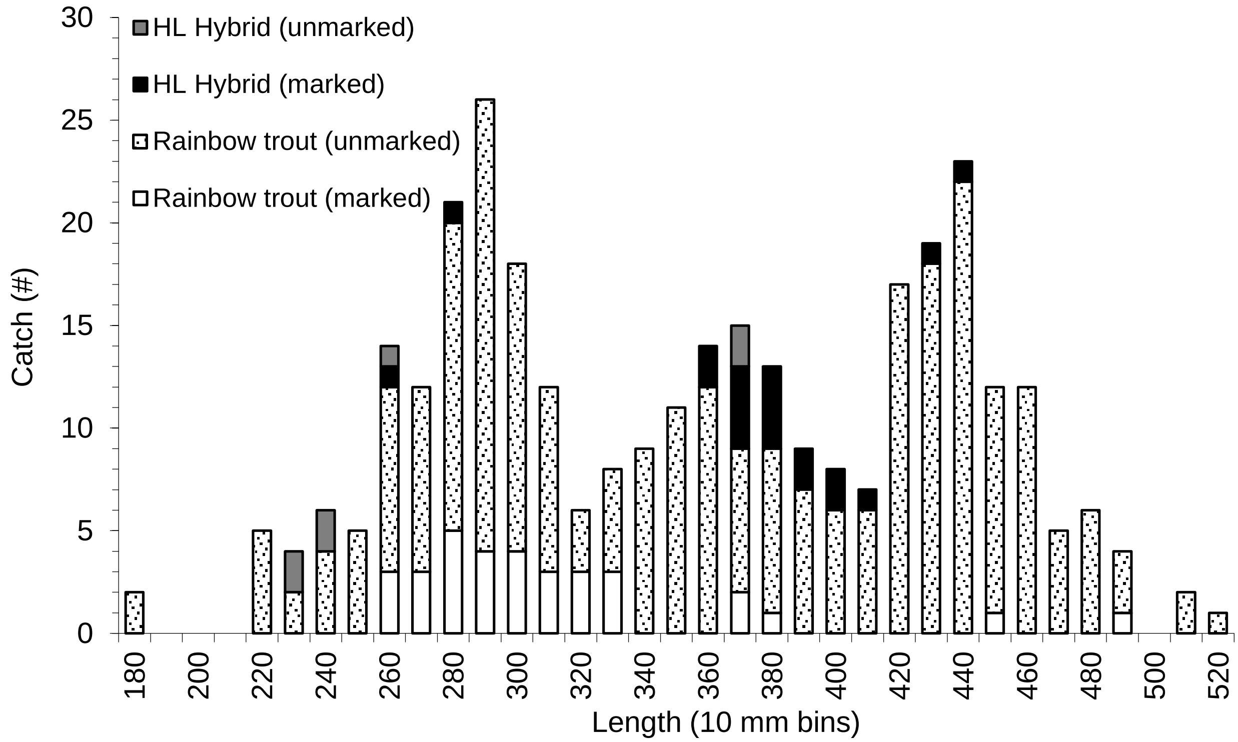

Figure 12. Length frequency histogram for trout sampled at Salmon Falls Creek Reservoir in 2008.

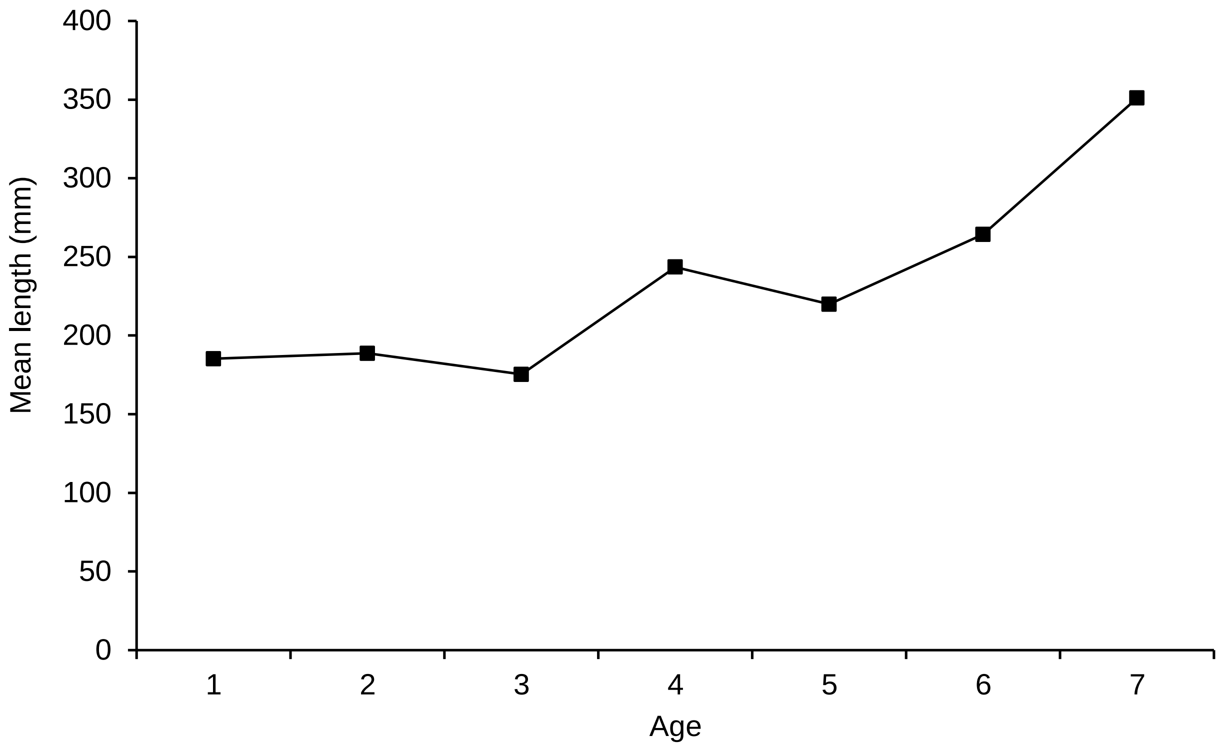

Figure 13. Mean length-at-age of smallmouth bass from Salmon Falls Creek Reservoir, 2008 sampling.

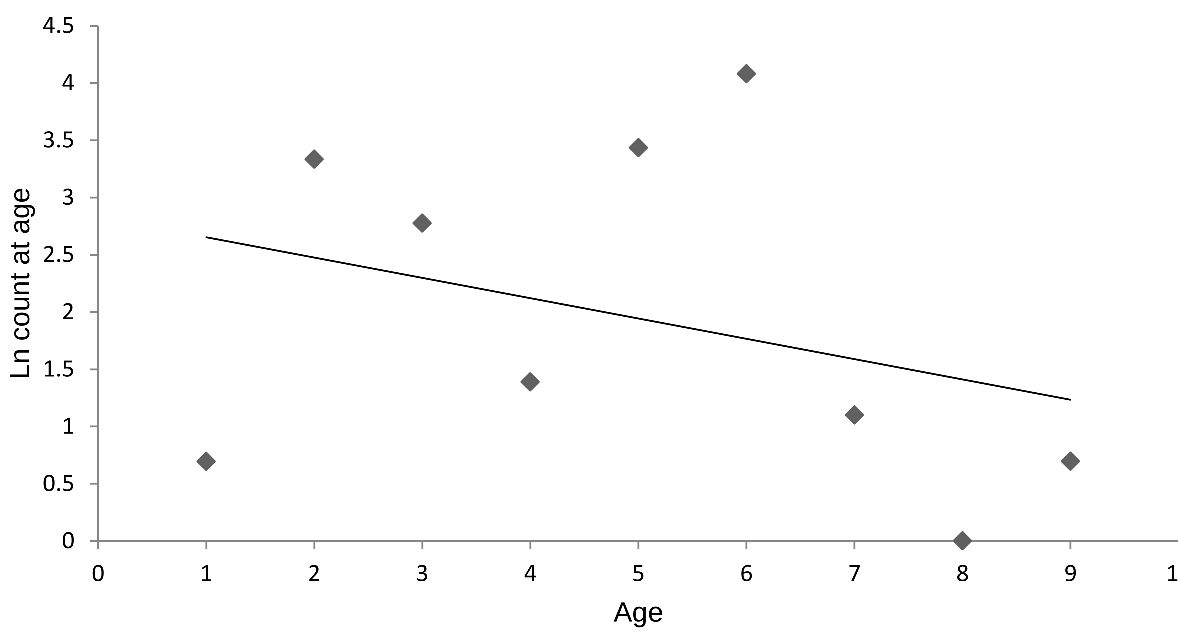

Figure 14. Smallmouth bass weighted catch curve for Salmon Falls Creek Reservoir sampling, 2008.

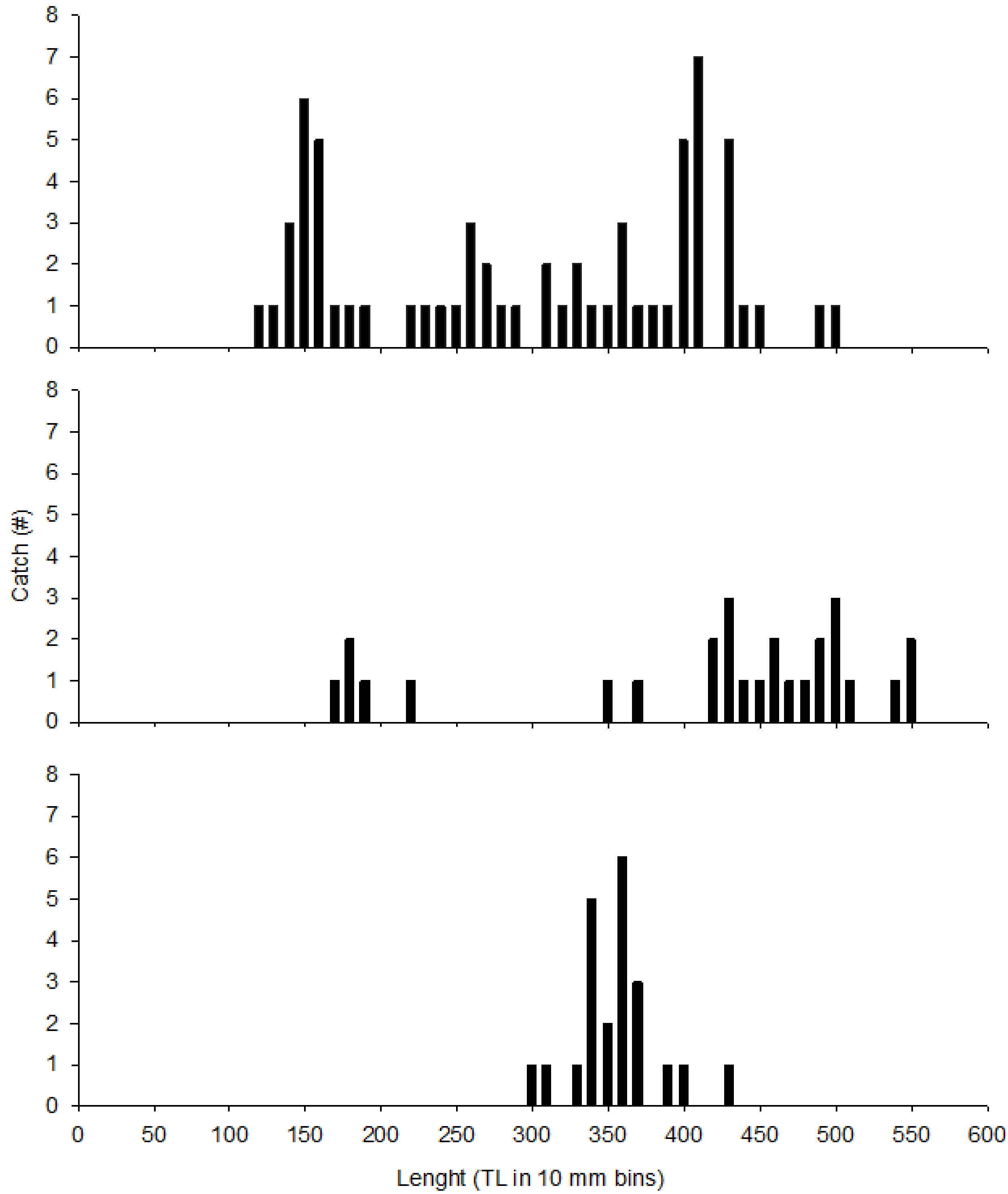

Figure 15. Length frequency histogram of rainbow trout (top), brown trout (middle), and Yellowstone cutthroat trout caught during a standard lowland lake survey completed in Sublett Reservoir in April and June, 2008.

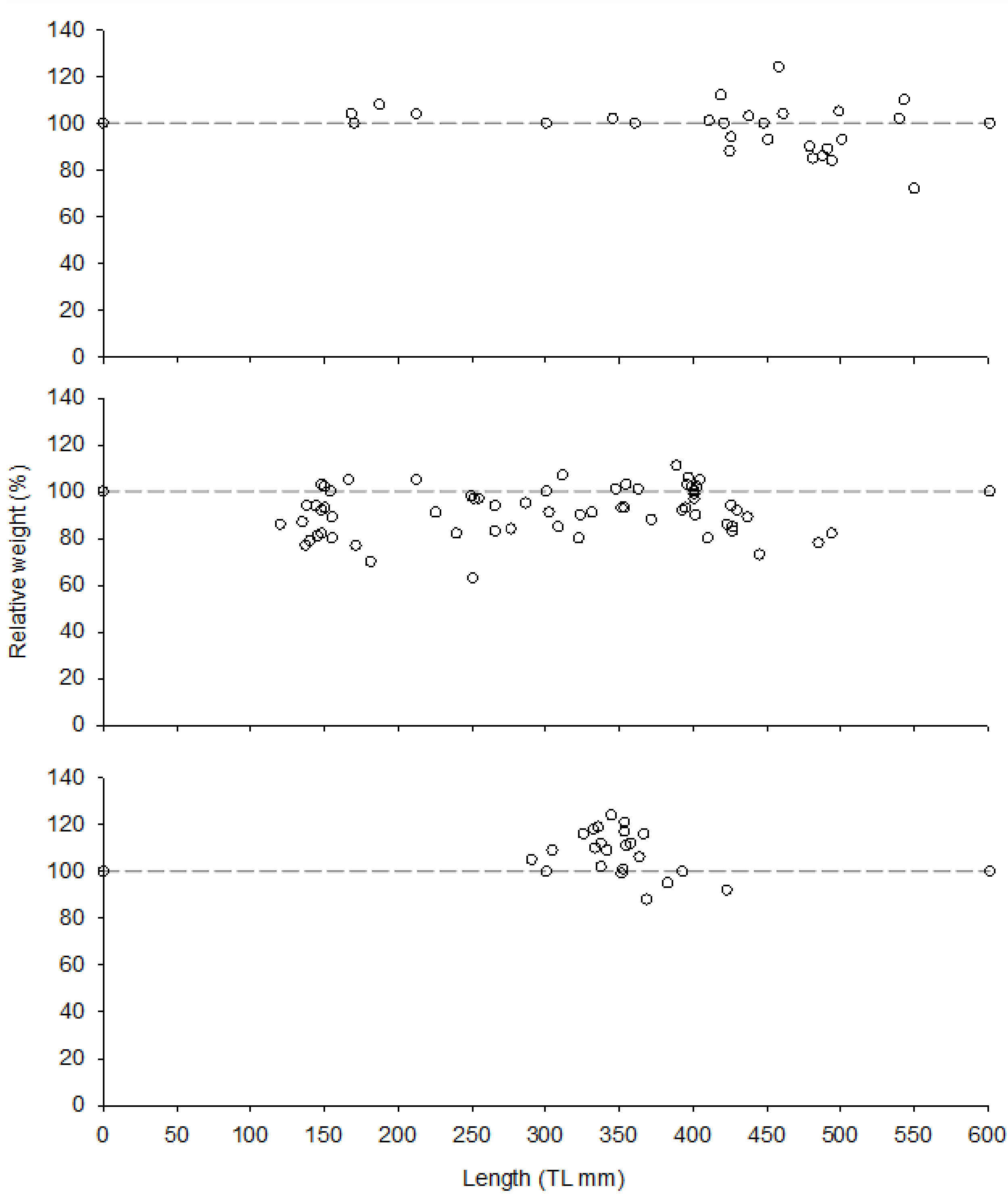

Figure 16. Relative weights of brown trout (top), rainbow trout (middle) and Yellowstone cutthroat trout (bottom) caught during a standard lowland lake survey completed in Sublett Reservoir in April and June, 2008.

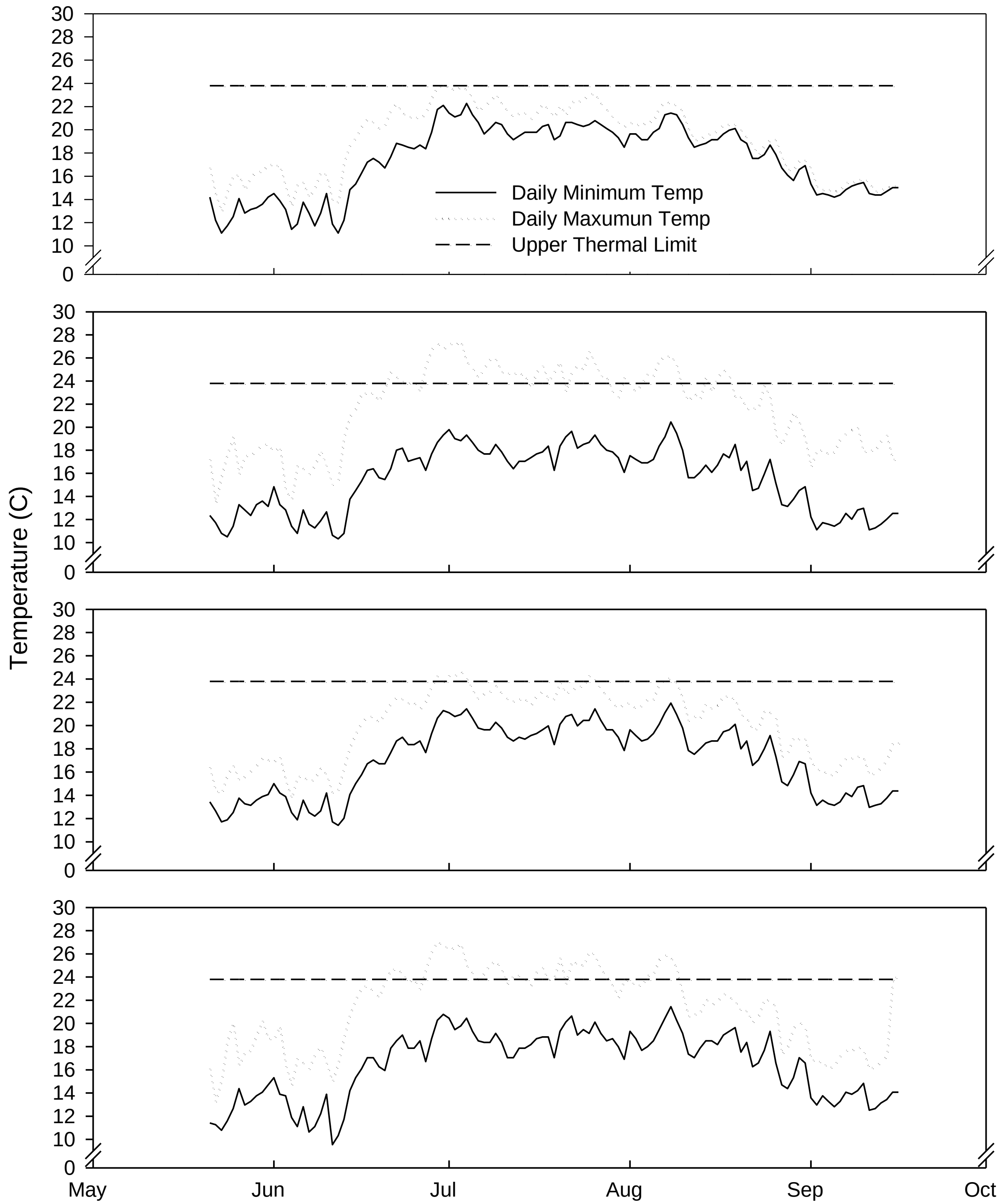

Figure 17. Daily maximum and minimum water temperatures from four locations on the Little Wood River from May 17 to September 14, 2008. Upper figure represents the most upstream site and lower figure represents the most downstream site. Dashed line represents upper temperature limit for rainbow trout (23.8 C).

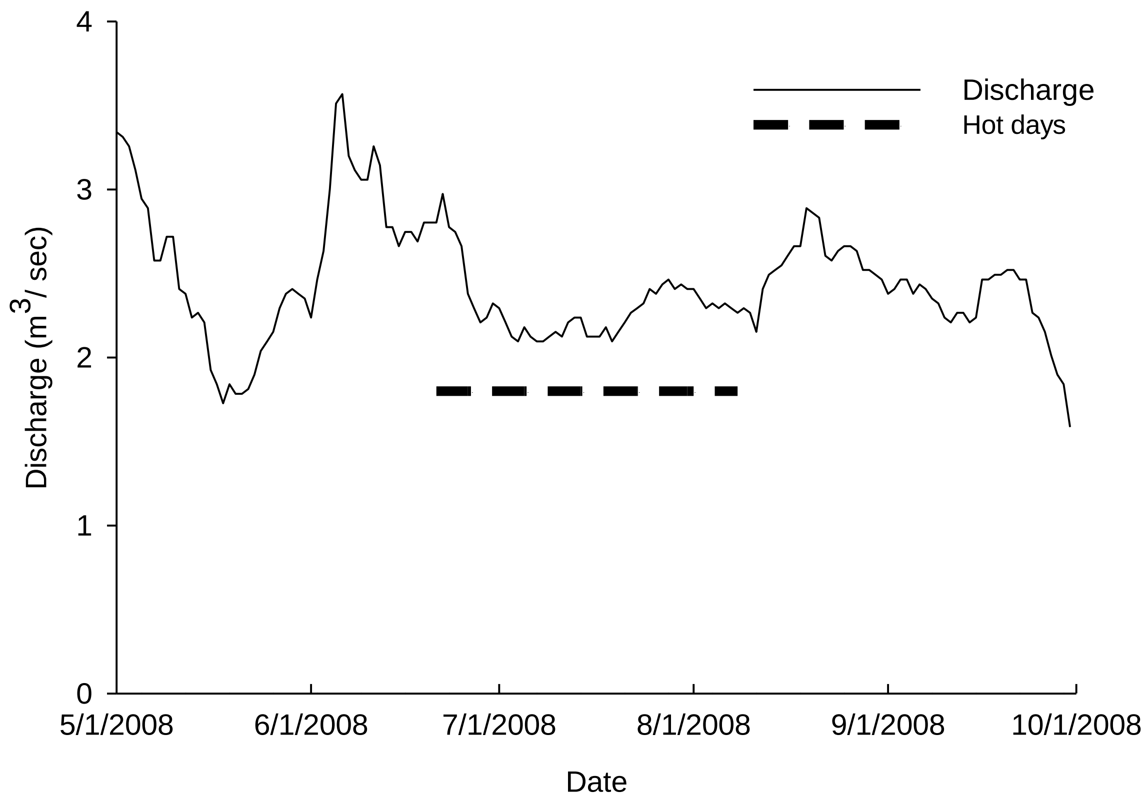

Figure 18. Daily stream discharge in Silver Creek, Idaho as reported from U.S.G.S gauge station (USGS 13150430 Silver Creek at sportsman access near Picabo, Idaho) from May 1 to September 30, 2008. Dashed line depicts the time period when water temperatures exceeded 23.8 C°.

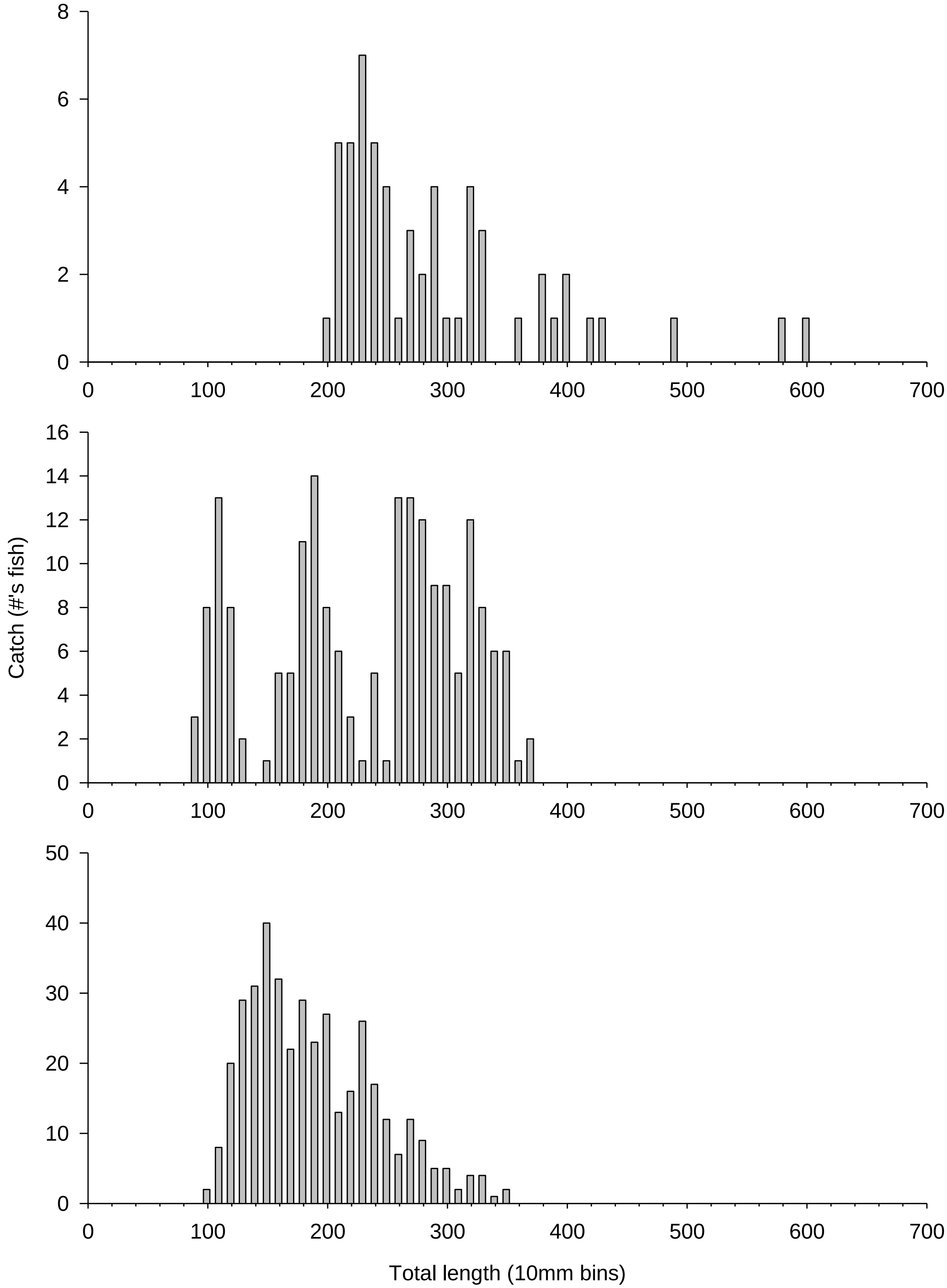

Figure 19. Length frequency histogram of bull trout (top), mountain whitefish (middle) and wild rainbow trout (bottom) in the electrofishing catch (non-recaptured fish) from the South Fork Boise River in September 2008.

Appendix A. Summary of 2008 fish sampling efforts and locations in the Magic Valley Region.

Water	Site #	Gear[a]	Start / Set	End / Pull	Time (h:min)	E	N	Zone	Datum	Note
ANDERSON RANCH RESERVOIR	1	E-FISH			:15	627656	4803456	11	WGS84	SMB EVAL
ANDERSON RANCH RESERVOIR	2	E-FISH			15	629027	4806015	11	WGS84	SMB EVAL
ANDERSON RANCH RESERVOIR	3	E-FISH			:15	630619	4807447	11	WGS84	SMB EVAL
ANDERSON RANCH RESERVOIR	4	E-FISH			:15	632972	4806815	11	WGS84	SMB EVAL
ANDERSON RANCH RESERVOIR	5	E-FISH			:15	633871	4807112	11	WGS84	SMB EVAL
ANDERSON RANCH RESERVOIR	6	E-FISH			:15	637976	4808590	11	WGS84	SMB EVAL
ANDERSON RANCH RESERVOIR	7	E-FISH			:15	637245	4810090	11	WGS84	SMB EVAL
ANDERSON RANCH RESERVOIR	8	E-FISH			:15	636560	4812543	11	WGS84	SMB EVAL
ANDERSON RANCH RESERVOIR	9	E-FISH			:15	63670	4813465	11	WGS84	SMB EVAL
ANDERSON RANCH RESERVOIR	10	E-FISH			:15	637908	4812162	11	WGS84	SMB EVAL
ANDERSON RANCH RESERVOIR	11	E-FISH			:15	637101	4810890	11	WGS84	SMB EVAL
ANDERSON RANCH RESERVOIR	12	E-FISH			:15	637139	4808232	11	WGS84	SMB EVAL
ANDERSON RANCH RESERVOIR	13	E-FISH			:15	634770	4806229	11	WGS84	SMB EVAL
ANDERSON RANCH RESERVOIR	14	E-FISH			:15	633894	4805551	11	WGS84	SMB EVAL
ANDERSON RANCH RESERVOIR	15	E-FISH			:15	631563	4805817	11	WGS84	SMB EVAL
ANDERSON RANCH RESERVOIR	16	E-FISH			:15	629933	4805528	11	WGS84	SMB EVAL
BELL RAPIDS	1	E-FISH			:15	671358	4745059	11	NAD27	LMB EVAL
BELL RAPIDS	2	E-FISH			:15	670840	4744421	11	NAD27	LMB EVAL
BELL RAPIDS	3	E-FISH			:15	668941	4740057	11	NAD27	LMB EVAL

Appendix A continued

Water	Site #	Gear[a]	Start / Set	End / Pull	Time (h:min)	E	N	Zone	Datum	Note
BELL RAPIDS	4	E-FISH			:15	668495	4738467	11	NAD27	LMB EVAL
BELL RAPIDS	5	E-FISH			:15	669015	4737573	11	NAD27	LMB EVAL
BELL RAPIDS	6	E-FISH			:15	669516	4736854	11	NAD27	LMB EVAL
BELL RAPIDS	7	E-FISH			:15	670846	4743640	11	NAD27	LMB EVAL
BELL RAPIDS	8	E-FISH			:15	669146	472710	11	NAD27	LMB EVAL
BELL RAPIDS	9	E-FISH			:15	668661	4741951	11	NAD27	LMB EVAL
BELL RAPIDS	10	E-FISH			:15	669283	4741080	11	NAD27	LMB EVAL
BELL RAPIDS	11	E-FISH			:15	668939	4740645	11	NAD27	LMB EVAL
BELL RAPIDS	12	E-FISH			:15	668317	4739774	11	NAD27	LMB EVAL
BELL RAPIDS	13	E-FISH			:15	668499	4737952	11	NAD27	LMB EVAL
BELL RAPIDS	14	E-FISH			:15	669048	4736726	11	NAD27	LMB EVAL
BIG WOOD RIVER	UPPER	REDD COUNT				717854	4801782	11	WGS84	REDD COUNTS
BIG WOOD RIVER	HWY 20 CROSSING	REDD COUNT				717419	4800641	11	WGS84	REDD COUNTS
BIG WOOD RIVER	USGS GAUGE	REDD COUNT				715608	4800424	11	WGS84	REDD COUNTS
BIG WOOD RIVER	SHEEP BRIDGE	REDD COUNT				714111	4800580	11	WGS84	REDD COUNTS
BIG WOOD RIVER	ROCK CREEK	REDD COUNT				712363	4800351	11	WGS84	REDD COUNTS
LITTLE WOOD RIVER	1	THERMO				742567	4786408	11	WGS84	TEMP
LITTLE WOOD RIVER	2	THERMO				740127	4783237	11	WGS84	TEMP

Appendix A continued

Water	Site #	Gear[a]	Start / Set	End / Pull	Time (h:min)	E	N	Zone	Datum	Note
LITTLE WOOD RIVER	3	THERMO				739011	4780900	11	WGS84	TEMP
LITTLE WOOD RIVER	4	THERMO				737217	4774486	11	WGS84	TEMP
OAKLEY RESERVOIR	1	E-FISH			:10			12	WGS84	FORAGE
OAKLEY RESERVOIR	2	E-FISH			:10			12	WGS84	FORAGE
OAKLEY RESERVOIR	3	E-FISH			:10			12	WGS84	FORAGE
OAKLEY RESERVOIR	4	E-FISH			:10			12	WGS84	FORAGE
OAKLEY RESERVOIR	5	E-FISH			:10			12	WGS84	FORAGE
OAKLEY RESERVOIR	6	E-FISH			:10			12	WGS84	FORAGE
OAKLEY RESERVOIR	7	E-FISH			:10			12	WGS84	FORAGE
OAKLEY RESERVOIR	8	E-FISH			:10			12	WGS84	FORAGE
OAKLEY RESERVOIR	2	FWIN GILL NET				258452	4674140	12	WGS84	FWIN
OAKLEY RESERVOIR	3	FWIN GILL NET	1120	1000		259141	4675245	12	WGS84	FWIN
OAKLEY RESERVOIR	4	FWIN GILL NET	1130	1015		257454	4672915	12	WGS84	FWIN
OAKLEY RESERVOIR	5	FWIN GILL NET	1140	1035		258200	4674777	12	WGS84	FWIN
OAKLEY RESERVOIR	6	FWIN GILL NET	1155	1045		257159	4671480	12	WGS84	FWIN
OAKLEY RESERVOIR	8	FWIN GILL NET	1210	1105		257879	4673734	12	WGS84	FWIN
OAKLEY RESERVOIR	9	FWIN GILL NET	1123	1110		258772	4674615	12	WGS84	FWIN
OAKLEY RESERVOIR	12	FWIN GILL NET	1130	1010		257360	4672203	12	WGS84	FWIN

Appendix A continued

Water	Site #	Gear[a]	Start / Set	End / Pull	Time (h:min)	E	N	Zone	Datum	Note
OAKLEY RESERVOIR	12	FWIN GILL NET	1140	1020		257478	4671659	12	WGS84	FWIN
OAKLEY RESERVOIR	14	FWIN GILL NET	1145	1035		257425	4672680	12	WGS84	FWIN
SALMON FALLS CREEK RESERVOIR	1	FWIN GILL NET	1145	940		257543	4673710	11	WGS84	FWIN
SALMON FALLS CREEK RESERVOIR	2	FWIN GILL NET	1200	950		686667	4665046	11	WGS84	FWIN
SALMON FALLS CREEK RESERVOIR	4	FWIN GILL NET	1220	1035		687053	4669830	11	WGS84	FWIN
SALMON FALLS CREEK RESERVOIR	5	FWIN GILL NET	1245	1000		687473	4667393	11	WGS84	FWIN
SALMON FALLS CREEK RESERVOIR	9	FWIN GILL NET	1300	1045		686968	4668752	11	WGS84	FWIN
SALMON FALLS CREEK RESERVOIR	11	FWIN GILL NET	1310	1055		686990	4665753	11	WGS84	FWIN
SALMON FALLS CREEK RESERVOIR	12	FWIN GILL NET	1130	945		686590	4669782	11	WGS84	FWIN
SALMON FALLS CREEK RESERVOIR	16	FWIN GILL NET	1140	1015		685616	4664027	11	WGS84	FWIN
SALMON FALLS CREEK RESERVOIR	20	FWIN GILL NET	1155	1000		686571	4674595	11	WGS84	FWIN
SALMON FALLS CREEK RESERVOIR	1	E-FISH			:10	687187	4675687	11	WGS84	FORAGE
SALMON FALLS CREEK RESERVOIR	2	E-FISH			:10	685941	4673259	11	WGS84	FORAGE
SALMON FALLS CREEK RESERVOIR	3	E-FISH			:10	685914	4670706	11	WGS84	FORAGE
SALMON FALLS CREEK RESERVOIR	4	E-FISH			:10	687089	4669854	11	WGS84	FORAGE
SALMON FALLS CREEK RESERVOIR	5	E-FISH			:10	687435	4668396	11	WGS84	FORAGE
SALMON FALLS CREEK RESERVOIR	6	E-FISH			:10	687688	4666782	11	WGS84	FORAGE
SALMON FALLS CREEK RESERVOIR	7	E-FISH			:10	685980	4665400	11	WGS84	FORAGE

Appendix A continued

Water	Site #	Gear[a]	Start / Set	End / Pull	Time (h:min)	E	N	Zone	Datum	Note
SALMON FALLS CREEK RESERVOIR	8	E-FISH			:10	685600	4663781	11	WGS84	FORAGE
SALMON FALLS CREEK RESERVOIR	9	E-FISH			:10	686051	4663339	11	WGS84	FORAGE
SALMON FALLS CREEK RESERVOIR	10	E-FISH			:10	684717	4660731	11	WGS84	FORAGE
SALMON FALLS CREEK RESERVOIR	1	BEFISH			:15	686492	4675171	11	WGS84	SMB EVAL
SALMON FALLS CREEK RESERVOIR	2	BEFISH			:15	687196	4673830	11	WGS84	SMB EVAL
SALMON FALLS CREEK RESERVOIR	3	BEFISH			:15	685964	4671074	11	WGS84	SMB EVAL
SALMON FALLS CREEK RESERVOIR	4	BEFISH			:15	687166	4668488	11	WGS84	SMB EVAL
SALMON FALLS CREEK RESERVOIR	5	BEFISH			:15	686998	4667008	11	WGS84	SMB EVAL
SALMON FALLS CREEK RESERVOIR	6	BEFISH			:15	686118	4665872	11	WGS84	SMB EVAL
SALMON FALLS CREEK RESERVOIR	7	BEFISH			:15	686851	4665066	11	WGS84	SMB EVAL
SALMON FALLS CREEK RESERVOIR	8	BEFISH			:15	687181	4664641	11	WGS84	SMB EVAL
SALMON FALLS CREEK RESERVOIR	9	BEFISH			:15	685415	4662677	11	WGS84	SMB EVAL
SALMON FALLS CREEK RESERVOIR	10	BEFISH			:15	686323	4664040	11	WGS84	SMB EVAL
SALMON FALLS CREEK RESERVOIR	11	BEFISH			:15	685964	4665015	11	WGS84	SMB EVAL
SALMON FALLS CREEK RESERVOIR	12	BEFISH			:15	686815	4667360	11	WGS84	SMB EVAL
SALMON FALLS CREEK RESERVOIR	13	BEFISH			:15	686873	4669536	11	WGS84	SMB EVAL
SALMON FALLS CREEK RESERVOIR	14	BEFISH			:15	686792	4670723	11	WGS84	SMB EVAL
SALMON FALLS CREEK RESERVOIR	15	BEFISH			:15	685796	4673676	11	WGS84	SMB EVAL

Appendix A continued

Water	Site #	Gear[a]	Start / Set	End / Pull	Time (h:min)	E	N	Zone	Datum	Note
SALMON FALLS CREEK RESERVOIR	16	BEFISH			:15	686455	4673266	11	WGS84	SMB EVAL
SALMON FALLS CREEK RESERVOIR	1	FGNET				687127	4674818	11	WGS84	TRT EVAL
SALMON FALLS CREEK RESERVOIR	2	FGNET				685924	4672771	11	WGS84	TRT EVAL
SALMON FALLS CREEK RESERVOIR	3	FGNET				687050	4669902	11	WGS84	TRT EVAL
SALMON FALLS CREEK RESERVOIR	4	FGNET						11	WGS84	TRT EVAL
SALMON FALLS CREEK RESERVOIR	5	FGNET				686620	4665460	11	WGS84	TRT EVAL
SALMON FALLS CREEK RESERVOIR	6	FGNET				686087	4671219	11	WGS84	TRT EVAL
SALMON FALLS CREEK RESERVOIR	7	FGNET				687466	4667937	11	WGS84	TRT EVAL
SALMON FALLS CREEK RESERVOIR	8	FGNET				686828	4667376	11	WGS84	TRT EVAL
SALMON FALLS CREEK RESERVOIR	9	FGNET				686465	4664366	11	WGS84	TRT EVAL
SALMON FALLS CREEK RESERVOIR	10	FGNET				685831	4662895	11	WGS84	TRT EVAL
SALMON FALLS CREEK RESERVOIR	11	FGNET				685809	4663606	11	WGS84	TRT EVAL
SALMON FALLS CREEK RESERVOIR	12	FGNET				686133	4665452	11	WGS84	TRT EVAL
SOUTH FORK BOISE RIVER	START	E-FISH				661103	827524	11	NAD27	TRD SUR
SOUTH FORK BOISE RIVER	END	E-FISH				662301	827323	11	NAD27	TRD SUR
SUBLETT Reservoir	1	FGNET				331734	4687975	12	WGS84	LOWLK SUR
SUBLETT Reservoir	2	FGNET				332143	4687718	12	WGS84	LOWLK SUR
SUBLETT Reservoir	3	SKGNET				331549	4688086	12	WGS84	LOWLK SUR

Appendix A continued

Water	Site #	Gear[a]	Start / Set	End / Pull	Time (h:min)	E	N	Zone	Datum	Note
SUBLETT Reservoir	4	SKGNET				331921	4687718	12	WGS84	LOWLK SUR
SUBLETT Reservoir	8	BEFISH				331594	4688331	12	WGS84	LOWLK SUR
SUBLETT Reservoir	8	BEFISH				331594	4688331	12	WGS84	LOWLK SUR
SUBLETT Reservoir	8	BEFISH				331594	4688331	12	WGS84	LOWLK SUR
SUBLETT Reservoir	8	BEFISH				331594	4688331	12	WGS84	LOWLK SUR
SUBLETT Reservoir	8	BEFISH				331594	4688331	12	WGS84	LOWLK SUR
SUBLETT Reservoir	8	BEFISH				331594	4688331	12	WGS84	LOWLK SUR
SUBLETT Reservoir	8	BEFISH				331594	4688331	12	WGS84	LOWLK SUR
SUBLETT Reservoir	8	BEFISH				331594	4688331	12	WGS84	LOWLK SUR
SUBLETT Reservoir	8	BEFISH				331594	4688331	12	WGS84	LOWLK SUR
SUBLETT Reservoir	8	BEFISH				331594	4688331	12	WGS84	LOWLK SUR
SUBLETT Reservoir	8	BEFISH				331594	4688331	12	WGS84	LOWLK SUR
SUBLETT Reservoir	8	BEFISH				331594	4688331	12	WGS84	LOWLK SUR
SUBLETT Reservoir	8	BEFISH				331594	4688331	12	WGS84	LOWLK SUR
SUBLETT Reservoir	8	BEFISH				331594	4688331	12	WGS84	LOWLK SUR

[a] E-Fish: stream electrofishing setup, BEFISH: boat electrofishing setup, SKGNET: sinking gill net, FGNET: floating gill net, THERMO: continuous water temperature loggings, FWIN GILL NEW: unique multi-pannel gill net used to sample walleye...

Appendix B. Equipment specifications for 2008 sampling in the Magic Valley Region.

Fishery type	Equipment	Description
Lakes & reservoirs	Power boat electrofisher	Smith-root © model SR-18 w/ model 5.0 pulsator
	Boom	Aluminum (2.6 m-long)
	Anode	Octopus-style steel danglers (1 m-long)
	Cathode	Boat and cathode array danglers - simultaneous
	Live well	Fresh flow aerated; 0.65 m^3
	Oxygen stone	35.6 X 3.8 cm (135 m^2); fine pore
	Generator	Honda © ; model EG5000x; 5,000 watt
	Electrofishing control box	Coffelt © ; model 15 VVP
	Sinking gillnet	6 panels (19, 25, 32, 38, 51, 64 mm bar-mesh); 38 x 1.8 m; monofilament
	Floating gillnet	6 panels (19, 25, 32, 38, 51, 64 mm bar-mesh); 38 x 1.8 m; monofilament
	Walleye Gillnet (FWIN)	8 panel (25, 38, 51, 64, 76, 102, 127, 152 mm bar-mesh); 61 x 1.8 m, monofilament
	Trap net	1.8 x 0.9 m box, 5 - 76 cm hoops, 15.2 m lead, 2 cm bar mesh
	Seine	18 m x 1 m, 6 mm mesh 18 m x 1 m, 3 mm mesh
	Conductivity meter	Yellow Springs Instruments © (YSI); model 30
	Plankton nets	250, 500, 750 *u* mesh; 0.5 m diameter mouth; 2.5 m depth
	Temperature / D.O. meter	Yellow Springs Instruments © (YSI); model 550A
	Dip nets	2.4 m-long handles ; trapezoid heads (0.6 m^2); 9.5 mm bar-mesh
	Secci disc	Standard; decimeter graduation

Appendix B continued

Fishery type	Equipment	Description
	Thermograph	Onset-Tidbit© v2 temp logger.
	Field PDA	Juniper Systems ©, model Allegro handheld; waterproof, WinCE/DOS compatible
	Scales	AND© 5000g electronic, OHAUS© 3000g, electronic Pesola © : , 300 g, 1 kg, 2.5 kg, 5.0 kg scales
	Car Counters	TRAFX© (Trafx Research Ltd., Conmore,Alberta)
Rivers and streams	Power boat electrofisher	Smith-root © model SR-18 w/ model 5.0 pulsator - see above for specs.
	Canoe	4.9 m-long aluminum
	Anode	13.7 m-long power cord; 2.4 m-long fiberglass handle; 0.4 m diameter steel hoop
	Cathode	Boat
	Live well	208 L plastic garbage can; O_2 supplemented
	Drift boat	4.5 m-long aluminum
	Boom	4.3 m-long fiberglass
	Anode	Octopus-style steel danglers (1 m-long)
	Cathode	Boat
	Live well	208 L rubber stock watering tub; O_2 supplemented
	Scales	AND© 5000g,electronic, OHAUS© 3000g,electronic Pesola © : , 300 g, 1 kg, 2.5 kg, 5.0 kg scales
	Oxygen stone	35.6 X 3.8 cm (135 m^2); fine pore
	Generator	Honda © ; model EG5000x; 5,000 watt
	Electrofishing control box	Coffelt © Model 15 VVP
	Oxygen stone	35.6 X 3.8 cm (135 m^2); fine pore
	Dip nets	2.4 m-long handles ; trapezoid heads (0.6 m^2); 9.5 mm bar-mesh
	Backpack electrofisher	Smith-root © model 15-D; single anode
	Conductivity meter	Yellow Springs Instrument © (YSI) model 30
	Thermograph	Onset-Tidbit© v2 temp logger.

Appendix C. List of aquatic species typically encountered in fisheries surveys in the Magic Valley Region.

.Common name	Family	Genus	Species - subspecies	Abbreviation
Arctic grayling	Salmonidae	Thymallus	arcticus	GR
Black bullhead	Ictaluridae	Ameiurus	melas	BLB
Black crappie	Centrarchidae	Pomoxis	nigromaculatus	BC
Blue catfish	Ictaluridae	Ameiurus	brunneus	BCF
Bluegill	Centrarchidae	Lepomis	macrochirus	BG
Bridgelip sucker	Catostomidae	Catostomus	columbianus	BLS
Eastern Brook trout	Salmonidae	Salvelinus	fontinalis	BKT
Brown bullhead	Ictaluridae	Ameiurus	nebulosus	BNB
Brown trout	Salmonidae	Salmo	trutta	BRN
Bull frog	Ranidae	Rana	catesbeiana	--
Bull trout	Salmonidae	Salvelinus	confluentus	BT
Channel catfish	Ictaluridae	Ictalurus	punctatus	CCF
Chiselmouth	Cyprinidae	Acrocheilus	alutaceus	CMC
Common carp	Cyprinidae	Cyprinus	carpio	CC
Common garter snake	Colubridae	Thamnophis	sirtalis	--
Copepod				--
Crayfish				--
Cutthroat trout	Salmonidae	Oncorhynchus	clarkii	CT
Daphnia				--
Fathead minnow	Cyprinidae	Pimephales	promelas	FHM
Gamerus (fresh water shrimp)	Palaemonidae			--
Golden trout	Salmonidae	Oncorhynchus	aguabonita	GT
Great Basin Spadefoot Toad	Pelobatidae	Scaphiopus	intermontanus	--
Green sunfish	Centrarchidae	Lepomis	cyanellus	GS
Largemouth bass	Centrarchidae	Micropterus	salmoides	LMB
Largescale sucker	Catostomidae	Catostomus	macrocheilus	LSS
Leatherside chub	Cyprinidae	Snyderichthys	copei	LSC
Leopard dace	Cyprinidae	Rhinichthys	falcatus	LPD
Leopard frog	Ranidae	Rana		--

Appendix C. continued

Common name	Family	Genus	Species - subspecies	Abbreviation
Longnose dace	Cyprinidae	Rhinichthys	cataractae	LND
Long-toed salamander	Ambystomatidae	Ambystoma	macrodactylum	--
Mottled sculpin	Cottidae	Cottus	bairdii	MSC
Mountain sucker	Catostomidae	Catostomus	platyrhynchus	MTS
Mountain whitefish	Salmonidae	Prosopium	williamsoni	MWF
New Zealand Mud Snail	Hydrobiidae	Potamopyrgus	antipodarum	--
Northern pikeminnow	Cyprinidae	Ptychocheilus	oregonensis	NPM
Peamouth	Cyprinidae	Mylocheilus	caurinus	PEA
Paiute sculpin	Cottidae	Cottus	beldingii	PSC
Pumpkinseed	Centrarchidae	Lepomis	gibbosus	PKS
Hatchery rainbow trout	Salmonidae	Oncorhynchus	mykiss	HRBT
Rainbow trout (wild)	Salmonidae	Oncorhynchus	mykiss	RBT
Redside shiner	Cyprinidae	Richardsonius	balteatus	RSS
Shorthead sculpin	Cottidae	Cottus	confusus	SHSC
Shoshone sculpin	Cottidae	Cottus	greenei	SSSC
Smallmouth bass	Centrarchidae	Micropterus	dolomieu	SMB
Snake River White Sturgeon	Acipenseridae	Acipenser	transmontanus	WST
Speckled dace	Cyprinidae	Rhinichthys	osculus	SPD
Spottail shiner	Cyprinidae	Notropis	hudsonius	STS
Tadpole Shrimp				--
Tailed frog	Leiopelmatidae	Ascaphus	truei	--
Utah chub	Cyprinidae	Gila	atraria	UTC
Utah sucker	Catostomidae	Catostomus	ardens	UTS
Walleye	Percidae	Sander	vitreus	WE
Western garter snake	Colubridae	Thamnophis		--
White crappie	Centrarchidae	Pomoxis	annularis	WC
Wood River sculpin	Cottidae	Cottus	leiopomus	WSC
Yellow bullhead	Ictaluridae	Ameiurus	natalis	YLB
Yellow perch	Percidae	Perca	flavescens	YP

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