FISHERY MANAGEMENT INVESTIGATIONS

IDAHO DEPARTMENT OF FISH AND GAME

FISHERY MANAGEMENT ANNUAL REPORT

Virgil Moore, Director

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Scott Stanton, Regional Fishery Biologist
Douglas Megargle, Regional Fishery Manager

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2009 Magic Valley Region Annual Fishery Management Report

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RIVER AND STREAM INVESTIGATIONS

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MOUNTAIN LAKES INVESTIGATIONS

Abstract

A standard high mountain lake survey was conducted on Independence Lake #2 in August 2009. One overnight sinking gill net was deployed resulting in a total catch of seven westslope cutthroat trout *Oncorhynchus clarkii lewisi* (i.e. CPUE=7). Total lengths of westslope cutthroat trout ranged from 300-365 mm and their weights ranged from 281-345 g. No Arctic grayling *Thymallus arcticus* were sampled despite an active stocking program. We can't conclude the absence of Arctic grayling given the small sample size and we'd recommend an increased sampling effort (additional net nights) to confirm a failed stocking effort. No evidence of salmonid natural production was detected. The lake experiences fairly heavy public use. We documented heavily used trails, five active fire pits, and anglers were seen onsite.

Authors:

Scott Stanton
Regional Fishery Biologist

Douglas Megargle
Regional Fishery Manager

Introduction

The Independence lakes are a chain of high mountain lakes. Independence Lake #2 is located near Cache Peak in southern Idaho (Appendix A). The lake has a surface area of approximately 5 ha, elevation of 2,755 m, and a northeast exposure.

The fishery is maintained through hatchery supplementation. Yellowstone cutthroat trout *Oncorhynchus clarkii bouvieri* are stocked on a three-year rotation in both Independence Lake #1 and #2 and Arctic grayling *Thymallus arcticus* are stocked annually.

The overall objective was to complete a standard mountain lake survey on Independence Lake #2 to evaluate the current hatchery stocking program.

Methods

A mountain lake survey was conducted on August 22-23, 2009 using the Idaho Department of Fish and Game (IDFG) standard protocol. A description of equipment used in mountain lake surveys is provided in Appendix B.

One sinking gill net was set overnight. All fish were identified to species, measured to total length (mm), and weighed (g). Catch data was summarized by species for length, weight, relative abundance, and catch-per-unit-effort (CPUE).

Water quality measures including temperature, alkalinity, total hardness, pH and specific conductivity were measured from mid-lake surface samples (see Appendix B for equipment descriptions). The level of human use and impact (e.g. trails, fire rings, and campsite development) was visually surveyed. Amphibian presence was not evaluated.

Results and Discussion

The lake appeared to provide suitable trout habitat. Specific water quality data are presented in (Table 1).

The catch was entirely made up of Yellowstone cutthroat trout. A total of seven cutthroat trout were collected in the gill net sample. Total length ranged from 300-365 mm and fish weight ranged from 281-345 g. No Arctic grayling *Thymallus articus* were caught or observed despite a recent stocking history. Approximately 2,080 grayling were stocked with fry in 2006 and we would have expected grayling to be part of the catch. We can't conclude the absence of artic grayling given the small sample size and recommend an increased sampling effort (additional net nights) to confirm a failed stocking effort.

No evidence was found that would suggest cutthroat trout or Arctic grayling are naturally producing. The lack of multiple cohorts in the catch suggests there is little to no natural recruitment. In addition, very little tributary spawning habitat was documented with most of the substrate being covered in sediment. No fish were observed in the inlet or the outlet.

The Independence Lakes are experiencing relatively high recreational use. A well-marked trail with a steep grade provided good access as evidenced by the numerous hikers, and anglers were observed at the lakes during the survey. Five dispersed historic campsites with five recently used fire pits were present in the area.

Management Recommendations

1. Repeat the mountain lake survey increasing the sampling effort (net nights) to increase the precision of the species relative abundance estimate.

2. Monitor angler catch and harvest rates using voluntary reporting techniques to gauge existing trout densities (fish/net night) against angler success.

3. Modifying the hatchery supplementation (increasing stocking densities and/or stocking frequency) if angler survey results indicate catch rates fall below 0.5 fish/hr.

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LAKES AND RESERVOIRS INVESTIGATIONS

ANDERSON RANCH RESERVOIR

Abstract

The Anderson Ranch Reservoir kokanee *Oncorhynchus nerka* population was surveyed using trawl abundance estimate techniques from July 21-22, 2009. We completed the prescribed sampling effort (21 transects) resulting in a catch of 793 fish made up of kokanee (n=351), yellow perch *Perca flavescens* (n=437), and smallmouth bass *Micropterus dolomieu* (n=5). Kokanee catch per trawl averaged 39 ± 28 (95% CI) and ranged from 2-51 fish. Kokanee lengths ranged from 20-350 mm

Total abundance of kokanee among all strata and age groups was estimated at 514,192 fish, representing a density of 333 fish/ha. Reservoir densities of age 0, 1, 2, and 3 kokanee were estimated at 279, 37, 9, and 6 fish/ha, respectively. Standing crop was estimated among all strata and age groups at 7.73 kg/ha.

The reduction in density is consistent with past fluctuations documented in Anderson Ranch Reservoir since 2003. This relative low density estimate will likely mean angling experiences will meet management objectives (IDFG 2007) in 2009 but fall short in 2010.

Authors:

Scott Stanton
Regional Fishery Biologist

Douglas Megargle
Regional Fishery Manager

Introduction

Anderson Ranch Reservoir is a Bureau of Reclamation (BOR) impoundment on the South Fork Boise River in Elmore County, Idaho. Maximum reservoir storage capacity is 60,833 cubic m, of which 3,575 cubic m is considered dead storage (USGS 1996). Anglers fishing Anderson Ranch Reservoir target primarily kokanee *Oncorhynchus nerka*, rainbow trout *Oncorhynchus mykiss*, smallmouth bass *Micropterus dolomieu*, and yellow perch *Perca flavescens*. Bull trout *Salvelinus confluentus* and several nongame 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. Fish management direction is to manage escapement and recruitment goals to provide catch rates of 1.0 fish/hr of kokanee with a mean size of 305 to 356 mm TL (IDFG 2007).

Anderson Ranch Reservoir kokanee abundance and escapement monitoring was continued in 2009 in an effort to identify management options for maintaining a quality fishery. Trends in reservoir kokanee abundance have been monitored on an annual basis using trawling techniques since 1987 (Partridge 1987) adopting more specific methods outlined in Rieman (1992) in 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 in the reservoir. Kokanee escapement control and monitoring efforts are described in the South Fork Boise River section of this report.

The objective of this sampling effort was to estimate kokanee abundance in Anderson Ranch Reservoir. Data derived from this effort will be used to determine if the fishery is meeting management goals (i.e. kokanee sizes) and to correlate reservoir abundance with kokanee escapement and size.

Methods

Kokanee abundance was estimated using nighttime trawling techniques described by Rieman (1992). Sample dates were on or around a new moon period, just prior to the fall spawn. Designated sampling strata followed the historical protocol (Partridge and Warren 1995). Seven transect tows were taken per strata. Trawls were completed using a 4.46 m^2 framed trawl net pulled at approximately 1.59 m/s. Net hauls were made on 180 second intervals per depth strata. Net hauls were made at three meter depth intervals from 7.3 m to 22.0 m.

Abundance, relative density, and standing crop were estimated by age group using an EXCEL spreadsheet developed by IDFG fisheries research personnel (Bill Harryman, IDFG, personal communication). Methodology for the trawling and data analysis was the same as used since 1987 (Partridge 1988).

Kokanee sampled during trawl efforts were measured to total length (mm) and weighed (g). 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 (Anderson and Newman 1996). Otoliths were aged from whole otoliths (surface read) or broken in half if a surface read was not possible. Otoliths were read using a dissecting microscope under 10X – 40X magnification.

Results

Anderson Ranch Reservoir kokanee were sampled on the nights of July 21 and 22, 2009. The reservoir elevation on the sample dates was approximately 1,260 m, about 19 m below full pool.

We completed the prescribed sampling effort (21 transects) resulting in a catch of 793 fish which was made up of kokanee (n=351), yellow perch (n=437), and smallmouth bass (n=5). Kokanee catch per trawl averaged 39 $\pm$ 28 (95% CI) and ranged from 2-51 fish. Kokanee lengths ranged from 20-350 mm (Figure 1).

A non-random subsample of kokanee was collected and aged (n=61). Length-at-age data were entered in the trawl spreadsheet to generate cohort density estimates.

Total abundance of kokanee among all strata and age groups was estimated at 514,192 fish, representing a density of 333 fish/ha. Reservoir densities of age 0, 1, 2, and 3 kokanee in 2009 were estimated at 279, 37, 9, and 6 fish/ha, respectively. The standing crop estimate among all strata and age groups was 7.73 kg/ha (Table 2).

Discussion

The 2009 density estimate in Anderson Ranch Reservoir is less than half of what the recorded density was in 2008. The reduction in density is consistent with past fluctuations documented in Anderson Ranch since 2003 (Table 3).

Management direction is to provide a kokanee fishery with catch rates of 1.0 fish/hr with mean lengths of 305 to 356 mm (IDFG 2007). Based on the reduced 2009 estimated densities and documented kokanee sizes, we would expect anglers to experience reasonably high catch rates of kokanee at or near the preferred mean lengths late in the 2009 kokanee fishing season but may experience declining catch rates in 2010. An annual creel during the peak kokanee fishing season (late June to early July) would provide correlative data to better evaluate the relation between reservoir densities and angler experiences.

Kokanee abundance trends found in Anderson Ranch Reservoir are, in large part, affected by factors outside IDFG control. Variables such as reservoir management, spawning habitat conditions, and winter survival of deposited eggs all play a critical part in the abundance of kokanee in Anderson Ranch reservoir. However, the Department can use supplementation, controlled harvest, and prescribed escapement to impact kokanee abundance. More specifically, the Department can supplement age-0 kokanee in poor recruitment years and limit escapement on the South Fork Boise River (SFBR) in high recruitment years.

Anderson Ranch Reservoir kokanee abundance estimates have been made annually for many years; however, no correlations have been established between SFBR kokanee escapement and reservoir recruitment and overall abundance. Escapement can be managed in high potential recruitment years to reduce reservoir abundance and improve size in the fishery. The Department can operate a complete migration barrier weir to monitor and/or control kokanee escapement on the SFBR. A correlation should be established between escapement and year-class strength in Anderson Ranch Reservoir to estimate the optimal escapement levels. This could be accomplished 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.

Management Recommendations

1. Annually monitor Anderson Ranch Reservoir kokanee abundance using both trawl and hydroacoustic techniques and combine with annual creel census to describe the relationship between reservoir abundance and angler success.

2. Develop a model that would use annual kokanee abundance estimates to predict YOY densities the following year. This information could be used to better address supplementation needs and to predict kokanee sizes available to anglers the following year.
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LOWER SALMON FALLS RESERVOIR (BELL RAPIDS)

Abstract

Largemouth bass *Micropterus salmoides* monitoring was initiated at Lower Salmon Falls Reservoir (Bell Rapids) in 2009. A total of 81 bass were collected with from seven 15-min sampling units resulting in a mean largemouth bass CPUE of 12 $\pm$ 2 (80% C.I.). Bass lengths ranged from 75-450 mm and weights ranged from 4-1,760 g (Figure 2). We estimated a PSD of 56 and the relative stock density of preferred size bass (RSD-Q) was determined to be 16%.

A subsample of largemouth bass were aged (n=70) and nine age classes were documented. The observed average length at age-5 was 325 mm. The theoretical maximum age was estimated at 10 years. Mean Wr was 107 (n=68, SD=16) and annual mortality was estimated at 28%.

A standard lowland lake survey was conducted at Lower Salmon Falls Reservoir (Bell Rapids) in 2009. The catch (n=923) was dominated by nongame species. The indexed catch (mean catch-per-unit-effort) was made up of black crappie *Pomoxis nigromaculatus* (<1%), bluegill *Lepomis macrochirus* (2%), common carp *Cyprinus carpio* (24%), smallmouth and largemouth bass combined (7%), sculpin spp. *Cottus* spp. (<1%), fathead minnow *Pimephales promelas* (<1%), northern pikeminnow *Ptychocheilus oregonensis* (<1%), peamouth *Mylocheilus caurinus* (<1%), rainbow trout (8 %), largescale sucker *Catastomus macrocheilus*. (54%), Utah chub *Gila atraria* (1%), and yellow perch (<1%).

Catch rates varied among species and across gear types. Catch rates (average catch/unit effort) were highest for nongame species. Largescale suckers and common carp combined made up over 75% of the catch and nearly 94% of the biomass, whereas sportfish made up just over 18% of the catch and just over 5% of the biomass.

Species composition of the catch differed between this survey and a previous effort in 1991. Partridge and Warren (1994) reported a catch made up of 17 different fish species whereas the 2009 survey only documented 12. All species found in the 2009 survey were present in 1992; however no brown trout, mountain whitefish, brown bullhead, chiselmouth chub, or redside shiner were collected in 2009.

Authors:

Scott Stanton
Regional Fishery Biologist

Douglas Megargle
Regional Fishery Manager

Introduction

Lower Salmon Falls Reservoir (Bell Rapids) was created by the construction of Lower Salmon 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 ha and a maximum depth of about 12 m.

While dominated by nongame species such as common carp *Cyprinus carpio* and suckers *Catostomus spp.*, the reservoir supports a fishery for largemouth bass *Micropterus salmoides* and stocked rainbow trout *Oncorhynchus mykiss* with incidental catches of smallmouth bass *M. dolomieu* (Warren et al. 2001). 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 two-fish daily bag limit with a protected slot-limit length (305-406 mm) restriction from July 1 to December 31. The current management plan essentially directs the Department to evaluate the existing fishing rules to determine if the conservative rules are effective and to consider adopting general bass rules (Idaho Department of Fish and Game 2007).

In 2009, both a standard lowland lake survey and a bass population monitoring effort were conducted on Lower Salmon Falls Reservoir. Information gathered from these surveys and future surveys will be used to compare species relative abundance, relative biomass, stock structure, and species growth over time. In addition, data collected during the standard bass monitoring will be used to evaluate the existing largemouth bass population and how that population has responded to protective regulations.

The overall objective of these sampling events was to describe the relative species composition (catch/unit effort), relative biomass (kg/unit effort) and ultimately to use these data to monitor the largemouth bass fishery over time and address regulation proposals across all Magic Valley Region bass fisheries.

Methods

Largemouth Bass Monitoring

The Regional bass monitoring protocol is used to monitor smallmouth and largemouth bass populations within the Magic Valley Region. This survey technique provides data for the evaluation of relative abundance (expressed as catch/unit effort), stock structure, fish condition (Wr), fish growth (length at age), and fish survival (catch curve).

Largemouth bass monitoring is conducted in the spring with water temperatures between 15 C and 24 C when largemouth bass are known to spawn (Heidinger 1975) or 16 and 24 when smallmouth bass are known to spawn. The bass populations are surveyed at night using the boat electrofishers manned with two netters targeting only bass (See Appendix B for gear description). Each electrofishing sample (effort unit) consists of 15 minutes of shocking effort (power on) at randomly chosen sample sites throughout the reservoir.

We estimated the number of electrofishing sample units (i.e. 900 seconds) required to describe mean catch/effort (CPUE) within identified confidence bounds and power goals. While in the field, a sample size estimator incorporated into a PDA (Personal Digital Assistant – i.e. electronic data device) provided real-time estimates of the mean CPUE, the associated precision of that estimate, and estimated sampling units needed to describe the true mean within the desired precision and power identified (PDA software: Data Plus Solutions Software©, Cohen 1988). We attempted to complete sufficient sample units to describe the mean CPUE ± 20% with 80% confidence (t-value=1.26). However, in some cases the number of sample units required to meet our identified confidence bounds and power goals was large due to highly variable catch between sample units and sufficient sample units may not have been completed due to limited time in the field.

All largemouth bass collected are measured total length (TL, mm) and weighed (g). Efforts are made to collect 5 fish from each cm length group between the smallest and largest bass collected during the effort. Otoliths are prepared for age estimation by breaking the otolith centrally, burning or browning the broken edge with an alcohol burner, and viewing the otolith with a dissecting microscope at 30X – 40X. Otoliths are coated with mineral oil to improve viewing clarity (Anderson and Neuman 1996). Mean length-at-age is calculated from the sub-sample of fish. Fish growth is evaluated from the mean-length-at-age summary using FAST software (Fisheries Analysis and Simulation Tools, Version 2.1©).

Stock structure and condition indices are generated in FAST software. Proportional stock density (PSD) is calculated to index the largemouth bass population stock structure (Anderson and Neuman 1996). Relative weights (Wr) are calculated in EXCEL© software and are reported as the mean Wr of individual fish from the catch.

Mortality and survival were estimated to evaluate the effects of exploitation and other limiting factors. Annual mortality and survival were estimated using a catch curve (Van Den Avyle 1993). Catch curves are generated in FAST© software.

This bass survey did not strictly follow the regional bass survey methods described above. Although both largemouth and smallmouth bass are found in this fishery, our analysis included only largemouth bass given the low relative abundance of smallmouth bass (Ryan and Megargle 2007). As described above, the regional bass surveys require netters target only bass; however, we opted to incorporate a bass survey concurrently with the lowland lake survey by implementing the electrofishing component of the lowland lake survey using the 15-min power on sampling effort. Additionally, netters targeted all fish species and bass CPUE was derived from a component of that catch.

Approximate electrofishing sample locations are listed in Appendix A and are the same locations as reported for the electrofishing locations for the standard lowland lake survey.

Lowland Lake Survey

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 ha. Sample locations are randomly selected (Van Vooren 1992). A description of equipment used in lowland lake surveys is listed in Appendix B.

Lowland lake surveys direct equal effort for collection of all fish species present. Fish sampled during lowland lake surveys are identified to genus and species, and measured to total length (mm) and weighed (g). Sub samples of fish weights are used when the catch is prolific and sufficient data is collected to model fish weights from measured TL. Within the subsample, a minimum of 100 fish from each species are randomly collected and should represent the observed range of fish sizes. Fish are recorded by species specific group counts (similar sizes) when time is limited. For each gear type used, data are summarized by average catch, average biomass, and combined gear average catch-per-unit-effort. Population indices including proportional stock densities (PSD), relative stock densities (RSD), 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 within the size range of the catch.

The objective of this effort was to generate an index to describe the species diversity and their relative abundance and relative biomass in this fishery. These data can be compared across fisheries and among years to help identify substantial shifts and to highlight management issues that need further investigation.

Results

Largemouth Bass Monitoring

Bass monitoring of Lower Salmon Falls Reservoir (Bell Rapids) was completed on June 2 and June 6, 2009. A total of 81 bass were collected with seven 15-min sampling units resulting in a mean CPUE of 12 $\pm$ 2 (80% C.I.)(Table 4).

Bass lengths ranged from 75-450 mm and weights ranged from 4-1,760 g (Figure 2). We estimated a PSD of 56 and the relative stock density of preferred size bass (RSD-Q) was determined to be 16% (Table 4).

A subsample of largemouth bass were aged (n=70) and nine age classes were documented. The observed average length at age-5 was 325 mm (Figure 3). The theoretical maximum age was estimated at 10 years. Mean Wr was 107 (n=68, SD=16) and annual mortality was estimated at 28%.

Lowland Lake Survey

Based on acreage, it was determined that Lower Salmon Falls Reservoir would require seven units-of-effort to sample the fishery under the standard lowland lake survey protocol. However, we did not apply the full prescribed lowland lake survey effort.

The lowland lake survey monitoring was actually completed with six floating gill net sets, six trap net sets, and seven hours of electrofishing. One of the floating gill nets was deployed but was lost and recovered at a later date and the catch was not comparable to those nets set overnight. One trap net failed to fish due to tampering and no sinking gill nets were used to avoid white sturgeon mortality. Therefore, for this survey, the mean catch/unit effort is equal to one floating gill net, one trap net, and one hour of electrofishing. Sample locations are listed in Appendix A.

The catch (n=923) was dominated by nongame species. The indexed catch (mean catch-per-unit-effort) was made up of black crappie *Pomoxis nigromaculatus* (<1%), bluegill *Lepomis macrochirus* (2%), common carp *Cyprinus carpio* (24%), smallmouth and largemouth bass combined (7%), sculpin spp. *Cottus* spp. (<1%), fathead minnow *Pimephales promelas* (<1%), northern pikeminnow *Ptychocheilus oregonensis* (<1%), peamouth *Mylocheilus caurinus* (<1%), rainbow trout (8 %), largescale sucker *Catastomus macrocheilus* (54%), Utah chub *Gila* *atraria* (1%), and yellow perch (<1%)(Figure 4). Common carp and largescale sucker made up the majority of the biomass in the catch (94%).

Catch rates varied among species and across gear types. Catch rates (average catch/unit effort) were highest for nongame species. Largescale suckers and common carp combined made up over 75% of the catch and nearly 94% of the biomass, whereas sportfish made up just over 18% of the catch and just over 5% of the biomass (Table 5).

Largemouth bass lengths ranged from 75-450 mm. The average Wr was 108 (n=63, SD=9) and the PSD was determined to be 55 (n=66, stock=200 mm, quality=300 mm).

Rainbow trout lengths ranged from 70-480 mm. The average Wr was 82 (n=73, SD=9) and the PSD was determined to be 3 (n=85, stock=250 mm, quality=400 mm).

Smallmouth bass lengths ranged from 90-445 mm. The average Wr was 98 (n=15, SD=11) and the PSD was estimated at 58 (n=15, stock=180 mm, quality=280 mm).

Discussion

Largemouth Bass Monitoring

The largemouth bass PSD has varied among years in Lower Salmon Falls Reservoir. Various surveys since 1987 have reported Largemouth bass PSD values of 41, 62, 59, 17, 33 and 56 (Grunder et al. 1987, Partridge and Warren 1994, Ryan and Megargle 2005, Ryan and Megargle 2007, Stanton et al. 2013). Based on PSD values over time, we can conclude there is likely fluctuating recruitment in the fishery, but anglers still have the opportunity to catch desirable sized largemouth bass. Largemouth bass PSD variations are common in fisheries with unstable recruitment and most Idaho largemouth bass fisheries do not have stable recruitment (Dillon 1992).

Catch data from 2009 showed a CPUE of 12 bass. In a 2008 bass survey as reported by (Stanton et al. 2013), the CPUE was 7 bass. Catch-per-unit-effort in 2007 reported by Ryan et al. 2007 was 11 bass. In a 2005 survey (Ryan and Megargle 2005), the mean CPUE was 11 bass. Trends in catch per unit effort appear to be relatively similar based on 2005-2009 with a slight decrease noticed in 2008 sampling. We chose to resample the Bell Rapids bass population to determine if the 2008 CPUE was repeatable which would suggest a relatively large decline in bass abundance. The 2009 catch rate rebounded and more closely resembled rates found in 2007 which suggests sampling efficiency (seasonal influence) may better explain the decreased catch rates seen in 2008.

Evaluation of the current size structure of largemouth bass, under slot-limit restrictions in Lower Salmon Falls Reservoir, suggested current conservative fishing regulations may not be overly effective. Anderson (1996) stated that the proper function of length slot-limits was to increase numbers of size protected fish (within the slot), promote growth of smaller fish by reducing inter-specific competition through angler harvest, and increase production of trophy fish. Based on the length frequency histogram of the catch (Figure 2), it does not appear the protective regulations are resulting in increased numbers of size protected fish or those fish equal to or greater than the minimum quality sizes (300 mm) (Anderson and Neuman 1996).

Based on relative weights, it appears as though growth is relatively good in Lower Salmon Falls Reservoir. However, Dillon (1992) suggests largemouth bass growth compensation strictly related to total fish density is unlikely; therefore, we might assume any density reductions outside of the slot limit will not result in overall growth benefits. Dillon (1992) also suggests there may be year class competition if a strong year class is produced particularly if high minimum length limits are in place.

The existing slot limit in Lower Salmon Falls Dam may be effectively serving as a high minimum length limit. Conservation officers believe bass angler pressure in Lower Salmon Falls Reservoir is relatively low and that most harvested bass are either illegal (within the protective slot limit) or above the slot limit (Clint Rogers, IDFG, Idaho, personal communication). This likely means the angler harvest more closely reflects harvest in a fishery with a minimum length limit of 406 mm, which can be considered a high minimum length limit. Under this this scenario, Dillon (1992) suggested the fishing rules could result in widely fluctuating fishery quality particularly pertaining to the production of trophy fish.

Adopting general bass regulations (minimum length limit = 304 mm) combined with seasonal protection during the largemouth bass spawn may increase angler use and harvest in Lower Salmon Falls Reservoir while preserving the opportunity to catch larger-sized largemouth bass. The current data do not appear to support the perpetuation of the slot limit, and relieving the fishery of at least some of the conservative rules may result in greater angler use. Larger-sized bass are most often sought by anglers during the spawning period, and these fish could be protected from harvest with a seasonal closure or through a minimum length limit imposed during the spawning period. We recommend options be publically scoped including the keeping the existing regulations.

Lowland Lake Survey

Results from the 2009 lowland lake survey can be compared to a lake survey completed in 1991 (Partridge and Warren 1994). These two surveys are not directly comparable since sampling methods differed but general comparisons are useful. The 2009 survey was a standard lowland lake survey whereas the 1991 survey was not classified as a lowland lake survey but implemented to describe the species composition of the fishery. The 1991 survey used electrofishing and sinking gillnets whereas the 2009 survey used floating gillnets, trap nets, and electrofishing.

Species composition of the catch differed between the two surveys. Partridge and Warren (1994) reported a catch made up of 17 different fish species whereas the 2009 survey only documented 12. All species found in the 2009 survey were present in 1992; however no brown trout, mountain whitefish, brown bullhead, chiselmouth chub, or redside shiner were collected in 2009. Some of this difference may be due to the use of sinking gillnet in 1992 and not in 2009 (bias towards deep water benthic fish species: brown bullhead, chiselmouth chub); however, brown trout, mountain whitefish, and redside shiner were collected in electrofishing samples in 1992 but not in 2009 therefore it is possible these species may no longer persist in the fishery.

Despite an ongoing hatchery supplementation program (8-10K catchables annually), rainbow trout made up a relatively small component of the relative catch (9%) and relative biomass (2%). Partridge and Warren (1994) reported variable rainbow trout relative abundance (varied by gear type) ranging from 1-11% which is similar to our results. Evaluation of angler effort, catch rate, catch, and harvest of those stocked trout would help interpret this result and provide information pertinent to the existing stocking strategy.

The relative abundance of smallmouth and largemouth bass remain similar between the 1992 and 2009 surveys. Partridge and Warren (1994) reported smallmouth bass made up 1% of the catch and largemouth bass ranged from 2-22% depending upon the gear used. Our results indicate relative abundance of smallmouth and largemouth bass was 1% and 7%, respectively. It does not appear as though there has been any substantial shift since 1992.

The lowland lake survey performed on Lower Salmon Falls Reservoir in 2009 indicates the fish community is dominated by suckers and common carp and, based on relative abundance and biomass, is providing a modest sportfishing opportunity. The largemouth bass may be negatively impacted by the abundance of common carp in the fishery. Wolfe et al. (2009) suggested centrarchid populations may be influenced by common carp. He found although centrarchid spawning was successful and larval growth and survival did not decrease in the presence of common carp, centrarchid growth slowed once they entered the juvenile stages. This growth reduction was attributed to food resource limitation resulting from direct competition with common carp for forage, high turbidity caused by common carp, or both. Aquatic vegetation has declined substantially over the past couple of decades and it's highly likely the common carp are at least part of the cause (increased turbidity). Commercial fishing for carp ceased sometime in the early 1990's which coincides with the observation of declining aquatic vegetation (Fred Partridge, IDFG, Idaho, personal communication). A reduction in carp densities may mitigate competition between common carp and largemouth bass (i.e. growth) and may increase the abundance of aquatic vegetation through a reduction in turbidity. A substantial reduction in common carp abundance would most easily be accomplished using commercial fishing operations.

Management Recommendations

1. Implement creel census to evaluate angler effort, catch, and harvest with respect to stocked rainbow trout and resident largemouth bass.

2. Pursue a commercial common carp fishing opportunity to reduce carp densities to limit centrarchid and salmonid impacts.

3. Continue bass monitoring on three year rotation schedule. Results can be used to evaluate the commercial fishing effects on sportfish abundance if commercial fishing is reestablished.

FILER PONDS

Abstract

A cursory water quality survey was completed on the Filer Ponds (Filer Kids Pond and Filer Large Pond) in 2009 to assess habitat suitability for stocked rainbow trout *Oncorhynchus mykiss*. Using thermographs, we monitored water temperatures from May 21 to October 18, 2009.

The thermographs did not document water temperatures above trout's upper thermal limit of 23.8^{o} C in the Filer Kids Pond. In the Filer Large Pond, we documented temperatures at or above trout's upper thermal limit on 8 days throughout the 150 day sample period.

Dissolved oxygen levels were documented to be 5.6, 10.1, and 9.5 mg/l in the Kids Pond on June 1, June 24, and October 1, respectively. Dissolved oxygen levels were 5.9, 7.8, and 8.7 mg/l in the Filer Large Pond on the same dates listed above.

Authors:

Scott Stanton
Regional Fishery Biologist

Douglas Megargle
Regional Fishery Manager

Introduction

The Idaho Department of Fish and Game and the Twin Falls Canal Company collaboratively created a new trout fishing pond complex in the Twin Falls and Filer area. The ponds were built and are owned by the Twin Falls Canal Company. There are three separate impoundments on the property but only two are suitable for hatchery supplementation. They are currently stocked by Idaho Department of Fish and Game and are currently managed as a put-and-take rainbow trout *Oncorhynchus mykiss* fishery

The new fishing ponds are located on the east side of the road at the intersection of 4350 North and 2300 East in Twin Falls County. The new ponds, hereafter referred to as the Kids Pond and the Large Pond, are located 7.2 km north of Filer, Idaho on 2300 East Road. The Kids Pond is approximately 0.1 ha in size, with a maximum depth of 3 m. The Large Pond is approximately 1.2 ha in size, with a maximum depth of 3 m. The daily bag limit on both ponds is six-trout any size. Idaho Fish and Game stocked approximately 2,900 trout ranging from 200-300 mm in size in the Filer Kids' Pond in 2009 and approximately 11,800 trout in the Large Pond in 2009.

The objective of this effort was to determine if there are seasonal limitations present with respect to salmonid thermal tolerances. If limitations are documented, the Department will pursue the development of a mixed fishery (bluegill *Lepomis macrochirus* and largemouth bass *Micropterus salmoides*) to provide a fishing opportunity when trout stocking is precluded by high water temperatures.

Methods

Filer Ponds were surveyed in 2009 to evaluate the water temperatures at the Kids Pond and the Large Pond. The thermographs were deployed in both Filer Ponds on May 21, 2009 and retrieved on October 18, 2009. Only one thermograph was deployed into each impoundment because lentic stratification is unlikely given the high exchange rate and the shallow nature of the fisheries (max depth = 2-3 m). Water temperatures were recorded at three hour intervals. Data were uploaded and processed using Box Car Pro© software. Locations and equipment are described in Appendices A and B.

Dissolved oxygen levels were recorded near the impoundment outflows at ½ the water depth on June 1, June 24, and October 1, 2009. These dates were selected to record dissolved oxygen before, during, and after the period of time we suspected high water temperatures would result in the most challenging habitat for trout (late July to early August).

Results

Temperature profiles differed between the two ponds. We did not document water temperatures above trout's upper thermal limit in the Filer Kids Pond; however, there were eight days documented above the thermal limits in the Filer Large Pond (Figure 5).

Dissolved oxygen levels were documented to be 5.6, 10.1, and 9.5 mg/l in the Kids Pond on June 1, June 24, and October 1, respectively. Dissolved oxygen levels were 5.9, 7.8, and 8.7 mg/l in the Filer Large Pond on the same dates listed above.

Discussion

We documented mid-summer temperatures that confirmed temperatures are not ideal for rainbow trout supplementation. Past studies define upper incipient lethal temperatures described for rainbow trout vary greatly but are generally described as temperatures between 25-30^{o} C (Coutant 1977, Raleigh et al. 1984, Currie et al. 1998). Five percent of the total sample days were above the upper lethal limit for rainbow trout in 2009. Temperature levels documented in the Filer Large Pond were certainly stressful to trout but were evidently not lethal based on the lack of publicly-reported fish kills.

The hatchery trout supplementation program is already suspended midsummer and early fall months until water temperatures drop to more suitable levels. These data support that decision; however, we would like to continue providing fishing opportunities in times when stocking is not prudent. In other fisheries around the state with similar habitat limitations (Boise urban ponds) the Department has adopted a mixed fishery management program using largemouth bass and bluegill. With the introduction of warm water fish species, Filer would become a popular year round fishery in an urban area of the Magic Valley.

The Filer Ponds are a heavily utilized urban fishery. The fisheries have become a very popular place to fish since rainbow trout stocking began in 2008. Water quality and temperature sampling should be continued as the Filer Ponds are supplied in part by irrigation return water and conditions may change annually.

Management Recommendations

1. Maintain current seasonal hatchery trout supplementation schedule.

2. Transplant bass and bluegill into the fishery to provide a mid-summer mixed fishery.

LAKE WALCOTT

Abstract

Smallmouth bass *Micropterus dolomieu* monitoring was conducted at Lake Walcott in 2009. A total of 533 smallmouth bass were collected among all sample locations. Average smallmouth bass CPUE was 31 ± 16 (95% C.I.). Total length of sampled fish ranged from 60-505 mm TL. Bass weights ranged from 2-1,845 g and the mean Wr was 119 (n=532, SD=32).

The smallmouth PSD was 45 with a RSD (S-Q) of 55. Mean relative weights were 106% for stock and 101% for quality smallmouth bass, respectively

A subsample of smallmouth bass (n=170) was aged. We documented 11 age classes. Maximum aged fish in the sample was 13 years old with a length of 493 mm. Annual mortality (ages 3-13) was 32%.

Author(s):

Scott Stanton
Regional Fishery Biologist

Douglas Megargle
Regional Fishery Manager

Introduction

Lake Walcott was formed in 1906, following completion of Minidoka Dam, built for power production and irrigation purposes. The reservoir encompasses an area of approximately 4,900 hectares and lies at an elevation of 1,385 m. The Minidoka National Wildlife Refuge surrounds Lake Walcott, which is located about 19 km northeast of the town of Rupert, Idaho in Blaine, Cassia, and Minidoka Counties. The reservoir is relatively shallow and composed of large marsh areas along shoreline reaches. The system currently supports a substantial nongame fish community comprised primarily of common carp *Cyprinus carpio*, Utah chub *Gila atraria*, and largescale sucker *Catostomus macrocheilus*. Game fish species present include: smallmouth bass *Micropterus dolomieu*, rainbow trout *Oncorhynchus mykiss*, and yellow perch *Perca flavescens*, and the occasional hatchery stocked Snake River white sturgeon *Acipenser transmontanus*.

Lake Walcott bass sampling efforts in 2009 were conducted to evaluate trends in the smallmouth bass population, with the overall objective being to describe the smallmouth bass abundance and size structure of the population.

Methods

Nighttime electrofishing occurred on June 15-16, 2009. Electrofishing samples consisted of seventeen 15-minute power-on units of effort at randomly chosen locations throughout the reservoir (Appendix A).

Refer to Lower Salmon Falls Reservoir; Methods; Largemouth Bass Monitoring in this report for detailed methods.

Results

A total of 533 smallmouth bass were collected among all sample locations. Average smallmouth bass CPUE was 31 ± 16 (95% C.I.). Total length of sampled fish ranged from 60-505 mm TL (Table 4, Figure 6). Bass weights ranged from 2-1,845 g and the mean Wr was 119 (n=532, SD=32).

The smallmouth PSD was 45 with a RSD (S-Q) of 55 (Table 4). Mean relative weights were 106% for stock and 101% for quality smallmouth bass, respectively

A subsample of smallmouth bass (n=170) was aged. We documented 11 age classes (Figure 7). Maximum aged fish in the sample was 13 years old with a length of 493 mm (Figure 7). Annual mortality (ages 3-13) was 28 % based on catch curve regression (r^2 = 0.69, F=19.8)(Figure 8).

Discussion

Overall the smallmouth bass fishery is doing well. The average Wr of 119 does not indicate any habitat or forage problems are present and the PSD of 45 is considered an indication of a balanced bass population (Anderson and Neumann 1996).

The CPUE trends from 2005 to 2009 may not be directly comparable due to unequal sampling efforts. Past smallmouth bass sampling showed a CPUE of 99 (n=4 units of effort) and 92 (n=6 units) in 2005 and 2006, respectively. In 2009, 17 units of effort generated a smallmouth CPUE estimate of 31 ± 16 (95% C.I.)(Table 4). Although no CPUE variation was reported in 2005 and 2006, it is highly likely the average CPUE had large variation due to low sample size suggesting the difference is not significant.

The bass size structure also differed from the previous survey in 2005 (Ryan et al. 2005). In 2009, bass PSD was determined to be 45 whereas the overall PSD was 25 in 2005. There was also concurrent decrease in RSD(S-Q) documented when compared to the 2005 survey. In 2009, RSD(S-Q) was 55 as compared to 74 in 2005 sampling event. Based on catch data, it appears as though there are relatively more bass in the stock to quality length-class and a slight decrease in the relative catch of bass quality size or greater which is likely the result of a substantial recruitment event between the sampling dates. This reduction in RSD(S-Q) is not of concern since it is driven more by increases in the number of smaller sized bass and possibly a bias related to seasonal spawning migration. In 2009, we sampled later in the spawn when many post-spawn bass likely migrated away from the shoreline area sampled and it's possible our catch was biased against those larger fish. We recommend the regional standard bass survey protocol be standardizes initiating sampling events based on water temperature rather than calendar days to prevent bias related to behavioral migration.

Relative weights were 106 % for stock and 101 % for quality smallmouth bass, respectively. When compared to the 2005 survey, there was an 8% decrease (33 mm) in the average length of bass at age-5 which is inconsequential.

<u>Management Recommendation</u>

1. Standardize sampling effort to allow more direct trend comparisons. Set a minimum sampling effort to reflect those implemented in 2009 and use water temperatures rather than calendar dates to set sampling schedule.

MILNER RESERVOIR

Abstract

Smallmouth bass *Micropterus dolomieu* monitoring was implemented Milner Reservoir in 2009. Twenty-three units-of-effort were completed on June 11 and 12 yielded a total catch of 431 smallmouth bass. The mean CPUE was 20 ± 5 (80% CI) smallmouth bass. Total length of sampled bass ranged from 55-430 mm TL. Proportional stock density was 26 ± 19 (95% CI) and RSD(S-Q) was 74. Mean relative weights were 103% for stock and 81% for quality smallmouth bass, respectively. Catch curve regression generated an annual mortality estimate of 37% for bass ages 3-13 (R^2=0.81, F=30.57). Age estimates indicated approximately 7 years were necessary to produce a 305 mm smallmouth bass and approximately five years to attain 264 mm TL.

A jaw tagging effort was undertaken in 2009 at the request of the local bass tournament fisherman. The Department collaborated with the clubs to design and implement a very simple evaluation of post-tournament released smallmouth bass in Milner Reservoir. We opted to use tag and tag reporting methods to document gross fish movement with the assumption that non-tournament angler targeting would not occur if bass dispersed from their release location.

The overall objective of the study was to determine if tournament caught bass dispersed following their release and if the timing (as it generally relates to smallmouth bass spawning or reservoir water temperatures) of the tournament influenced dispersal behavior. Bass were differentially jaw tagged with colored tags based on the season of the tournament and catch locations were assigned to one of seven reservoir strata. A total of 711 smallmouth bass were jaw tagged and released during tournaments held in Milner Reservoir in 2009. A combined total of 86 tags or 12.1% of the tagged bass were reported as harvested or caught and released by anglers in 2009. Sixty-three percent of the reported catch of bass released by tournament participants was subsequently caught in locations other than the post-tournament release sites.

Authors:

Scott Stanton
Regional Fishery Biologist

Douglas Megargle
Regional Fishery Manager

Introduction

Milner Reservoir is a 760 ha impoundment on the Snake River inundating approximately 40 km of river near the town of Burley, Idaho. It is managed primarily as an irrigation diversion providing water to the Milner-Gooding Canal system, the Twin Falls Canal system and the North Side Canal system. The reservoir has been operated with seasonally consistent water surface elevation since the early 1990's when the dam was reconstructed.

There are several publicly and privately owned boat launch facilities and access points on Milner Reservoir, providing ample access to boats and shore anglers. Game fish known to be present include smallmouth bass *Micropterus dolomieu*, rainbow trout *Oncorhynchus mykiss*, yellow perch *Perca flavescens* and channel catfish *Ictalurus punctatus*. Channel catfish are stocked annually by Idaho Power Company. Rainbow trout are no longer stocked in Milner Reservoir, but hatchery origin fish are entrained through the Minidoka Dam spillway (i.e. the Lake Walcott fishery) into the upper reservoir.

An increasingly successful smallmouth bass fishery at Milner Reservoir has resulted following dam reconstruction in the 1990's. It is assumed that more stable water level management has benefited smallmouth bass. However, in recent years, temporary fall drawdowns are common. The effect of seasonal draw downs on the smallmouth fishery is unknown.

Milner Reservoir has become an increasingly popular tournament bass fishery. The current quality of the smallmouth bass fishery has remained stable to this point, despite increasing angling pressure. However, recently some concern has been expressed by anglers regarding the long term stability of the fishery under increasing angling pressure. More specifically, tournament holders were requesting overland transport permits for tournament-caught bass based on the suspicion the public was targeting their release sites resulting in increased harvest on the quality-sized bass caught during tournaments. The Department agreed to work with the clubs to evaluate their concerns.

The Department collaborated with the clubs to design and implement a very simple evaluation of post-tournament released smallmouth bass in Milner Reservoir. We opted to use tag and tag reporting methods to document gross fish movement with the assumption that non-tournament angler targeting would not occur if bass dispersed from their release location. Dispersal would be evaluated based on reported catch locations. Precise bass movement and dispersal data (e.g. distance traveled over time) were not feasible with this design, so essentially we only documented gross movement patterns. A large proportion of bass caught in the same release location would support the tournament-holders theory that non-tournament anglers were targeting their releases. The overall objective of the study was to determine if tournament caught bass dispersed following their release and if the timing (as it generally relates to smallmouth bass spawning or reservoir water temperatures) during the time of the tournament influenced dispersal behavior.

As stated above, Milner Reservoir experiences annual draw-downs. Annual drawdowns are implemented dam safety reasons (visual inspection) and the more severe five-year drawdown is implemented to allow shoreline construction projects to occur above the high water line. Every five years, the reservoir is drawn down 1.8-2.1 m to allow the dam to be thoroughly inspected for dam safety considerations (Brian Olmstead, Twin Falls Canal Company, Personal communication). Anglers were concerned about the fishery impacts of the five-year drawdown; therefore, the Department began to monitor the smallmouth bass fishery in 2007 prior to the scheduled drawdown in December, 2010. In 2007, IDFG (Stanton et al. 2013) initiated this smallmouth bass population monitoring program on Milner Reservoir using the Regional bass survey protocol. The reservoir was sampled again in 2009. These data will be used to determine the population impacts of the five-year drawdown.

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 and non-tournament anglers as well as the influences of water management.

Methods

Smallmouth Bass Jaw Tagging

We monitored bass movement by documenting the catch of smallmouth bass released after four tournaments as the catch location relates to the release location. A total of 711 bass were tagged and released in Milner Reservoir over the tournament season. Smallmouth bass were jaw tagged in Milner Reservoir on May 15 and 30, August 1, and September 12, 2009 by both IDFG and local bass clubs.

Bass were tagged at the tournament weigh-in and then released at locations typically used by tournament holders. Bass were differentially jaw tagged across the tournament season to grossly evaluate if proximity to the spawning season (May and June) or seasonal variations in water temperatures influenced post-tournament movement away from the release location. Seasonal variations identified would only be used to help inform additional research. We used four colors (colored jaw tags) to loosely stratify the releases from spring to fall months (Table 6). All bass caught during the tournaments were measured (TL, mm), jaw tagged, and released normally by the tournament holders. The release location was determined by tournament holders and identified using the reservoir strata described below.

The Reservoir was stratified based on a systematic partition of the fishery into seven sections (Figure 9). Maps were handed out to tournament anglers at each tournament. When anglers recaptured tagged bass they recorded where on the reservoir (strata number) the bass was caught and the color of the tag. Tags also had an IDFG number for non-tournament anglers to call in when a tagged fish was caught. Follow up phone calls were used to obtain more specific information about where and when the bass were recovered. This information could then be used to identify which reservoir strata the bass were recovered.

Results of this study were presented as the relative number of tagged fish caught by anglers in relation to their release location (reservoir strata) and the general season of the tournament (tag colors).

Smallmouth Bass Monitoring

Bass monitoring occurred on June 11-12, 2009. Refer to Lower Salmon Falls Reservoir; Methods; Largemouth Bass Monitoring in this report for detailed methods.

This sampling effort occurred independently of the tournament evaluation described above and was not intended to supplement the tournament evaluation.

Results

Smallmouth Bass Jaw Tagging

Overall, we released 711 jaw-tagged bass in Milner Reservoir. A combined total of 86 tags or 12% of the tagged bass were reported as caught by anglers after they were released by tournament holders in 2009 (Table 6). Only three percent (n=22) of the released tagged bass were reported as caught in the same location and eight percent (n=60) were caught at different locations.

Smallmouth Bass Monitoring

Twenty-three units of effort were completed on June 11 and 12, 2009. A total of 431 smallmouth bass were collected among all sample locations. Average catch-per-unit-effort was 20 ± 5 (80% CI).

Total length of sampled bass ranged from 55-430 mm TL (Figure 10). Average total length was 200 mm ± 5 mm (95% CI). Observed length-at-age indicated it takes approximately five years to attain 264 mm TL (Table 4, Figure 11).

Population and conditional indices indicated the Milner Reservoir smallmouth bass population is still dominated by stock sized fish of good relative condition. Proportional stock density was 26 $\pm$ 19 (95% CI) and RSD(S-Q) was 74 (Table 4). Mean relative weights were 103% for stock and 81% for quality smallmouth bass, respectively.

Catch curve regression generated an annual mortality estimate of 37% for bass ages 3-13 (R^2=0.81, F=30.57)(Figure 12).

Discussion

Smallmouth Bass Jaw Tagging

Preliminary results seem to refute the tournament holder's claims that non-tournament anglers are targeting and exploiting bass released after tournaments. To date, the majority of bass released by tournament participants were caught in areas other than the release site.

The lowest proportion of bass caught in the same release location occurred with those fish released on May 15th (16%) and September 12th (3%). There appeared to be no substantial relation between season (defined by tag color) and the relative numbers of released bass caught at the tournament release location. There may be a week negative trend in overall returns as the season progressed from May to September with the poorest overall returns being reported for the September event; however, there was less time for anglers to report tag returns in the August and September releases and results may change as more returns are reported in 2010.

A more thorough discussion of the smallmouth bass jaw tagging will be presented upon the completion of three consecutive years of tag returns. It is our intent to document tag returns for two to three consecutive years.

Smallmouth Bass Monitoring

The Milner Reservoir smallmouth bass population has been surveyed twice since beginning the standard bass monitoring program. Results showed similar estimates for average length, PSD, RSD(S-Q), and maximum age; however, differences were found in the catch rate (CPUE) and length at age-5 (i.e. growth). These results are difficult to explain.

Our smallmouth bass CPUE in 2009 represented a three-fold reduction when compared to an identical effort survey in 2007 (Ryan and Megargle 2007). The CPUE was reduced from 63 bass/15 min. electrofishing unit to 19 bass/15 min.

Smallmouth bass growth appears to be showing a slight decline in Milner Reservoir. Warren and Megargle (2003) found smallmouth bass achieved 300 mm in average length at age-5 in 2003. Back calculations estimates showed age-5 bass ranged from 305-328 mm in years prior to sampling. Later sampling efforts yielded an average length at age-5 estimates of 305 mm and 315 mm in 2003 and 2007, respectively (Warren and Megargle 2003, Ryan and Megargle 2007). We documented an average length of 264 mm for age 5 smallmouth bass in 2009 which appears to be the slowest growth recorded since 2003.

All mean lengths at age-5 described above fall at or above the Idaho age class averages as described in Dillon (1992) with the exception of the 2009 sample. Length-at-age for nearly all age classes declined slightly in 2009 as compared to those lengths reported by Ryan and Megargle (2007)(Figure 11); however, the most significant reduction in growth appears to be affecting smallmouth bass between ages 4 and 8. This slight reduction in growth could suggest a fishery-wide impact to smallmouth bass habitat, their forage, increased competition or a combination of those factors but the reduction is more likely a natural fluctuation.

In Idaho, smallmouth bass growth is best explained by water temperature and forage abundance (Dillon 1992) but it is unlikely the thermal regime in Milner Reservoir was substantially different between 2007 and 2009.

It's possible there were unusual habitat problems (e.g. significant freeze, longer duration drawdown) between the 2007 and 2009 sampling efforts that might have negatively impacted forage availability or substantially impacted suitable bass habitat. Although Milner Reservoir water management is considered essentially "run-of-the-river, the reservoir is still annually drawn down for 2-4 weeks for shoreline repair purposes and is more substantially drawn down on a five-year basis for dam safety considerations. Unfortunately, reservoir elevation data were not available at the time of this report therefore this theory could not be further explored.

Periodic sampling of the fishery should continue and is recommended based on the popularity of the fishery. Water fluctuation levels in the reservoir greatly influence smallmouth bass habitat in Milner reservoir, and habitat that is accessible to juvenile smallmouth bass is often limited during drawdown situations. Maintaining smallmouth bass monitoring in Milner reservoir through pre- and post-drawdown years, will help describe trends in the population and understand the population dynamics in the fishery.

Management Recommendations

1. Continue smallmouth bass sampling every three years.
2. Collaborate with water management entities to reduce the severity and frequency of annual drawdowns.

OAKLEY RESERVOIR

Abstract

Fall walleye *Sander vitreus* index netting (FWIN) was completed in Oakley Reservoir on October 13-15, 2009. A total of 15 overnight gill nets yielded a catch of 286 walleye. The average overall catch-per-unit-effort was 19 (SD=13.7) and ranged from 8 to 57 walleye per net. Mean relative weights for each size class of walleye were 83, 81, 75, 77, 113 and 108% for substock, stock, quality, preferred, memorable, and trophy sized walleye, respectively. Stock density of the catch was 15, 6, 4, and 1 % for PSD, RSD-P, RSD-M, and RSD-T, respectively. Fifteen age classes were present in the sampled walleye and ages ranged from 1 to 19. Walleye annual mortality for combined sexes based on catch curve analysis was 23% which is slightly lower than in 2008.

The overall FWIN rank was 2.5 on a scale from 1-3 indicating the fishery is classified as being between "healthy and stable" and "stressed and unstable". This index was derived from four ranked indices combined including: 1) Mean CPUE $\geq$ 450 mm TL = 1.13 (SD=1.4), age classes present (with n > 1) = 11, max age = 19 years, and a female diversity index value = 1.3.

Authors:

Scott Stanton
Regional Fishery Biologist

Douglas Megargle
Regional Fishery Manager

Introduction

Oakley Reservoir is a 548 ha irrigation impoundment located in the lower reaches of the Goose Creek and Trapper Creek drainages.

The fishery is managed as a mixed fishery including rainbow trout *Oncorhynchus mykiss*, yellow perch *Perca flavescens* and walleye *Sander vitreus*. Other species present include mottled sculpin *Cottus bairdii*, largescale sucker *Catostomus macrocheilus*, and spottail shiner *Notropis hudsonius*. Spottail shiners were introduced in 1989 to provide additional walleye forage.

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 derive a standardized fishery ranking and to allow more robust trend monitoring (Morgon 2002).

Methods

Walleye Index Netting

Fall walleye index netting was initiated to monitor walleye population trends and better understand population dynamics. FWIN data will also be used in future regulation evaluations. Standard FWIN protocols described in the Manual of Instructions (Morgan 2002) were used in sampling efforts (Appendix B). Based on a maximum reservoir surface area, a minimum sample size of 16 gill net nights was recommended. A biological threshold of 300 walleye was set prior to sampling. Sampling was discontinued when either sample size or biological threshold were met. Net locations were randomly selected and are listed in Appendix A. 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 10 C and 15 C. Sample site locations are provided in Appendix A.

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 patterns were described 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©.

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 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.

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= 28 net nights) from April 8 to May 29, 2009. Walleye over 300 mm TL were floy-tagged with unique tag numbers for each individual fish and released. Recaptured tags were reported to the IDFG “tag you’re it” hotline number.

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

Results

Walleye Index Netting

Fall Walleye Index Netting was conducted from October 13-15, 2009. A total of 15 net nights were implemented resulting in a catch of 286 walleye. By-catch species collected included largescale sucker, rainbow trout, yellow perch, and spottail shiner. The mean CPUE was 19 (S.D.=13.7) walleye and ranged from 8 to 57 walleye. The overall rank was 2.5 on a scale from 1-3 with 3 representing a healthy and stable population (Table 7)

Mean total length of sampled walleye was 310 mm (SD 110). Total length ranged from 120-820 mm TL (Figure 13). Mean weight of sampled walleye was 439 g (SD 153). Mean relative weights for each size class of walleye were 83, 81, 75, 77, 113 and 108% for substock, stock, quality, preferred, memorable, and trophy sized walleye, respectively. Proportional stock density (Anderson and Newman 1996) of the sampled population was 15%. Stock density of the catch was 15, 6, 4, and 1 % for PSD, RSD-P, RSD-M, and RSD-T, respectively. Walleye of stock size (249 mm) and greater made up 83% of the sampled population. Four percent of the sampled walleye were of preferred length or greater (509 mm). The sex ratio within the catch slightly favored male walleye at 53%. Fifteen age classes were present in the sampled walleye and ages ranged from 1 to 19 (Figure 14). Walleye annual mortality for combined sexes based on catch curve analysis was 23% which is slightly lower than in 2008.

Sampled walleye were in good physical condition across all age classes. Walleye had a mean gonadal somatic index of 2.2% for males and 1.5% for females. Mean visceral fat indices were 1.3% for male and 2% for female walleye.

Walleye Exploitation

A total of 280 fish were tagged and released in Oakley Reservoir from April 8 to May 29, 2009. Records indicate anglers caught 50 of those fish and released 7, for a total harvest of 43 fish (15%). Compliance adjusted exploitation rates will be provided in 2010 when research designed to estimate tag reporting compliance is completed.

Discussion

Walleye Index Netting

FWIN survey results indicated walleye were relatively abundant in Oakley Reservoir. The FWIN survey results showed CPUE, on average, was 19 Walleye per net. Observed catch rates in 2009 are comparable but slightly lower than catch rates observed by Ryan and Megargle (2007) and Stanton et al. (2013). CPUE was reported to be 26 and 37 walleye/net in 2007 and 2008, respectively. For comparison, Alberta FWIN CPUE (24 h sets) ranged from 12-42 walleye ($100m^2$/24h) in Canadian fisheries (Curruthers and Patterson 2008) and Washington Department of Fish and Wildlife reported CPUE ranging from 4-25 walleye (fish/net) in Washington Lakes (WDFW 2008). In most cases, authors referred to walleye fisheries with CPUE in the high teens as “abundant”.

Mean relative weight of preferred stock walleye was 77 and generally increased with fish length. This mean relative weight was slightly lower than mean relative weights of preferred stock walleye collected in 2008 (Wr=90). Overall, relative weight values were lower for walleye below the memorable stock size and higher for fish in and above the memorable stock size. This may suggest walleye are forage limited until they achieve a larger size where they seem to access more abundant or more suitable forage.

Benchmark classifications identified the Oakley Reservoir walleye population with a score of 2.5 on a scale of 1-3 with 3 being optimal (Table 7). This score remained the same as in the 2008 sampling effort. The FWIN results indicate the fishery is not stressed and unstable, but not entirely healthy and stable. The index components that brought down the FWIN score was the number of fish over 450 mm.

These facts, combined with high relative weights of memorable and trophy sized walleye, suggest the fishery could support more fish in the larger stock categories. The reason for low densities of these larger sized walleyes is unknown, but might include harvest, high natural mortality, or inconsistent recruitment.

Oakley Reservoir is not known for heavy angling pressure. More will be known about angling impacts upon the completion of the below mentioned walleye exploitation estimate. The reservoir access is relatively primitive and requires a reasonably long drive to reach. Boat anglers are often reluctant to trailer larger boats to the reservoir choosing to fish walleye in

Salmon Falls Creek Reservoir which has better access. Anecdotal evidence suggests this fishery is frequented by walleye anglers who target larger walleye at night; however, there is relatively low pressure by the less avid more opportunistic walleye anglers. Therefore, it is less likely harvest is the major limiting factor.

Oakley Reservoir is an irrigation impoundment with widely fluctuating water levels. Drought has severe impacts upon the quantity of habitat available to walleye and their forage. Yellow perch spawning habitat is severely limited when spring water levels do not inundate willows near the inlet. Early drawdowns starting mid-March can often reduce survival of eyed walleye eggs and fry. This stochastic environment combined with walleye's natural variation in cohort strength is likely more limiting to the abundance and stability of the walleye fishery than angler impacts

Walleye Exploitation

Exploitation rates will be provided in 2010 upon the completion of a concurrent study designed to estimate angler tag reporting rates for fish in Idaho.

Management Recommendations

1. Use available trend data, following three years of sampling, to evaluate current and potential regulation scenarios and their effectiveness at enhancing angling opportunities.

2. Conduct FWIN in 2014. Adopt a 5-year monitoring protocol.

RUPERT GUN CLUB POND

Abstract

An electrofishing survey was conducted at Rupert Gun Club Pond in 2009 to evaluate the fisheries community.

Rupert Gun Club Pond was sampled on June 17, 2009. The total catch (n=348) was made up by yellow perch *Perca flavescens* (69%), common carp *Cyprinus carpio* (24%), bluegill sunfish *Lepomis macrochirus* (7%) and bass (<1%). Most perch and bluegill caught were small with total lengths that ranged from 80-115 mm and 40-140 mm for bluegill and yellow perch, respectively. We caught only 1 largemouth bass *Micropterus salmoides* (260 mm) and no hatchery rainbow trout *Oncorhynchus mykiss*.

The biomass of the catch was predominantly common carp (98%) with warmwater sportfish making up the remaining weight (largemouth bass 0.3%, yellow perch 2%, bluegill 0.4%).

Carp dominance has greatly reduced the potential of the sportfishery and restoration would be necessary to enhance the fishing opportunity.

Authors:

Scott Stanton
Regional Fishery Biologist

Douglas Megargle
Regional Fishery Manager

Introduction

Rupert Gun Club Pond was created by the construction of canal systems on the Snake River upstream of Burley, Idaho. The pond has a surface area of approximately 3 ha and a maximum depth of about 3 m. Rainbow trout *Oncorhynchus mykiss* are stocked in the spring; however, it is assumed the resident warmwater fishery provides the bulk of the fishing opportunity throughout much of the year.

Similar ponds in the area (e.g. Ponderosa Pond, Emerald Lake) were evaluated and found to have fish communities dominated by common carp *Cyprinus carpio*. The overwhelming carp abundance had depressed the sportfish production within these fisheries and carp were eradicated to rebuild the fisheries. No data were available to evaluate the Rupert Gun Club Pond; therefore, baseline species composition data were needed. The objective of this effort was to determine the existing fish species composition and to determine if renovation was needed to enhance the sportfishing opportunity.

Methods

Monitoring on Rupert Gun Club Pond was completed using boat-based electrofishing methods. We sampled the entire fishery with an effort of 1 h power-on (Appendix A). All sampling was conducted during the day and all fish species were collected. Fish were identified to species, measured (TL, mm), weighed (g), and released.

Results

Rupert Gun Club Pond was sampled on June 17, 2009. The total catch (n=348) was made up by yellow perch *Perca flavescens* (69%), common carp (24%), bluegill sunfish *Lepomis macrochirus* (7%) and bass (<1%). Most perch and bluegill caught were small with total lengths that ranged from 80-115 mm and 40-140 mm for bluegill and yellow perch, respectively. We caught only 1 largemouth bass *Micropterus salmoides* (260 mm) and no hatchery rainbow trout.

The biomass of the catch was predominantly made up of common carp (98%) with warmwater sportfish making up the remaining weight (largemouth bass 0.3%, yellow perch 2%, bluegill 0.4%).

Discussion

Carp dominance has greatly reduced the potential of the sport fishery and restoration would be necessary to enhance the fishing opportunity. Rupert Gun Club Pond is dominated by carp and small yellow perch and bluegill. Yellow perch, bass and bluegill were present; however their numbers were insufficient and they are too small to provide any recreational value.

We need to determine the water source and outflow of this fishery prior to considering a restoration. The Rupert Gun Club Pond water level is controlled by a series of local canals that connect to other large canals in the area. Any direct connection to the Snake River or other drainages containing common carp could greatly reduce the longevity and overall benefit of a restoration effort.

Management Recommendations

1. Evaluate the water and supply and drainage to determine if common carp could reenter the fishery.

2. If isolation were determined, chemically treat the fishery and rebuild the warmwater fishery.

3. Evaluate the exploitation rate of hatchery supplemented rainbow trout. Consider terminating the stocking program if returns fall short of management goals (40% by count, 100% by weight) for hatchery trout returns.

SALMON FALLS CREEK RESERVOIR

Abstract

A trout survey was conducted on SFCR in April of 2009 to identify relationships between hatchery trout stocking strategies and available abundance in the reservoir. Trout abundance was indexed using catch-per-unit-effort (CPUE). Hybrid stocking success was loosely evaluated using the proportion of hybrids in the catch relative to other rainbow trout.

Rainbow trout made up 88% of the total trout catch, whereas Yellowstone cutthroat x rainbow trout hybrids *Oncorhynchus mykiss X O. clarkii bouvieri* comprised only 12%. A total of 189 trout were sampled. Overall CPUE was 15 fish/net for rainbow trout and 2 fish/net for hybrids. Hybrid trout ranged in size from 305-491 mm TL and rainbow trout ranged from 115 mm to 520 mm.

Population and conditional indices show Salmon Falls Creek Reservoir's hybrid trout population is entirely dominated by stock sized fish of good relative condition. Proportional stock density was 33 +/- 11 (95% C.I.). Stock density indices were 67 and 33 for RSD(S-Q) and RSD(Q-P), respectively. Mean relative weights were 103 % for stock and 97 % for stock and quality hybrid trout, respectively.

Hybrids are performing relatively well in SFCR. Hybrids appear to be in good condition as indicated by Wr values close to or over 100%. Additionally, hybrids made up a greater proportion of the catch (12%) than the proportion they were stocked (8%).

Authors:

Scott Stanton
Regional Fishery Biologist

Douglas Megargle
Regional Fishery Manager

Introduction

Salmon Falls Creek Reservoir (SFCR) is a 1,376 ha 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, creating productive fish habitat even in low water years. The reservoir is managed for a mixed species fishery including: rainbow trout *Oncorhynchus mykiss*, rainbow trout X Yellowstone cutthroat trout *O. clarkii bouvieri* hybrid (herein referred to as hybrids), walleye *Sander vitreus*, kokanee *O. nerka*, yellow perch *Perca flavescens*, smallmouth bass *Micropterus dolomieu*, and black crappie *Pomoxis nigromaculatus.* SFCR is one of only three waters in Idaho providing a sanctioned walleye fishery.

Changes in the IDFG hatchery trout supplementation program need to be evaluated to promote adaptive management strategies. The relatively recent addition of fingerling hybrids to the supplementation program merited evaluation. The hybrids were first stocked in 2006 at annual stocking rates that have ranged from 31,000-106,000 fingerlings. On average, hybrids made up 8% (SD=4) of a total 2.9 million trout stocked since 2006.

We chose to survey the fishery using gill nets to determine the species and strain composition of the trout population in SFCR. Specifically, we wanted to determine if the fingerling Yellowstone cutthroat trout x rainbow trout hybrid program was resulting in a substantial fishing opportunity as determined by relative catch composition and CPUE.

Methods

We used floating gill nets to sample the fishery. Trout monitoring is best 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. We deployed the gill nets offshore to avoid significant by-catch associated with the littoral habitat. Floating gill nets dimensions are described in Appendix B and are the same listed under standard lowland lake nets. Each net location was determined randomly using ¼ UTM grids and locations are presented in Appendix A.

Sample size was determined in situ. While in the field, a sample size estimator incorporated into a PDA (Personal Digital Assistant – i.e. electronic data device) provided real-time estimates of the mean CPUE, the associated precision of that estimate, and estimated sampling units needed to describe the true mean within the desired precision and power identified (PDA software: Data Plus Solutions Software©, Cohen 1988). We attempted to complete sufficient sample units to describe the mean CPUE ± 20% with 80% confidence (t-value=1.26). However, in some cases the number of sample units required to meet our identified confidence bounds and goals was too large due to high catch variation and sufficient sample units may not have been completed due to limited time in the field.

For the purposes of this evaluation, rainbow trout (all strains) and steelhead were not differentiated and referred to only as rainbow trout. Rainbow trout X Yellowstone cutthroat trout hybrids (herein referred to as hybrids) were phenotypically identified. Trout with visible cutthroat trout slashes and sparse spotting on the head were classified as hybrids. All fish collected were measured to total length (mm) and weighed (g).

Trout abundance was indexed using catch-per-unit-effort (CPUE). Hybrid stocking success was loosely evaluated using the proportion of hybrids in the catch relative to other rainbow trout. We would consider the hybrid stocking program successful if their relative abundance is reasonably close to their relative stock rates.

Stock densities and relative weight were determined as described in Anderson and Neumann 1996. Stock category minimum lengths used were 250, 380, and 510 mm for stock, quality, and preferred length categories, respectively.

Results

Floating gill nets were set overnight April 16-18, 2009 (n=15) resulting in a total catch of 536 fish. Fish species in the catch included rainbow trout, brown trout *Salmo trutta*, Yellowstone cutthroat trout X rainbow trout hybrids, largescale suckers *Catostomus macrocheilus*, bridgelip suckers *Catostomus columbianus*, black crappie, yellow perch, northern pikeminnow *Ptychocheilus oregonensis*, chiselmouth chub *Acrocheilus alutaceus*, and walleye.

The sampling effort yielded a combined catch of 189 trout. Rainbow trout made up 88% of the total trout catch with hybrids making up 12%. Overall CPUE was 15 fish/net for rainbow trout and 2 fish/net for hybrids. Hybrid trout ranged in size from 305-491 mm TL and rainbow trout ranged from 115 mm to 520 mm (Figures 15 and 16).

Population and conditional indices show Salmon Falls Creek Reservoir's hybrid trout population is entirely dominated by stock sized fish of good relative condition. Proportional stock density was 33 +/- 11 (95% C.I.). Stock density indices were 67 and 33 for RSD(S-Q) and RSD(Q-P), respectively. Mean relative weights were 103 % for stock and 97 % for stock and quality hybrid trout, respectively.

Discussion

Overall trout catch in 2009 was relatively low (189 trout; CPUE=17; SD=12) in comparison to SFCR trout sampling in 2008 (326 trout; CPUE=27, SD=17)(Stanton et al. 2013). However, this difference is not significant given the high degree of variation associated with the netting effort (overlapping confidence limits). It is more likely that our sample-size is insufficient to compare CPUE among years.

Hybrids are performing relatively well in SFCR. Hybrids appear to be in good condition as indicated by Wr values close to or over 100%. Additionally, hybrids made up a greater proportion of the catch (12%) than the proportion they were stocked (8%). This proportion comparison is not a direct comparison since many of the rainbow trout were stocked as catchables in large part to maximize survival in a predator rich habitat (e.g. walleye, smallmouth bass, northern pikeminnow). However, in a predator rich habitat such as SFCR we would predict a lower survival of fingerlings, and the increased proportion in the catch indicates the hybrid fingerlings are surviving the predator pressure in the fishery.

The inclusion of fingerling hybrids in the hatchery supplementation program appears to be a cost-effective way to provide anglers a unique fishing opportunity (i.e. new species) as well as a means to supplement the existing trout fishery in general.

Management Recommendations

1. Continue hybrid Yellowstone cutthroat trout stocking in SFCR. Consider increasing stocking request if supply is sufficient.

2. Repeat monitoring in SFCR in 2010 to monitor the contribution of hybrid stocking to trout fishery composition.

River and Stream Investigations

BIG WOOD RIVER

Abstract

A temperature monitoring survey was completed in the Big Wood River below Magic Dam in 2009. No water temperatures above trout's upper thermal limit of 23.8 C were documented at any of the three sample locations on the Big Wood River in 2009. There were three days where water temperature reaches 18 C, at the downstream-most thermograph but it was unlikely these temperatures were sufficiently high enough or were experienced long enough to induce mortality.

A standard stream survey was completed on the Big Wood River in 2009 in three reaches. Rainbow trout *Oncorhynchus mykiss* abundance for fish $\geq$ 200 mm was 959 ± 478 (95% CI), 1,166 ± 423 (95% CI), 160 ± 63 (95% CI) in the Lower Hailey, Gimlet, and Kendall Gulch (aka Boulder) transects, respectively. Mountain whitefish *Prosopium williamsoni* ($\geq$ 200 mm) densities in the Gimlet reach was 59 ± 29 (95% CI) which is equal to 46 whitefish/ha. Density estimates were not possible for mountain whitefish in the Boulder and Kendall Gulch reaches or for brown trout *Salmo trutta* in any of the reaches due to insufficient recaptures.

Rainbow trout densities continue to fluctuate but the documented changes are not alarming. Relative to the 2006 estimates, the linear trout densities decreased in the lower two transects (Hailey and Gimlet) and increased in the upper transect (Boulder) yet none of these density shifts were statistically significant (i.e. overlapping confidence limits). In addition, all estimates were above the long-term fish density averages.

We documented slight shifts in the trout stock structure in two of the three reaches surveyed in both 2006 and 2009. The Hailey reached showed no change in the PSD whereas the PSD increased from three to six percent in the Boulder reach and decreased from two to less than one percent in the Gimlet reach.

The trout size distribution within the Gimlet transect suggests there may be challenges present for older aged trout. It is our belief the decreased PSD noted in this evaluation was a decline in the number of large trout ($\geq$400 mm) since estimates of fish between 200 and 400 mm (i.e. stock size) were nearly identical in 2006 (1,159) and 2009 (1,166). Eight trout over 400 mm were captured in 2006 whereas only one was caught in 2009. Given the trend presented in Ryan et al. (2006), we believe larger trout are not surviving in the Gimlet reach as well as they did in 1992.

Authors:

Scott Stanton
Regional Fishery Biologist

Douglas Megargle
Regional Fishery Manager

Introduction

The Big Wood River originates in the Smokey, Boulder, 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, Idaho, forming the Malad River. The Big Wood River is impounded by Magic Dam located west of State Highway 75, forming 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 fishery is currently managed with three regulation combinations including a slot limit (two trout limit with none between 305 mm and 406 mm allowed), 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, Warm Springs Creek, Magic Reservoir, and intermittently below Magic Reservoir in the Richfield Canal section. These locations coincide with areas managed for general rules.

A standard stream survey of the Big Wood River fishery was last completed in 2006 as part of a long-term monitoring program. The fishery is surveyed once every three years. The purpose of this effort is to generate trout and mountain whitefish *Prosopium williamsoni* density estimates, describe trout stock structure, and describe the general condition (Wr) of trout in three locations of the Big Wood River. Those results can be compared among reaches and years and can help identify the need to modify or adapt existing management.

A temperature monitoring survey was completed in the Big Wood River below Magic Dam in 2009 to evaluate a component of the salmonid habitat.

Methods

Thermograph Survey

Big Wood River was surveyed on 2009 to evaluate the water temperatures at three locations ranging from upstream to downstream: 1) just below Magic Dam, 2) near the Richfield Canal Diversion, and 3) one half mile below Richfield Diversion in the natural Big Wood River channel. Thermographs were deployed in on May 1, 2009 and retrieved on September 28, 2009. 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.

Standard Stream Survey

A standard stream survey was implemented at three separate Big Wood River locations using a pontoon-raft electrofishing apparatus. (Appendix B). Standard transects included Lower Hailey, Gimlet, and Kendall Gulch (Boulder), as defined by Thurow (1986-1988, 1990). Sample site locations are noted in Appendix A.

Two electrofishing passes, separated by seven days, were completed at each transect to facilitate abundance estimation. Sampling was completed moving downstream with a four-man netting crew. All trout (brown, rainbow) and mountain whitefish were netted during the effort with the exception of fry. Net mesh was not suitable to capture and hold trout and mountain whitefish fry.

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

Estimates of fish abundance were 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 upward when less than five recaptures are made within an individual length group. Estimates of fish equal or greater than 200 mm are reported for evaluation of long term trends.

Data collected were compiled, summarized, and used to estimate catch composition, stock density, and relative weight. Length categories used to derive PSD for rainbow trout *Oncorhynchus mykiss* include 250 and 400 mm for stock and quality length categories, respectively (Anderson and Newman 1996). Rainbow trout relative weight was calculated in FA+© and reported as mean relative weight of the catch (Simpkins and Hubert 1996).

The surface area of each sample site was estimated to generate trout density estimates. Transect lengths and widths are measured with a Leica LRF 900 Rangemaster rangefinder. Transect waypoints are marked for future replication using a Magellan Sporttrack Topo Global Positioning System (GPS) (Appendix A).

Results

Thermograph Survey

No water temperatures above trout's upper thermal limit of 23.8 C were documented at any of the three sample locations on the Big Wood River below Magic Dam in 2009 (Figure 17). The thermograph placed in the most upstream location documented temperatures that ranged from a low of 8.7 C to a high of 12 C. The thermograph placed in the midstream location ranged from 4.7-15 C over a four month period. The thermograph placed in the most downstream location averaged 14 C (SD=4) over a four month period and ranged from a low of 8 C to a high of 20 C.

Standard Stream Survey

Lower Hailey Transect – Transect length and mean width at the lower Hailey transect was 1,058 m, and 19.2 m, respectively. The total area sampled was determined to be 2.03 ha.

Catch composition was determined using the combined mark and recapture catch. The catch in the lower Hailey transect included wild rainbow trout (n=661, 87%), mountain whitefish (n=68, 5%), brook trout *Salvelinus fontinalis* (n=21, 2%), brown trout *Salmon trutta* (n=6, 1%), mottled sculpin *Cottus bairdii* (n=30, 4%), and bridgelip suckers *Catostomus columbianus* (n=3, <1%).

The rainbow trout (≥ 200 mm) abundance was estimated at 959 ± 478 (95% CI), which equated to 470 trout/ha (Tables 8 and 9). Mean total length of rainbow trout ranged from 35-420 mm TL and rainbow RSD(Q) or PSD was two percent.

A total of 39 and 29 mountain whitefish were collected in the lower Hailey reach during the marking and recapture runs, respectively. Only three marked fish were recaptured which was insufficient to generate an abundance estimate. Mean total length of mountain whitefish ranged from 75-430 mm TL.

Gimlet Transect – Transect length and mean width at the Gimlet location was 694 m, and 18.4 m, respectively. The total area sampled was determined to be 1.28 ha.

Catch composition was determined using the combined mark and recapture catch. Fish sampled in the Gimlet transect included wild rainbow trout (n=415, 87%), mountain whitefish (n=23, 5%), brook trout *Salvelinus fontinalis* (n=2, <1%), sculpin spp. (n=32, 7%), and bridgelip suckers (n=2, <1%).

The number of rainbow trout ≥ 200 mm was estimated at 1,166 ± 423 (95% CI), equal to 810 trout/ha. Rainbow trout total length ranged from 45- 430 mm TL and rainbow trout RSD(Q) or PSD was less than one percent.

A total of 29 and 14 mountain whitefish were collected in the Gimlet transect during the marking and recapture runs, respectively. Abundance of mountain whitefish ≥ 200 mm was 59 ± 29 (95% CI) which is equal to 46 whitefish/ha (Table 8).

Kendall Gulch (Boulder) Transect – Transect length and mean width at the lower Hailey transect was 982 m, and 12.2 m respectively. The total area sampled was determined to be 1.20 ha.

Catch composition was determined using the combined mark and recapture catch. Fish sampled in the Kendall Gulch (Boulder) transect included wild rainbow trout (n=47, 77%), hatchery rainbow trout (n=2, 3%), mountain whitefish (n=11, 18%), and sculpin sp. (n=1, 1%).

We estimated the number of rainbow trout (hatchery and wild combined) ≥ 200 mm at 160 ± 63 (95% CI), which equated to 131 trout/ha. Rainbow trout total length ranged from 85-425 mm TL and rainbow trout RSD(Q) or PSD was six percent.

A total of 17 and 6 mountain whitefish were collected in the Kendall Gulch transect during the marking and recapture runs, respectively. Not enough recaptures were collected for a population estimate.

Mean relative weights for each size class of rainbow trout across all transects were 82 and 89% for sub stock and stock sized trout.

Discussion

Thermograph Survey

The three thermal profiles generated from the sampling effort on the Big Wood River below Magic Reservoir did not document stressful or lethal thermal habitat conditions. There were three days where water temperature reaches 18^{o} C, at the downstream most thermograph but it was unlikely these temperatures were sufficiently high enough or were experienced long enough to induce mortality. Upper incipient lethal temperatures described for rainbow trout vary greatly but are generally described as temperatures between 25^{o} and 30^{o} C (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^{o} C and as progressively declining as temperatures exceed 19 ^{o} C and approach 25 ^{o} C. Brown trout upper incipient lethal temperatures are described at about 27 ^{o} C (Needham 1969) with optimal growth occurring between 12 ^{o} and 19 ^{o} C (Frost and Brown 1967).

Standard Stream Survey

Rainbow trout densities continue to fluctuate (Table 9) but the documented changes are not alarming. Relative to the 2006 estimates, the linear trout densities decreased in the lower two transects (Hailey and Gimlet) and increased in the upper transect (Boulder) yet none of these density shifts were statistically significant (i.e. overlapping confidence limits). In addition, all estimates were above the long-term fish density averages.

We documented slight shifts in the trout stock structure in two of the three reaches surveyed. The Hailey reached showed no change in the PSD; whereas, the PSD increased from three to six percent in the Boulder reach and decreased from two to less than one percent in the Gimlet reach.

The trout size distribution within the Gimlet transect suggests there may be challenges present for older aged trout. This is unexpected given the conservative fishing rules in place. Gimlet reach is under catch-and-release fishing rules and is managed for quality-sized rainbow trout. As previously mentioned above, we documented stable or increased PSD values in reaches where harvest is allowed; however, the Gimlet reach continues to show a negative trend in PSD values. The proportional stock density (PSD) is a ratio of the number of trout over 400 mm (minimum quality length) divided by the number of trout over 250 mm (minimum stock length). Ryan and Megargle (2006) reported a decline of PSD (i.e. RSD400) since 1992 ending with his estimate of three percent in 2006. Our data show this decline continued with a PSD of less than one percent. A decline in PSD can be explained one of two ways. First, there can be an actual decline in the number of quality sized trout assuming stable numbers of stock sized trout in the population; or, second, there can be an increased number of stock-sized trout assuming stable numbers of quality-sized. It is our belief the decreased PSD noted in this evaluation was a decline in the number of large trout ($\geq$400 mm) since estimates of fish between 200 and 400 mm (i.e. stock size) were nearly identical in 2006 (1,159) and 2009 (1,166). Eight trout over 400 mm were captured in 2006 whereas only one was caught in 2009. Given the trend presented in Ryan et al. (2006), we believe larger trout are not surviving in the Gimlet reach as well as they did in 1992.

It is unknown why relatively less trout $\geq$400 mm are found in the Gimlet reach when compared to previous years. The reduction in larger-sized trout may result from increased angler mortality (i.e. hooking mortality since this is a no harvest reach) and or loss of suitable habitat; however, we lack the direct quantitative data needed to specifically evaluate either. However, Thurow 1988 correlated discharge with useable trout habitat suggesting decreased discharge decreased the quantity and quality of stream habitat in the Big Wood River. Discharge in 2006 was substantially greater (mean annual discharge=21.0 m^3/sec) when compared to the 2009 survey (mean annual discharge=11.4 m^3/sec. (USGS http://waterdata.usgs.gov/nwis) suggesting there may have been decreased useable trout habitat in 2009.

We recommend the habitat be more closely evaluated and angler use be estimated to better determine the cause of the decline in large fish in the Gimlet reach and to help identify potential management actions required to address identified problems. Additionally, regular population monitoring will be needed to place the decline in larger trout in perspective since the

2009 survey was only the second estimate since the Department established regular surveys (every three years) in this reach.

Management Recommendations

1. Maintain standard stream survey every three years to document long term trends in the Big Wood River.

2. Evaluate trout habitat within the Gimlet reach. Work with governmental organizations, non-governmental organizations and other fishing clubs to address identified problems

3. Implement creel census on the Gimlet reach to evaluate angler effort, catch, and associated hooking mortality.

BILLINGSLEY CREEK

Abstract

Billingsley Creek water temperatures were surveyed in 2009 to better understand the stream temperature characteristics associated with changing habitat in the stream related to recent privately funded habitat enhancement projects and decreased discharge.

Thermographs were deployed on May 18, 2009 and retrieved on October 15, 2009. Three thermographs were deployed in Billingsley Creek including one site on the lower reaches of Bill Jones' property, one site near the University of Idaho hatchery at Tupper Grade, and one site at the lower end of the IDFG Billingsley Creek Wildlife Management Area (WMA).

No water temperatures above trout's upper thermal limit of 23.8°C were documented at any of the three sample locations.

Authors:

Scott Stanton
Regional Fishery Biologist

Douglas Megargle
Regional Fishery Manager

Introduction

Billingsley Creek is a 13.6 km-long spring fed stream that flows into Lower Salmon Falls Reservoir, a Snake River impoundment near the town of Hagerman, Idaho. The stream is used extensively as a source of irrigation water, commercial fish production, and hydroelectric production.

Billingsley Creek provides both a brown trout *Salmo trutta* and rainbow trout *Oncorhynchus mykiss* fishery. Historically, both species have been maintained by hatchery stocking and hatchery escapement from local private fish producers. IDFG currently stocks brown trout into Billingsley creek. Angling opportunities include multiple regulation scenarios (Ryan et al. 2007).

Billingsley Creek water temperatures were surveyed in 2009 to better understand the stream temperature characteristics associated with changing habitat in the stream related to recent privately funded habitat enhancement projects and decreased discharge (Frank Irwin, Watermaster, personal communication).

Methods

Billingsley Creek was surveyed on 2009 to evaluate the water temperatures at one site on the lower reaches of Bill Jones property, one site near the University of Idaho hatchery at Tupper Grade, and one site at the lower end of the IDFG Billingsley Creek Wildlife Management Area (WMA).

Three thermographs were deployed in Billingsley Creek, Idaho. Thermographs were deployed on May 18, 2009 and retrieved on October 15, 2009. Water temperatures were recorded every three hours. Locations and equipment are described in Appendices A and B. Data were uploaded and processed using Box Car Pro© software.

Results

The thermograph placed in the most upstream location recorded a temperature range of 13-22^{o} C and did not document water temperatures above trout's upper thermal limit of 23.8^{o} C (Figure 20).

The thermograph placed in the midstream location ranged from a low of 13^{o} C to a high of 17^{o} C and did not document water temperatures above trout's upper thermal limit.

The thermograph placed in the most downstream location ranged from a low of 11^{o} C to a high of 20^{o} C and did not document water temperatures above trout's upper thermal limit.

Discussion

Upper incipient lethal temperatures described for rainbow trout vary greatly but are generally described as temperatures between 25-30^{o} C (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^{o} C and as progressively declining as temperatures exceed 19^{o} C and approach 25^{o} C. Brown trout upper incipient lethal temperatures are described at about 27^{o} C (Needham 1969) with optimal growth occurring between 12-19^{o} C (Frost and Brown 1967).

We documented water temperatures above stressful levels described but not lethal limits for both rainbow and brown trout, but we suspect these exposures were short-term and did not result in significant or any mortality. No fish kills were observed or reported during the survey period.

Management Recommendation

1. Work with private land owners to manage riparian areas to enhance riparian shading and prevent future increases in stream water temperatures.

SIXMILE CREEK

Abstract

Renovation of Sixmile Creek was conducted on October 20, 2009 in effort to remove non-native fish and expand the overall distribution of pure Yellowstone cutthroat trout *Oncorhynchus clarkii bouvieri* within their native range. The hybridized rainbow trout *O. mykiss* X Yellowstone cutthroat trout population was chemically eradicated using piscicide.

One treatment was made on October 20th with a duplicated effort the following day (October 21st). Synpren© fish toxicant was used to treat 0.48 km of stream. A total of 1.1 L of chemical was applied at four parts per million to the stream water. Fish toxicant was applied through a single 19 L drip station at the stream inlet and by sand rotenone at the springs.

Lethal concentrations were confirmed using live cages holding resident fish captured prior to treatment. All fish residing within the cages were killed during the treatment suggesting lethal concentrations were achieved.

Authors:

Scott Stanton
Regional Fishery Biologist

Douglas Megargle
Regional Fishery Manager

Introduction

Sixmile Creek is an isolated tributary within the Raft River drainage in Cassia County, Idaho. It is a spring fed system that typically sustains a discharge of approximately 0.05 m^3/sec of cool water that terminates approximately 1.8 km at an irrigation impoundment called Gunnel Reservoir (aka Sixmile Reservoir). The reservoir serves one water user for irrigation and stock water purposes. This drainage represents suitable habitat for a restored Yellowstone cutthroat trout *Oncorhynchus clarkii bouvieri* population despite its small size. However, the only fish species that was present in the drainage was the rainbow trout *O. mykiss* x Yellowstone cutthroat trout hybrid.

The drainage is characterized as a high elevation shrub step system with dense juniper stands associated with the riparian corridor. Land use includes "pass through" grazing practices and the springs are fenced, prohibiting cattle access. The spring creek and impoundment reside entirely on United States Forest Service, Sawtooth National Forest, Cassia Ranger District land. Coordinates are found in Appendix A.

The purpose of the renovation effort was to reintroduce a pure Yellowstone cutthroat trout population to ultimately expand core Yellowstone cutthroat trout populations. The objective of this effort was to eradicate the existing rainbow trout X Yellowstone cutthroat trout hybrid population and to ultimately reintroduce genetically pure Yellowstone cutthroat trout. This specific objective is described in the Management Plan for Conservation of Yellowstone Cutthroat Trout in Idaho (IDFG 2007).

Methods

Gunnel Reservoir was drained prior to the chemical restoration. The headgate was opened and Sixmile Creek was allowed to pass through the dam unimpeded. This discharge traveled approximately 0.5 km before subbing into the ground.

Renovation of Sixmile Creek was conducted on October 20-21, 2009. One treatment was made on October 20th with a duplicated effort the following day (October 21st). Synpren© fish toxicant was used to treat 0.48 km of stream. A total of 1.1 L of chemical was applied at calibrated delivery rates to achieve 4 ppm to the stream water. Fish toxicant was applied through a single 19 L drip station at the stream inlet and by sand rotenone at the springs. No detoxification was needed.

Results and Discussion

Sixmile Creek is a relatively small and simple drainage and therefore the piscicide treatment was not complicated. The Department had complete access to the entire drainage including the source-springs. There were no tributaries and the Department was able to work with the water rights holder to dewater the impoundment on bottom of the drainage leaving the outflow open. The outflow subbed into the water table and did not allow for the downstream survival of any fish.

Lethal concentrations were confirmed using live cages holding resident fish captured prior to treatment. All fish residing within the cages were killed during the treatment suggesting lethal concentrations were achieved.

The Sixmile drainage will be restocked with genetically pure Yellowstone cutthroat trout residing in the adjacent drainage (Eightmile Creek). The Department will transplant approximately 100-200 individual trout in 2010 and monitor the transplant over subsequent years. Additional transplants will be implemented if reintroduction fails or requires supplementation.

Management Recommendations

1) Reintroduce (i.e. transplant) genetically pure Yellowstone cutthroat trout into Sixmile Creek. Use the genetically pure source of Eightmile Creek to achieve the reintroduction. Monitor original Yellowstone cutthroat trout transplant. Repeat additional transplant supplementations if warranted.

2) Work with land managers to protect or enhance the limited stream and riparian habitat found within the drainage (e.g. grazing practices).

SOUTH FORK BOISE RIVER

Abstract

A picket weir was used to estimate kokanee escapement from Anderson Ranch Reservoir into the South Fork Boise River. The trap site, located approximately 5 km upstream of Anderson Ranch Reservoir to near Pine, Idaho, was installed on August 8, 2009 and removed on October 10, 2009. This was the second year of a long-term project designed to model South Fork Boise River escapement as it relates to kokanee salmon *Oncorhynchus nerka* abundance in Anderson Ranch Reservoir. The weir was also evaluated as a potential egg source for the statewide hatchery program.

In all, a total of 49,907 kokanee were trapped at the weir. A total of 22,825 kokanee were passed through the weir and 27,082 were held for egg take purposes. Kokanee averaged 331 mm TL (SD = 29) and ranged from 221 -391 mm TL. Age classes were dominated by age-3 kokanee (81%) with some age-2 (19%) kokanee reaching the weir as well. The sex ratio at the weir was proportionately equal and average fecundity was determined to be 625 eggs.

The 2009 trawl estimates suggested the 2008 controlled SFBR escapement failed to achieve the predicted abundance of 313,700 age-1 kokanee (Stanton et al. 2013). Our 2008 estimated escapement target (Stanton et al. 2013) was 17,700 females that would produce approximately 1 million fry which, based on average survival, would ultimately result in at least 313,700 age-1 kokanee. However, trawl estimates showed an abundance of 57,410 (95% CI ± 22.929) age-1 kokanee which fell substantially short of the predicted 2009 age-1 abundance.

The 2009 trawl abundance estimate and the 2009 SFBR escapement estimate differed. The trawl estimated there were approximately 10,134 (± 7,146) age-3 and 15,021 (± 10,478) age-2 kokanee in the reservoir whereas we estimated 49,907 spawning kokanee migrated from the reservoir to the weir. Based on our aging data, we estimated 40,425 age-3 and 9,482 age-2 kokanee ascended the SFBR during the 2009 spawn. This fact, combined with the fact there are other spawning tributaries, indicate the trawl is substantially underestimating adult abundance.

The South Fork Boise River kokanee weir did not serve well as an egg-take location for the statewide kokanee hatchery program. The overabundance of green eggs made this location less efficient when compared to the traditional Deadwood River location.

Authors:

Scott Stanton
Regional Fishery Biologist

Douglas Megargle
Regional Fishery Manager

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). Fishing gear is restricted to artificial flies and lures with a single barbless hook. The reach upstream from Big Smoky Creek, including all tributaries, is managed with general rules. Both reaches that are managed with no exceptions to the general rules are stocked with catchable size rainbow trout *Oncorhynchus mykiss* 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 salmon *O. nerka* are also known to migrate upstream from Anderson Ranch Reservoir to spawn in the river from late August into early October.

The overall goal of this effort was to meet the current management goal for the kokanee fishery in ARR. Specifically, the goal is to maintain a fishery with kokanee catch rates of at least 1 kokanee/hour between 205-356 mm TL (IDFG 2007). The objective is to control annual recruitment through hatchery supplementation or controlling escapement (if needed) in order to reduce density dependent growth impacts within ARR.

This was the second year the weir was in operation. The intent of kokanee escapement monitoring in the SFBR was to ultimately develop a predictive model relating kokanee escapement, reservoir abundance, and kokanee length. In addition, the Department wanted to limit kokanee production in Anderson Ranch Reservoir through control kokanee escapement in the South Fork Boise River – the major production source – and to evaluate the weir as an IDFG kokanee eggs source for statewide stocking programs.

The purpose of the 2009 effort was to operate the weir to estimate kokanee escapement in the South Fork Boise River and estimate recruitment into ARR. Our intent was to estimate the entire escapement run for reservoir abundance modeling purposes. Additionally, the Department wanted to evaluate the feasibility of using the kokanee weir as an egg source to meet statewide kokanee stocking needs.

Methods

A steel frame picket weir was constructed to capture spawning kokanee migrating from Anderson Ranch Reservoir into the preferred spawning habitat upstream in the South Fork Boise River. The weir is located approximately 5 km upstream of Anderson ranch reservoir to near Pine, Idaho. The weir was installed on August 8, 2009 and removed on October 10, 2009. The picket-weir was built on a pre-constructed cement foundation and provided a complete barrier to kokanee migration. A large trap box was integrated into the weir to allow fish to be trapped, sorted, and segregated by sex.

Kokanee were prevented from freely ascending the South Fork Boise River at the weir. At regular intervals, the kokanee were diverted into a trap box and either held for egg collection or passed through the weir throughout the entire spawning run period.

Kokanee not used for hatchery purposes were trapped, enumerated (either volumetrically or estimated), and passed through the weir 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 152 mm 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 straight 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. Ultimately, male escapement would be determined by applying the male to female ratios found during subsequent subsampling.

Fish were released daily at increased amounts until peak spawn at which point egg collection began. Fish were released daily throughout the egg collection period 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 subsample of twenty-five kokanee were randomly collected each week to asses sex ratio, mean length (TL mm), and mean fecundity. Otoliths were collected and later sectioned and aged in the lab, to describe age structure in the spawning run.

Results

The weir was closed on August 8, 2009 and opened on October 10, 2009. The weir functioned as a complete barrier to upstream kokanee migration. No kokanee were observed escaping through or over the picket weir throughout the season.

In all, a total of 49,907 kokanee were trapped at the weir. A total of 22,825 kokanee were passed through the weir and 27,082 were not passed for egg take purposes. The hatchery use was considerably higher than we anticipated. Large numbers of the trapped kokanee were not suitably ripe to allow egg harvest at the weir site. There were not sufficient facilities on site to hold kokanee until they ripened; therefore, during egg harvest days, all females were sacrificed to detect and harvest ripe eggs. This approach resulted in more fish being sacrificed for egg harvest than were allowed to pass through the weir.

A total of 216 kokanee were randomly sampled throughout the trapping period at a rate of approximately twenty-five kokanee per week. Kokanee averaged 331 mm TL (SD = 29) and ranged from 221 -391 mm TL. Age classes were dominated by age-3 kokanee (81%) with some age-2 (19%) kokanee reaching the weir as well. The sex ratio at the weir was proportionately equal and average fecundity was determined to be 625 eggs.

Discussion

The South Fork Boise River kokanee weir did not serve well as an egg-take location for the statewide kokanee hatchery program. The overabundance of green eggs made this location less efficient when compared to the traditional Deadwood River location (Dan Baker, IDFG, Nampa Hatchery, assistant manager, personal communication).

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 second year of escapement estimates on the SFBR and more estimates are needed to build a sufficient model. Annual monitoring will be needed to further refine the model regardless if escapement control is implemented.

The 2009 trawl estimates suggested the 2008 controlled SFBR escapement failed to produce the predicted abundance of 313,700 age-1 kokanee (Ryan et al. 2008 in press). Our 2008 estimated escapement target (Ryan et al. 2008 in press) was 17,700 females that would produce approximately 1 million fry which, based on average survival, would ultimately result in at least 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. However, trawl estimates showed an abundance of 57,410 (95% CI ± 22.929) age-1 kokanee which fell substantially short of the desired goal.

The trawl abundance estimate and the SFBR escapement estimate differed. The trawl estimated there were approximately 10,134 (± 7,146) age-3 and 15,021 (± 10,478) age-2 kokanee in the reservoir and we estimated 49,907 kokanee migrated from the reservoir to the weir. Based on our aging data, we estimated 40,425 age-3 and 9,482 age-2 kokanee ascended the SFBR during the 2009 spawn. This fact, combined with the fact there are other spawning tributaries, indicate the trawl is substantially underestimating abundance. Efforts to correlate escapement against trawl estimated abundance may prove problematic if the trawl is inaccurate. We would recommend conducting a hydroacoustic estimate concurrently with the trawl to further evaluate the trawls abundance estimate.

We have no data to determine why production or survival from 2008 kokanee spawners was substantially lower than predicted. Survival estimates used to prescribe the escapement target in 2008 were based on three years of trawl data. It's possible the average survival rates derived from those data were insufficient to capture annual variation. Survival estimates should be reevaluated using all trawl data available to increase the precision of the estimate. Additionally, the actual holding and handling of kokanee at the weir may have somehow decreased spawning success. As stated above, accurate reservoir abundance is needed to truly evaluate kokanee survival.

The weir has proven to be a very resource intensive management tool. Annual operating costs (personnel, operating, and materials) have ranged from about $18-24,000. Initial results have indicated controlling female kokanee escapement on the SFBR is, as of yet, not a predictable management tool. The Department should consider the overall costs verses the realized benefits of pursuing this management before committing to long-term escapement monitoring.

Management Recommendations

1. Continue monitoring ARR kokanee densities as a tool for providing a consistent quality fishery. Possibly incorporate hydroacoustic sampling as a comparative tool to trawling.
2. Evaluate potential of using kokanee density estimates for predicting catch rates and catch size for the ARR population.
3. Long-term 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.

FIGURES

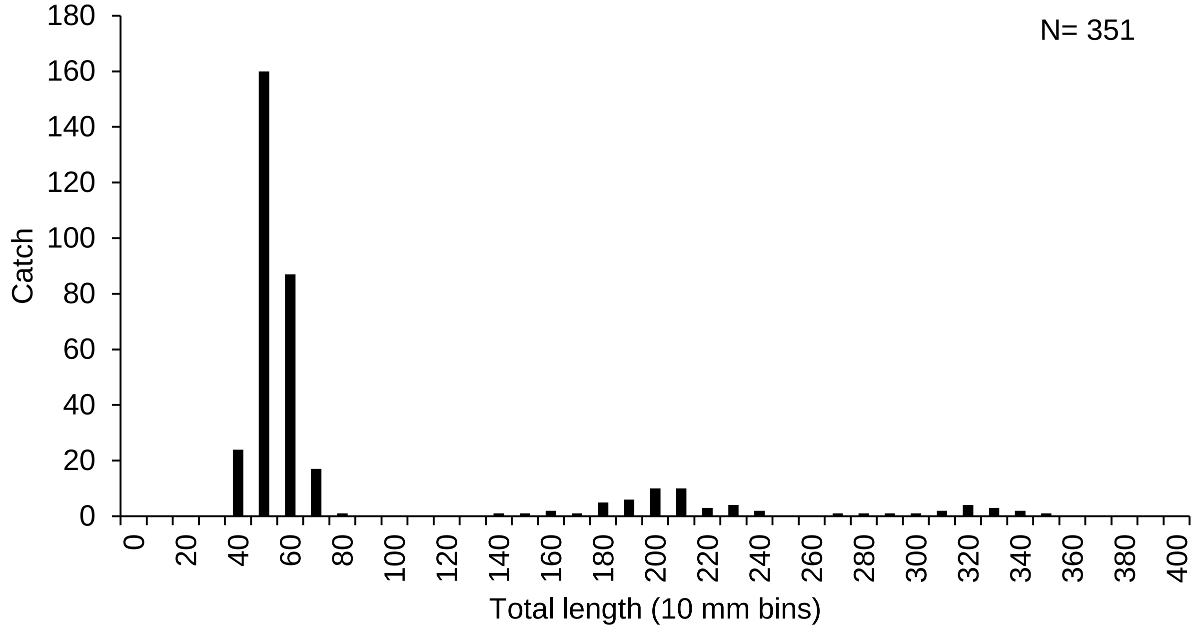


Figure 1. Length frequency histogram of the combined nighttime trawl kokanee catch (21 trawls) in Anderson Ranch Reservoir on July 21-22, 2009.

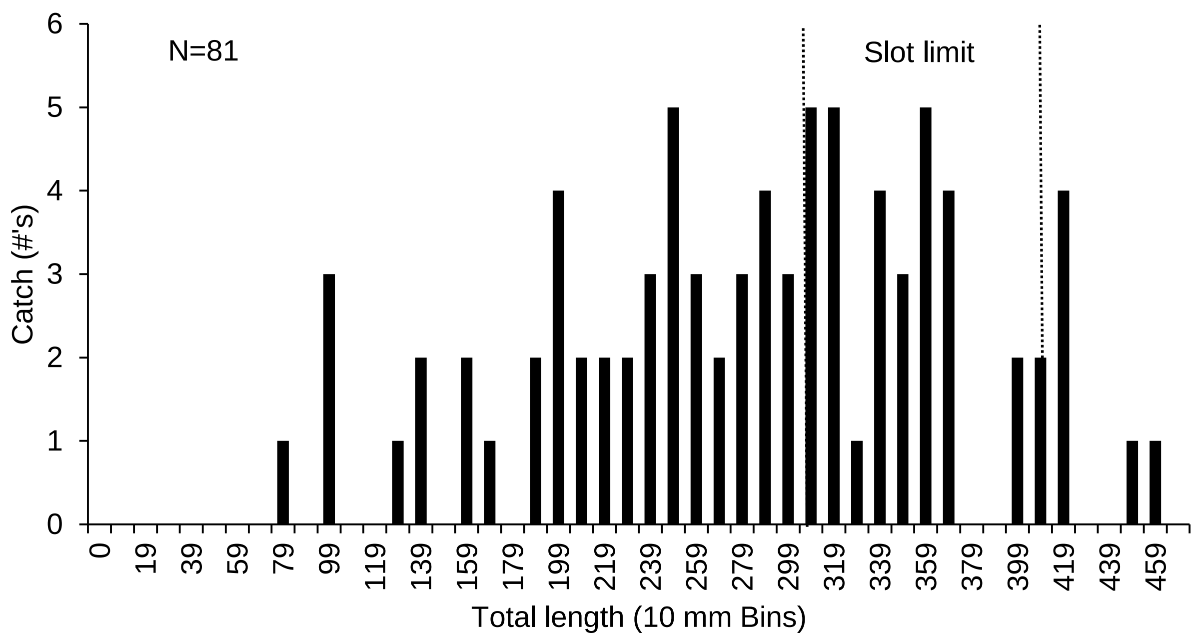


Figure 2. Length frequency histogram of the largemouth bass catch from nighttime electrofishing in Bell Rapids in 2009. Dashed line depicts existing protect slot limit for bass in this fishery

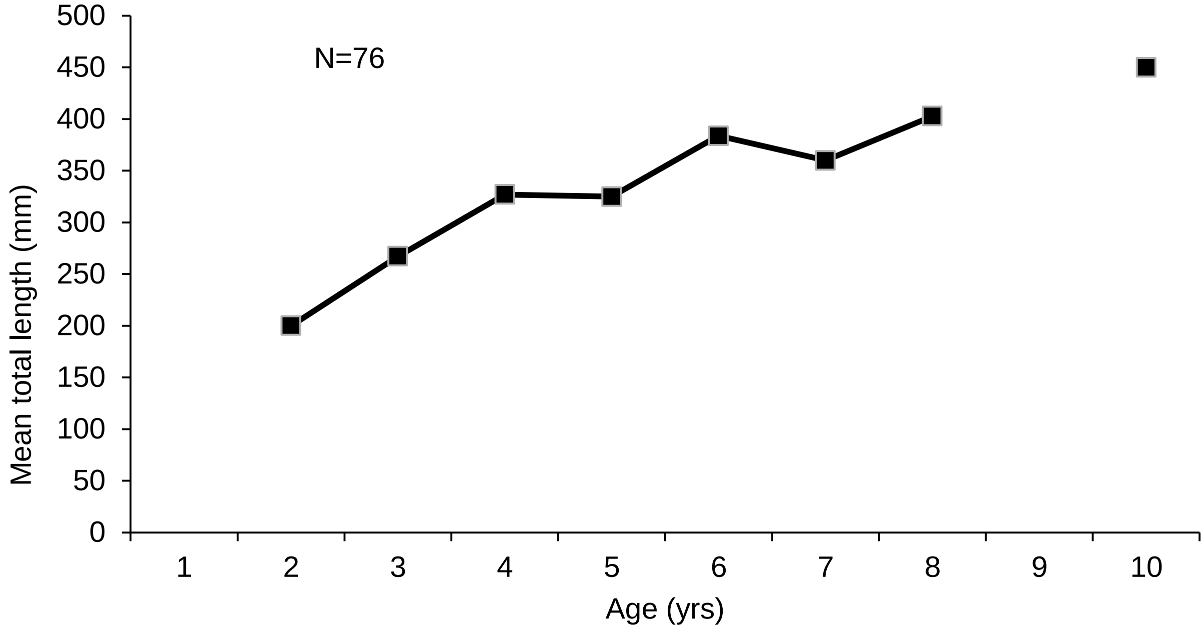


Figure 3. Mean total length-at-age of largemouth bass electrofished in Bell Rapids in 2009.

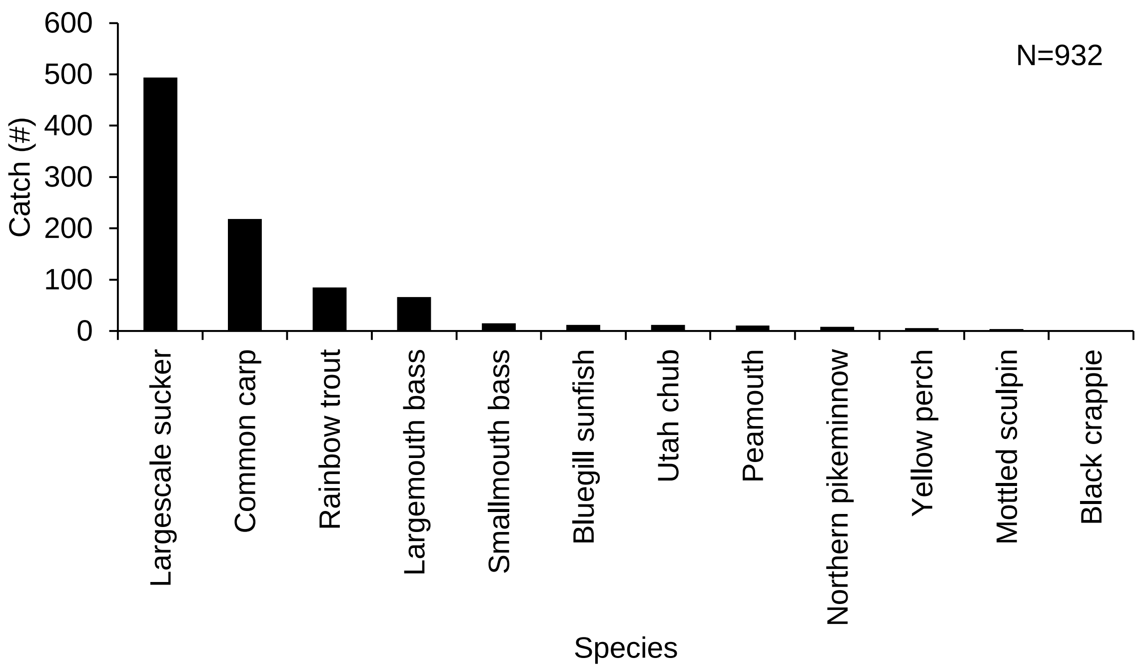
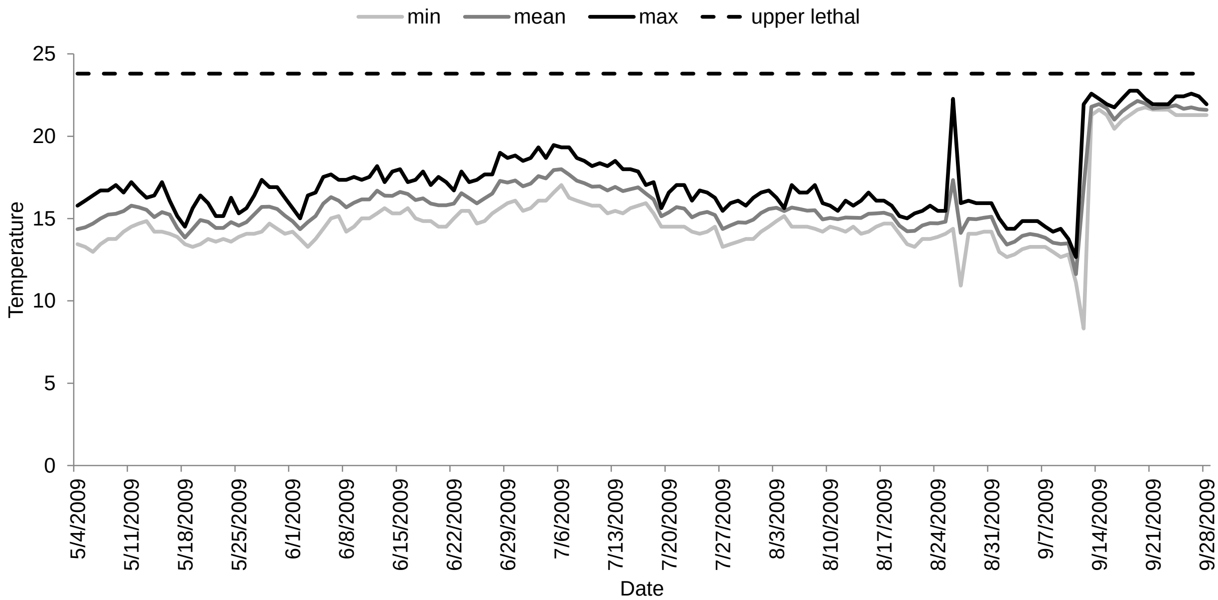


Figure 4. Total catch by fish species across all gear types and sampling units from a lowland lake survey in Bell Rapids in 2009.



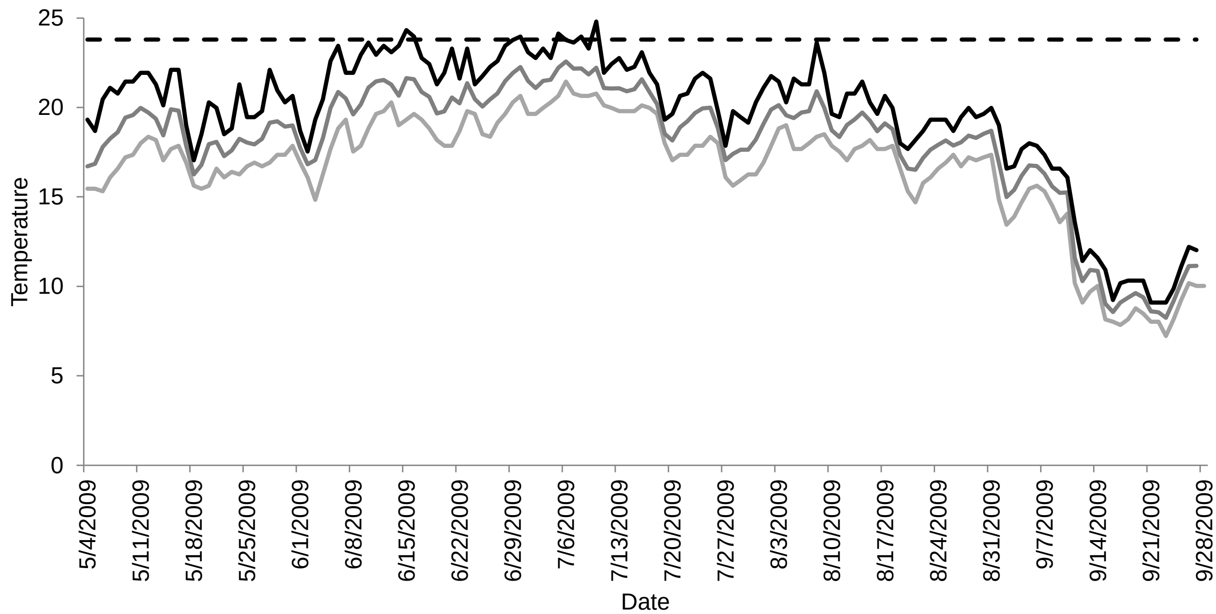


Figure 5. Water temperature (C) profiles for Filer Kids Pond (top), and Filer Large Pond (bottom), collected in from May 4 to September 28, 2009. Dashed line depicts trout upper lethal thermal limit.

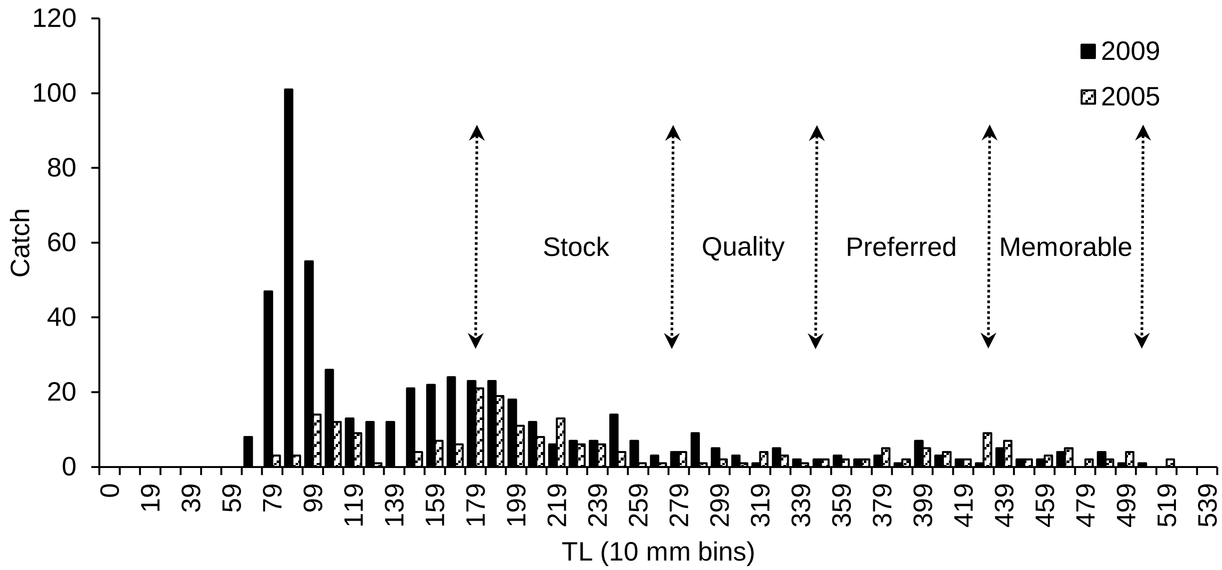


Figure 6. Length frequency histogram of Lake Walcott smallmouth bass electrofished in 2005 and 2009.

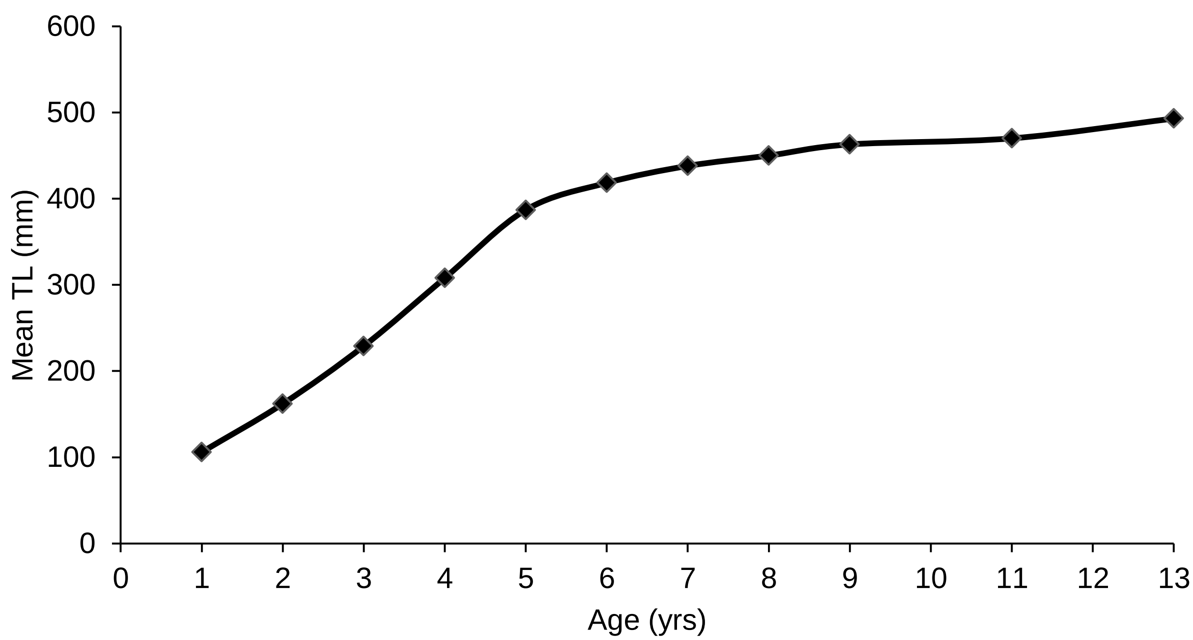


Figure 7. Mean total length-at-age of smallmouth bass (n=114) in Lake Walcott in 2009.

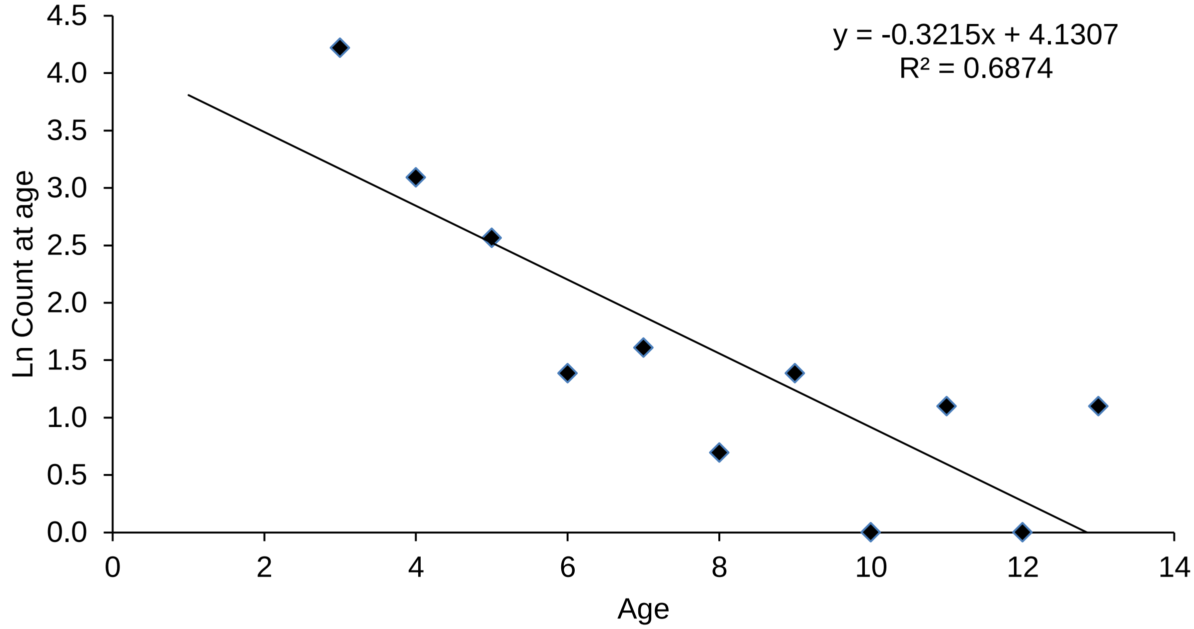


Figure 8. Catch curve regression for smallmouth bass (age-3 to age-13) based on electrofishing in Lake Walcott in 2009.

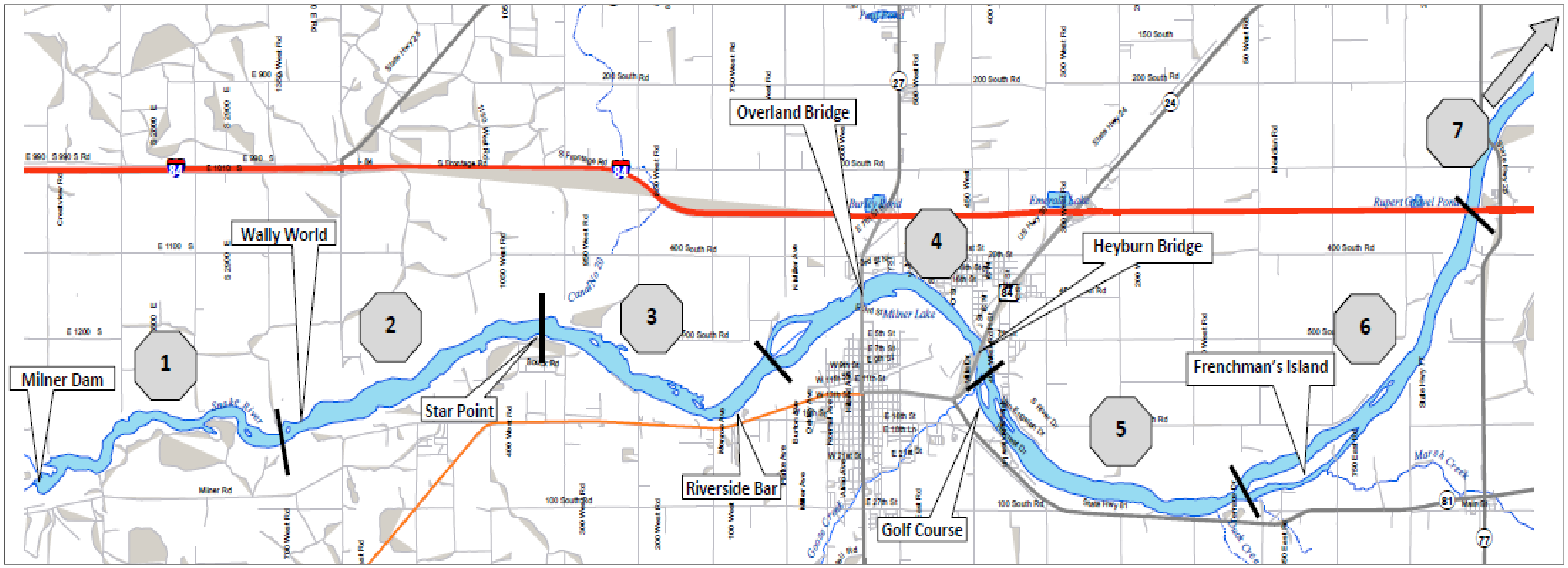


Figure 9. Map of tournament release sites and reported angler catch sections for smallmouth bass tagged and released post tournament in Milner reservoir in 2009.

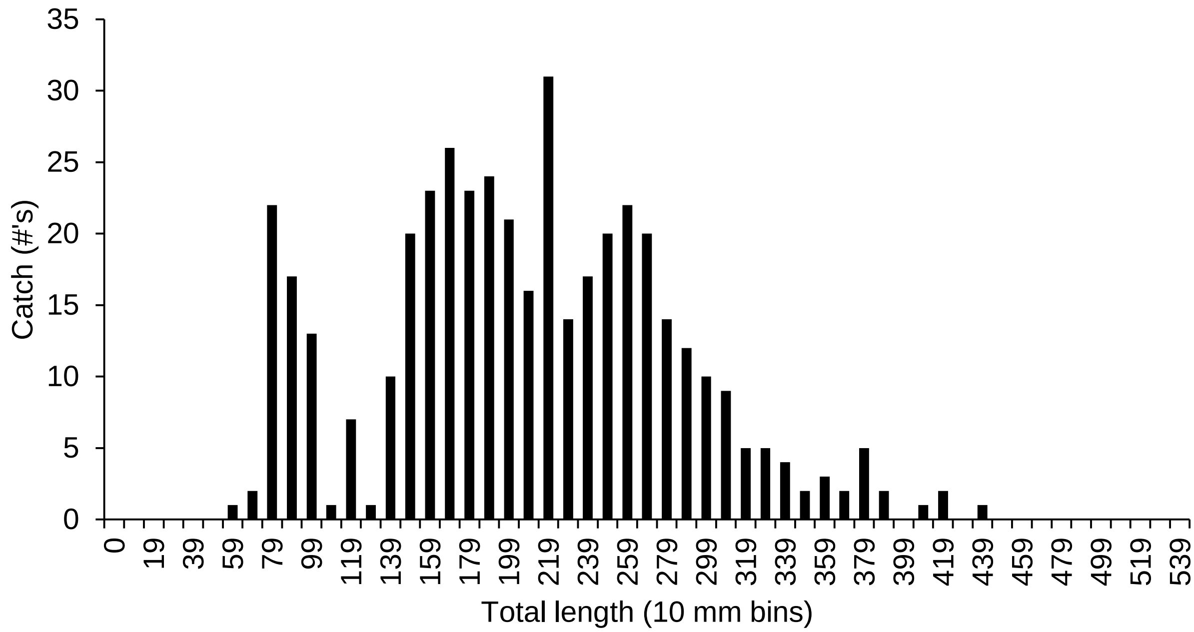


Figure 10. Length frequency histogram for Milner Reservoir smallmouth bass electrofished (n=428) in 2009.

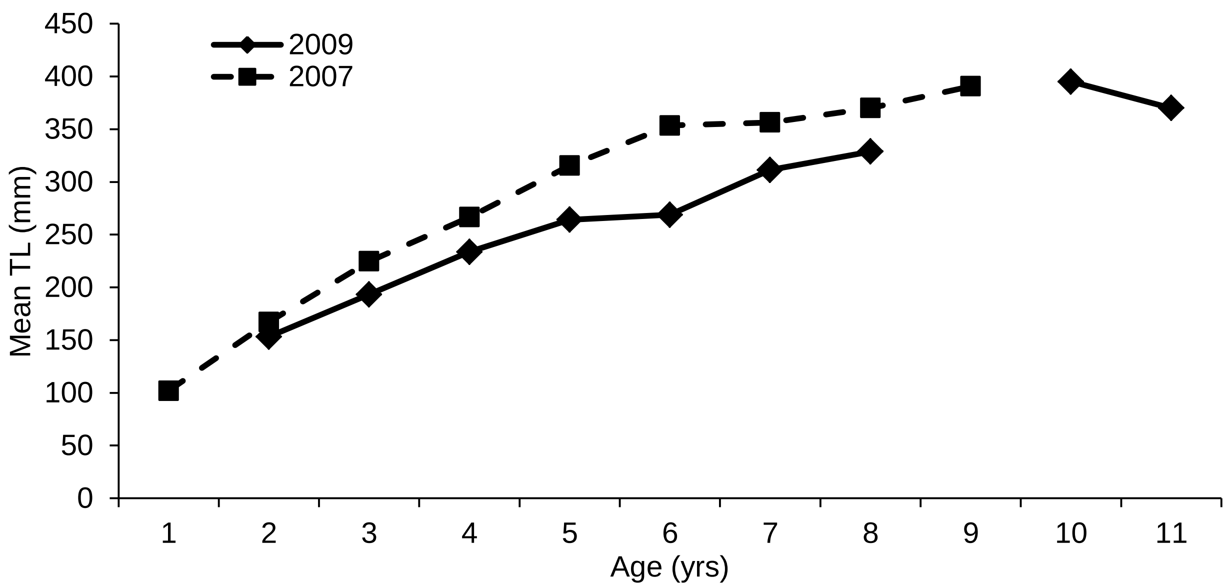


Figure 11. Mean total length-at-age of smallmouth bass electrofished in Milner Reservoir in 2007 (n=1,007) and 2009 (n=199).

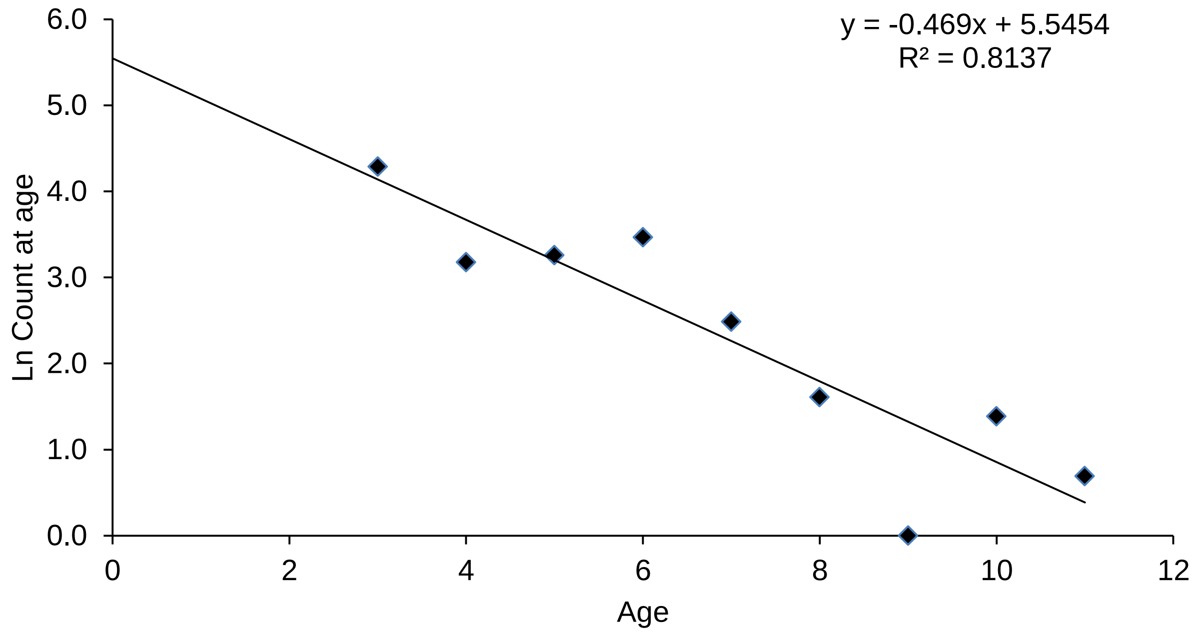


Figure 12. Catch curve for smallmouth bass collected (n=175) in Milner Reservoir in 2009.

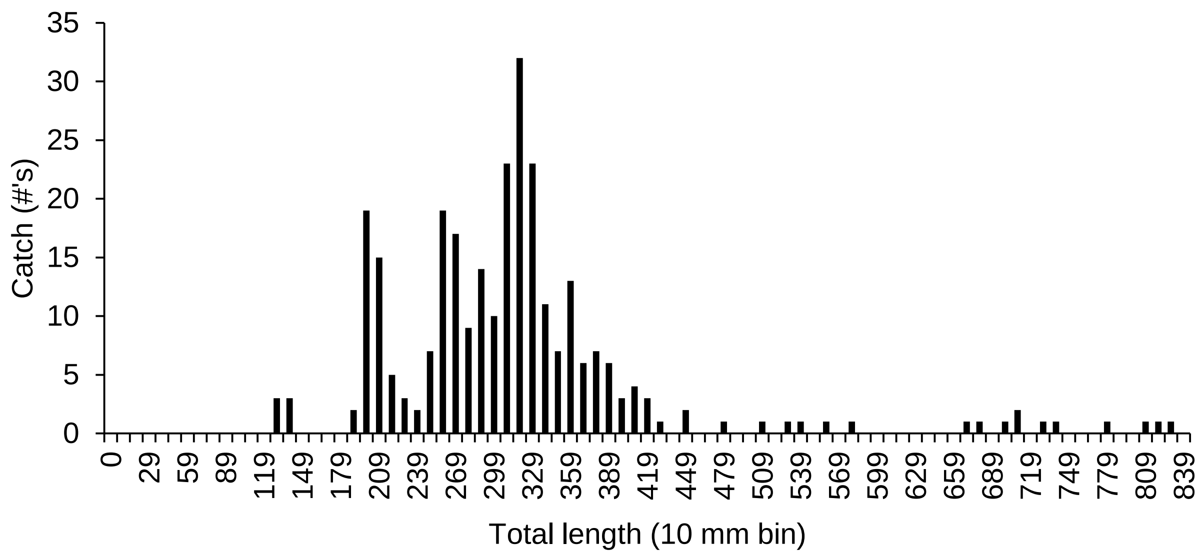


Figure 13. Length frequency histogram for walleye gill netted (n=286) in Oakley Reservoir in 2009.

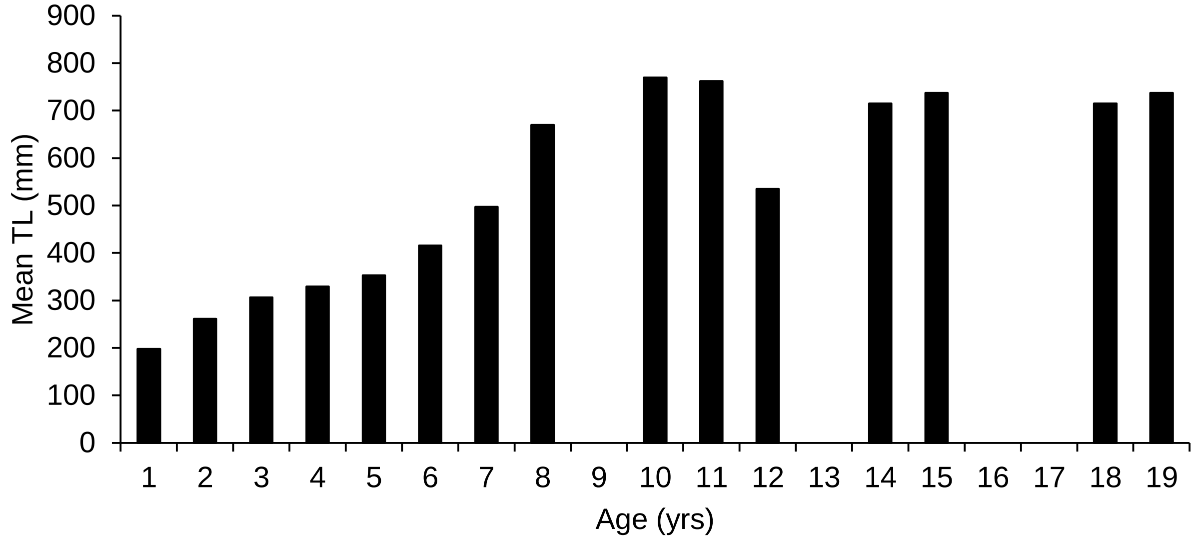


Figure 14. Mean length-at-age of walleye (n=280) in Oakley Reservoir in 2009.

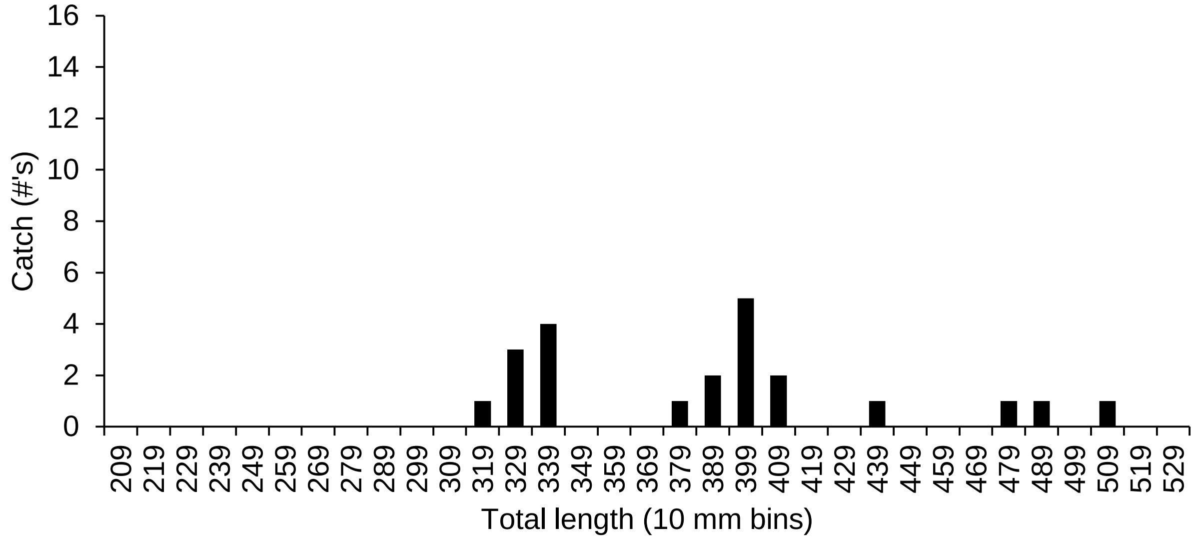


Figure 15. Length frequency histogram for hybrid trout gill netted (n=22) in Salmon Falls Creek Reservoir in 2009.

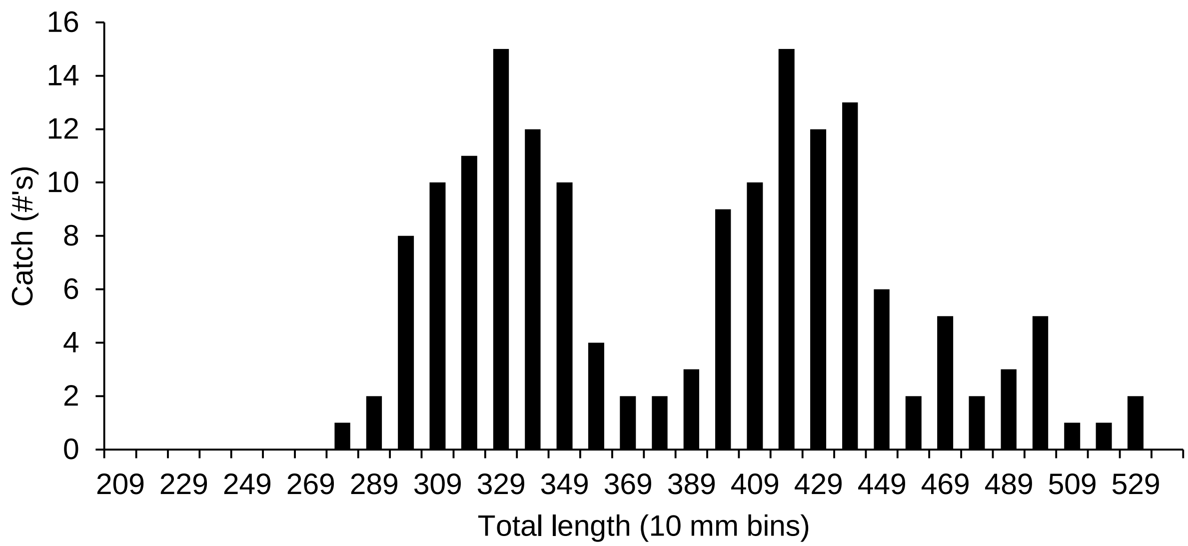


Figure 16. Length frequency histogram for hatchery rainbow trout gill netted (n= 167) in Salmon Falls Creek Reservoir in 2009.

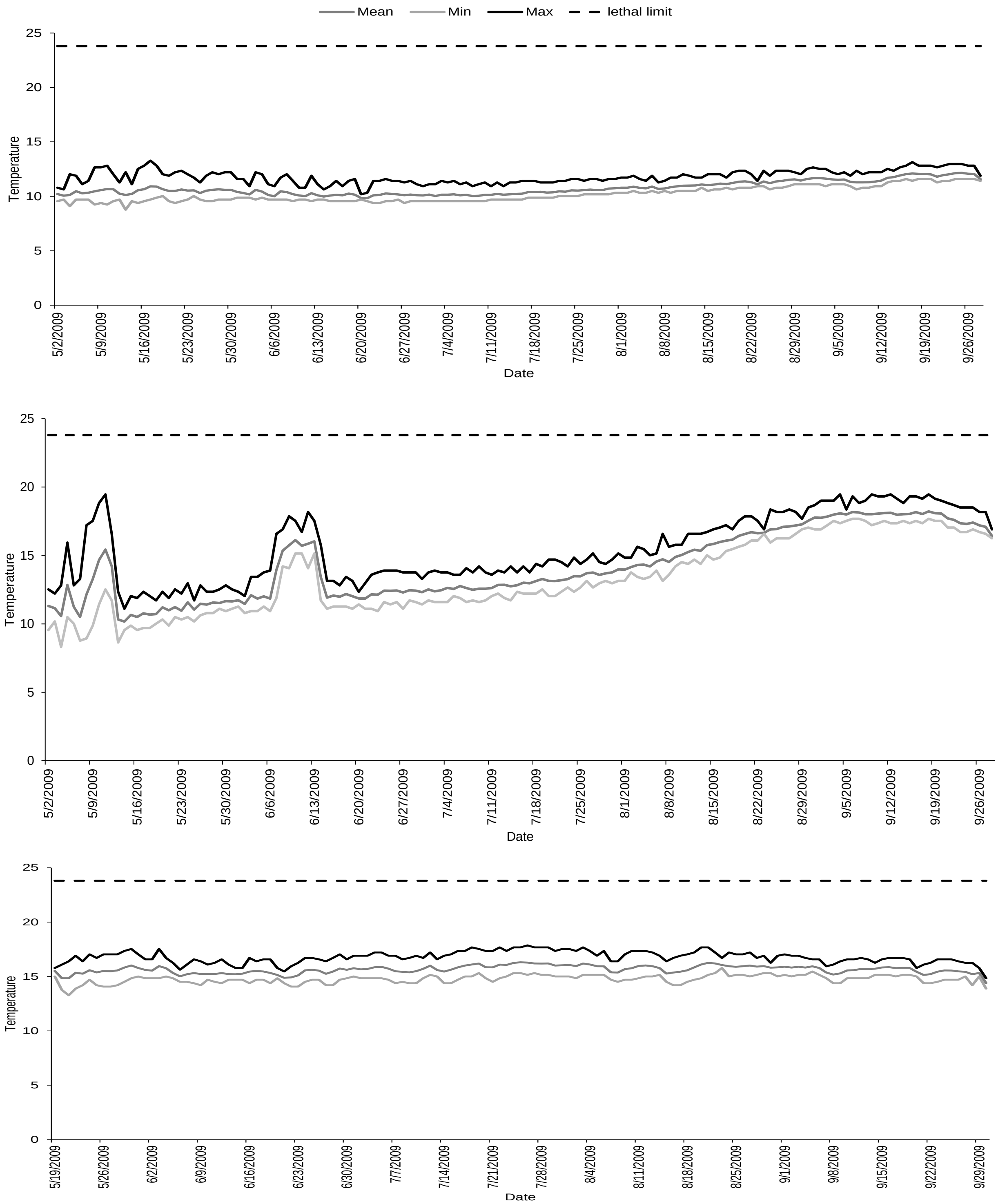


Figure 17. Temperature (C) profiles for the Big Wood River below Magic Reservoir. Upper site (top), middle (center), and lower site (bottom), collected in 2009

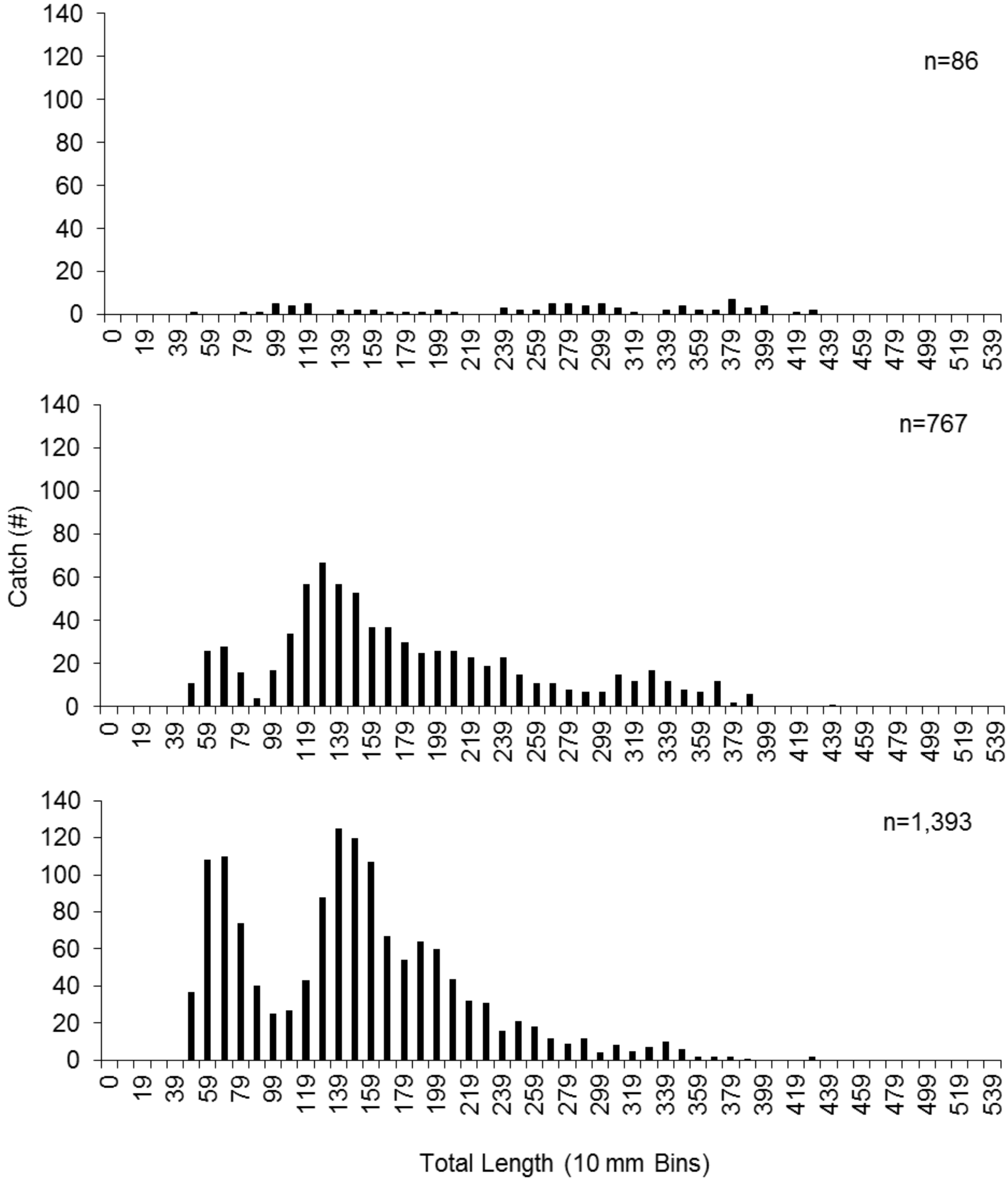


Figure 18. Length frequency histogram for rainbow trout electrofished in the Boulder (upper), Gimlet (middle) and Hailey (bottom) transects of the Big Wood River in 2009.

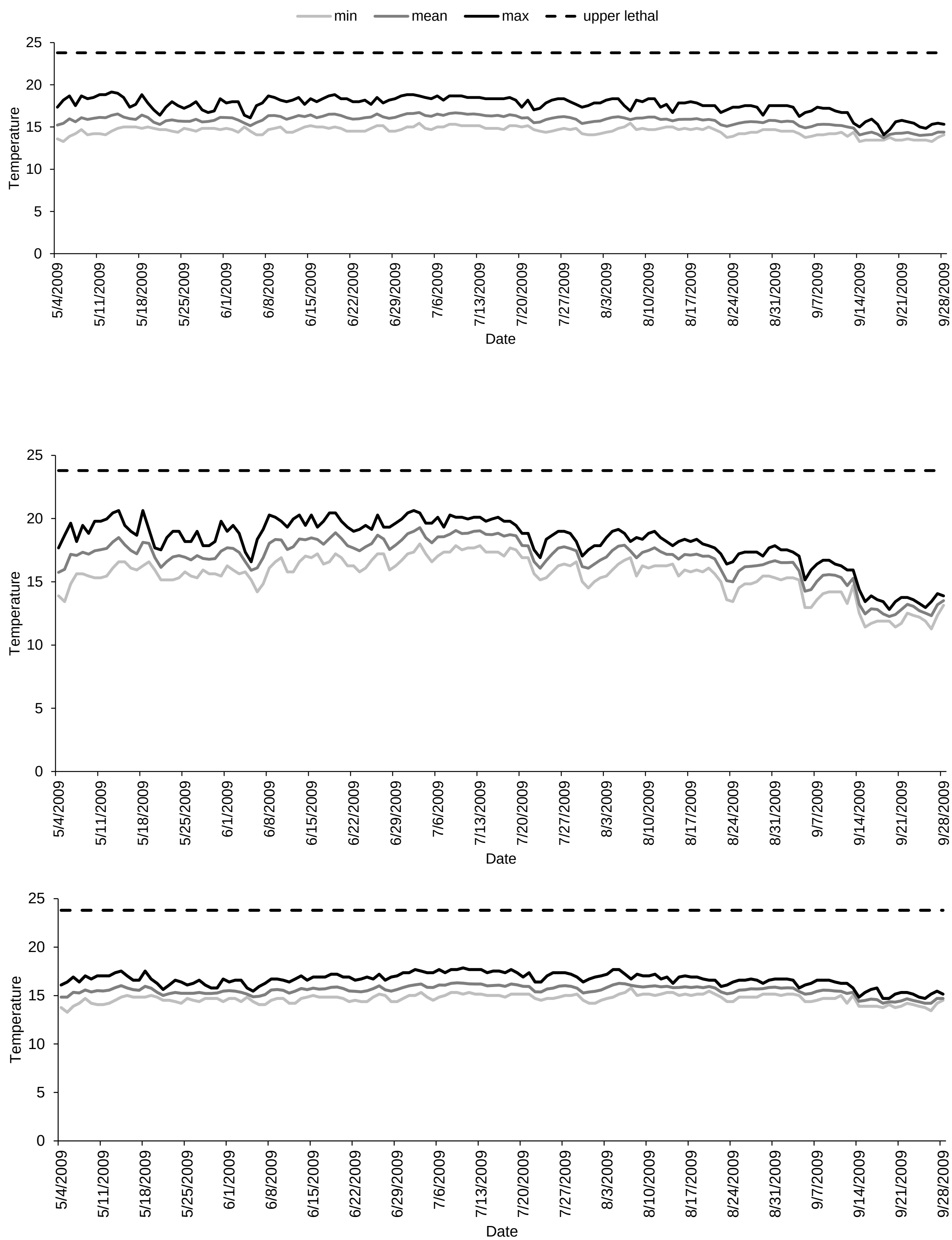


Figure 19. Temperature (C) profiles for Billingsley creek at the upper (top), middle, and lower sites (bottom) from May 4 to September 28, 2009.

TABLES

Table 1. Summary of water quality data collected at Independence Lake #2 on August 23, 2009.

Site	pH	Sp C (*u*S)	Secchi (m)	Temp. (C)	Depth (m)
1		15.5	3.0	14.4	5
2		15.3	3.0	14.2	8
3		15.0	3.0	16.1	4
4	7.5	15.3	3.3	14.7	9
5	5.8	15.4	3.0	14.9	

Table 2. Trawl-generated kokanee abundance estimates for Anderson Ranch Reservoir in 2009.

Section summaries

	Age-0	Age-1	Age-2	Age-3	Total
Sec. 1	332,863	21,098	4,160	2,760	
Sec. 2	80,214	19,263	9,497	6,401	
Sec. 3	18,550	17,049	1,364	973	
Whole Lake est.	431,627	57,410	15,021	10,134	514,192
Conf. Int. ±	128,848	22,929	10,478	7,146	
95%	29.85%	39.94%	69.76%	70.52%	
$\tilde{X}$ / ha=	279.55	37.18	9.73	6.56	333.03
n =	21				
N_t =	28,431				
t-value =	2.086				
Area (ha)=	1,544				

Biomass Estimates (kg)

	Age-0	Age-1	Age-2	Age-3	Total
Sec. 1	471.42	1,250.41	1,093.66	888.07	3,703.57
Sec. 2	96.11	1,478.65	2,424.58	2,186.73	6,186.07
Sec. 3	21.33	1,338.42	342.66	340.51	2,042.93
Whole Lake est.	588.86	4,067.49	3,860.91	3,415.31	11,932.56

Standing Crop Estimates (kg/ha)

	Age-0	Age-1	Age-2	Age-3	Total
Sec. 1	0.78	2.06	1.80	1.46	6.10
Sec. 2	0.17	2.55	4.17	3.76	10.65
Sec. 3	0.06	3.76	0.96	0.96	5.74
Whole Lake est.	0.38	2.63	2.50	2.21	7.73

Table 3. Anderson Ranch Reservoir age-specific kokanee abundance estimates based on trawl data from 2005-2009.

	Abundance					
Year	Age-0	Age-1	Age-2	Age-3	Age-4	Total
2003	166,214	9,062	3,790	1,091	0	180,157
2004	-	-	-	-	-	-
2005	526,307	37,980	12,736	20,652	0	597,675
2006	1,186,580	192,890	40,528	9,827	0	1,429,825
2007	692,704	841,421	97,832	66,645	0	1,698,602
2008	1,172,086	40,712	152,748	30,584	0	1,396,130
2009	431,627	57,410	15,021	10,134	0	514,192

Table 4. Standard bass sampling indices among Magic Valley Region fisheries from 2005 to 2009.

			Year				
Fishery	Species	Measure	2005	2006	2007	2008	2009
Anderson Ranch Res.	SMB	Ave. catch (CPUE)			88	20	
		Ave. length (mm)			114	198	
		Ave length Age 5			251	280	
		PSD			17	36	
		RSD (S-Q)			83	64	
		Max. age (years)			5	6	
Bell Rapids Res.	LMB	Ave. catch (CPUE)	11		11	7	12
		Ave. length (mm)	287		211	244	277
		Ave length Age 5	286		256	302	325
		PSD	59		17	33	56
		RSD (S-Q)	13		36	67	44
		Max. age (years)	11		9	10	10
Milner Res.	SMB	Ave. catch (CPUE)			63		19
		Ave. length (mm)			198		200
		Ave length Age 5			315		264
		PSD			28		26
		RSD (S-Q)			72		74
		Max. age (years)			9		11
Salmon Falls Cr. Res.	SMB	Ave. catch (CPUE)				60	
		Ave. length (mm)				185	
		Ave length Age 5				220	
		PSD				33	
		RSD (S-Q)				67	
		Max. age (years)				7	
Lake Walcott	SMB	Ave. catch (CPUE)	99	92			31
		Ave. length (mm)	166	132			160
		Ave length Age 5	420	418			387
		PSD	15	17			45
		RSD (S-Q)	85	83			55
		Max. age (years)	13	13			13

Table 5. Standard lowland lake survey catch summary (mean catch/unit effort) by species and gear type from a survey completed in Lower Salmon Falls Reservoir in April, 2009. Effort applied includes electrofishing (n=7), sinking gill net (n=6), and trap net (n=6).

	Catch (#)				Biomass (kg)			
Species	Efish	Gill (float)	Trap	Tot. (%)	Efish	Gill (float)	Trap	Tot. (%)
Largescale sucker	47	2	25	74 (53)	45	2	26	73 (50)
Common carp	16	3	14	33 (24)	34	5	25	64 (44)
Rainbow trout	9	2	2	13 (9)	2	1	<1	3 (2)
Largemouth bass	9	0	0	9 (7)	4	0	0	4 (3)
Smallmouth bass	2	0	0	2 (1)	1	0	0	1 (<1)
Utah chub	0	1	1	2 (1)	0	<1	<1	0 (<1)
Bluegill sunfish	1	0	1	2 (1)	0	0	<1	0 (<1)
Peamouth	1	<1	0	1 (<1)	0	<1	0	0 (<1)
Northern pikeminnow	<1	1	0	1 (<1)	0	<1	<1	0 (<1)
Yellow perch	<1	0	1	1 (<1)	0	0	<1	0 (<1)
Mottled sculpin	1	0	0	1 (<1)	0	0	0	0 (<1)
Black crappie	<1	0	0	0 (<1)	0	0	0	0 (<1)
Total [a]	88	9	44	141	87	8	52	147

[a] Total may differ slightly from actual column total in the table due to rounding effects

Table 7. Jaw tag recovery locations for tournament-caught smallmouth bass by section in Milner Reservoir in 2009.

Post-tournament bass released				Returns # (%)			
Section	Date	N	Tag color	Outside release section	Inside release section	No information	Total
2	05/15/2009	203	Blue	32 (16)	0 (0)	1 (<1)	33 (16 %)
4	05/30/2009	162	Red	14 (9)	11 (7)	2 (1)	27 (17 %)
4	08/01/2009	154	Gold	8 (5)	11 (7)	1 (<1)	20 (13 %)
5	09/12/2009	192	Green	6 (3)	0 (0)	0 (0)	6 (3 %)
Total		711		60 (8)	22 (3)	4 (<1)	86 (12 %)

Table 8. FWIN index score for Oakley Reservoir in 2009. Lower portion of the table depicts the overall index range and related classification.

Parameter	Value	Point	Note
CPUE≥450	1.94	2	Geomean
Age classes	13	2	With > 1 in sample
Maximum age	19	3	
Female diversity	0.94	3	
	Mean score	2.5	

Parameter	**Healthy/Stable** (3 Points)	**Stressed/Unstable** (2 Points)	**Unhealthy/Collapsed** (1 Point)
CPUE≥450mm	≥2.00•net-1	0.44 to 1.99•net-1	≤0.43•net-1
Number 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 diversity index	≥0.66	0.56 to 0.65	≤0.55

Table 9. Electrofishing generated mark and recapture statistics and abundance estimates for mountain whitefish and rainbow trout sampled in the Big Wood River in 2009.

Location	Species	Size class	M	C	R	Pop. Est.	SD Est.
Hailey-Lower	Mountain whitefish	≥ 100 mm	39	29	3	NA	NA
	Rainbow trout	100-199 mm	447	308	34	3,954	1,168
	Rainbow trout	200-299 mm	86	113	10	900	453
	Rainbow trout	300-399 mm	13	29	6	59	26
Gimlet	Mountain whitefish	≥ 100 mm	23	14	5	59	29
	Rainbow trout	100-199 mm	251	71	25	1,666	548
	Rainbow trout	200-299 mm	90	60	12	942	183
	Rainbow trout	300-399 mm	44	44	8	224	112
Boulder	Mountain whitefish	≥ 100 mm	2	4		NA	NA
	Rainbow trout	100-199 mm	12	8	1	NA	NA
	Rainbow trout	200-299 mm	15	9	3	129	18
	Rainbow trout	300-399 mm	15	11	5	31	6

Table 10. Big Wood River rainbow trout population and density estimate for trout $\geq$ 200mm by year and location.

Reach	Year	Season	Pop. est.	95% C.I.	Trout/100m	Trout/ha
Lower Hailey	1986	Summer	352	218-598	18	97
	1987	Summer	544	292-1,113	27	177
	1987	Fall	583	338-1,093	29	189
	1988	Summer	1,038	749-1,483	52	353
	1992	Fall	974	834-1,114	49	331
	1995	Fall	979	789-1,170	53	263
	1996	Fall	1,351	1,168-1,534	73	386
	2000	Fall	1,237	1,082-1,392	114	488
	2003	Fall	701	413-989	32	334
	2006	Fall	1327	951-1703	123	566
	2009	Fall	959	481-1437	81	470
		Average	913	726-1100	59	332
Gimlet	1986	Summer	675	431-1,898	34	197
	1986	Fall	455	258-878	23	133
	1987	Summer	955	609-1,577	48	318
	1987	Fall	301	187-512	15	100
	1988	Summer	808	601-1,111	41	276
	1992	Fall	895	713-1,077	80	406
	1993	Fall	1,001	770-1,232	64	326
	1995	Fall	985	835-1,135	68	343
	1996	Fall	1,280	1,120-1,440	87	410
	2000	Fall	1,123	978-1,268	151	744
	2003	Fall	744	545-943	86	392
	2006	Fall	1198	971-1417	170	856
	2009	Fall	1166	743-1409	127	810
		Average	891	739-1043	76	409
Boulder	1986	Summer	43	19-108	4	32
	1987	Summer	20	10-40	2	-
	1996	Fall	27	22-32	3	19
	2006	Fall	157	134-184	16	150
	2009	Fall	160	97-223	20	131
		Average	81	25-137	9	83

APPENDICIES

Appendix A. Sample locations within the Magic Valley Region, 2009.

			UTM coordinates				
Water	Site	Gear	E	N	Zone	Datum	Note
BELL RAPIDS	1	E-FISH	668661	4741951	11	NAD27	LOW Lake
BELL RAPIDS	2	E-FISH	669283	4741080	11	NAD27	LOW Lake
BELL RAPIDS	3	E-FISH	668939	4740645	11	NAD27	LOW Lake
BELL RAPIDS	4	E-FISH	668317	4739774	11	NAD27	LOW Lake
BELL RAPIDS	5	E-FISH	668499	4737952	11	NAD27	LOW Lake
BELL RAPIDS	6	E-FISH	669048	4736726	11	NAD27	LOW Lake
BELL RAPIDS	7	E-FISH	669048	4736726	11	NAD27	LOW Lake
BELL RAPIDS	1	TRAPNET	668661	4741951	11	NAD27	LOW Lake
BELL RAPIDS	2	TRAPNET	669283	4741080	11	NAD27	LOW Lake
BELL RAPIDS	3	TRAPNET	668939	4740645	11	NAD27	LOW Lake
BELL RAPIDS	4	TRAPNET	668317	4739774	11	NAD27	LOW Lake
BELL RAPIDS	5	TRAPNET	668499	4737952	11	NAD27	LOW Lake
BELL RAPIDS	6	TRAPNET	669048	4736726	11	NAD27	LOW Lake
BELL RAPIDS	7	TRAPNET	669048	4736726	11	NAD27	LOW Lake
BELL RAPIDS	1	FGNET	668661	4741951	11	NAD27	LOW Lake
BELL RAPIDS	2	FGNET	669283	4741080	11	NAD27	LOW Lake
BELL RAPIDS	3	FGNET	668939	4740645	11	NAD27	LOW Lake
BELL RAPIDS	4	FGNET	668317	4739774	11	NAD27	LOW Lake
BELL RAPIDS	5	FGNET	668499	4737952	11	NAD27	LOW Lake
BELL RAPIDS	6	FGNET	669048	4736726	11	NAD27	LOW Lake
BELL RAPIDS	7	FGNET	669048	4736726	11	NAD27	LOW Lake
BIG WOOD RIVER	KENDALL GULCH START	E-FISHING	701628	4850386	11	WGS84	STR SURVEY
	KENDALL GULCH END	E-FISHING	702054	4850738	11	WGS84	STR SURVEY
	GIMLET START	E-FISHING	713877	4834706	11	WGS84	STR SURVEY

Appendix A. Sample locations within the Magic Valley Region, 2009.

Water	Site	Gear	UTM coordinates E	N	Zone	Datum	Note
	GIMLET END	E-FISHING	714010	4833837	11	WGS84	STR SURVEY
	LOWER HAILEY START	E-FISHING	716791	4821341	11	WGS84	STR SURVEY
	LOWER HAILEY END	E-FISHING	716866	4821012	11	WGS84	STR SURVEY
BIG WOOD RIVER	1		714551	4792332	11	WGS84	HOBO TEMP
BIG WOOD RIVER	2		714592	4791887	11	WGS84	HOBO TEMP
BIG WOOD RIVER	3		714648	4788380	11	WGS84	HOBO TEMP
BILLINGSLEY CR	1		672417	4744589	11	WGS84	HOBO TEMP
BILLINGSLEY CR	2				11	WGS84	HOBO TEMP
BILLINGSLEY CR	3				11	WGS84	HOBO TEMP
FILER PONDS	1 & 2		697302	4722732	11	WGS84	HOBO TEMP
INDEPENDENCE LAKE #2	2		386221	4728723	11	WGS84	MTN LAKE
LAKE WALCOTT	1	E-FISH	671358	4745059	11	WGS84	SMB EVAL
LAKE WALCOTT	2	E-FISH	670840	4744421	11	WGS84	SMB EVAL
LAKE WALCOTT	3	E-FISH	668941	4740057	11	WGS84	SMB EVAL
LAKE WALCOTT	4	E-FISH	668495	4738467	11	WGS84	SMB EVAL
LAKE WALCOTT	5	E-FISH	669015	4737573	11	WGS84	SMB EVAL
LAKE WALCOTT	6	E-FISH	669516	4736854	11	WGS84	SMB EVAL
LAKE WALCOTT	7	E-FISH	670846	4743640	11	WGS84	SMB EVAL
LAKE WALCOTT	8	E-FISH	669146	472710	11	WGS84	SMB EVAL
LAKE WALCOTT	9	E-FISH	668661	4741951	11	WGS84	SMB EVAL
LAKE WALCOTT	10	E-FISH	669283	4741080	11	WGS84	SMB EVAL
LAKE WALCOTT	11	E-FISH	668939	4740645	11	WGS84	SMB EVAL
LAKE WALCOTT	12	E-FISH	668317	4739774	11	WGS84	SMB EVAL
LAKE WALCOTT	13	E-FISH	668499	4737952	11	WGS84	SMB EVAL
LAKE WALCOTT	14	E-FISH	669048	4736726	11	WGS84	SMB EVAL

Appendix A. Sample locations within the Magic Valley Region, 2009.

			UTM coordinates				
Water	Site	Gear	E	N	Zone	Datum	Note
LAKE WALCOTT	15	E-FISH	669048	4736726	11	WGS84	SMB EVAL
LAKE WALCOTT	16	E-FISH	668939	4740645	11	WGS84	SMB EVAL
LAKE WALCOTT	17	E-FISH	668317	4739774	11	WGS84	SMB EVAL
MAGIC RES.	1	PLANKTOW	713020	4796112	11	WGS84	QUAGGA
MAGIC RES.	2	PLANKTOW	711722	4797911	11	WGS84	QUAGGA
MAGIC RES.	3	PLANKTOW	710653	4799945	11	WGS84	QUAGGA
MAGIC RES.	4	PLANKTOW	713475	4794421	11	WGS84	QUAGGA
MAGIC RES.	5	PLANKTOW	711722	4797911	11	WGS84	QUAGGA
MAGIC RES.	6	PLANKTOW	710653	4799945	11	WGS84	QUAGGA
MAGIC RES.	7	PLANKTOW	713520	4796552	11	WGS84	QUAGGA
MAGIC RES.	8	PLANKTOW	710766	4800431	11	WGS84	QUAGGA
MAGIC RES.	9	PLANKTOW	711638	4796145	11	WGS84	QUAGGA
MILNER	1	E-FISH	277517	4710801	12	WGS84	SMB EVAL
MILNER	2	E-FISH	262236	4714367	12	WGS84	SMB EVAL
MILNER	3	E-FISH	257395	4712773	12	WGS84	SMB EVAL
MILNER	4	E-FISH	261260	4713809	12	WGS84	SMB EVAL
MILNER	5	E-FISH	268651	4714527	12	WGS84	SMB EVAL
MILNER	6	E-FISH	274907	4711777	12	WGS84	SMB EVAL
MILNER	7	E-FISH	262714	4714626	12	WGS84	SMB EVAL
MILNER	8	E-FISH	275883	4711120	12	WGS84	SMB EVAL
MILNER	9	E-FISH	271221	4715562	12	WGS84	SMB EVAL
MILNER	10	E-FISH	272058	4715323	12	WGS84	SMB EVAL
MILNER	11	E-FISH	269608	4714407	12	WGS84	SMB EVAL
MILNER	12	E-FISH	256239	4713530	12	WGS84	SMB EVAL
MILNER	13	E-FISH	262695	4715025	12	WGS84	SMB EVAL
MILNER	14	E-FISH	253689	4712714	12	WGS84	SMB EVAL

Appendix A. Sample locations within the Magic Valley Region, 2009.

			UTM coordinates				
Water	Site	Gear	E	N	Zone	Datum	Note
MILNER	15	E-FISH	272855	4714586	12	WGS84	SMB EVAL
MILNER	16	E-FISH	272855	4714586	12	WGS84	SMB EVAL
MILNER	17	E-FISH	256239	4713530	12	WGS84	SMB EVAL
MILNER	18	E-FISH	262695	4715025	12	WGS84	SMB EVAL
MILNER	19	E-FISH	253689	4712714	12	WGS84	SMB EVAL
MILNER	20	E-FISH	272855	4714586	12	WGS84	SMB EVAL
MILNER	21	E-FISH	272855	4714586	12	WGS84	SMB EVAL
MILNER	1	PLANKTOW	264295	4714671	12	WGS84	QUAGGA
MILNER	2	PLANKTOW	261021	4714014	12	WGS84	QUAGGA
MILNER	3	PLANKTOW	258136	4713012	12	WGS84	QUAGGA
MILNER	4	PLANKTOW	254902	4713401	12	WGS84	QUAGGA
MILNER	5	PLANKTOW	254085	4712609	12	WGS84	QUAGGA
MILNER	6	PLANKTOW	263026	4714803	12	WGS84	QUAGGA
MILNER	7	PLANKTOW	262916	4714803	12	WGS84	QUAGGA
MILNER	8	PLANKTOW	746370	4712513	12	WGS84	QUAGGA
MILNER	9	PLANKTOW	263174	4714821	12	WGS84	QUAGGA
MILNER	10	PLANKTOW	257904	472917	12	WGS84	QUAGGA
MILNER	11	PLANKTOW	254035	4712622	12	WGS84	QUAGGA
OAKLEY RESERVOIR	1	FWIN GILLNET	258452	4674140	12	WGS84	FWIN
OAKLEY RESERVOIR	2	FWIN GILLNET	259141	4675245	12	WGS84	FWIN
OAKLEY RESERVOIR	3	FWIN GILLNET	257454	4672915	12	WGS84	FWIN
OAKLEY RESERVOIR	4	FWIN GILLNET	258200	4674777	12	WGS84	FWIN
OAKLEY RESERVOIR	5	FWIN GILLNET	257159	4671480	12	WGS84	FWIN
OAKLEY RESERVOIR	6	FWIN GILLNET	257879	4673734	12	WGS84	FWIN
OAKLEY RESERVOIR	7	FWINGILLNET	258772	4674615	12	WGS84	FWIN
OAKLEY RESERVOIR	8	FWIN GILLNET	257360	4672203	12	WGS84	FWIN

Appendix A. Sample locations within the Magic Valley Region, 2009.

Water	Site	Gear	UTM coordinates E	N	Zone	Datum	Note
OAKLEY RESERVOIR	9	FWIN GILLNET	257478	4671659	12	WGS84	FWIN
OAKLEY RESERVOIR	10	FWIN GILLNET	257478	4671659	12	WGS84	FWIN
OAKLEY RESERVOIR	11	FWIN GILLNET	257454	4672915	12	WGS84	FWIN
OAKLEY RESERVOIR	12	FWIN GILLNET	258200	4674777	12	WGS84	FWIN
OAKLEY RESERVOIR	13	FWIN GILLNET	257159	4671480	12	WGS84	FWIN
OAKLEY RESERVOIR	14	FWIN GILLNET	257879	4673734	12	WGS84	FWIN
OAKLEY RESERVOIR	15	FWIN GILLNET	258772	4674615	12	WGS84	FWIN
OAKLEY RESERVOIR	1	PLANKTOW	257272	4670981	12	WGS84	QUAGGA
OAKLEY RESERVOIR	2	PLANKTOW	257281	4672288	12	WGS84	QUAGGA
OAKLEY RESERVOIR	3	PLANKTOW	257823	4674206	12	WGS84	QUAGGA
OAKLEY RESERVOIR	4	PLANKTOW	254089	4612602	12	WGS84	QUAGGA
OAKLEY RESERVOIR	5	PLANKTOW	257213	4673031	12	WGS84	QUAGGA
OAKLEY RESERVOIR	6	PLANKTOW	257761	4674195	12	WGS84	QUAGGA
OAKLEY RESERVOIR	7	PLANKTOW	257199	4671204	12	WGS84	QUAGGA
OAKLEY RESERVOIR	8	PLANKTOW	257450	4673071	12	WGS84	QUAGGA
OAKLEY RESERVOIR	9	PLANKTOW	257830	4674356	12	WGS84	QUAGGA
RUPERT GUN CLUB	1	E-FISH	282912	4719542	12	WGS84	SURVEY
SALMON FALLS CR. RES.	1	FGNET	687127	4674818	11	WGS84	TRT EVAL
SALMON FALLS CR. RES.	2	FGNET	685924	4672771	11	WGS84	TRT EVAL
SALMON FALLS CR. RES.	3	FGNET	687050	4669902	11	WGS84	TRT EVAL
SALMON FALLS CR. RES.	4	FGNET	685924	4672771	11	WGS84	TRT EVAL
SALMON FALLS CR. RES.	5	FGNET	686620	4665460	11	WGS84	TRT EVAL
SALMON FALLS CR. RES.	6	FGNET	686087	4671219	11	WGS84	TRT EVAL
SALMON FALLS CR. RES.	7	FGNET	687466	4667937	11	WGS84	TRT EVAL
SALMON FALLS CR. RES.	8	FGNET	686828	4667376	11	WGS84	TRT EVAL
SALMON FALLS CR. RES.	9	FGNET	686465	4664366	11	WGS84	TRT EVAL

Appendix A. Sample locations within the Magic Valley Region, 2009.

Water	Site	Gear	UTM coordinates E	N	Zone	Datum	Note
SALMON FALLS CR. RES.	10	FGNET	685831	4662895	11	WGS84	TRT EVAL
SALMON FALLS CR. RES.	11	FGNET	685809	4663606	11	WGS84	TRT EVAL
SALMON FALLS CR. RES.	12	FGNET	686133	4665452	11	WGS84	TRT EVAL
SALMON FALLS CR. RES.	1	PLANKTOW	685568	4664515	11	WGS84	QUAGGA
SALMON FALLS CR. RES.	2	PLANKTOW	687863	4666821	11	WGS84	QUAGGA
SALMON FALLS CR. RES.	3	PLANKTOW	686270	4671193	11	WGS84	QUAGGA
SALMON FALLS CR. RES.	4	PLANKTOW	686844	4674099	11	WGS84	QUAGGA
SALMON FALLS CR. RES.	5	PLANKTOW	685173	4663094	11	WGS84	QUAGGA
SALMON FALLS CR. RES.	6	PLANKTOW	687647	4666801	11	WGS84	QUAGGA
SALMON FALLS CR. RES.	7	PLANKTOW	687246	4674949	11	WGS84	QUAGGA
SALMON FALLS CR. RES.	8	PLANKTOW	709412	4727859	11	WGS84	QUAGGA
SALMON FALLS CR. RES.	9	PLANKTOW	687617	4666798	11	WGS84	QUAGGA
SALMON FALLS CR. RES.	10	PLANKTOW	687164	4675036	11	WGS84	QUAGGA

Appendix B. Sampling equipment used in the Magic Valley Region, 2009.

Fishery type	Equipment	Description
Mountain Lakes	Mountain lake gill net	Swedish made Lundgrens type-A lightweight multi filament sinking net 6 panel (46, 38, 33, 30, 25, 19 mm bar-mesh) 45.6 X 1.5 m
	Scale	Pesola ©: , 0-300 g, 0-1 kg, 0-2.5 kg scales
	Float tube	Creek Company© , round
	Conductivity meter	Yellow Springs Instrument (YSI) model 30
	Depth sounder	Hondex© portable depth sounder
	Secci disc	Standard; decimeter graduation
	pH meter	Oakton © hand held pH meter - Model 35624.2
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

Appendix B. cont.

	Secci disc	Standard; decimeter graduation
	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
Rivers and Streams	Power boat electrofisher	Smith-root © model SR-18 w/ model 5.0 pulsator - see above for specs.
	Raft	3.35 m (Outcast Power Drifter)
	Anode	13.7 m-long power cord; 2.4 m-long fiberglass handle; 0.4 m diameter steel hoop
	Cathode	Boat – dangler and pannel
	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

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Submitted by:	Approved by: **IDAHO DEPARTMENT OF FISH AND GAME**
Douglas Megargle Regional Fishery Manager	Edward B. Schriever, Chief Fisheries Bureau
Scott D. Stanton Regional Fishery Biologist	
	Jeff Dillon State Fishery Manager