FISHERY MANAGEMENT INVESTIGATIONS

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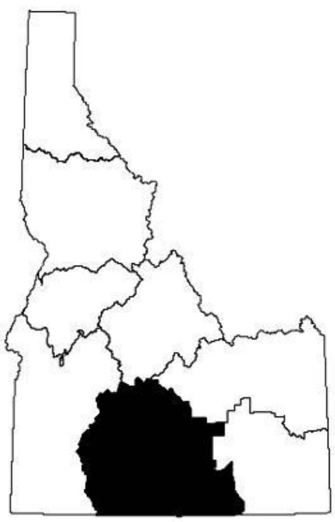

MAGIC VALLEY REGION
2010

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PREFACE

Some standard formatting is applied throughout this report. Sampling locations including georeferenced data are reported in Appendix A. Specific sampling equipment used for completed surveys are found in Appendix B.

HIGH MOUNTAIN LAKES INVESTIGATIONS

ABSTRACT

A standard high mountain lake survey was conducted on Baker Lake in 2010. Two nets were set overnight, yielding a combined catch of 16 trout. Total length ranged from 220 to 632 mm. The largest individuals were Brown Trout *Salmo trutta*. Cutthroat Trout *Onchorhynchus clarkii,* and Cutthroat X Rainbow Trout hybrids *O. clarkii* x *O. mykiss* were most abundant (*n* = 11), followed by Brown Trout (*n* = 3), Rainbow Trout *O. mykiss* (*n* = 1) and Golden Trout *O. mykiss aguabonita* (*n* = 1). Average catch per unit effort (CPUE) for all trout species combined was 25 trout/net-night in 2002 and 8 trout/net-night in 2010. Trout densities may have decreased since 2002, though this conclusion is based on small sample sizes. This decrease may be explained by several factors including: 1) increased frequency or severity of winter kills, 2) poor natural recruitment, or 3) increased fishing-related mortality. Also, the lower CPUE for stocked Golden Trout during 2010 may be indicative of poor post-stocking survival, resulting in low catch rates.

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INTRODUCTION

Baker Lake is a cirque lake located near Baker Peak in the headwaters of Baker Creek, a tributary of the Big Wood River, Blaine County, Idaho (Figure 1, Appendix A). Baker Lake is a relatively large (4.5 ha), high-elevation (2,681 m) lake. Inflows to the lake include seeps, springs, and snowmelt. The lake's outlet flows for 150 m over a boulder-dominated substrate containing pockets of gravel before descending down a steep cascade. Although no definite barrier exists downstream of the steep cascade, it is unlikely that fish can migrate to the lake from the lower drainage (Ryan et.al 2007). The 2007-2012 Fisheries Management Plan (IDFG 2007) direct staff to manage Baker Lake as a trophy Cutthroat Trout *O. clarkii* fishery. Current fishing regulations prohibits the use of bait and allows a two-fish daily bag limit, with none less than 508 mm (20").

Stocking records indicate that Baker Lake was stocked intermittently with Golden Trout *O. mykiss aguabonita* and Cutthroat Trout between at least 1960 and 1989. Between 1989 and 2010, Baker Lake was stocked with Golden Trout every two to four years, most recently receiving 999 Golden Trout in 2008. Prior to 2010, Baker Lake was last sampled in 2002. The purpose of this sampling effort was to evaluate the fish community (species composition, mean length, relative weight, and relative abundance) and to determine whether the current stocking strategies and regulations have been effective.

METHODS

We surveyed Baker Lake on August 19 and 20, 2010, utilizing standard IDFG protocols. Fish were sampled with two, floating gillnets. Nets were fished overnight. Gillnets were set and retrieved using a small inflatable raft. Specific gears utilized for this survey are described in Appendix B.

All sampled fish were identified to species, measured for total length (±1 mm), and weighed (±1 g). We summarized the catch by calculating catch per unit of effort (CPUE), as well as mean length and weight.

We measured several limnological factors including depth (m), temperature, pH, and productivity (indexed with secchi disc). Measurements were made at three locations in the middle of the lake and then averaged. A cursory survey for amphibians was made near the shoreline by turning over rocks and logs and visually searching the littoral zone of the lake. Angler use and camping area development were visually assessed around the lake's perimeter and documented.

RESULTS/DISCUSSION

Total catch was 16 trout with a mean CPUE of 8 trout/net-night. CPUE for 2010 was markedly lower than the 25 trout/net-night reported for 2002 (Ryan et al. 2007). Cutthroat Trout and Hybrids composed the majority of the catch (n = 11), followed by Brown Trout (n = 3), Rainbow Trout (n = 1) and Golden Trout (n = 1, Table 1). No additional fish were sampled with angling. Trout length ranged from 220 to 632 mm. Trout weight ranged from 95 to 555 g. The largest individuals were Brown Trout.

Trout densities appeared to have decreased compared to 2002. There are several possible explanations for this decrease including: 1) over harvest or poaching, 2) increased winter kill, 3) poor natural recruitment, or 4) fishing mortality. Determining which of these factors led to

this decline was not possible with our survey design. Despite frequent stocking, we sampled very few Golden Trout, which have been the only species stocked since 1989, yet was poorly represented in the catch. Natural recruitment of the other trout species in the lake are supporting this fish community and fishery and are likely reducing survival of stocked Golden Trout through predation or competition (Warren and Partridge 1996).

The lack of Golden Trout suggests that frequent stocking contributes little to the maintenance of this fish community and fishery. Seemingly, natural recruitment has been sufficient for sustaining this fishery. Furthermore, only one trout exceeding the 20" length limit was sampled. This suggests that this population does not possess adequate growth rates or longevity to produce a trophy fishery. However, this observation is based only on the length frequency and not corroborated with an age assessment. Future evaluations should determine ages, growth rates, and longevity to determine whether this management direction is realistic and achievable.

Limnological factors were measured at three sites in Baker Lake. Average depth was 9.3 m, average temperature was 9.7 °C, average pH was 10.2, and average secchi disk transparency was 9.0 m (Table 2). Surface water temperature was 11° C.

Habitat suitability for trout was inferred by visual observations. Available winter refugia appeared adequate with a maximum depth of 11 m and multiple apparent ground-water sources. Spawning habitat within the lake was limited with approximately 10% of the lake being less than 1-m deep and most of the shoreline being comprised of fine silt**.** Suitable spawning gravels and flow were observed in both the inlet and outlet of the lake, and numerous juvenile salmonids were observed in the outlet.

The lake appears to receive substantial visitor use. There was a well-marked and maintained trail which provided adequate access. Visual assessment of the lake's perimeter suggested visits were common. Four dispersed campsites and two additional primitive fire pits were present. In addition, numerous anglers were observed at the lake during the survey.

RECOMMENDATIONS

1. Discontinue frequent stocking as natural recruitment is sufficient to support the trout community and fishery.

2. Estimate ages, growth rates, and longevity to determine potential and feasibility of trophy trout management here.

LAKES AND RESERVOIR INVESTIGATIONS

AMERICAN WHITE PELICAN AND DOUBLE-CRESTED CORMORANT COUNTS

ABSTRACT

The presence of piscivorous birds and related predation of game fishes at the Hagerman WMA ponds might lead to a decline in the quality of this fishery if fish predation by birds is substantial. As a first step in assessing whether predation might be substantial, we completed structured counts of American White Pelican *Pelecanus erythrorhynchos* and Double-Crested Cormorant *Phalacrocorax auritus*. Between March 13 and October 22, 2010, we counted piscivorous birds at two ponds located at the Hagerman WMA, Riley and Settling ponds. Over 16 intervals, Pelican and cormorant use was estimated as 4,104 (SD = 132) and 1,213 bird use days (SD = 72), respectively. Combined, piscivorous birds consumed 4,928 kg of fish. Assuming 100% selection of hatchery trout, this would equate to 26,613 catchable-sized hatchery - about 59% of the fish stocked on the Hagerman WMA. This conclusion assumed 100% selection of hatchery trout, which undoubtedly would have positively biased the predation estimate. In contrast, we only completed counts during the day and these piscivorous birds are known to forage extensively at night, thereby negatively biasing our predation estimate. The amount of use and daily consumption rates seem to support the contention that piscivorous birds have the potential to reduce fishing success at the Hagerman WMA ponds.

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INTRODUCTION

American White Pelican *Pelecanus erythrorhynchos* and Double-Crested Cormorant *Phalacrocorax auritu*s (hereafter pelican and cormorant, respectively) are known to forage on hatchery Rainbow Trout *Oncorhynchus mykiss* stocked in some of the Magic Valley Region's waters. Moderate to high avian predation rates could substantially reduce the number of stocked trout available for anglers. Obtaining more information and understanding about avian predation would help determine appropriate actions for minimizing predation and maximizing angler catch and harvest rates.

Pelicans and cormorants are often seen foraging at the Hagerman WMA ponds. The composition of their diet is not known, but expected to consist of warmwater fishes and stocked hatchery trout. Warmwater fish populations, such as Bluegill *Lepomis macrochirus* and Largemouth Bass *Micropterus salmoides* are self-sustaining in some Hagerman WMA ponds, but densities are relatively low. To provide better angling opportunities, staff from Hagerman State Fish Hatchery stocked 45,000 hatchery Rainbow Trout in the WMA ponds during 2010.

Riley and Settling ponds are frequented by pelicans and cormorants more often than other ponds within the WMA. Staff has observed that piscivorous bird counts are typically highest immediately after hatchery trout are stocked. Piscivorous bird abundance increased after hatchery trout were stocked and remained until the majority of stocked fish were consumed (Warren et al. 2001).

A study was implemented using creel census techniques that would provide estimates of pelican and cormorant use (Malvestuto 1996). The resulting data could be used to estimate piscivorous bird consumption and to document seasonal trends. The objective of this investigation was to estimate combined seasonal pelican and cormorant use of two Hagerman WMA ponds. Quantifying piscivorous bird use will improve understanding of possible impacts to this put-and-take fishery.

METHODS

The Hagerman WMA is located in Gooding County, along Highway 30, south of Hagerman, Idaho (Figure 2, Appendix A).

Piscivorous bird counts were completed on two Hagerman WMA ponds from March 13 to October 22, 2010. The sampling period was divided into 14-d intervals and we randomly selected survey dates and times. Survey dates were stratified into two categories, including weekday as well as weekend days and holidays. Five weekdays and two weekend/holiday days were randomly chosen within each 14-d interval. White Pelican and Double-Crested Cormorant were counted visually from fixed locations.

Estimates of pelican and cormorant use were calculated for each 14-day interval and summed to estimate total use. Total pelican per census interval were calculated by multiplying the mean daily count within an interval by the number of days in the interval. The mean pelican count was equal to the sum of pelicans observed on daily interval counts, divided by the number of count days. Total bird use days was extrapolated by multiplying the mean number of birds per count by the total days of the census interval (e.g. 14 days). The sum of total bird use days was divided by the total number of days in the survey (e.g. 223 days) to estimate the number of birds per day using the surveyed waters.

RESULTS

A combined total of 1,170 White Pelicans were counted on Riley and Settling ponds. The highest instantaneous count was 58 pelican on Riley Pond. The mean daily pelican count for the sample period for the two ponds was 11 (SD = 12). Total pelican use days was estimated as 4,104 (SD = 132). The estimated number of Pelican per day using the surveyed waters was 18 birds.

A combined total of 384 cormorants were counted on the Hagerman WMA in 2010. The highest instantaneous count was 29 cormorant on the Riley Pond. The mean daily cormorant count for the sampling period for the two ponds was 4 (SD = 8). Total cormorant use days was estimated as 1,213 (SD = 72). The estimated number of cormorants per day using the surveyed waters was 5 birds.

We did not attempt to determine diet selection for these piscivorous birds at Hagerman WMA. Therefore, we were unable to precisely estimate consumption of hatchery Rainbow Trout. Other fish species were present in these ponds and piscivorous birds more than likely consumed species other than hatchery Rainbow Trout. For context and as an absolute maximum estimate, we calculated consumption assuming piscivorous birds only ate hatchery Rainbow Trout and only foraged on these two ponds. We used consumption rates of 1.10 kg/d for adult pelican and 0.46 kg/d for adult cormorant (Shmueli et al. 2000). Accordingly, pelicans and cormorants consumed 4,415 kg and 513 kg of hatchery Rainbow Trout during the survey period, respectively. Catchable Rainbow Trout reared for stocking in these fisheries average 5.4 fish/kg (2.41 fish/lb) which extrapolates to a total potential consumption of 23,843 and 2,770 hatchery Rainbow Trout by pelicans and cormorants, respectively.

DISCUSSION

This was the first attempt to estimate piscivorous bird use of ponds on the Hagerman WMA that are managed primarily as put-and-take fisheries. We assume our sampling methods resulted in an underestimate of avian predator use as we only counted during the day time. Pelican forage nocturnally, and pelican abundance may be two to three times higher at night than during the day in the same location (McMahon and Evans 1992). IDFG hatchery staff reported nocturnal feeding by pelicans during the survey which supports this contention. Future attempts to estimate piscivorous bird use should include nocturnal counts.

We estimated fish consumption as 4,928 kg for the period of March 13 and October 22, 2010. If piscivorous bird only consumed hatchery Rainbow Trout, this would equate to 26,613 standard-sized catchables (i.e. 10") or approximately 59% of all trout stocked on the Hagerman WMA during this period. There are several biases (positive and negative) that prevent this from being a definite conclusion. However, piscivorous bird use of these ponds is likely substantial enough to cause concern about the performance of hatchery trout.

RECOMMENDATIONS

1. Expand monitoring of piscivorous birds that utilize other fisheries in the Magic Valley Region.
2. Prioritize management actions as described in the IDFG Pelican Management Plan (IDFG 2009).

ANDERSON RANCH RESERVOIR

ABSTRACT

During 2010, we used a trawl to sample the kokanee *Onchorhynchus nerka* population in Anderson Ranch Reservoir. Total abundance of kokanee combined for all strata and age groups was estimated at 1,017,288 fish, representing a density of 611 fish/ha. Reservoir densities of age zero, one, two, three, and four kokanee were estimated at 473, 27, 83, 27, and 2 fish/ha, respectively. Standing crop combined for all strata and age groups was estimated as 17.24 kg/ha.

Kokanee density increased substantially compared to 2009, but is comparable to the 2005 - 2010 average. Abundance of age-3 kokanee increased four-fold from 2009 to 2010, concomitantly size of age-3 kokanee decreased, suggesting food limitation. Mean length at age age-3 decreased from 315 mm (SD = 42) in 2009 to 293 mm (SD = 23) in 2010. Age-2 kokanee were abundant suggesting that adult sizes for age-3 kokanee during 2011 will decrease further.

Kokanee escapement in the South Fork Boise River was controlled in 2008 to reduce overall densities in Anderson Ranch Reservoir. Objectives were to allow for recruitment of approximately 1 million age-0 kokanee in 2009 and ultimately an age-1 abundance of 313,700 kokanee in 2010. Unfortunately escapement or survival were not sufficient to meet these objectives, and age-0 abundance was approximately 50% less than objectives. This cohort remained below objective through age-1 during 2010.

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INTRODUCTION

Anderson Ranch Reservoir is a Bureau of Reclamation (BOR) impoundment on the South Fork Boise River in Elmore County. Maximum reservoir storage capacity is 60,833 hectare meters, of which 3,575 hectare meters is considered dead storage (USGS 1996). Kokanee *Onchorynchus nerka* are the primary gamefish targeted by anglers, though some effort is directed at Rainbow Trout *O. mykiss*, Smallmouth Bass *Micropterus salmoides*, and Yellow Perch *Perca flavescens*. Bull Trout *Salvelinus confluentus* and several nongame fish species are also present. Kokanee are managed to provide a high-yield and harvest-oriented fishery. Bag and possession limits for kokanee are 25 and 50, respectively. Trends in kokanee abundance are monitored on an annual basis using trawling techniques. The objective of this sampling effort was to monitor the kokanee fishery and to determine whether alternate management strategies are needed to maintain a quality kokanee fishing experience.

METHODS

Kokanee abundance and size trends in Anderson Ranch Reservoir were monitored using nighttime trawling techniques initially described by Rieman (1992). Furthermore, we utilized strata and scheduled sampling efforts to mimic previous sampling efforts (Partridge and Warren 1995). Sample dates were selected on or around the new moon period of late July or early August.

The reservoir was stratified into three sections. Three trawling tows, utilizing seven steps per tow, were completed within each section. Trawling tows were completed using a 4.46-m^2 framed trawl net pulled at approximately 1.59 m/s. The trawl nets was initially deployed to depths below the observed kokanee layer. At each step, the net was towed for 180 s / step. Upon completion of an 180-s tow, the trawl net was incrementally raised (or stepped) 3 m and towed, until it appeared that stepped tows had completely sampled the kokanee layer (i.e. range of depth with kokanee present).

Sampled kokanee were measured for total length to the nearest mm and weighed to the nearest gram. Otoliths and/or scales were collected from up to ten kokanee per 1-cm length bin. Ages were determined using standard fish aging techniques (DeVries and Frie 1996). We collected aging structures and ages using a non-random subsample of 186 kokanee. Kokanee less than 100 mm were assigned to the age-0 age class and all others were aged from otoliths.

Abundance, density, and standing crop were estimated for each age group individually using an EXCEL spreadsheet developed by IDFG fisheries research personnel (Harryman 2010). Kokanee densities were calculated relative to the surface area of strata and the entire reservoir at the time of sampling. Water surface elevation was obtained from the US Bureau of Reclamation's website.

RESULTS

We completed tows on the nights of July 14 and 15, 2010. Reservoir surface elevation was approximately 1,895 m. Three tows were completed in each designated strata, and each tow included seven steps.

In all, we completed transects resulting in a total catch of 747 kokanee. Mean kokanee catch per trawl (± 90% CI) was 35 fish/trawl, and ranged from 3 to 60. Kokanee TL ranged from 50 to 340 mm (Figure 3).

Total abundance of kokanee for all strata and age groups combined was estimated as 1,017,288 fish, representing a density of 611 fish/ha (Table 3). Five age classes were identified in the catch. Reservoir densities of age-0, 1, 2, 3, and 4 kokanee in 2010 were estimated at 473, 27, 83, 27, and 2 fish/ha, respectively. The standing crop estimate for 2010, for all strata and age groups combined, was 17.24 kg/ha. Average length at age-3 was 293 mm (SD = 23, Figure 4).

DISCUSSION

The 2010 overall kokanee density increased substantially compared to 2009 but is comparable to recent averages (Table 4). Age-3 abundance increased four-fold from 2009 to 2010, resulting in smaller age-3 kokanee suggesting food limitation at this density. Mean length at age-3 decreased from 315 mm in 2009 to 293 mm in 2010. High abundance of age-2 kokanee in 2010 suggests that the age-3 cohort will be even more numerous and smaller than 2010. During 2010, mean length at age-3 was less than the size objective of 305 - 356 mm. Densities of this magnitude are not conducive to achieving the desired kokanee sizes as described in the 2007 - 2012 Fisheries Management Plan (IDFG 2007). Decreasing kokanee densities in Anderson Ranch Reservoir should be a priority to meet management objectives.

Kokanee escapement in the South Fork Boise River was managed during 2008 to reduce overall densities in Anderson Ranch Reservoir (Stanton and Megargle 2008). In 2008, we restricted spawning escapement in the South Fork Boise River to 63,123 kokanee of which 24,700 were female. The goal of this restricted escapement effort was to achieve recruitment of approximately 1 million YOY kokanee in 2009 and ultimately an age-1 abundance of 313,700 kokanee in 2010. Fry recruitment in 2009 was about 50% lower than forecasted leading to fewer age-1 kokanee that desired. In essence, the use of controlled escapement during 2008 to achieve prescribed kokanee densities was not successful. This failure was not surprising given the stochastic nature of spawning success, egg-to-fry survival rates, and annual survival rates within the reservoir (Table 3). In addition, inaccurate or imprecise trawl estimates may also have confounded efforts to model escapement to predict abundance of age-1 kokanee in the reservoir. For example, the 2008 age-0 cohort was tracked through 2010 using trawl estimates. This cohort abundance estimate included 1.1 million age-0s in 2008, to 57,000 age-1s in 2009, to 137,000 age-2s in 2010. Imprecise estimates such as these prevent accurate and precise modeling. Managing escapement will continue to be a difficult task due to these sorts of uncertainties; however, escapement control is still likely an effective tool to substantially reduce recruitment in years when age-3 abundance is unusually high.

RECOMMENDATIONS

1. Control escapement into spawning tributaries when monitoring indicates high abundances of age-3 kokanee.
2. Monitor kokanee annually for management purposes and to provide information to kokanee anglers.

CAREY LAKE

ABSTRACT

We monitored the Largemouth Bass *Micropterus salmoides* population in Carey Lake on June 13 - 14, 2010. We utilized boat electrofishing at night to sample bass along randomly-selected transects. A total of 59 Largemouth Bass were sampled at seven transects. Catch per unit effort (CPUE) was 34 bass/h (± 10, 80% CI). Mean TL of Largemouth Bass was 205 mm (SD = 57) and ranged from 90 to 370 mm. Stock densities for PSD, RSD-Q, and RSD-P were 29, 70, and 29, respectively. Mean relative weight for substock-, stock-, and quality-sized bass were 104, 96, and 99, respectively.

There has been a shift in relative abundance and size structure of Largemouth Bass in Carey Lake. CPUE declined from 336 bass/h in 2007 to 34 bass/h in 2010. In addition, PSD has increased from 6 in 2007 to 29 in 2010. The increased PSD seems to indicate failed or minimal recruitment in 2008 and 2009, rather than an increase in the number of larger bass. Drought conditions have been prevalent since 2007 and it is possible low water conditions during spring and early summer are detrimental to bass recruitment. In addition, low water conditions have resulted in fast growth and establishment of dense beds of aquatic macrophytes, which may reduce bass foraging ability and increase the likelihood of winter kill.

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INTRODUCTION

Carey Lake is located on a state Wildlife Management Area (WMA) 0.6 km east of the town of Carey in Blaine County, Idaho. Carey Lake is situated at an elevation of 1,452 m and has a maximum surface area of 148 hectares. Most of the lake is shallow and marsh-like; however, deeper areas exist (4.5 to 5.5 m) due to dredging operations conducted in August 1977. Carey Lake supports populations of Largemouth Bass *Micropterus salmoides*, Bluegill *Lepomis macrochirus*, Yellow Perch *Perca flavescens* and Brown Bullhead *Amerius nebulosus*. Bass and Bluegill were first stocked around 1949. Supplemental stockings of adult bass and Bluegill occurred periodically from 1965 to 1975. These species have supported a popular fishery for many years. Around 1973, Yellow Perch were illegally introduced and since become the most numerous fish species present. Yellow Perch angling during winter and through the early summer has become popular. Drought conditions (e.g., 1977) and numerous winterkills (1973 to 1985) have at times almost completely eliminated fish populations from Carey Lake (Ryan and Megargle 2008).

During the past five years, Carey Lake has been subject to frequent drought conditions which likely reduced fish population abundances. We initiated this sampling effort to evaluation the current Largemouth Bass population and to establish standard sampling methods and sites for future monitoring.

METHODS

We sampled Largemouth Bass on June 13 and 14, 2010 using boat electrofishing equipment. We established transects utilizing randomly selected start points. Each transect was sampled for 15 minutes of on-time (i.e. active electrofishing). Two netters were utilized and only bass were captured. We characterized relative abundance by calculating mean catch per unit (CPUE) effort as bass/h. Sample size goals for electrofishing units (i.e. transects sampled for 15 minutes) were based on the variance of catch between units.

All sampled bass were measured for total length to the nearest millimeter and weighed to the nearest gram. Otoliths were collected from a representative sub-sample to estimate length-at-age. Otoliths were prepared for age estimation by breaking centrally, burning or browning the broken edge with an alcohol burner, and viewing the broken edge with a dissecting microscope at 30 – 40X. Otoliths were coated with mineral oil to improve viewing clarity. Growth was estimated from mean length at age using the von Bertalanffy growth function generated in FAST (Fisheries Analysis and Simulation Tools, Version 2.1©).

Stock structure and condition indices was generated in FAST. Proportional and incremental stock densities were calculated as an index of size structure (Anderson and Neumann 1996). Relative weight was calculated in FAST and were summarized as the mean within a designated size group.

RESULTS

We sampled 59 Largemouth Bass along seven transects resulting in a CPUE of 34 bass/h (± 10, 80% CI). Bass length ranged from 90 to 370 mm and averaged 205 mm (SD = 57, Figure 5). Mean length at age-3 was 281 (SD = 58) mm. No age-4 or older bass were sampled (Figure 6). Bass weight ranged from 11 to 625 g.

Proportional stock density was 29 (± 18, 95% CI; Table 5); whereas the incremental stock densities of the catch were 71 and 29 for RSD S-Q and RSD Q-P, respectively. Mean relative weights for substock, stock, quality-sized bass were 104, 96, and 99, respectively.

DISCUSSION

There has been a shift in Largemouth Bass density and size structure in Carey Lake. CPUE declined from 336 bass/h in 2007 to 34 bass/h in 2010. In addition, PSD has increased from 6 in 2007 to 29 in 2010. The increased PSD appears to reflect failed or minimal recruitment in 2008 and 2009 rather than higher abundance of larger bass. Small bass were very rare, and we only sampled one age-1 bass (Figure 6).

Drought conditions have been prevalent since 2007 and low water levels in spring and early summer may have been detrimental to bass recruitment. In addition, low water conditions have resulted in proliferation of aquatic macrophytes which may be reducing bass foraging ability and increasing the likelihood of winterkill. During 2010, macrophytes had become so extensive that little open water remained. Largemouth bass use edges as cover, and often require transitional areas for both spawning and growth (Brown and Urban 1969; Stroud and Clepper 1975). Too much habitat complexity has been shown to substantially limit Largemouth Bass foraging efficiency (Savino and Stein 1982) which might partially explain the scarcity of larger-sized bass in the population (Miranda and Pugh 1997). Also, limnological characteristics of Carey Lake such as eutrophic status, shallowness, and high biological oxygen demand increase the likelihood of winterkill especially during drought years (Greenbank 1945). It is possible that bass growth, survival, and longevity could be increased by decreasing densities of aquatic macrophytes; however, this management option may contradict management objectives for other species such as waterfowl.

RECOMMENDATIONS

1. Monitor Largemouth Bass in Carey Lake to better understand long-term trends.

2. Implement habitat improvement project(s), pending concurrence of Wildlife Habitat staff. Investigate the feasibility and cost of biological, chemical and mechanical options to reduce abundance and density of submerged aquatic macrophytes to increase survival, growth, and longevity of Largemouth Bass.

MAGIC RESERVOIR

ABSTRACT

During June 2010, we surveyed the Smallmouth Bass *Micropterus dolomieu* population in Magic Reservoir with boat electrofishing. We completed twenty units of sampling effort and only caught 12 bass. Mean catch per unit effort was 2.4 bass/h (± 1.2; 80% CI). Catch was insufficient to allow meaningful characterization of this population.

We counted Brown Trout redds in the Big Wood River upstream of Magic Reservoir during fall 2010. We observed a total of 130 redds. This was a decrease compared to 2008 and 2009, but within the range observed during the last 25 years.

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INTRODUCTION

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

Magic Reservoir provides year-round fishing opportunities for Rainbow Trout *Onchorhynchus mykiss*, Brown Trout *Salmo trutta*, Yellow Perch *Perca flavescens*, and Smallmouth Bass *Micropterus dolomieu*. Most Rainbow Trout originate from hatchery sources, though both Brown Trout and Rainbow Trout spawn naturally in the Big Wood River upstream of the reservoir. Recent contribution of wild trout to this fishery is not well understood. Staff have completed annual Brown Trout redd counts in the Big Wood River between Magic Reservoir and Bellevue, since 1986. Counts are used to monitor trends in Brown Trout abundance in this system.

Staff initiated these monitoring efforts to further regional efforts to understand bass population, monitor bass and trout trends, and address regulation proposals.

METHODS

Smallmouth Bass Monitoring

Smallmouth Bass were sampled in late spring using boat electrofishing equipment as described in the lake and reservoir general methods. Electrofishing samples consisted of 15 minute units of effort beginning at randomly chosen sample sites throughout the reservoir. Electrofishing samples consisted of 20, 15-min units of effort beginning at randomly chosen sample sites throughout the reservoir (Appendix A). Two netters were used, and only bass were targeted during sampling. Abundance was indexed by calculating average catch per unit effort as bass/h. Sample size goals for electrofishing units were based on the variance between units encountered during the sampling effort. A sample size was estimated utilizing a PDA data recorder and data processing software, so that information was accessible while sampling in the infield.

All sampled bass were measured for total length to the nearest millimeter and weighed to the nearest gram. Otoliths were collected from a representative sub-sample to estimate length-at-age relationships. Otoliths were prepared for age estimation by breaking centrally, burning or browning the broken edge with an alcohol burner, and viewing the broken edge with a dissecting microscope at 30–40X. Otoliths were coated with mineral oil to improve viewing clarity. Growth was estimated from mean length at age using the von Bertalanffy growth function generated in FAST (Fisheries Analysis and Simulation Tools, Version 2.1©). Stock structure and condition indices were generated in FAST. Proportional stock density was calculated as an index of size structure (Anderson and Neumann 1996). Relative weights were calculated in FAST and were summarized as the mean within a designated size group.

Brown Trout Redd Counts

Brown Trout redds were counted on December 7, 2010 from Sheep Bridge to a point north of Stanton Crossing on the Big Wood River upstream of Magic Reservoir. Survey reach descriptions are listed in (Table 6.). Redds were visually identified and counted as survey reaches were walked. Redds were identified as a clean depression in suitable gravel/cobble substrate with an associated pillow of substrate behind the depression. In cases where multiple redds were clustered, each discernible depression was considered one redd.

RESULTS

Smallmouth Bass Monitoring

We completed electrofishing surveys on Magic Reservoir on June 3, 4, and 7, 2010. Twenty units of sampling effort were completed and resulted in a total catch of 12 bass.

Sample size was insufficient to analyze or generate meaningful summaries regarding length, weight, age, or condition. Mean CPUE was 2.4 bass/h (± 1.2, 80% CI). A length-frequency histogram of the catch can be found in Figure 7.

Brown Trout Redd Counts

A combined total of 130 Brown Trout redds were observed among the three reaches surveyed upstream of Magic Reservoir during 2010. Redd counts in 2010 were below totals for 2009 and 2008 when 297 and 201 redds were counted, respectively.

DISCUSSION

Smallmouth Bass Monitoring

The total catch of bass despite substantial sampling effort was extremely low. Possible explanations for the low catch may include electrofisher malfunction or habitat conditions unconducive to electrofishing. We had no overt indication the electrofishing unit was malfunctioning; however, catch of other fish species was very low possibly indicating the unit was not working properly. In addition, the 2010 reservoir storage was extremely high compared to previous years and new areas of shoreline were inundated that hadn't been for several years. The resulting aquatic habitat was very sterile, and it is possible Smallmouth Bass were not using this habitat since it held very little forage or cover.

Brown Trout Redd Counts

Brown Trout redd counts decreased in 2010 as compared to both 2008 and 2009 (Table 6). The survey was implemented nearly three weeks later than normal due to other sampling obligations, and it's possible older redds appeared inactive and were not counted. However, total

counts do not fall outside the ranges documented between 1986 and 2009 and the 2010 counts should be considered within normal bounds.

RECOMMENDATIONS

1. Repeat Smallmouth Bass standardized sampling and incorporate Magic Reservoir into the Magic Valley Region bass monitoring program.

2. Continue monitoring Brown Trout spawning redds upstream of Magic Reservoir.

MILNER RESERVOIR

ABSTRACT

A total of 711 tournament-caught Smallmouth Bass *Micropterus dolomieu* were jaw-tagged and released in Milner Reservoir in 2009 to assess movement and dispersal from release sites. To date (November 30, 2010), 195 tags have been returned or reported. Of these, 162 reports included capture location information that could be used to determine movement from release location. Movement of individual bass varied from <1 km to >43 km from release locations. IDFG concludes that stockpiling of bass at tournament release locations is not a serious concern to this population.

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INTRODUCTION

Milner Reservoir is a 760-ha impoundment of the Snake River near Burley, Idaho. The reservoir is managed primarily to provide irrigation water to the Milner-Gooding, Twin Falls, and North Side canal systems. The reservoir has been operated with seasonally consistent water surface elevation since the early 1990s when the dam was reconstructed.

Milner Reservoir has ample access for boat and shore anglers including several public or and private boat launch facilities and access points. The reservoir supports several species of gamefish including Smallmouth Bass *Micropterus dolomieu*, Rainbow Trout *Onchorhynchus 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 from Lake Walcott.

Anecdotal observations indicate that Smallmouth Bass populations in Milner Reservoir increased substantially following dam reconstruction in the 1990s. It is assumed that more stable water levels benefited Smallmouth Bass. However, in recent years, fall draw-downs have become more common. The effect of seasonal draw-downs on the bass population is unknown.

Milner Reservoir supports a popular bass fishery, including several tournaments annually. The quality of the Smallmouth Bass Fishery has remained stable to this point. However, recently, anglers have expressed some concern about whether [suspected] increases in fishing effort might lead to reduced quality. In 2007, IDFG completed Smallmouth Bass monitoring efforts at Milner Reservoir. The reservoir was sampled again in 2009. Information gathered from these and future surveys will be used to provide insight on Smallmouth Bass population dynamics and management.

In 2009, Idaho Department of Fish & Game's regional fisheries staff were approached by local bass club members concerned that current post-tournament bass release practices could be negatively impacting Milner Reservoir's Smallmouth Bass population. Tournament anglers bring captured Smallmouth Bass to a common weigh-in site. After weigh-in, all fish are placed in a large livewell and transported by boat to one release location. In theory, this could lead to concentration of bass in one location if they don't disperse, which could make them more susceptible to harvest. In order to assess these possibilities, a jaw tagging effort was undertaken in 2009. The purpose of the study was to determine whether, how quickly, and to what extent bass moved from the release site. If vulnerability to harvest were considered excessive, IDFG could institute tournament rules permitting overland transport or other release methods to avoid stockpiling problems.

The results of this study are based on analysis of tournament release locations and 2009-2010 angler reports through the IDFG hotline. Anglers reported the tag identification number and location at which bass were caught and released, or caught and harvested. Follow-up calls from IDFG were used to obtain specific capture location when it was not provided in the initial report.

METHODS

During four 2019 tournaments, IDFG staff and local bass club members affixed color jaw tags to tournament-captured Smallmouth Bass. Bass were tagged at the tournament weigh in and then released. Jaw tags were uniquely colored for each tournament date (May 16-blue, May

30-red, Aug 1-gold, and Sept 12-green). Each tag included a specific identification number and the IDFG hotline telephone number.

To allow description of approximate recapture location for tagged bass, we divided the reservoir into seven sections (Figure 8). Maps were provided to tournament anglers at each tournament following the first tagging event. When anglers recaptured tagged bass, they were instructed to record the capture location and tag color. Tags also included an IDFG tag-reporting phone number which would allow others (i.e. non-tournament anglers) to report capture of tagged bass. Follow-up phone calls were used as needed to obtain more specific information about where and when the bass were recapture. This information allowed comparison of release and recapture locations.

Overall, 711 tagged Smallmouth Bass were released in Milner Reservoir. On May 16, 203 Smallmouth Bass were tagged with a blue jaw tag. They were released in Section 2, river mile 646.8. On May 30, 162 Smallmouth Bass were tagged with a red jaw tag and released in Section 4, river mile 650.5. On August 1, 154 Smallmouth Bass were tagged with a gold jaw tag. They were released in Section 4, river mile 653.2. On September 12, 192 Smallmouth Bass were tagged with a green jaw tag and released in Section 5, river mile 657.3.

RESULTS

Tag results from both 2009 and 2010 are compiled in this report (Table 7). The average length of tagged bass was 373 mm and ranged from 297 to 470 mm (Figure 9). Of the 195 tag reports, 162 reports included sufficient capture location information to determine movement from release location. All 162 reports indicated some movement, with distance varying greatly from <1 km to >43 km from release locations. The frequency and magnitude of movement indicates that concentration of bass and increased susceptibility of harvest at post-tournament release locations was not a serious concern for maintaining the quality of this fishery. Furthermore, movement data suggests no need to implement alternate release strategies.

DISCUSSION

Several factors may influence bass to move varying distances from release locations. Factors may include competition and availability of resources such as food and habitat at a release location. We also examined patterns of post-release movement for bass caught during different seasons. Blue and red tagged bass were captured and released pre-spawn in May, and on average, appeared to travel farther than gold (August) and green (September) released bass. Movement may also have been influenced by water temperatures. Blue and red tagged fish were released in the spring when Milner Reservoir water temps were recorded around 53° F.

Assuming that each released bass had an equal opportunity to be recaptured, gold and green tagged bass were reported at a much lower catch rate than blue or red tagged bass. It leads us to wonder whether survival rates were lower for gold and green tagged bass. Gold tagged bass were released at the beginning of August when water temps have been recorded around 72° F and green tagged bass were released several weeks later. Higher water temperatures may increase physiological stress (from capture, weigh-in, and tagging) and could result in reduced movement or higher mortality.

We also suspected that bass would be more susceptible to recapture when released in close proximity to popular or easily-accessed areas. Gold and red tagged bass were released in close proximity to the cities of Heyburn and Burley, respectively, and had the highest capture rates within the first week after release. Overall, these two colors also had the highest capture rates within the same section as released. Regardless, study results suggested bass movement from release locations was sufficient to prevent substantially increased vulnerability to harvest. Furthermore, with dispersal distances up 43 km, bass movement post-release may limit an individual's susceptibility to be encountered at its release location. Thus, the tournament angling effort and current post-tournament release practices at Milner Reservoir do not appear to appreciably increase Smallmouth Bass harvest or reduce population abundance.

RECOMMENDATIONS

1. Continue current bass tournament restrictions and rules; do not permit overland transport of tournament-caught Smallmouth Bass.

SALMON FALLS CREEK RESERVOIR

ABSTRACT

During April 2010, we set floating gill nets at randomly selected sites throughout Salmon Falls Creek Reservoir in order to describe and monitor trout populations. A total of 132 trout were sampled. Rainbow Trout *Onchorhynchus mykiss* composed 95% of the total trout catch with Yellowstone Cutthroat Trout *O. clarkii bouvieri* x Rainbow Trout hybrids (hereafter "hybrids") composing the remainder of the catch. Individual catch per unit effort was 10 Rainbow Trout / net-night and 0.58 hybrids / net-night. Length of hybrids ranged from 380 to 490 mm, and averaged 440 mm. Total length of hatchery Rainbow Trout ranged from 160 to 515 mm, and averaged 361 mm. The hybrid trout population was dominated by stock-sized fish of good relative condition.

A stratified angler creel survey was completed on Salmon Falls Creek Reservoir from April 23 through November 12, 2010, and included a total of 75 creel days. Estimated total angler effort was 89,046 h (± 1,617, 80% CI). Average angler catch rate for trout was 1.02 fish/h (± 0.03, 80% CI). Anglers were asked a series of questions related to their fishing experiences and management preferences for Salmon Falls Creek Reservoir. Of the surveyed anglers, 88% were satisfied, whereas 12% were dissatisfied with current fisheries management.

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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 dam configuration resulted in a large inactive storage volume (i.e. substantial water volume remains even in low water years). The reservoir provides a mixed fishery that includes hatchery-supported populations of Rainbow Trout *Onchorhynchus mykiss,* Yellowstone Cutthroat Trout *O. clarkii bouvieri* x Rainbow Trout hybrids (hereafter hybrids), kokanee *O. nerka*, as well as naturally-reproducing populations of Black Crappie *Pomoxis nigromaculatus*, Smallmouth Bass *Micropterus dolomieu*, Walleye *Sander vitreus*, and Yellow Perch *Perca flavescens*. Salmon Falls Creek Reservoir is one of only three waters in Idaho managed to maintain a Walleye fishery.

During 2010, we sampled trout to identify relationships between stocking strategies for Rainbow Trout and hybrids and the resulting abundance of trout in the reservoir. This survey was similar to surveys completed during the last several years including during 2006, 2007, 2008, and 2009. Experimental stocking of hybrids and their subsequent performance is of particular interest as this program was initiated during 2006 because of strong public interest. Department reluctance for stocking fingerling hybrids led to establishment of an agreement for which a private fishing club provided financial assistance to IDFG to offset production and transport costs of hybrids while IDFG assessed their performance. If performance was adequate IDFG would no longer receive financial assistance. Contrastingly, if performance was poor, IDFG would discontinue stocking. This was the last survey necessary before determining whether hybrid performance is adequate.

METHODS

Trout Netting

Understanding relative survival and growth of stocked trout is important for making decisions regarding stocking strategies, habitat conditions, and availability of trout for anglers. We sampled trout using IDFG standard floating gill nets (Appendix B) during spring when water temperatures were less than 15.5° C. Gill net dimensions are described in Appendix B. Gill nets were set April 12 and 13, 2010 at randomly selected locations (Appendix A). The majority of nets were set slightly off shore in an effort to reduce bycatch. Nets were soaked for a total of 12 net-nights. Sample size goals for net nights were based on the variance between units encountered during the sampling effort. Sample size was determined using an infield PDA data recording device, to enhance accessibility to sample design information. For sampled trout, we determined species based on common morphological characteristics including spotting patterns, coloration of finds, and presence throat slashes. We measure trout for total length to the nearest millimeter and weight to the nearest gram. Sampled fish were identified and inspected for marks. Hybrid trout stocked during 2006 were marked with an adipose fin clip for identification. Otoliths were collected from suspected hybrids to determine age structure. Relative trout abundance was indexed by calculating catch per unit effort (CPUE) or catch per net night. Hybrid trout stocking efforts were evaluated using species catch composition; where the proportion of hybrid trout at release was compared to the proportion of hybrid trout represented in the catch.

Creel Survey

A stratified angler creel survey was completed on SFCR from April 23 to November 12, 2010. One stratum was used on SFCR. The survey period was stratified into 14-d intervals. Day types were stratified into weekdays and weekend/holidays. Angler interviews and counts were conducted on two weekday and two weekend/holiday days per interval. Survey dates and times were randomly selected. Survey times were not stratified and included daylight hours only. Angler counts were conducted on foot at available access sites and by boat. One daily count was made per selected date. Angler interviews were conducted on the ground and on the water throughout the entire survey period. Creel surveys were completed 75 days during this period.

Catch and harvest rates were obtained from angler interviews. Anglers were questioned about the trip duration, method of angling, catch, and harvest. Harvested fish were inspected for species and size.

Angler counts were conducted at randomly scheduled times and were made from several pre-selected vantage points. Total angler effort was estimated by calculating the average angler counts for weekend days and holidays, as well as weekdays in each creel interval. Average anglers per count was equal to number of anglers contacted divided by the number of counts. Total expended hours per survey interval was calculated by multiplying the mean number of anglers per count, multiplied by days in the interval, multiplied by mean daylight hours in the interval. Combined totals for weekend days and holidays as well as weekdays were used to estimate angler effort. Catch rates were obtained from the angler interviews, and were applied to the estimated angling hours from the census counts, to estimate total harvest.

To determine angler satisfaction of current IDFG management strategies, anglers who were interviewed for the creel survey also were asked a series of categorical questions pertaining to their immediate fishing experience at SFCR. Anglers were asked three questions: 1) Are you satisfied with today's fishing experience, 2) What species were you targeting today, and 3) Do you know that IDFG has been stocking hybrids in SFCR? Overall angler satisfaction was calculated as the mean response from these three questions with one being the least satisfied and five being most satisfied.

RESULTS

Standard Trout Monitoring

From 2006 to 2010, SFCR was stocked with approximately 4.5 million salmonids. This included approximately 320,000 fingerling-sized hybrids, 2.4 million RBT fingerlings (including steelhead), and an additional 374,000 catchable-sized RBT. On average, the number of hybrid fingerlings stocked represented about 11.5% of the total salmonids stocked.

We sampled a total of 132 trout during 2010 with gill nets, including 125 Rainbow Trout (95%) and 7 hybrid trout (5%). CPUE for Rainbow Trout and hybrids were 10 fish net-night and 0.6 / net-night. Hatchery Rainbow Trout ranged in size from 160 to 515 mm, with the average length being 361 mm (SD = 82, Figure 10). Hatchery Rainbow Trout ranged in weight from 11 - 1,538 g, with the average weight being 574 g (SD = 348). Hybrids ranged in size from 380 to 490 mm, with the average length being 440 mm (SD = 47). Hybrids ranged in weight from 360 to 1,430 g, with the average weight of 1,019 g (SD = 386). Based on examination of otoliths, three

age classes of hybrids were present in the sample. Ages ranged from 1 to 3 years, with most being 3-year old fish. Mean length at age-3 was 458 mm.

Size structure and condition indices indicated that most hybrids in SFCR are stock sized and of good relative condition. Proportional stock density was 30 (± 15, 95% CI). Stock density indices for RSD S-Q and RSD Q-P were 62 and 31, respectively. Mean relative weight substock-, stock-, and quality-sized hybrids were 109, 103, and 97, indicating that hybrids were in average condition.

Creel Survey

In total, we contacted 1,097 anglers during the creel survey of SFCR. Angler effort was surveyed from April 23 through November 12, 2010. Estimated angler effort in the surveyed sections and time period was 89,046 h (± 1,617, 80% CI). Overall mean angler catch rate for trout was 1.02 fish / h (± 0.03, 80% CI). Of 1,097 anglers surveyed, 7% were fly fishermen, 58% were lure or gear fishermen, and 35% were bait fishermen.

In total, 1,097 anglers were interviewed. General anglers seeking anything that bites represented 55% of our interviewed anglers. Rainbow Trout (22%) were the most targeted species followed by Walleye (18%), Yellow Perch (2%), hybrids (2%), and Smallmouth Bass (1%). The majority of anglers (55%) were unaware that hybrids were being stocked. The mean angler satisfaction score was 4.51, indicating that anglers were highly satisfied with their angling experience.

DISCUSSION

Standard Trout Monitoring and Creel Survey

From 2006 to 2010, SFCR was stocked with approximately 4.5 million salmonids. This included approximately 320,000 fingerling-sized hybrids, 2.4 million RBT fingerlings (including steelhead), and an additional 374,000 catchable-sized RBT. On average, the number of hybrid fingerlings stocked represented about 11.5% of the total salmonids stocked. This stocking represents a substantial investment of resources in this fishery.

Based on the single year of sampling and the low number of hybrids captured, it is difficult to make conclusions regarding hybrid trout performance. The mean TL of hybrids was 25 mm longer than Rainbow Trout, with a mean length at age-3 of 458 mm, suggesting excellent growth rates. The longest hybrid was only 25 mm shorter than the longest RBT sampled, suggesting similar sizes between the two groups. This is especially true when considering these fish were stocked as fingerlings. Since hybrids have only been stocked since 2006, the ultimate trophy size potential is yet unknown, as the oldest fish would only be age-4.

While size distribution was similar between RBT and hybrids, gill net catch was lower for hybrids. We would have expected gill net catch of hybrids to be proportional to their stocking – about 11.5% of total salmonids if survival was equal among all groups. Hybrids only made up 5% of the catch. However, we only captured 7 hybrids during one sampling year using 12 net sets. It appears that hybrid relative abundance has declined since 2008. The 2010 survey showed a marked decline in hybrid CPUE from around 2.0 in the previous two years to around 0.6 fish/net-night (Figure 11). No correlation is apparent between hybrid stocking rates and subsequent gill

net CPUE. Few marked fish and a single sample year reduces our power to detect a significant difference between the groups, and therefore the long-term viability of hybrids as a fishery option. Additional sampling data in the coming years would increase the power to compare RBT and hybrid survival.

Unfortunately, the creel survey did not provide information that would help evaluate species-specific harvest rates. Catch or catch rate by trout species was not attainable with the data recorded. Nearly half of the surveyed anglers were not aware hybrids were present; thus, many anglers could not accurately report the number of each trout species caught and released. Additionally, creel clerks could not positively differentiate between hybrids and Rainbow Trout using phenotypic characteristics. This meant accurate species-specific harvest estimates were not calculable.

Gill net, creel, and angler preference information suggest that stocking hybrids provides marginal benefits to this fishery, especially as hundreds of thousands of other salmonids are already stocked. Also, most anglers were generalists or targeted other species, primarily Rainbow Trout and Walleye, and were unaware that hybrids have been planted in SFCR. Therefore, stocking hybrid trout may be of limited benefit given the very small contribution they are currently making to the trout fishery. Stocking hybrid trout in Salmon Falls Reservoir will need to be carefully considered, as hatchery rearing space is becoming an issue. Hybrid trout are produced on a schedule when Department hatcheries are already limited on space, which could make producing these fish increasingly difficult when the hatchery

RECOMMENDATIONS

1. Monitor the Salmon Falls Creek Reservoir salmonid fishery on a 3-year rotation to evaluate the relative contribution of Rainbow Trout and hybrids. Data collected from the monitoring effort will be used to evaluate stocking strategies.

STONE RESERVOIR

ABSTRACT

On June 1, 2010, we sampled Largemouth Bass *Micropterus salmoides* in Stone Reservoir. Sampling efforts included ten units of boat electrofishing (15-min power on electrofishing). This effort yielded a total catch of six Largemouth Bass. The mean CPUE was 2.4 fish/h. Mean TL of bass was 238 mm (SD = 98), and ranged from 145 to 425 mm. Mean weight was 315 g (SD = 55) and ranged from 36 to 1,231 g. The number of bass collected was too small to generate meaningful data summaries. It appears abundance of Largemouth Bass in Stone Reservoir has decreased substantially.

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INTRODUCTION

Stone Reservoir is an irrigation storage reservoir located on Deep Creek in Oneida County, Idaho (T15S, R32E, Sec 35). Deep Creek is a tributary to Salt Lake in the Great Basin. The reservoir is 11 km north of Snowville, Utah at an elevation of 1,400 m. The reservoir is owned by the Delmore Canal Company and provides irrigation water to lands in Idaho and Utah. At full pool, the reservoir has a surface area of 123 hectares and a volume of 8.1 hectometers^3 (Idaho Department of Water Resources 1981). Dam height is 10.4 m. Drainage area above the reservoir is 655 km^2.

Stone Reservoir supports warm and cold water fish populations including Largemouth Bass *Micropterus salmoides*, Yellow Perch *Perca flavescens*, White Crappie *Pomoxis annularis*, Black Crappie *P. nigromaculatus*, and Rainbow Trout *Onchorhynchus mykiss* (Megargle et al. 2004). The overall objective of this sampling effort was to monitor the Largemouth Bass population at Stone Reservoir and to allow comparisons with previous years and to other Magic Valley bass fisheries.

METHODS

We used boat electrofishing to sample bass in Stone Reservoir on June 1, 2010. Electrofishing samples consisted of ten, 15 minute units of effort beginning at randomly chosen sample sites throughout the reservoir (Appendix A). Sampling efforts focused on Largemouth Bass only, and no other species were sampled. Catch per unit effort (CPUE) was calculated from total effort and catch and reported as bass/h, and compared to previous years monitoring results. All sampled bass were measured for total length to the nearest millimeter and weighed to the nearest gram.

RESULTS

We sampled a total of six Largemouth Bass. Mean CPUE was 2.4 bass/h (Table 5). Average length of bass was 238 mm (SD = 98), and ranged from 145 to 425 mm. Average weight was 315 g (SD = 55), and ranged from 36 to 1,231 g.

DISCUSSION

Results suggest a substantial decrease in the abundance of Largemouth Bass in Stone Reservoir. Compared to Ryan et al. (2004), Largemouth Bass abundance has declined by 90%. Bass declines are likely a result of drought. IDFG received notification from the public indicating Stone Reservoir had become nearly dewatered following the 2004 survey (Ryan et al. 2007). However, complete dewatering of the reservoir was never confirmed by IDFG personnel. Nonetheless, severe drought conditions were experienced at Stone Reservoir and though immediate impacts to the fish community were not evaluated, it’s likely population has declined significantly as a result.

RECOMMENDATIONS

1. Conduct a standard lowland lake survey in Stone Reservoir to understand the current fish community and to identify restoration potential.

RIVERS AND STREAMS INVESTIGATIONS

BIG WOOD RIVER (BELOW MAGIC RESERVOIR)

ABSTRACT

A standard stream survey was completed on the Big Wood River downstream of Magic Dam in 2010. Seven species were sampled including Rainbow Trout *Onchorhynchus mykiss* (*n* = 599, 88%), Brown Trout *Salmo trutta* (*n* = 13, 3.75%), Bridgelip Sucker *Catostomus columbianus* (*n* = 44, 6%), Longnose Dace *Rhinichthys cataractae* (*n* = 9, 1%), Redside Shiner *Richardsonius balteatus* (*n* = 4, 0.5%), Yellow Perch *Perca flavescens* (*n* = 3, 0.5%), and Speckled Dace *Rhinichthys osculus* (*n* = 2, 0.25%). A total of 612 trout were sampled during the mark and recapture runs. Mean total length of Brown Trout was 312 mm (SD = 137) and ranged from 45 to 410 mm. Mean total length of Rainbow Trout was 220 mm (SD = 127) and ranged from 100 to 530 mm. Trout abundance (≥ 200 mm) was estimated at 1,591 fish (± 965, 95% CI). A total of 176 trout were tagged in the Big Wood River downstream of Magic Dam in 2010 to estimate angler exploitation. Assuming no post release mortality of tagged trout and a tag reporting rate of 50%, trout exploitation estimate was 8.8%. Water temperatures were variable and never exceeded trout thermal tolerance thresholds. Salmonid survival was likely not limited by summer thermal regimes in the Big Wood River.

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INTRODUCTION

The Big Wood River originates in the Smoky, Boulder, and Pioneer Mountain ranges of south-central Idaho. The river flows southwest from its origin to its confluence with the Little Wood River west of Gooding, Idaho; here, it forms the Malad River. Magic Reservoir is the largest impoundment of the Big Wood River. Downstream from Magic Dam, the river flows for 7.12 miles before all flow is diverted into the Richfield Canal. Entrainment from Magic Reservoir is thought to be the origin of trout residing in this reach. Substrate consists of embedded gravels and fractured lava flow. Banks are steep, rocky, and void of substantial riparian vegetation. The Big Wood River downstream of Magic Dam is a popular fishery for Rainbow Trout *Onchorhynchus mykiss*, Brown Trout *Salmo trutta*, and Mountain Whitefish *Prosopium williamsoni*. Hatchery Rainbow Trout are occasionally stocked in addition to the hatchery trout entrained from Magic Reservoir.

Flows are often high during the summer irrigation season from May-September, then drop to very low flows during winter when irrigation ends. Timing of water delivery fluctuates bases on water storage and irrigation needs, so river conditions may vary considerably between years. Because flows are inconsistent and often intermittent because of drought and water management strategies, the spillway section of the Big Wood River has general fishing regulations. In years of average to below average runoff, reservoir storage is depleted and irrigation releases may cease in mid to late summer, leaving only minimal seepage flow below Magic Dam. Depending on the when flows are shut down, water temperatures are thought to occasionally reach lethal limits and may result in partial or near-complete fish kills. We deployed digital temperature loggers to evaluate potential thermal limitations to trout below the Magic Dam in 2010.

The last survey of the Big Wood River, below Magic Reservoir was in 2003 and did not include temperature data. Therefore, the intent of this survey was to continue trend monitoring of fish populations and identify potential thermal regime limitations to salmonid populations. Additionally, floy tags were deployed in trout with the intent to evaluate angler use and exploitation.

METHODS

Standard stream survey

The Big Wood River downstream of Magic Dam was sampled using raft electrofishing equipment to evaluate trends in fish abundance and condition (Appendix A and B). Two electrofishing passes, separated by seven days, were completed at one transect to allow calculation of abundance and other metrics.

Upon capture, fish were identified, measured (TL, mm), weighed (g), marked, and released. Weights were taken only during the marking run. Caudal fin clips were used to mark trout and whitefish ≥ 100 mm for identification in the recapture run. During the recapture run, we identified, examined for marks, and measured all captured salmonids.

Abundance estimates for Rainbow Trout and Mountain Whitefish were made using a modified Peterson, mark-recapture estimator (Ricker 1975). Estimates were calculated in 100 mm increments for fish ≥ 100 mm total length. A minimum of five recaptures was required for estimates. Length groups were pooled when less than five recaptures were made within an

individual length group. Estimates of fish ≥ 200 mm were reported for evaluation of long-term trends (Warren and Megargle 2003).

Data collected were compiled, summarized, and used to estimate stock density, relative weight, annual mortality, and length at age. Relative stock densities (RSD – 400) were determined for Rainbow Trout collected in each transect. RSD - 400 was calculated as the number of fish ≥ 400 mm divided by the number of fish ≥ 200 mm (Ney 1993). Otoliths were collected from a representative group of Rainbow Trout. Sectioned otoliths were read and age was determined by counting annuli. Estimated ages were used to determine length at age and applied to an age length key to extrapolate age to all sampled fish in the marking pass (Devries and Frie 1996).

Habitat data was collected on a separate date following electrofishing efforts. Transect lengths and widths were measured with a rangefinder (Appendix B). Transect waypoints were marked for future replication using a GPS (Appendix A and B).

Water temperature monitoring

Three continuous-read archival thermographs (HOBO©) were installed within a 1.5 km reach of the Big Wood River starting immediately downstream of Magic Dam. They were deployed at even intervals between the dam and the end of the reach. Specific locations are found in Appendix A.

The thermographs were deployed from April 4 to October 12, 2010. They were placed in perforated PVC pipes with end-caps, deployed in areas likely to remain in water after irrigation flows are reduced or cease, and anchored to the shoreline using 1/8-inch stainless steel cable. Data was downloaded using Box Car Pro© software and processed using Microsoft EXCEL©.

Trout exploitation

We estimated trout exploitation to determine whether harvest was having a substantial effect on the size structure of trout within the reach. To estimate exploitation, we inserted green t-bar anchor tags into the dorsal musculature of trout sampled during an electrofishing survey. We chose green tags to reduce the likelihood that tag color might bias angler catch of tagged trout especially during low water conditions. Visible tags might bias tag returns since anglers might intentionally target the tagged trout. Tag reporting rates were assumed to be similar to those for non-reward duck leg bands, which were estimated at about 50% (Nichols et al. 1991).

Fish were anesthetized, measured for length (TL, mm), weighed (g), marked with t-bar anchor tags, and released back into the stream. The tags included a tag reporting phone number and individual tag identification number to facilitate reporting. Anglers were able to report tag information using the Department's "Tag-You're-It" tag reporting system including phone, direct return, or online tag reports.

RESULTS

Standard Stream Survey

We sampled the Big Wood River downstream of Magic Dam from April 27 to May 3, 2010. Site length was 1,009 m. The upstream boundary of the site was just downstream of the large spillway hole located immediately downstream of the dam.

We sampled seven species including Rainbow Trout (*n* = 599, 88%), Brown Trout (*n* = 13, 3.8%), Bridgelip Sucker *Catostomus columbianus* (*n* = 44, 6%), Longnose Dace *Rhinichthys cataractae* (*n* = 9, 1%), Redside Shiner *Richardsonius balteatus* (*n* = 4, 0.5%), Yellow Perch (*n* = 3, 0.5%), and Speckled Dace *Rhinichthys osculus* (*n* = 2, 0.3%).

Abundance of trout (≥ 200 mm) was estimated at 1,591 (± 965, 95% CI), which equated to 1,113 trout/ha. Total length of Rainbow Trout was 220 mm (SD = 127), ranging from 100 to 530 mm (Figure 13). Mean length of Brown Trout was 312 mm (SD = 137) and ranged from 45 to 410 mm.

Proportional stock density was 23 (± 15, 95% CI). Catch data suggested that most fish are of sub-stock size. Mean relative weight were 98 for quality-sized fish and 59 for stock-sized fish. Relative fish condition appears to be near national averages with the exception of spent females captured in the sample. Four age classes were present in the sample. Mean length-at-age summaries are shown in Figure 14.

Water Temperature Survey

Water temperatures were conducive to trout growth and survival. The thermograph placed in the most upstream location averaged 10.7^{o} C (SD = 2) during the four-month monitoring period and ranged from a low of 8.7^{o} C to a high of 25^{o} C. The thermograph placed in the midstream location averaged 11.5^{o} C (SD = 3) and ranged from a low of 4.7^{o} C to a high of 23^{o} C. The thermograph placed in the most downstream location averaged 15.6^{o} C (SD = 9) and ranged from a low of 8^{o} C to a high of 23^{o} C. Water temperatures were less than the upper thermal limit of trout at all times.

Trout Exploitation

A total of 176 fish were tagged in the Big Wood River downstream of Magic Dam in 2010. Combined, 10 trout were reported with four trout identified as harvested and six as released. Assuming 0% tagging mortality and 50% reporting rate, the adjusted extrapolated rate for Rainbow Trout was 11%.

DISCUSSION

The abundance of trout downstream of Magic Dam was comparable to other tailwater fisheries in southwestern Idaho (i.e. moderate abundance). The origin of sampled trout was not entirely clear and was believed to be from natural in-reach reproduction and from entrainment of stocked fingerlings from the reservoir. Very few trout appeared to originate from catchable plants

(i.e. as evidenced by fin erosion). Sampled trout represented a wide range of lengths with few gaps indicating variation in recruitment or entrainment. Lastly, exploitation of trout was low and angler harvest does not appear to be substantially altering the size or age structure of this population.

Water temperature was conducive to trout survival and growth during 2010. None of the three thermographs recorded temperatures that exceeded thermal thresholds. It is important to note that the time of flow curtailment was advantageous for maintaining cooler water for trout. We conclude that environmental conditions in recent years have at least been suitable to support the wild trout populations downstream of Magic Dam, based on the presence of several year classes. However, we believe it would be beneficial to continue monitoring of temperatures during a drought cycle.

Our catch did not fully represent the sizes of trout reported by anglers for this reach. Anglers frequently report catching both Rainbow and Brown Trout between 635 and 762 mm (25 - 30 inches). During our survey, we were unable to sample deep scour holes using our standard stream equipment which may have reduced our ability to sample larger fish.

RECOMMENDATIONS

1. Periodically reevaluate water temperatures in the Big Wood River between Magic Dam and the Richfield Canal Diversion. If feasible, incorporate continuous dissolved oxygen monitoring.
2. Repeat trout population survey during normal flows using boat electrofishing sampling techniques (Reservoir electrofishing boat).
3. Mark fingerling trout stocked into Magic Reservoir to assess whether entrainment contributed substantially to the Big Wood River tailwater fishery.

BILLINGSLEY CREEK

ABSTRACT

A standard stream survey was completed on Billingsley Creek during 2010. In addition, we tagged trout to estimate use and exploitation. The sampled reach was 350 m long with a mean width of 13.2 m (SD = 10.7) resulting in a total sampled area of 4,660 m^2. The catch (n = 552) was largely comprised of Brown Trout *Salmo trutta* and Rainbow Trout *Onchorhynchus mykiss* with lesser numbers of Redside Shiner *Richardsonius balteatus* and Utah Chub *Gila atraria*.

A total of 152 Brown Trout were sampled and resulted in an abundance estimate of 409 Brown Trout (± 156, 95% CI). A total of 241 Rainbow Trout were sampled and resulted in an abundance estimate of 395 (± 90, 95% CI). To estimate exploitation, trout were tagged with green t-bar anchor tags to allow self-reporting by anglers. We tagged 231 trout averaging 192 mm. No tags were reported in 2010.

There has been a shift in the relative abundance of fish species sampled in this reach since the 2002 survey. The component of the catch comprised of Brown Trout has increased from zero in 2002 to 29% in 2010. The Department ceased stocking Brown Trout in 1998 but revived the stocking program in 2003. In addition, the catch and relative abundance of Rainbow Trout has increased substantially since the 2002 survey.

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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, as well as for commercial fish and hydroelectric production.

Billingsley Creek provides angling opportunities for Brown Trout *Salmo trutta* and Rainbow Trout *Onchorhynchus mykiss*. Historically, IDFG has stocked both species. In addition, hatchery trout escape from nearby commercial aquaculture facilities and enter Billingsley Creek. The percentage of wild trout in this fishery has not been determined recently.

Within the last decade, Billingsley Creek was surveyed in 2002 in an effort to establish trend monitoring sites and baseline information. Sample sites were re-surveyed during 2006 to monitor the fish community, especially to assess performance of a recently re-initiated hatchery Brown Trout stocking program (2003). During 2006, an additional sample site was added in lower Billingsley Creek to increase longitudinal coverage. We re-sampled one site during 2010 to monitor the fish community and assess performance of stocked trout.

METHODS

Trout Exploitation

We estimated exploitation of Rainbow Trout stocked in Billingsley Creek to determine the efficacy of this stocking program. Rainbow Trout were reared at the American Falls State Fish Hatchery. Trout were anesthetized with MS-222 prior to tagging. We inserted green, T-bar anchor tags into the dorsal musculature of 231 Rainbow Trout. Mean length of Rainbow Trout was 192 mm. Fish were held for a 21-d withdrawal period prior to stocking into lower Billingsley Creek within the Billingsley Creek WMA on September 27, 2010. Tags possessed an individual tag identification number and a phone number to allow reporting. Fish were scattered at multiple release locations to ensure dispersion. Tag reporting information was collected by phone or direct return by anglers.

Standard Stream Survey

We completed a mark-recapture survey to estimate trout abundance in Billingsley Creek. Trout were sampled with raft electrofishing equipment. The marking and recapture runs occurred on July 21 and July 28, 2010, respectively. One survey site on the Bill Jones property was utilized (Appendix A). The site was 350 m long with a mean width of 13.2 m (SD = 10.7) resulting in a total sampled area of 4,660 m^2. As in previous year's efforts, trout were the target of the survey; however, non-target fish species were netted opportunistically. Upon capture, fish were identified, measured (TL, mm), weighed (g), marked, and released. Weights were taken only during the marking run. Caudal fin clips were used to mark trout and whitefish equal or greater than 100 mm for identification in the recapture run. Salmonids were counted, measured, and examined for marks in the second (recapture) electrofishing pass.

Abundances of Brown Trout and Rainbow Trout were estimated using a modified-Peterson, mark-recapture estimator (Ricker 1975). Partial estimates were calculated for each

100-mm length interval for trout equal to or greater than 100 mm total length. A minimum of five recaptures was required for estimates. Length groups with less than five recaptures were pooled with the next longer interval. For trend analysis, we compared population abundance for trout greater than 200 mm as has been reported in previous surveys (Warren and Megargle 2002).

Habitat data was collected on a separate date following electrofishing efforts. Transect length and widths were measured with a rangefinder (Appendix B). Transects waypoints were marked for future replication using a GPS (Appendix A and B).

RESULTS/DISCUSSION

Trout Exploitation

No tags were reported during 2010. Exploitation estimates will be calculated after a full year at large and reported in the 2011 annual report.

Standard Stream Survey

The catch (n = 552) was comprised largely of Brown Trout and Rainbow Trout with lesser numbers of Redside Shiner and Utah Chub (Table 8). A total of 152 Brown Trout (≥ 200 mm) were sampled and resulted in an abundance estimate of 409 (± 156, 95% CI). Mean length of Brown Trout was 293 mm (SD = 64) and ranged from 75 to 510 mm (Figure 15). Mean weight was 296 g (SD = 250). A total of 241 Rainbow Trout (≥ 200 mm) were sampled and resulted in an abundance estimate of 395 (± 90, 95% CI). Mean length of Rainbow Trout was 232 mm (SD = 17) and ranged from 155 to 310 mm. Average weight of Rainbow Trout was 166 g (SD = 108).

There has been a shift in the relative abundance of fish species sampled in this reach since the 2002 survey (Table 8). The catch and proportion of Brown Trout in the catch has increased from zero in 2002 to 159 and 29% in 2010. The Department ceased stocking Brown Trout in 1998, but reinstated the stocking program in 2003. In addition, catch and proportion of total catch of Rainbow Trout has increased substantially since the 2002 survey. This improvement is likely habitat related since the Department has not stocked Rainbow Trout since 2002, and the sample area habitat was substantially improved by a privately-funded stream restoration project that started in 2001. Concurrently, the catch and proportion of the catch comprised of Utah Chub was decreased substantially possibly because of increased predation or habitat conditions due to the restoration project.

RECOMMENDATIONS

1. Evaluate angler use of the Billingsley Creek and associated harvest of trout by conducting a creel survey.

2. Evaluate options to improve angler access to stocked trout. Use new stock locations and seek opportunities to maintain or increase public access.

ROCK CREEK

ABSTRACT

Rock Creek's trout community includes a mix of wild- and hatchery-produced fish. Anthropogenic alterations to this watershed have reduced shade and flow, reducing the quality of the trout habitat. To determine one aspect of habitat suitability, we measured water temperature using data-logging thermographs. Temperatures were collected at 3-h intervals between April 30 and October 14, 2010. Water temperatures at both locations did not exceed published thermal limits that lead to trout mortality.

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INTRODUCTION

Rock Creek is a tributary to the Snake River in Twin Falls County, Idaho. Rock Creek originates at the top of Magic Mountain in the South Hills of Idaho. Rock Creek flows north for approximately 40 miles before entering the Snake River west of Twin Falls, Idaho. Rock Creek and its tributaries are a popular destination anglers seeking to pursue Rainbow Trout *Onchorhynchus mykiss* and Brown Trout *Salmo trutta*. This fishery is supported by both wild- and hatchery-produced individuals. Hot summer air temperatures, low elevation, and habitat modifications might reduce the quality of habitat for trout. To determine if summer temperature is a concern, we collected water temperature data during 2010.

METHODS

During 2010, we collected water temperature data at four sites in Rock Creek. Archiving temperature data loggers (Hobo© thermographs) were deployed on April 30, 2010 and retrieved on October 14, 2010. Water temperatures were recorded every three hours. Locations and equipment are described in Appendix A and B. Data were uploaded and processed using Box Car Pro© software and summarized with EXCEL© software.

RESULTS/DISCUSSION

Water temperatures were conducive to trout growth and survival. Unfortunately, two of the four thermographs were lost. However, the two remaining thermographs were from the most upstream and downstream locations. At the upstream site, maximum water temperature remained below 15° C with the exception of a few brief periods in July and August. At the downstream site, maximum water temperature remained below 20°C with the exception of a few brief periods in late June through mid-July. These results suggest thermal regimes in Rock Creek were not currently negatively affecting trout survival.

RECOMMENDATIONS

1. No further temperature monitoring is needed for the short term.

SILVER CREEK

ABSTRACT

Silver Creek is a nationally-renowned trout fishery that receives substantial angling attention, effort, and trip-related expenditures. Therefore, it is important to understand and monitor trout populations here. During 2010, we sampled trout at three locations to describe abundance and size structure, as well as to compare to previous year’s data. Sample sites included lower Stalker Creek, Silver Creek - Cabin Site, and Silver Creek - Martin Bridge. Sampling was conducted during the daytime for the lower Stalker Creek reach and during nighttime for the Silver Creek sites. Estimates of Rainbow Trout *Onchorhynchus mykiss* and Brown Trout *Salmo trutta* abundance were made using a modified-Peterson mark-recapture estimator.

Rainbow Trout abundance estimates were highest in the Lower Stalker Creek site (1,227 ± 364) and lowest in the Martin Bridge site where too few Rainbow Trout were sampled to allow calculation of an estimate. Brown Trout abundance was highest in the Martin Bridge site (513 ± 243) and lowest in the Lower Stalker Creek reach. Although there were some slight changes in species-specific abundances, trout populations appear relatively stable. Trends for Rainbow and Brown Trout populations were relatively stable, except for the Silver Creek - Cabin Site where populations declined.

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INTRODUCTION

Silver Creek is a tributary of the Little Wood River and is located in Blaine County, Idaho. It originates at the confluence of its two main spring creek tributaries, Stalker Creek and Grove Creek on the Nature Conservancy's Silver Creek Preserve. Silver Creek and its tributaries provide a popular blue-ribbon destination trout fishery for Rainbow Trout *Onchorhynchus mykiss* and Brown Trout *Salmo trutta*. Several reaches of Silver Creek are managed with special regulations that include restrictive bag limits, seasonal closures, or gear and bait restrictions.

During the last 10 years, Silver Creek and its trout community have been the focus of several studies including determining Brown Trout and Rainbow Trout movements (Young et al. 1997), describing the fish community structure (Wilkison 1996), analyzing genetic population structure (Williams et al. 2000), and evaluating whirling disease presence (Spall et al. 1996). Standard IDFG population monitoring transects and survey protocols were formalized in 2004 (Ryan and Megargle 2004) and have been sampled at three-year interval since. We continued this practice during 2010 and completed mark-recapture population estimates for three sites and compared information to past surveys (2001, 2004, and 2007).

METHODS

During 2010, we sampled three sites in Silver Creek and Stalker Creek to evaluate trends in population abundance and size structure. Sampled segments included: lower Stalker Creek; Silver Creek - Cabin site; and Silver Creek - Martin Bridge (Appendix A). Transect lengths at the lower Stalker Creek; Silver Creek, Cabin site; and Silver Creek, Martin Bridge locations were 1,400 m, 1,150 m, and 1100 m, respectively. Mean transect widths at the lower Stalker Creek, Silver Creek - Cabin site, and Silver Creek - Martin Bridge locations were 8.5, 27.4, and 15.6 m, respectively. Sampling was conducted with drift boat electrofishing equipment (Appendix B). Trout were sampled on two passes separated by seven days. Sampling was conducted during daytime on the lower Stalker Creek site and during nighttime for the other two sites. Electrofishing efforts occurred 21 - 23 June, 2010 and 28 - 30 June, 2010, respectively.

Fish were identified, measured for total length, weighed (g), marked, and released during the first sampling pass (i.e. marking run). We only weighed fish during the marking run. All trout longer than 100 mm were marked with a caudal fin clip to allow identification during the recapture run. Other sampled species were not marked. During the second run (i.e. recapture run) Rainbow Trout and Brown Trout were counted, measured, and examined for marks before being released.

We estimated Rainbow Trout and Brown Trout abundance using a modified-Peterson mark-recapture estimator (Ricker 1975). Partial population estimates were calculated for 100-mm length bins for trout species longer than 100 mm total length. A minimum of five recaptures was required to complete estimates. Length groups were pooled when less than five recaptures were made within an individual length group.

Marking run data were used to describe the fish community and estimate population parameters. Estimated population parameters included relative stock density and relative weight. Relative stock densities (RSD – 400) were calculated for Rainbow Trout and Brown Trout sampled from each site to describe the availability of preferred size individuals. RSD-400 was calculated as the number of fish ≥ 400 mm divided by the number of fish ≥ 200 mm (Ney 1993). Relative weight was calculated for Rainbow Trout and Brown Trout as a measure of fish condition and

reported as mean relative weight by 100 mm length groups (Anderson and Neumann 1996, Simpkins and Hubert 1996).

Habitat data was collected on a separate date following electrofishing efforts. Transect lengths and widths were measured with a rangefinder (Appendix B) or measuring tape at set intervals. Interval distance was chosen randomly. Transects waypoints were marked for future replication using a GPS (Appendix A and B). Habitat data were collected on 7 July, 2010.

RESULTS AND DISCUSSION

Lower Stalker Creek

Fish sampled in the Stalker Creek transect included wild Rainbow Trout (*n* = 387, 58%), Brown Trout (*n* = 246, 37%), Brook Trout *Salvelinus fontinalis* (*n* = 4, ≤1%), Bridgelip Sucker *Catostomus columbianus* (*n* = 13, 2%), Redside Shiner *Richardsonius balteatus* (*n* = 12, 2%), Longnose Dace *Rhinichthys cataractae* (*n* = 4, ≤1%), and Speckled Dace *Rhinichthys osculus* (*n* = 2, ≤1%).

The estimated number of Rainbow Trout in the sample reach (≥ 100 mm) was 1,227 (± 364, 95% CI) which was equivalent to 876 trout/km (Tables 9 and 10). Mean length of Rainbow Trout was 160 mm (SD = 59) and ranged from 100 to 450 mm (Figure 17). Length of Rainbow Trout at age four was 400 mm (Figure 18).

The estimated number of Brown Trout in the sample reach (≥ 100 mm) was 461 (± 210; 95% CI) which was equivalent to 329 trout/km (Tables 9 and 10). Mean length of Brown Trout was 265 mm (SD = 167) and ranged from 40 to 585 mm. Mean length of Brown Trout at age four was 420 mm (Figure 18).

Silver Creek – Cabin Transect

Fish sampled in the Silver Creek Cabin transect included wild Rainbow Trout (*n* = 206, 56%), Brown Trout (*n* = 128, 35%), Bridgelip Sucker (*n* = 20, 5%), Longnose Dace (*n* = 13, 4%), Paiute Sculpin *Cottus beldingii* (*n* = 1, < 1%), and Speckled Dace (*n* = 2, < 1%; Table 11).

The estimated number of Rainbow Trout in the sample reach (≥ 100 mm) was 593 (± 233, 95% CI), which equated to 516 Rainbow Trout/km (Tables 9 and 10). Mean length of Rainbow Trout was 284 mm (SD = 107) and ranged from 75 to 470 mm (Figure 19). Relative stock density (RSD – 400) was 4.

The estimated number of Brown Trout in the sample reach (≥ 100 mm) was 346 (± 180, 95% CI), which equated to 301 Brown Trout/km (Tables 9 and 10). Mean length of Brown Trout was 367 mm (SD = 146) and ranged from 65 to 620 mm (Figure 19). Relative stock density (RSD – 400) was 33. Mean length-at-age for Brown Trout and Rainbow Trout are presented in Figure 20.

Silver Creek – Martin Bridge transect

In the Silver Creek - Martin Bridge site, we sampled wild Rainbow Trout (*n* = 31, 5%), Brown Trout (*n* = 263, 44%), Bridgelip Sucker (*n* = 161, 27%), Longnose Dace (*n* = 4%), Redside Shiner (*n* = 102, 17%) and Speckled Dace (*n* = 27, 3%; Table 12).

Abundance estimates for Rainbow Trout were incalculable. Fewer than five total recaptures (i.e. three) precluded a Rainbow Trout population estimate for this site. Mean length of Rainbow Trout was 199 mm (SD = 71) and ranged from 120 to 400 mm (Figure 21). Mean length of Rainbow Trout at age 4 was 340 mm.

Estimated number of Brown Trout in the sample reach (≥ 100 mm) was 513 (± 243, 95% CI), which equated to 566 Brown Trout/km (Tables 9 and 10). Mean length of Brown Trout was 289 mm (SD = 112) and ranged from 65 to 610 mm (Figure 21). Relative stock density (RSD – 400) was 24.

Trout abundances and size structures suggested that Rainbow and Brown Trout populations have been relatively stable for the last decade with the exception of declines in Rainbow Trout and Brown Trout abundance in the Silver Creek - Cabin Site and the observed decline in Brown Trout abundance between 2001 and 2010 in Stalker Creek. Declines in Brown Trout abundance from the 2001 survey year may be biased by sample timing and upstream movement (Young et al. 1997). RSD values indicate a higher proportion of large spawning size fish was present during this survey. We recommend that sampling continue to be conducted in early to mid-June to allow consistent comparison among years (Ryan and Megargle 2007; Figure 23).

RECOMMENDATIONS

1. Monitor these populations consistently by using previously-established sample sites and timing.

2. Establish a consistent habitat monitoring program that includes substrate composition.

SIXMILE CREEK

ABSTRACT

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 relatively cool water. Perennial flows cease about 1.8 km from Gunnel Reservoir (aka Sixmile Reservoir) an irrigation and stock water impoundment. This drainage is native range of Yellowstone Cutthroat Trout *Onchorhynchus clarkii bouvieri* and possesses suitable habitat despite its small size. However, as of 2008, the only fish species that was present in the drainage was the Rainbow Trout *O. mykiss* x Yellowstone Cutthroat Trout hybrid. A rotentone treatment was completed in 2009 to extirpate hybrids for eventual re-establishment of genetically-pure Yellowstone Cutthroat Trout. During 2010, we completed translocation efforts to re-establish a population here and ultimately increase abundance and expand the range of this core Yellowstone Cutthroat Trout population (IDFG 2007). This specific objective is described in the Management Plan for Conservation of Yellowstone Cutthroat Trout in Idaho.

We translocated eighty-three genetically pure YCT from Eightmile Creek into Sixmile Creek and Gunnel Reservoir. Mean length was 130 mm (SD = 29) and ranged from 55 to 250 mm. Mean weight was 27 g (SD = 29) and ranged from 1 to 104 g. Based on length frequency, it is probable that multiple age classes were translocated. In addition, we observed ripe females. The survival of translocated YCT will be evaluated in 2011.

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INTRODUCTION

Sixmile Creek is a disconnected tributary within the Raft River drainage in Cassia County, Idaho. The drainage is characterized as high-elevation, shrub steppe ecotype and includes dense juniper stands in and along the riparian corridor. Land use is primarily "pass through" grazing. Most springs are prohibiting cattle access. Lands surrounding Sixmile Creek and its impoundment are managed by the Cassia Ranger District, Sawtooth National Forest - US Forest Service.

Sixmile Creek is spring fed and possesses a discharge of approximately 0.05 m^3/sec. In most years and seasons, perennial flow ceases downstream of an irrigation impoundment called Gunnel Reservoir (aka Sixmile Reservoir). The reservoir is used for irrigation and stock watering purposes. This drainage is within the native range of Yellowstone Cutthroat Trout (YCT) *Onchorhynchus clarkii bouvieri* and possesses suitable habitat despite its small size. However, as of 2009, Rainbow Trout *O. mykiss* x Yellowstone Cutthroat Trout hybrids were the only fish species present. A rotentone treatment was completed in 2009 to extirpate hybrids to allow eventual re-establishment of genetically-pure YCT. During 2010, we completed YCT translocation efforts to re-establish a population here and ultimately increase abundance and expand the range of this core YCT population. This specific objective is described in the Management Plan for Conservation of Yellowstone Cutthroat Trout in Idaho.

METHODS

On May 5, 2010, we conducted backpack electrofishing survey to determine whether hybrids had been extirpated from Sixmile Creek and Gunnel Reservoir. Coordinates are found in Appendix A.

On May 13, 2010, genetically-pure YCT were translocated from Eightmile Creek to Sixmile Creek. We collected YCT with a backpack electrofisher. YCT were measured for total length (mm), and weighed (g). A small fin sample was collected from each fish for further genetic analysis. The fish were loaded into a small, oxygen-supplemented transport tank and moved approximately two miles with an all-terrain vehicle to a larger transport tank affixed to a 3/4 ton pickup. The fish were driven approximately five miles to the headwaters of Sixmile Creek, where they were released in five different locations along the creek and into Gunnel Reservoir.

RESULTS AND DISCUSSION

We translocated eighty-three, genetically-pure YCT from Eightmile Creek into Sixmile Creek and Gunnel Reservoir. Mean length of YCT was 130 mm (SD = 29) and ranged from 55 to 250 mm (Figure 24). Mean weight was 27 g (SD = 29) and ranged from 1 to 104 g. Based on length-frequency analysis, it appeared that multiple age classes were translocated. In addition, we observed ripe females within the lot. Survival of translocated YCT will be determined during 2011.

RECOMMENDATIONS

1. Transplant additional YCT from another nearby creek, possibly Almo Creek, to ensure adequate genetic diversity.

1. Monitor survival and reproduction to determine if efforts led to establishment of a self-sustaining population.

FIGURES

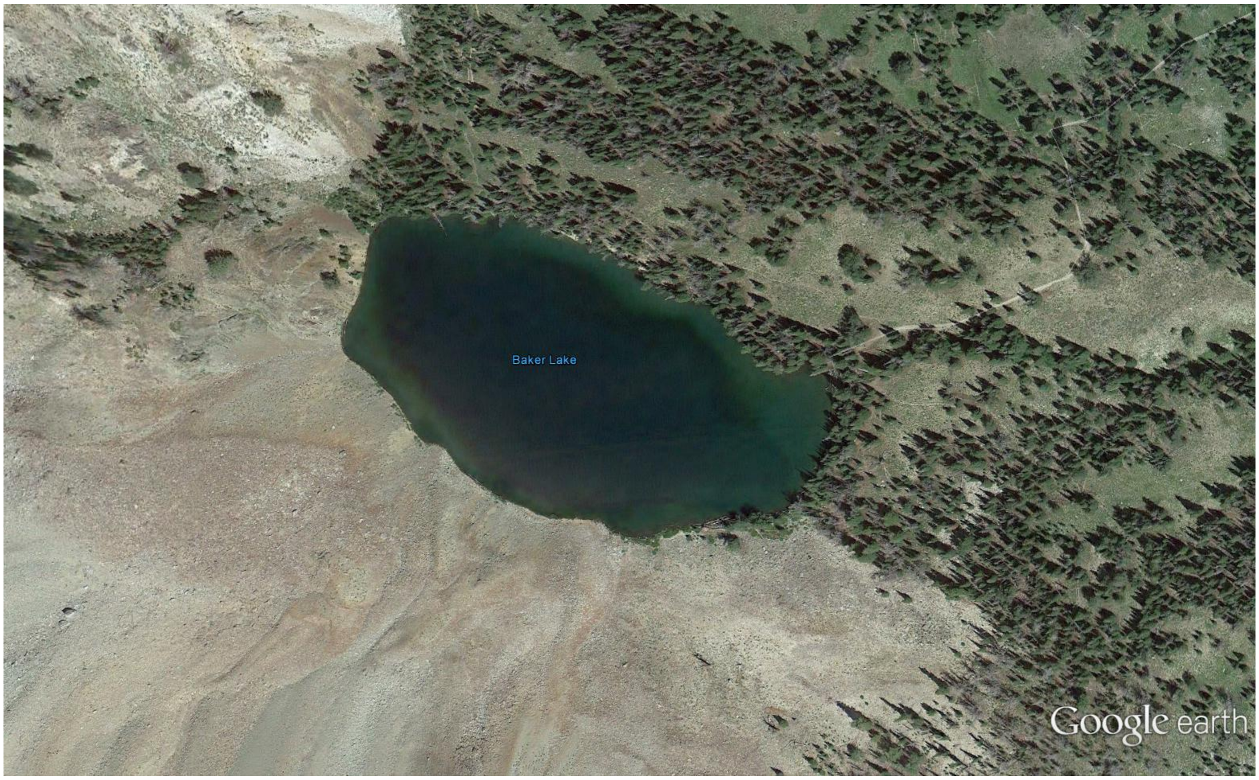

Figure 1. Satellite image depicting Baker Lake in Blaine County approximately 25 km West of Ketchum, Idaho. Top of photo is north.

Figure 2. Map depicting the two ponds surveyed to estimate avian predator use on the Hagerman WMA including Riley Pond and the Settling Pond (outlined in red).

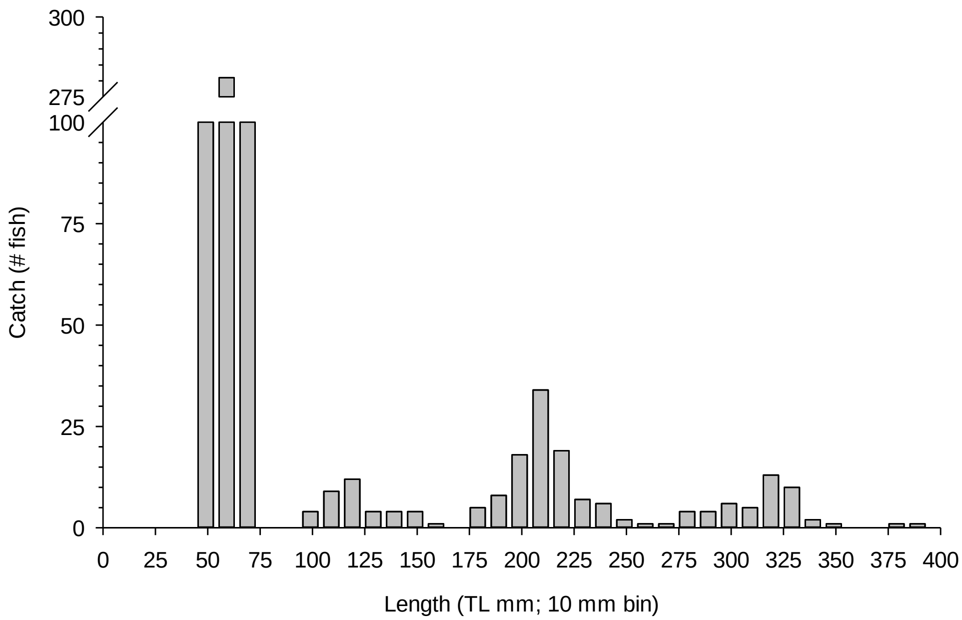

Figure 3. Length-frequency histogram of kokanee collected by trawl in Anderson Ranch Reservoir during 2010 (n = 747).

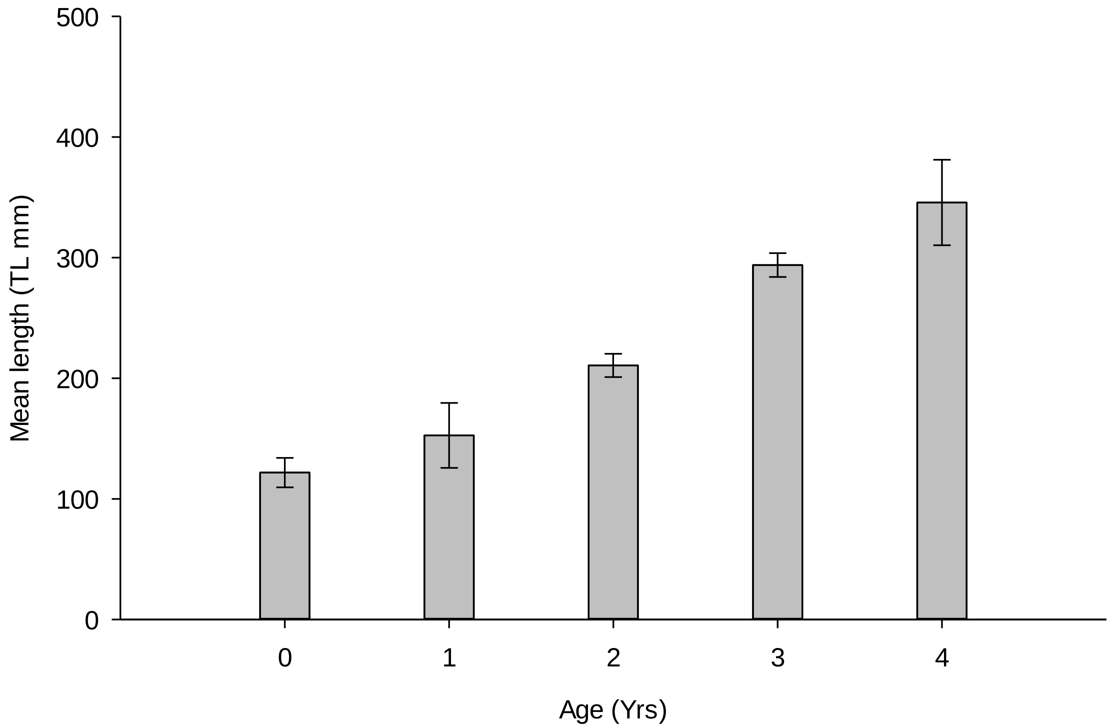

Figure 4. Mean length at age of a subsample of kokanee (*n* = 125) collected from Anderson Ranch Reservoir during 2010. Bounds represent 95% confidence intervals.

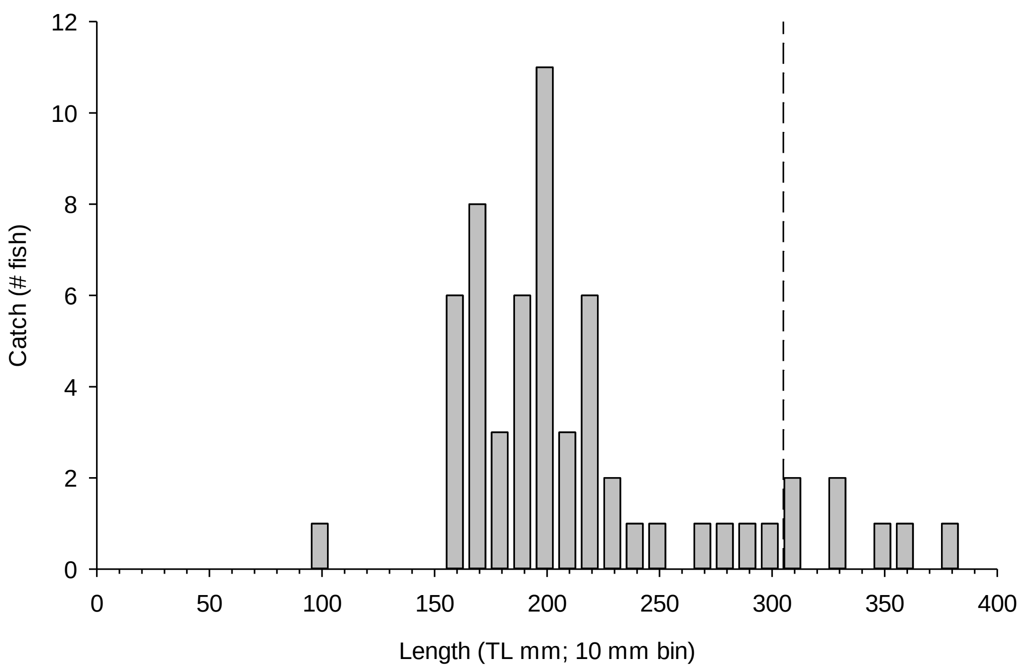

Figure 5. Length-frequency histogram for Largemouth Bass sampled from Carey Lake during 2010 (*n* = 59). Dashed line depicts minimum length limit (305 mm).

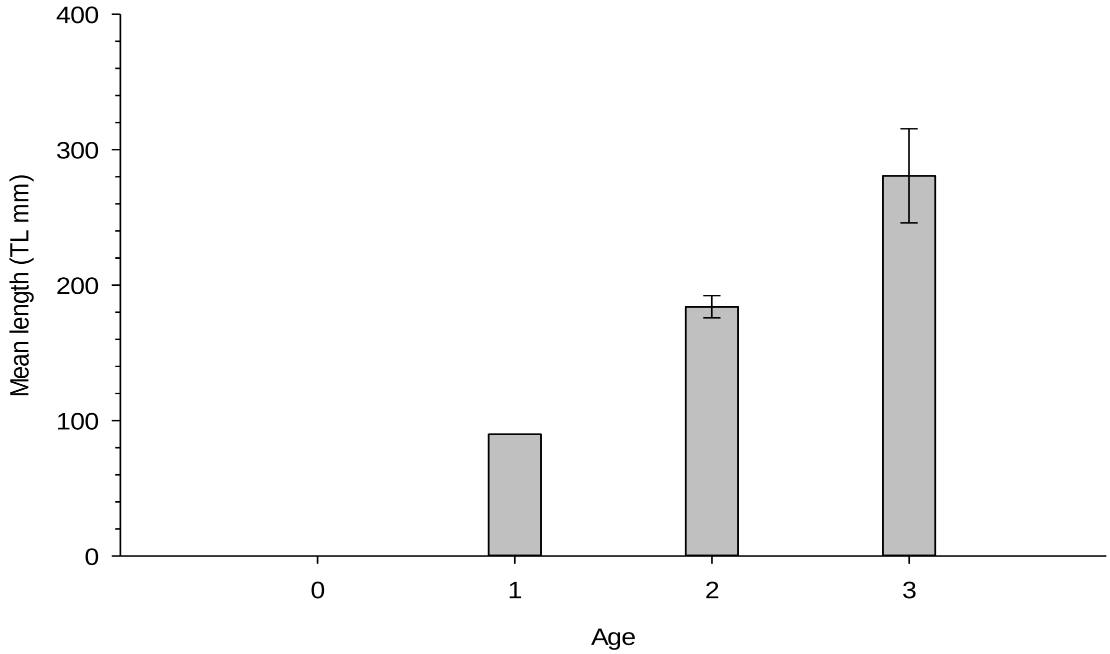

Figure 6. Mean length-at-age for Largemouth Bass (*n* = 59) sampled from Carey Lake during 2010. Error bounds represent 95% confidence intervals.

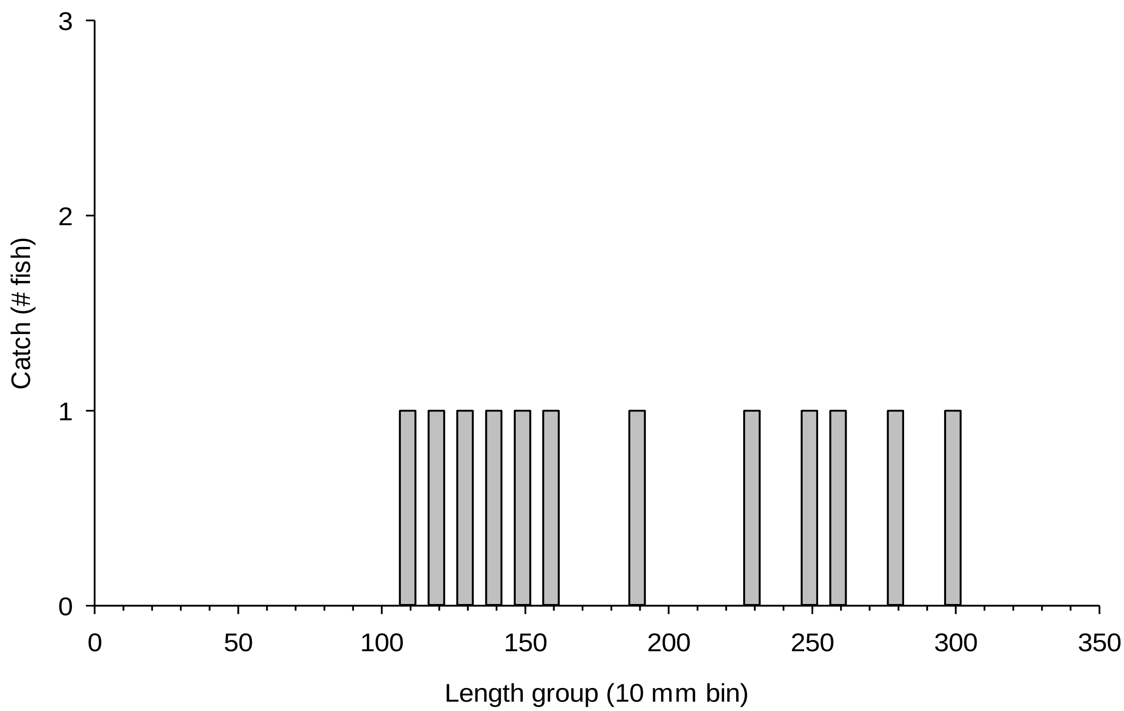

Figure 7. Length-frequency histogram of Smallmouth Bass (*n* = 12) sampled from Magic Reservoir in 2010.

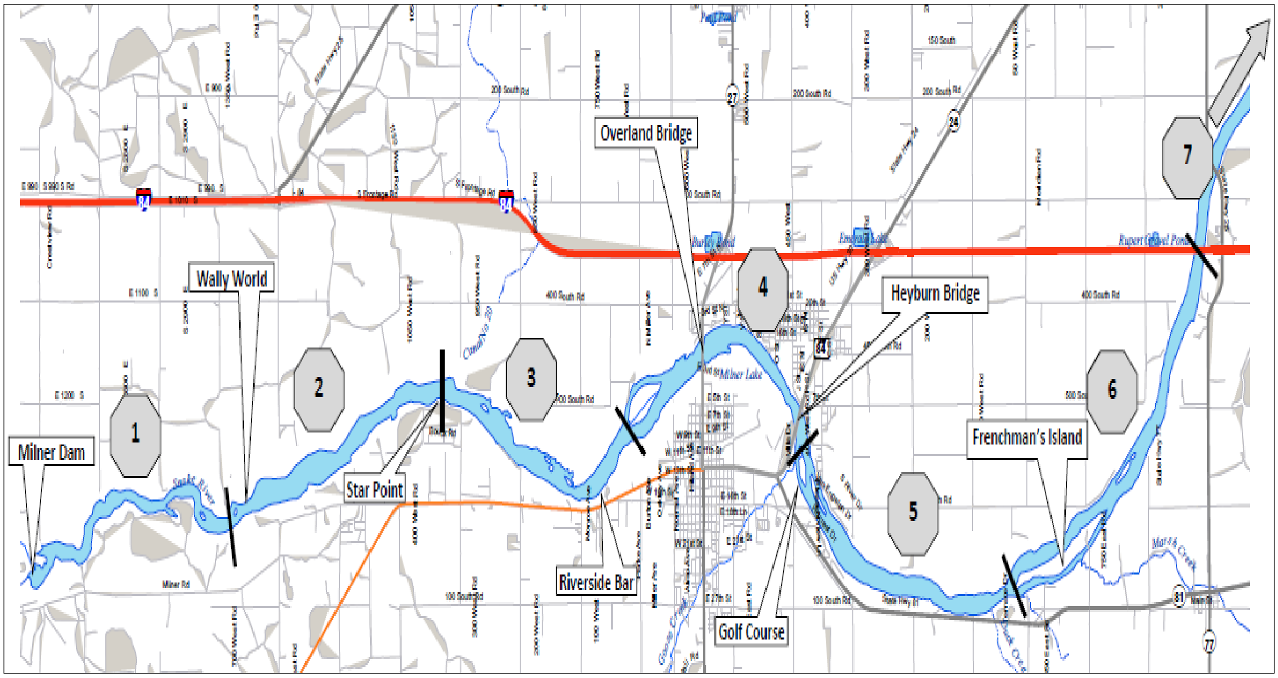

Figure 8. Map of Milner Reservoir jaw tag release sections

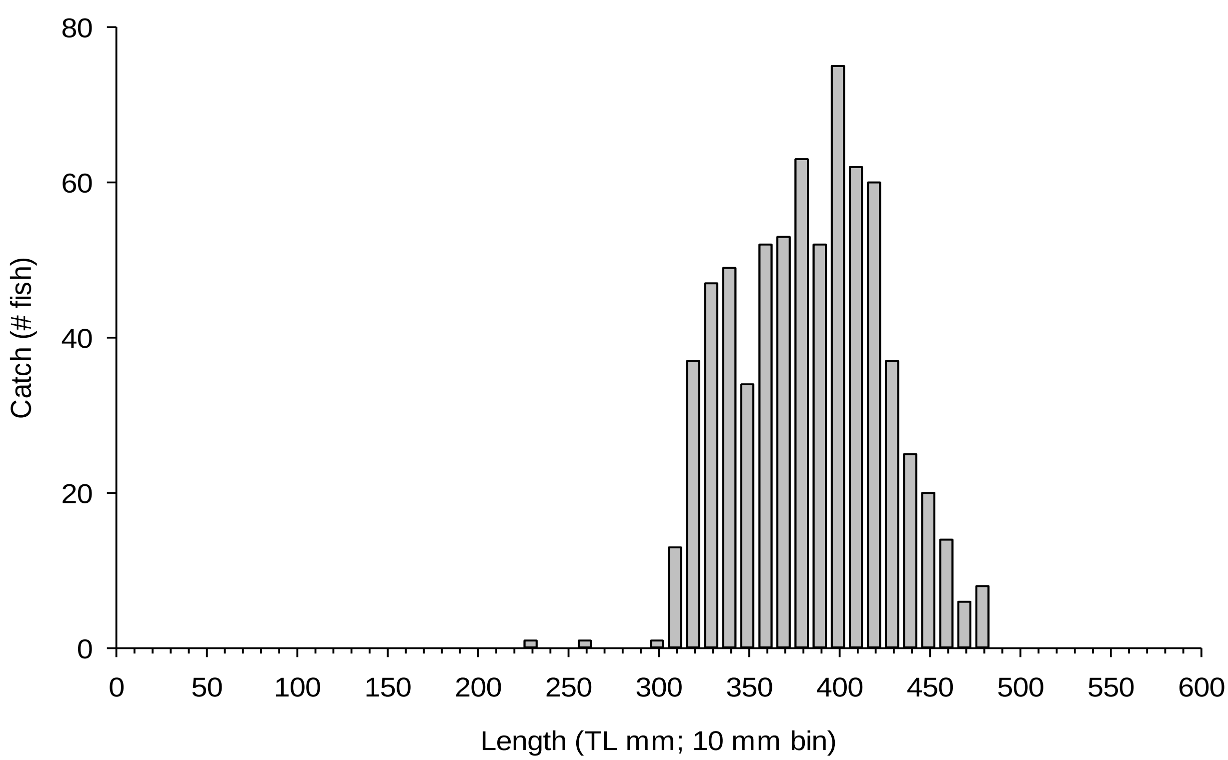

Figure 9. Length-frequency histogram for Smallmouth Bass (n = 711) tagged during 2009 & 2010 to estimate movement and harvest in Milner Reservoir.

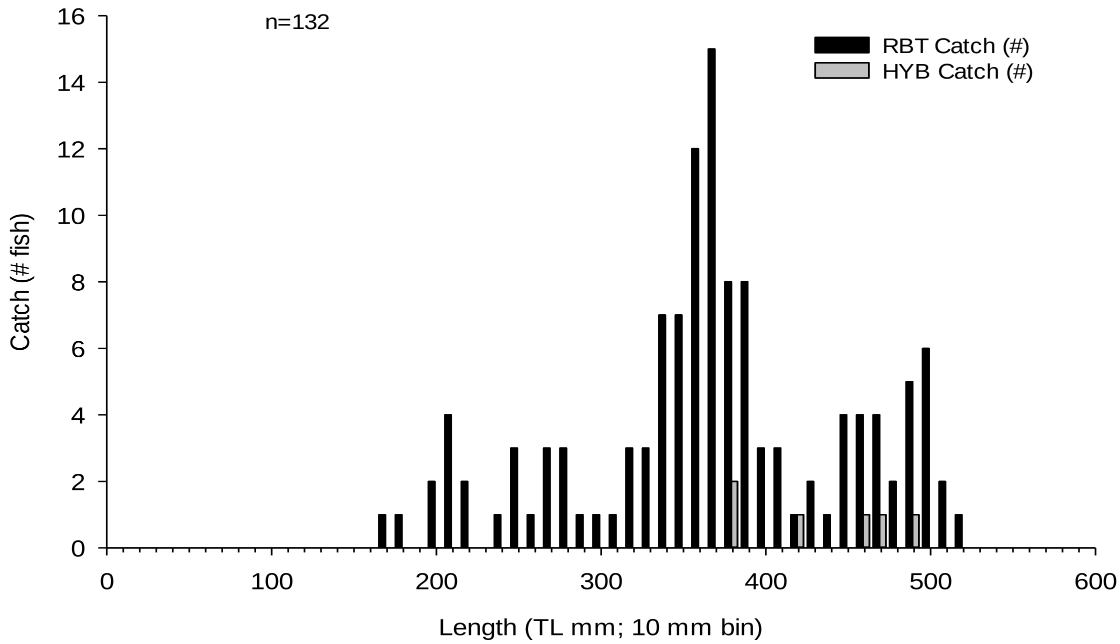

Figure 10. Length-frequency histogram for Rainbow Trout and hybrid trout sampled by gill nets from Salmon Falls Creek Reservoir during 2010.

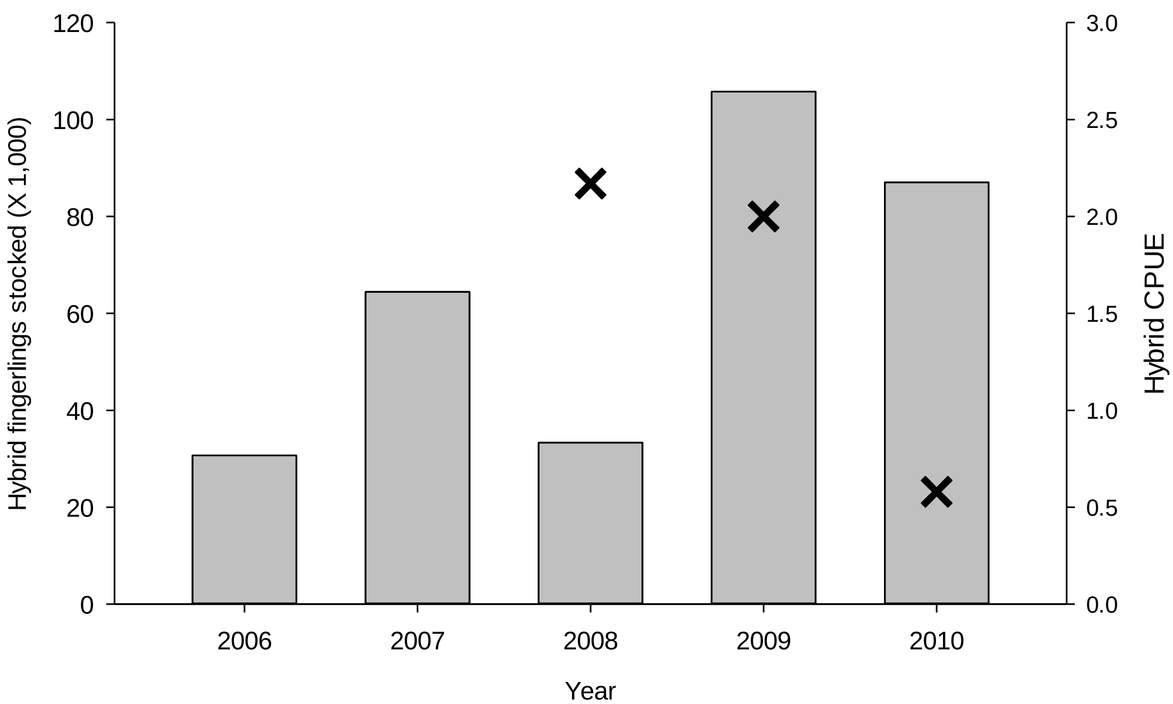

Figure 11 Catch per unit effort (CPUE, labeled as X) and stocking history (bars) for hybrid trout in Salmon Falls Creek Reservoir during 2006-2010.

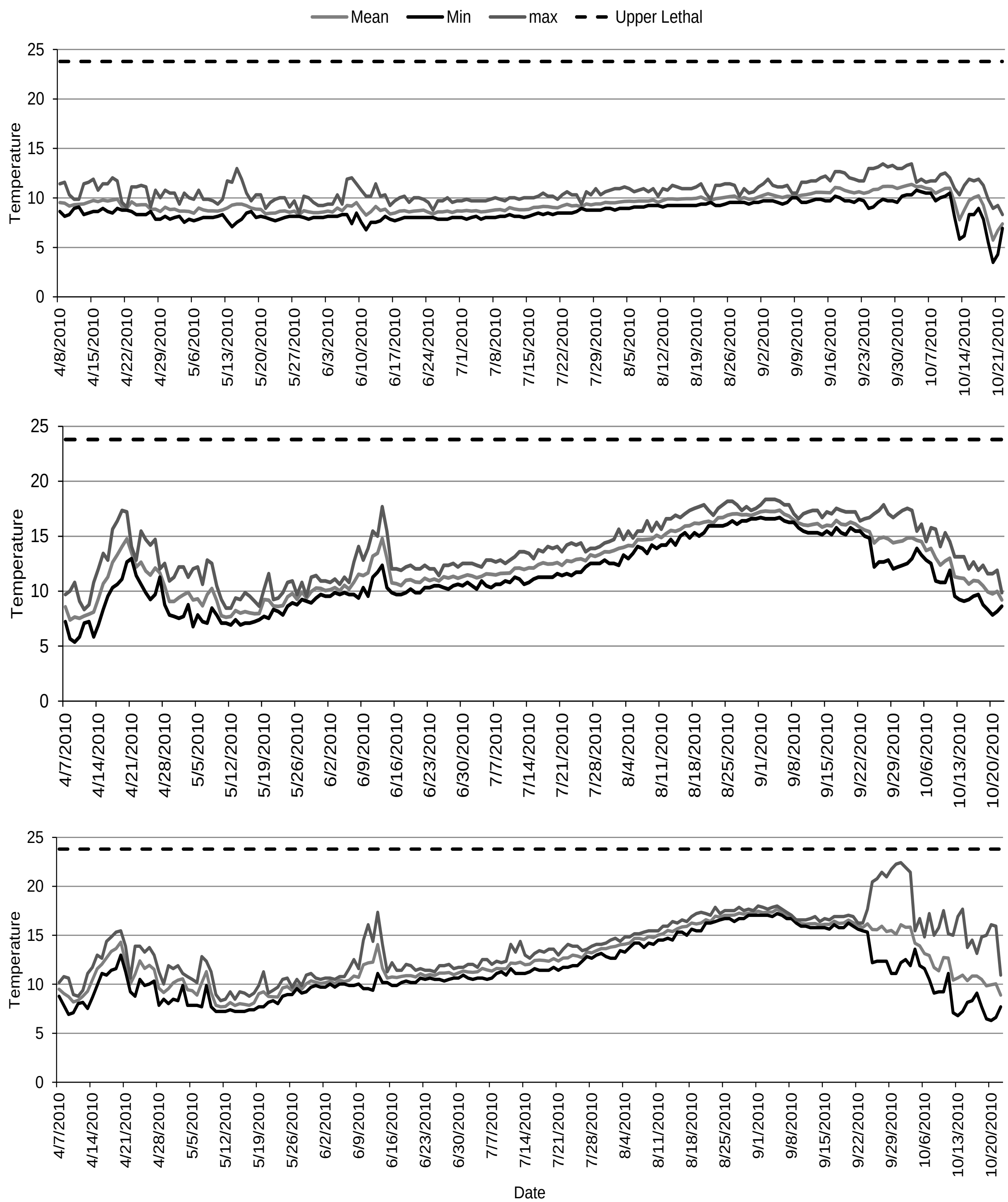

Figure 12. Mean daily water temperature (C) for three locations on the Big Wood River downstream of Magic Reservoir in 2010. Top (upper reach), middle (middle reach), bottom (lower reach). Top (upper reach) is closest to the dam.

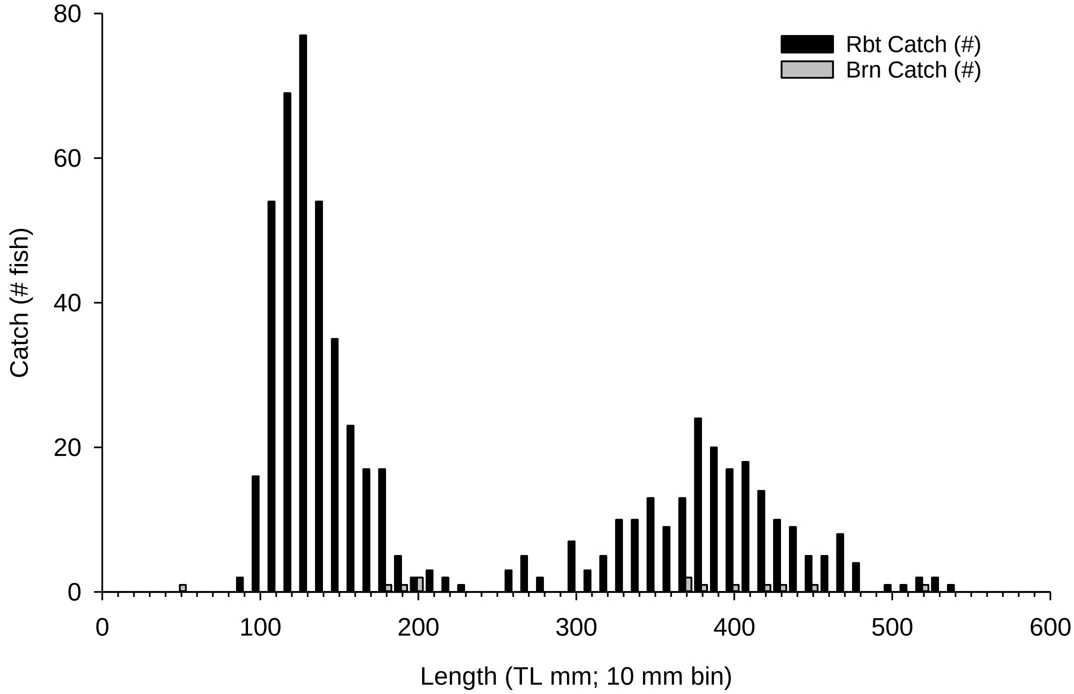

Figure 13. Length-frequency histogram for Rainbow Trout and Brown Trout sampled from the Big Wood River downstream of Magic Reservoir during 2010.

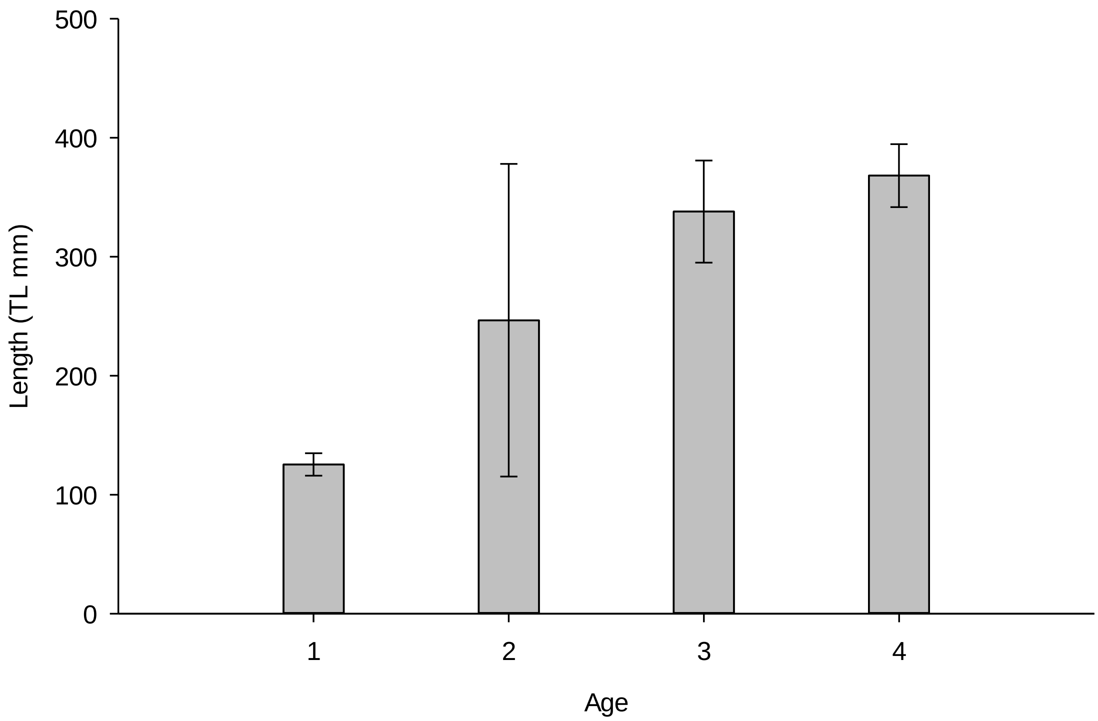

Figure 14. Mean length at age for Rainbow Trout sampled with electrofishing from the Big Wood River downstream of Magic Reservoir during 2010 (n = 42). Error bars represent 95% CIs.

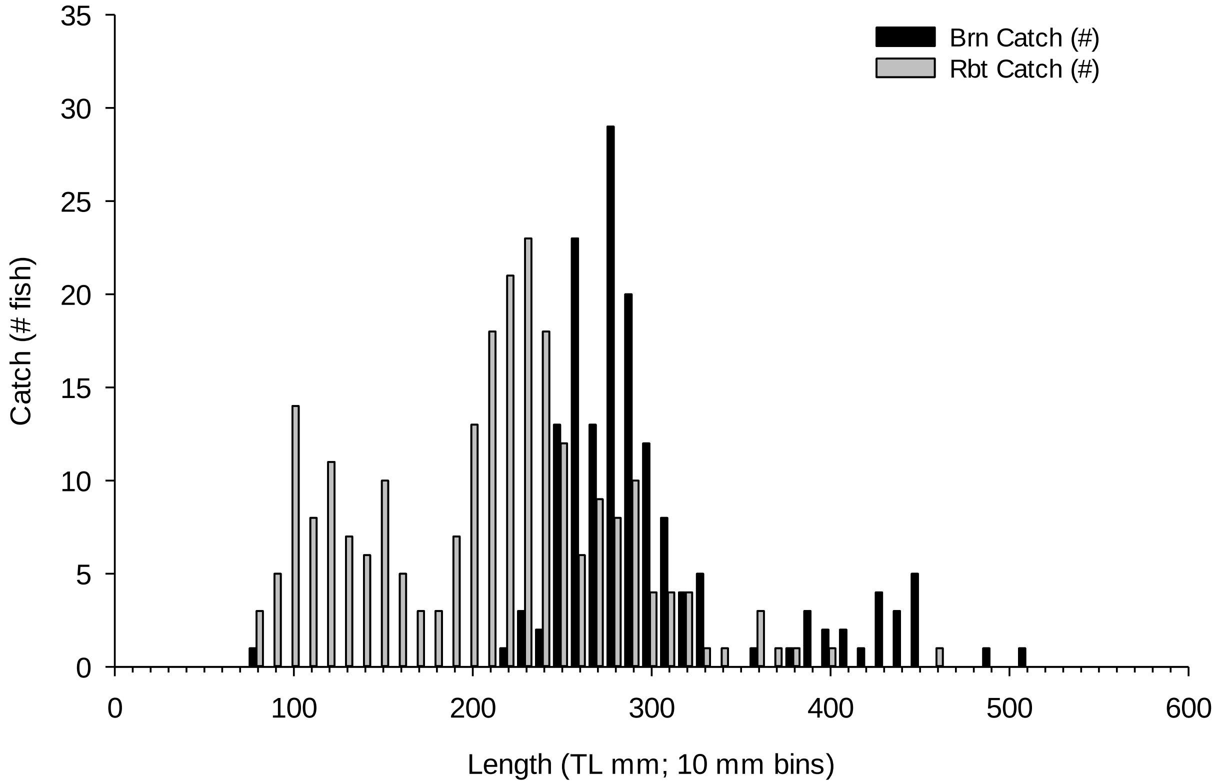

Figure 15. Length-frequency histogram for Brown Trout and Rainbow Trout (*n* = 393) sampled with electrofishing from Billingsley Creek during 2010.

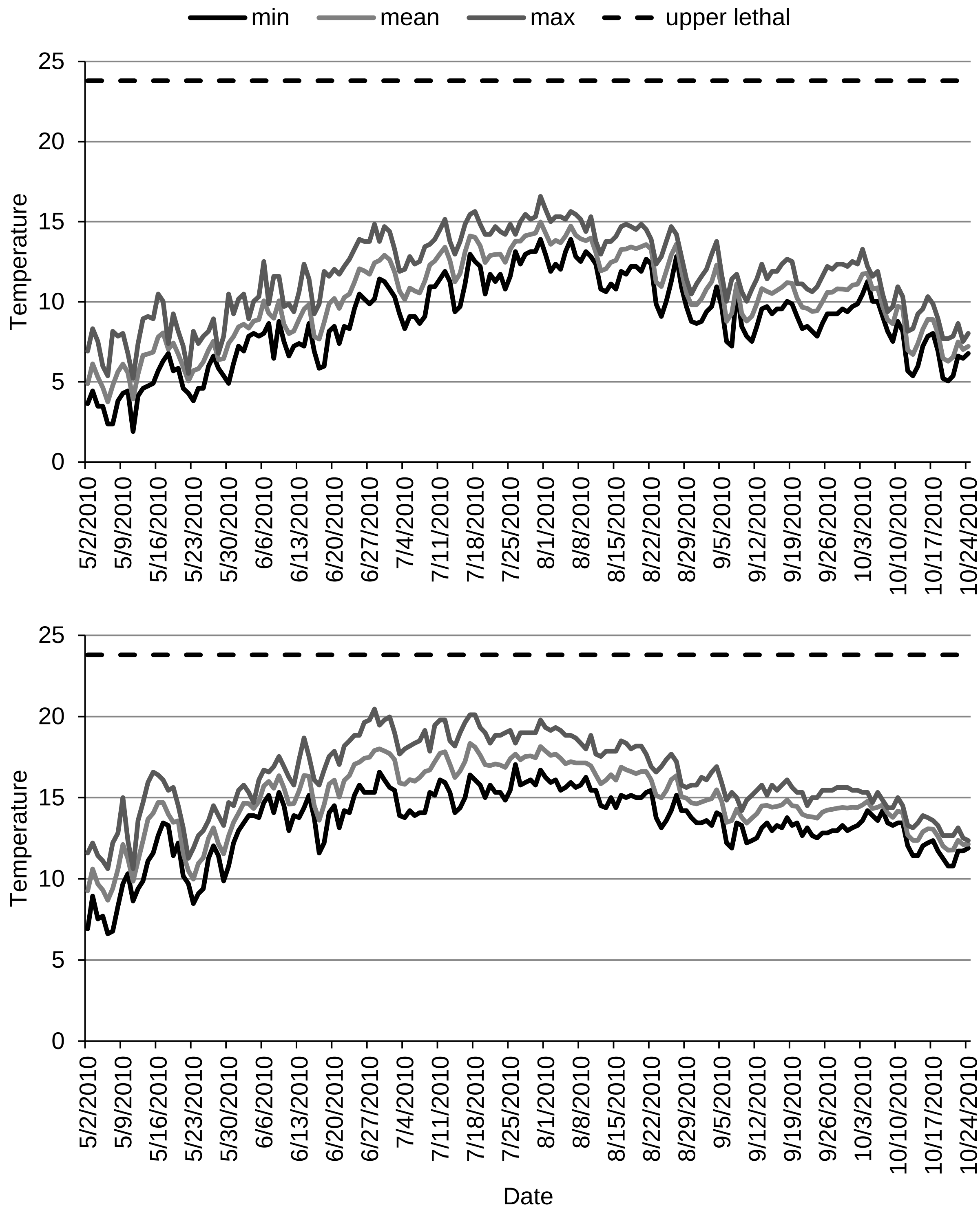

Figure 16. Average daily temperature (C) profiles for two sites on Rock Creek, 2010. Rock Creek at Third Fork (upstream –top figure), and Rock Creek Park (downstream-bottom figure).

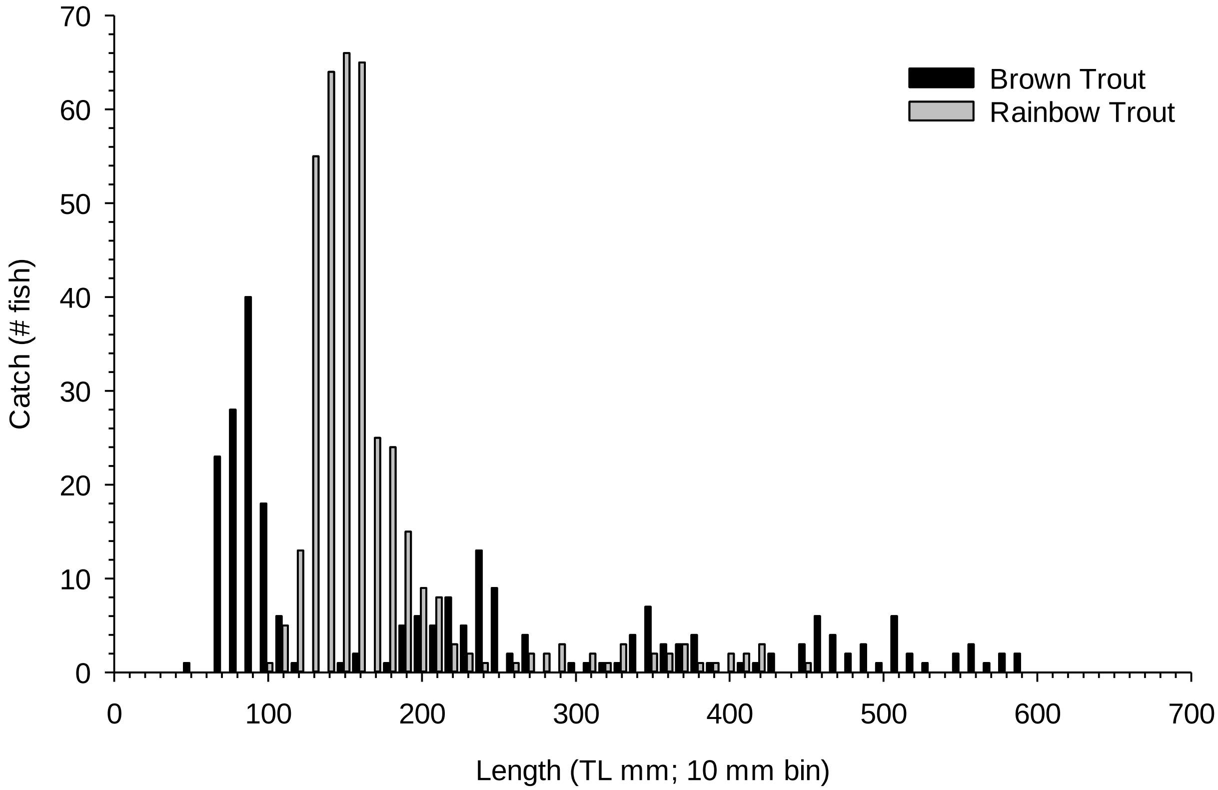

Figure 17. Length-frequency histogram for Brown Trout and Rainbow Trout sampled with electrofishing from Stalker Creek during 2010.

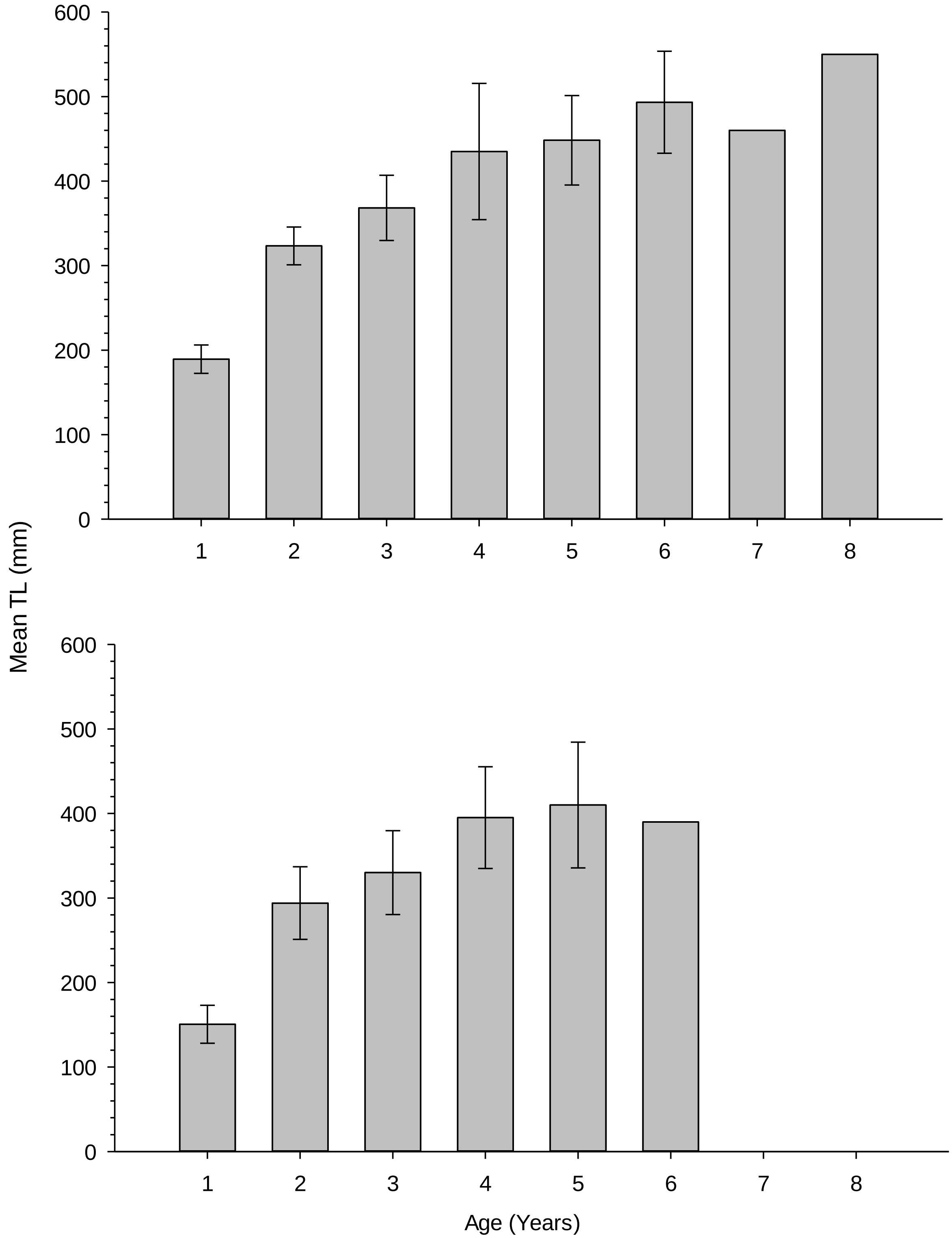

Figure 18 Mean length at age of Brown Trout (top) and Rainbow Trout (bottom) sampled with electrofishing from Stalker Creek during 2010. Error bars represent 95% CIs.

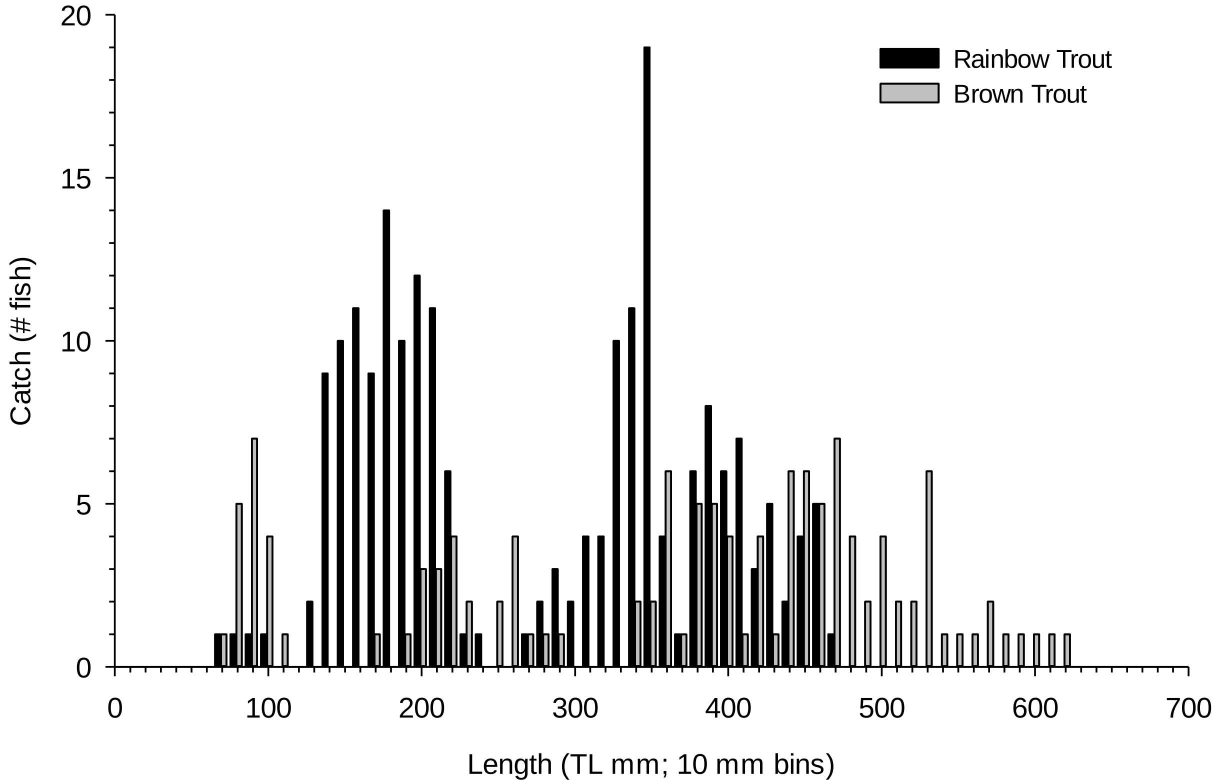

Figure 19. Length-frequency histogram for Brown Trout and Rainbow Trout sampled with electrofishing from the Silver Creek - Cabin Creek transect during 2010.

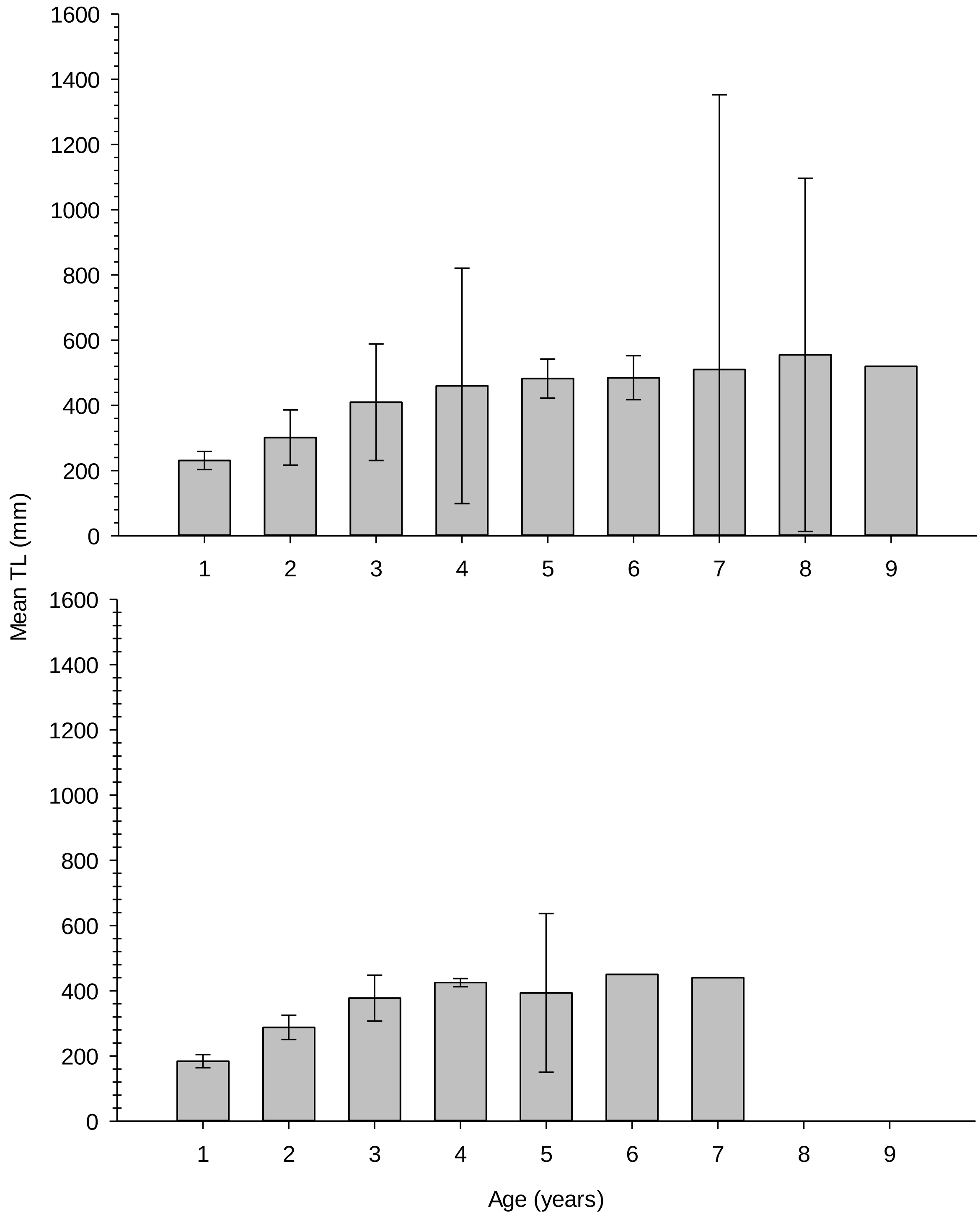

Figure 20 Mean length-at-age of Brown Trout (top) and Rainbow Trout (bottom) sampled with electrofishing from Silver Creek - Cabin Creek transect in 2010. Error bars represent 95% CIs.

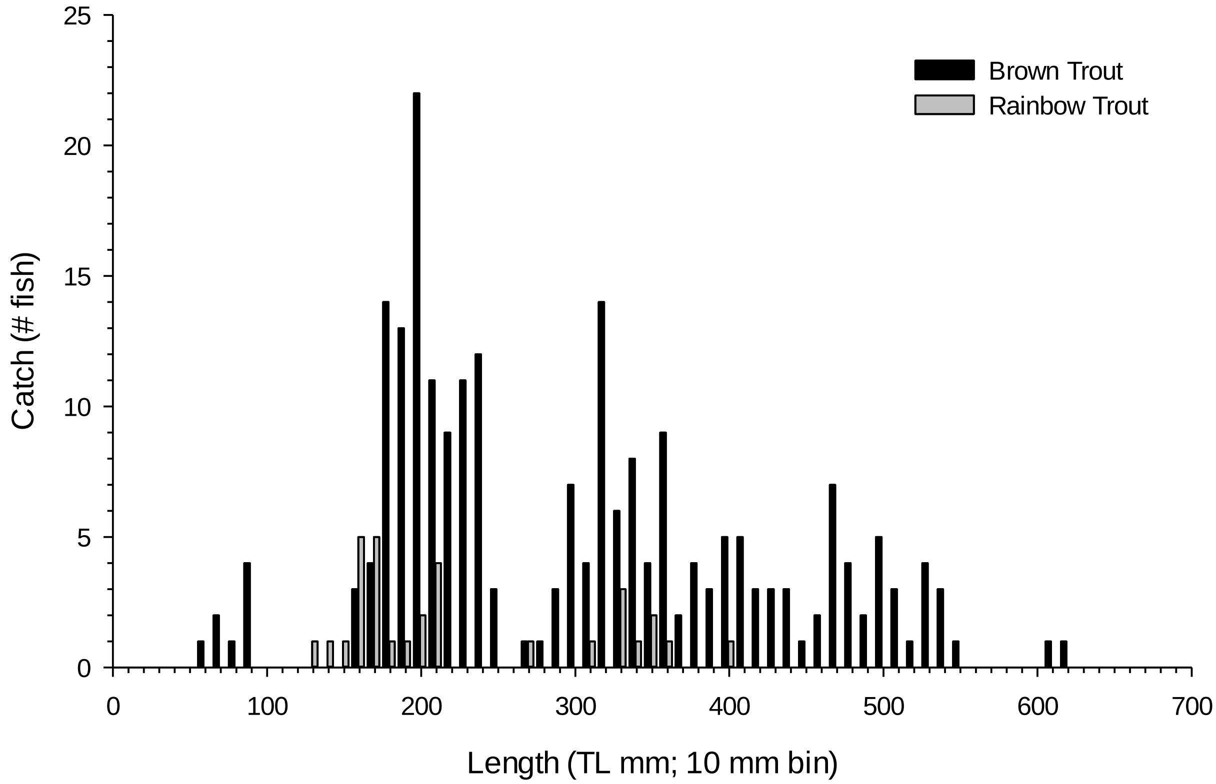

Figure 21. Length-frequency histogram of Brown Trout and Rainbow Trout sampled with electrofishing from the Silver Creek - Martin Bridge transect during 2010.

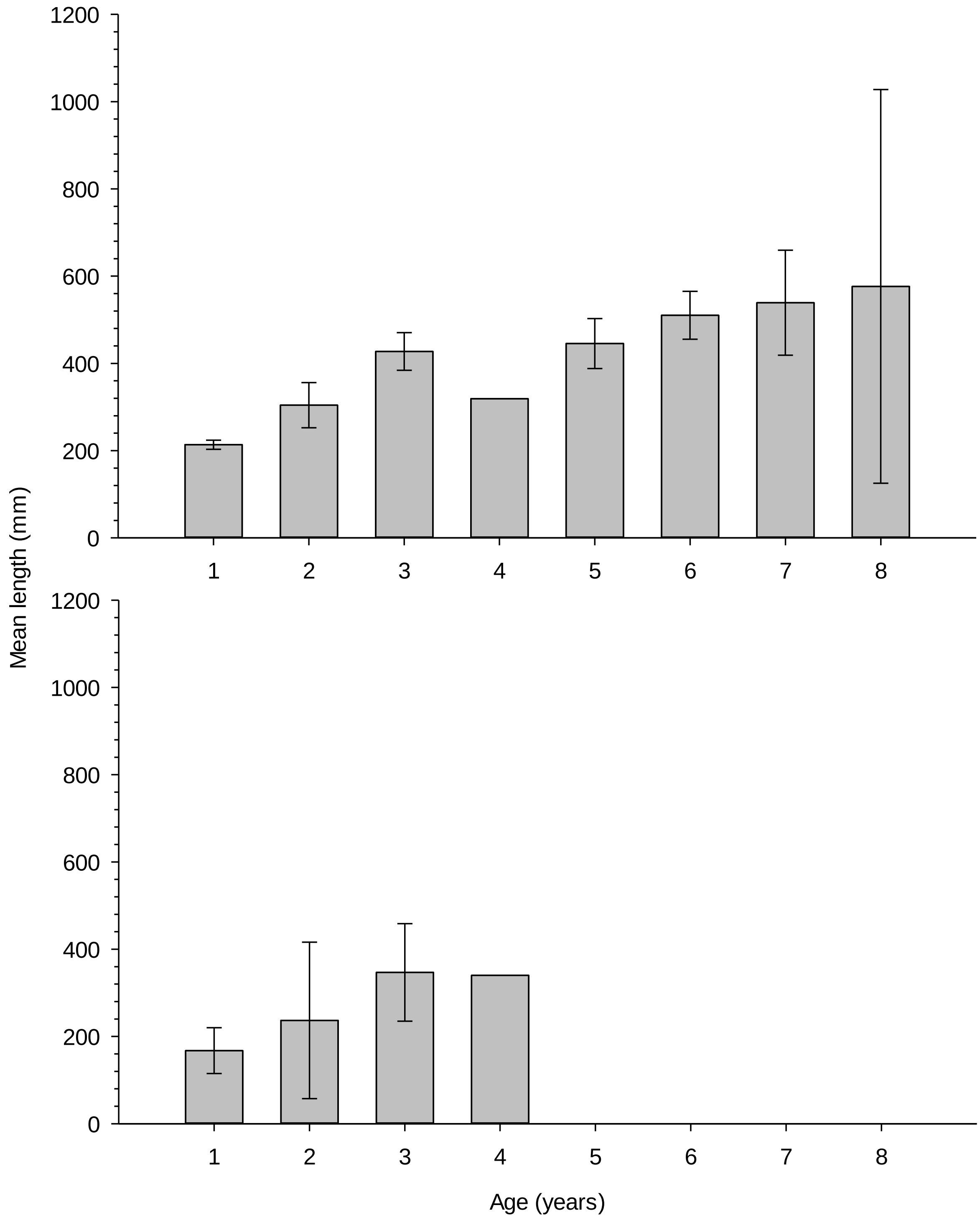

Figure 22. Mean length at age of Brown Trout (top) and Rainbow Trout (bottom) sampled with electrofishing from Silver Creek - Martin Bridge transect during 2010. Error bars represent 95% CIs.

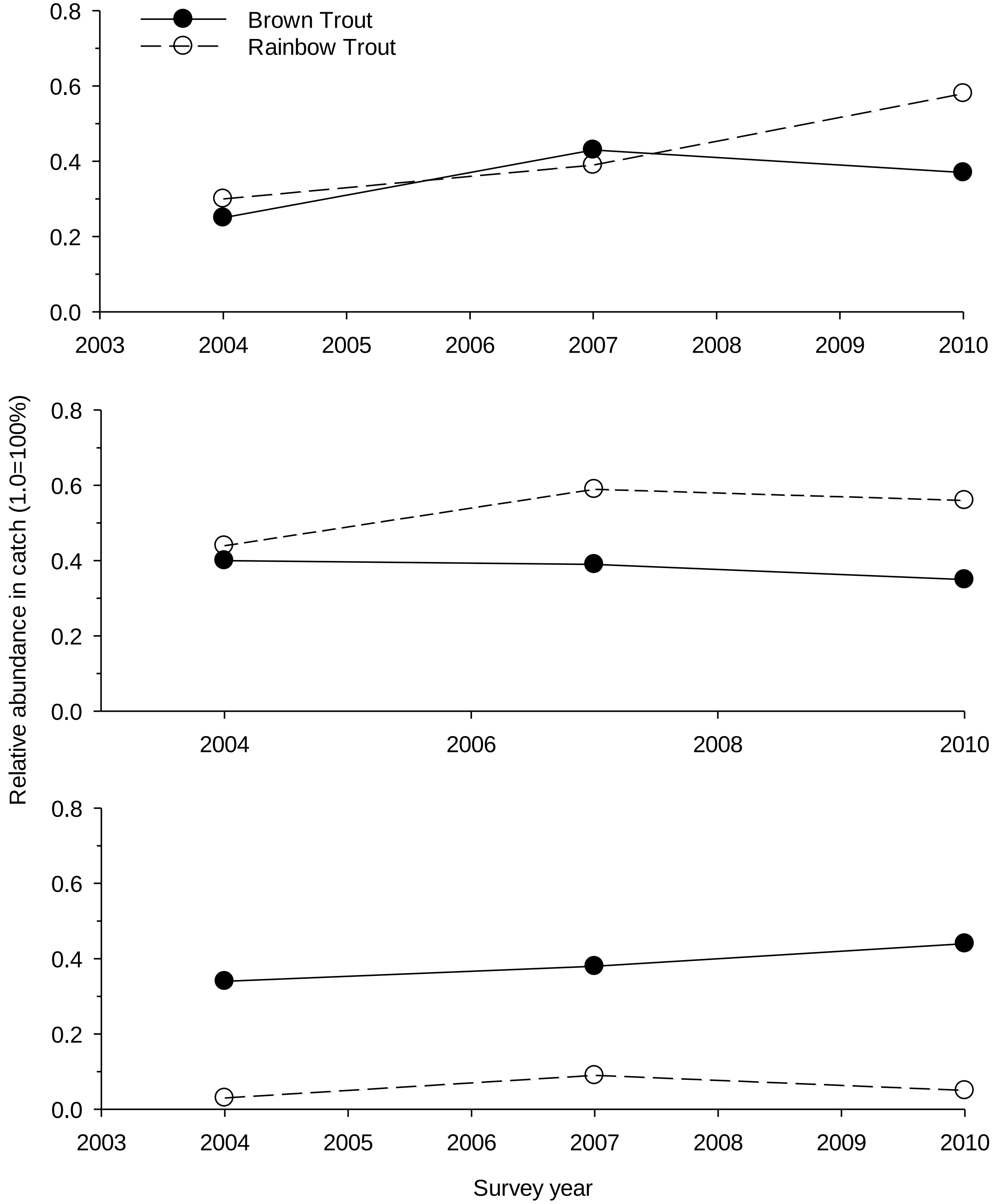

Figure 23. Relative composition in the catch of Brown and Rainbow Trout in three reaches of Silver Creek including 2004, 2007, and 2010 surveys. Sites include Stalker Creek (top), Cabin (middle) and Martin Bridge (bottom). This figure depicts only trout species and does not include relative abundance in the catch of other fish species.

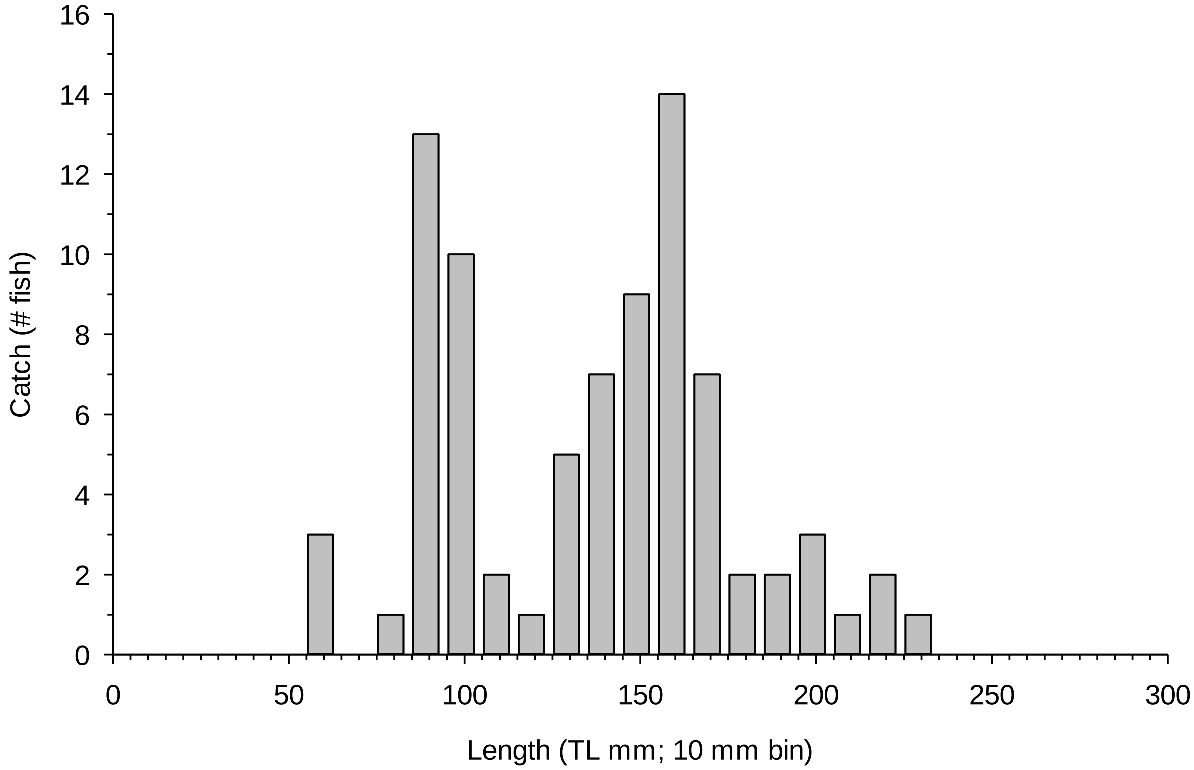

Figure 24. Length-frequency histogram for Yellowstone Cutthroat Trout (*n* = 83) translocated from Eightmile Creek into Sixmile Creek during 2010.

TABLES

Table 1. Catch summary including length, weight, and age of fish sampled from Baker Length with two gill nets during 2010. Species collected included Brown (BRN), Golden (GOLD), Henrys Lake Cutthroat (HLCT), Westslope Cutthroat Trout (WSCT), Rainbow X Cutthroat Trout Hybrid (RBT X CT hybrid), and Rainbow Trout (RBT).

Net	Species	Length (mm)	Weight (g)	Age
1	BRN	400	555	9
	BRN	632	440	9
	GOLD	300	249	4
	HLCT	290	206	--
	HLCT	240	140	--
	RBT	360	475	4
	RBT X CT	380	391	7
	RBT X CT	350	310	10
	WSCT	330	286	4
	WSCT	370	395	7
2	BRN	430	401	15
	HLCT	220	95	--
	HLCT	380	499	--
	HLCT	330	335	--
	RBT X CT	340	330	6
	RBT X CT	360	418	6

Table 2. Summary of habitat parameters measured in Baker Lake during 2010.

Location	Secchi depth (m)	Lake depth (m)	Temp °C	pH
West	11	11	11	10.9
Middle	8.5	9.5	9	9.5
East	7.5	7.5	9	10.3
Average (SD)	9.0 (1.8)	9.3 (1.8)	9.7 (1.2)	10.2 (0.7)

Table 3. Population estimates for kokanee from 2010 trawling in Anderson Ranch Reservoir.

Strata	Age 0	Age 1	Age 2	Age 3	Age 4	Total
			Abundance (#)			
1	153,669	4,433	39,042	24,548	3,173	224,865
2	313,815	25,617	46,181	10,559	0	396,172
3	319,396	15,164	52,129	9,399	162	396,250
Total	786,879	45,215	137,352	44,507	3,335	1,017,288
			Biomass Estimates (kg)			
1	259	369	5,029	6,877	1,113	13,647
2	559	653	3,606	2,634		7,453
3	598	625	4,051	2,266	51	7,590
Total	1,416	1,648	12,686	11,777	1,164	28,690
			Standing Crop Estimates (kg/ha)			
1	0.38	0.54	7.4	10.11	1.64	20.07
2	0.95	1.11	6.11	4.46	0	12.63
3	1.52	1.59	10.28	5.75	0.13	19.26
Total	0.85	0.99	7.62	7.08	0.7	17.24

Table 4. Anderson Ranch Reservoir kokanee abundance estimate trends from 2005-2010.

Year	Age 0	Age 1	Age 2	Age 3	Age 4	TOTAL
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
2010	786,879	45,215	137,352	44,507	3,335	1,017,288
					Average	1,108,952

Table 5. Standard sampling indices for Magic Valley bass populations from 2006 to 2010.

			Year				
Fisheries	Species	Measure	2006	2007	2008	2009	2010
Bell Rapids Res.	LMB	Ave. catch (CPUE)		11	7	12	
		Ave. length (mm)		211	244	277	
		Ave length at Age 5		256	302	325	
		PSD		17	33	56	
		RSD(S-Q)		36	67	44	
		Max. age (years)		9	10	10	
Milner Res.	SMB	Ave. catch (CPUE)		63		19	
		Ave. length (mm)		198		200	
		Ave length at 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 at Age 5			220		
		PSD			33		
		RSD(S-Q)			67		
		Max. age (years)			7		
Lake Walcott	SMB	Ave. catch (CPUE)	92			31	
		Ave. length (mm)	132			160	
		Ave length at Age 5	418			387	
		PSD	17			45	
		RSD(S-Q)	83			55	
		Max. age (years)	13			13	
Magic Reservoir [a]	SMB	Ave. catch (CPUE)					2.4
Stone Reservoir [a]	LMB	Ave. catch (CPUE)					2.4
Carey Lake	LMB	Ave. catch (CPUE)		84			34
		Ave. length (mm)		162			205
		Ave length at Age 3		286			280
		PSD		6			29
		RSD(S-Q)		93			70
		Max. age (years)		3			3

[a] Insufficient sample size to describe population characteristics and stock structure.

Table 6. Brown Trout redd count summary for the Big Wood River for 1986-2010.

Date	Big Wood River[a]					Rock Creek
	Reach 1	Reach 2	Reach 3	Reach 4	Total	
Nov. 19, 1986	--[d]	26	--[b]	96	122	--[d]
Nov. 19, 1987	104	62[c]	--[b]	30	196	--[d]
Nov. 15, 1988	13	75	31	39	158	--[d]
Nov. 18, 1989	6	20	33	8	67	1
Nov. 20, 1990	1	25	30	14	70	0
Nov. 15, 1991	3	30	38	15	86	0
Nov. 19, 1992	5	14	9	15	43	0
Nov. 24, 1993	1	28	--[b]	15	43	0
Nov. 16, 1994	9	27	56	5	97	0
Nov. 16, 1995	2	29	54	32	117	0
Nov. 11, 1996	--[d]	8	37	51	96	--[d]
Nov. 25, 1997	--[d]	44	53	23	120	--[d]
Nov. 23, 1998	--[d]	45	139	71	255	--[d]
Nov. 23, 1999	--[d]	104	209	130	443	--[d]
Nov. 17, 2000	--[d]	79	211	153	443	--[d]
Nov. 16, 2001	21	30	36	24	111	--[d]
Nov. 14, 2002	6	26	13	17	62	--[d]
Nov. 17, 2003	--[d]	16	30	30	76	--[d]
2004	no data	no data	no data	no data	no data	no data
Nov. 15, 2005	37	49	30	99	215	--[d]
Nov. 15, 2006	0	17	42	20	79	--[d]
Nov. 15, 2007	0	23	40	37	100	--[d]
Nov. 14, 2008	0	60	110	31	201	--[d]
Nov. 10, 2009	0	52	106	139	297	--[d]
Dec. 6, 2010	0	57	41	31	130	--[d]

a Reach 1 - Rock Creek to Sheep Bridge
Reach 2 - Sheep Bridge to fence at U.S.G.S. station
Reach 3 - Fence to Stanton Crossing
Reach 4 - Stanton Crossing to Davis Pond
b Combined with previous reach
d Not surveyed

Table 7. Bass jaw tag returns from Milner Reservoir for 2009, 2010, and to date.

	RELEASED IN SECTION 2 ON 5/16/2009	2009		2010		TO DATE 11/30/2010	
BLUE JAW TAGS	Total fish tagged	203					
	Total tag returns	33	16%	14	6%	47	23%
	Total tag returns outside Sec 2	32	36%	9	64%	41	87%
	Total tag returns inside Sec 2	0	0%	1	7%	1	2%
	Total tag returns without location info	1	3%	4	29%	5	11%

	RELEASED IN SECTION 4 ON 5/30/2009	2009		2010		TO DATE 11/30/2010	
RED JAW TAGS	Total fish tagged	162					
	Total tag returns	27	17%	20	12%	47	29%
	Total tag returns outside Sec 4	14	52%	10	50%	24	51%
	Total tag returns inside Sec 4	11	41%	3	15%	14	30%
	Total tag returns without location info	2	7%	7	35%	9	19%

	RELEASED IN SECTION 4 ON 8/1/2009	2009		2010		TO DATE 11/30/2010	
GOLD JAW TAGS	Total fish tagged	154					
	Total tag returns	20	13%	6	4%	26	17%
	Total tag returns outside Sec 4	8	40%	4	67%	12	46%
	Total tag returns inside Sec 4	11	55%	2	33%	13	50%
	Total tag returns without location info	1	5%	0	0%	1	3.85%

	RELEASED IN SECTION 5 ON 9/12/2009	2009		2010		TO DATE 11/30/2010	
GREEN JAW TAGS	Total fish tagged	192					
	Total tag returns	6	3%	19	10%	25	13%
	Total tag returns outside Sec 5	6	100%	12	63%	18	72%
	Total tag returns inside Sec 5	0	0%	2	11%	2	8%
	Total tag returns without location info	0	0%	5	26%	5	20%

TOTAL TAG RETURNS					
2009		2010		TO DATE 11/30/2010	
86	12%	59	8%	145	20%

Table 8. Catch and relative fish abundance for electrofishing surveys of Billingsley for 2002, 2006, and 2010.

	2002		2006		2010	
Species	N	Catch (%)	N	Catch (%)	N	Catch (%)
Brown Trout	0	0%	55	14%	159	29%
Rainbow Trout	33	11%	65	17%	241	43%
Redside Shiner	57	19%	146	37%	55	10%
Utah Chub	204	69%	125	32%	97	18%

Table 9. Comparative abundance estimates for three sites in Silver Creek sampled with electrofishing gear.

Species	Site	Year	Size class	Pop est.
Rainbow Trout	Stalker	2001	100 - 499 mm	877
		2004	>100 mm	801
		2007	100 - 499 mm	768
		2010	100 - 499 mm	1,227
	Cabin	2001	≥ 100 mm	7,483
		2004	≥ 100 mm	3,433
		2007	100 - 499 mm	2,054
		2010	100 - 499 mm	593
	Martin	2001		
		2004		
		2007		
		2010		-na-
Brown Trout	Stalker	2001	100 - 699 mm	1,827
		2004	> 100 mm	439
		2007	100 - 699 mm	324
		2010	100 - 699 mm	461
	Cabin	2001	≥ 100 mm	2,997
		2004	≥ 100 mm	1,727
		2007	100 - 699 mm	366
		2010	100 - 699 mm	346
	Martin	2001	100-300 mm	627
		2004	100-300 mm	797
		2007	100 - 699 mm	538
		2010	100 - 699 mm	513

Table 10. Comparative density estimates for three sites sampled with electrofishing gear in Silver Creek.

Species	Site	Year	Size Class	#/km
Rainbow Trout	Stalker	2001	100 - 499 mm	1,070
		2004	>100 mm	666
		2007	100 - 499 mm	966
		2010	100 - 499 mm	876
	Cabin	2001	≥ 100 mm	6,236
		2004	≥ 100 mm	4,286
		2007	100 - 499 mm	1,726
		2010	100 - 499 mm	516
	Martin	2001		
		2004		
		2007		
		2010		-Na-
Brown Trout	Stalker	2001	100 - 699 mm	2,228
		2004	> 100 mm	365
		2007	100 - 699 mm	408
		2010	100 - 699 mm	329
	Cabin	2001	≥ 100 mm	2,498
		2004	≥ 100 mm	2,156
		2007	100 - 699 mm	308
		2010	100 - 699 mm	301
	Martin	2001	100 - 699 mm	900
		2004	100 - 699 mm	904
		2007	100 - 699 mm	640
		2010	100 - 699 mm	566

Table 11. Relative abundance of fish sampled with electrofishing gear in the Cabin site of Silver Creek.

	Catch (%)		
Species	2004	2007	2010
Rainbow Trout	43.7	58.7	56.0
Brown Trout	40.0	39.3	35.0
Bridgelip Sucker	9.3	0.0	5.0
Redside Shiner	1.7	0.3	0.0
Longnose Dace	2.5	1.0	4.0
Speckled Dace	1.1	0.3	0.0

Table 12. Relative abundance of fish sampled with electrofishing gear in the Martin Bridge site of Silver Creek.

	Catch (%)		
Species	2004	2007	2010
Rainbow Trout	3.0	8.8	5.0
Brown Trout	33.7	38.4	44.0
Bridgelip Sucker	19.2	35.0	27.0
Redside Shiner	29.3	13.1	17.0
Longnose Dace	3.5	2.4	4.0
Speckled Dace	11.5	2.4	3.0

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APPENDIX A. SAMPLING EFFORT AND RELATED GEOREFERENCES.

Water	Site	Gear	E	N	Z	Datum	Note
Baker L	1	Gill net	687464	4840159	11	Wgs84	Mt. lake survey
Big Wood R.	Tailrace	Elect-fish	701628	4850386	11	Wgs84	Stream Surv.
	Tailrace	Elect-fish	702054	4850738	11	Wgs84	Stream Surv.
	Stanton Cross.	Redd count	717419	4800641	11	Wgs84	Redd Cnts.
	USGS Gauge	Redd count	715608	4800424	11	Wgs84	Redd Cnts.
	Sheep Br.	Redd count	714111	4800580	11	Wgs84	Redd Cnts.
	Roc Cr.	Redd count	712363	4800351	11	Wgs84	Redd Cnts.
	1	Thermograph	714551	4792332	11	Wgs84	Hobo Temp
	2	Thermograph	714592	4791887	11	Wgs84	Hobo Temp
	3	Thermograph	714648	4788380	11	Wgs84	Hobo Temp
Billingsley Cr	1	Elect-fish	672417	4744589	11	Wgs84	Stream Surv.
	2	Elect-fish	672417	4744589	11	Wgs84	Stream Surv.
Carey L	1	Elect-fish	262605	4801808	12	Wgs84	Bass
	2	Elect-fish	262681	4801850	12	Wgs84	Bass
	3	Elect-fish	262854	4801733	12	Wgs84	Bass
	4	Elect-fish	262875	4801648	12	Wgs84	Bass
	5	Elect-fish	263134	4801791	12	Wgs84	Bass
	6	Elect-fish	262883	4801691	12	Wgs84	Bass
	7	Elect-fish	262519	4801820	12	Wgs84	Bass
Clover Cr.	1	Thermograph	633617	4700987	11	Wgs84	Hobo Temp
Magic Res.	1	Elect-fish	713020	4796112	11	Wgs84	Bass
	2	Elect-fish	711722	4797911	11	Wgs84	Bass
	3	Elect-fish	710653	4799945	11	Wgs84	Bass
	4	Elect-fish	713475	4794421	11	Wgs84	Bass
	5	Elect-fish	711722	4797911	11	Wgs84	Bass
	6	Elect-fish	710653	4799945	11	Wgs84	Bass
	7	Elect-fish	713520	4796552	11	Wgs84	Bass
	8	Elect-fish	710766	4800431	11	Wgs84	Bass
	9	Elect-fish	711638	4796145	11	Wgs84	Bass
	10	Elect-fish	711638	4796145	11	Wgs84	Bass
	11	Elect-fish	711638	4796145	11	Wgs84	Bass
	12	Elect-fish	711638	4796145	11	Wgs84	Bass
	13	Elect-fish	711638	4796145	11	Wgs84	Bass
	14	Elect-fish	711638	4796145	11	Wgs84	Bass
	15	Elect-fish	711638	4796145	11	Wgs84	Bass
	16	Elect-fish	711638	4796145	11	Wgs84	Bass
	17	Elect-fish	711638	4796145	11	Wgs84	Bass
	18	Elect-fish	711638	4796145	11	Wgs84	Bass
	19	Elect-fish	711638	4796145	11	Wgs84	Bass
	20	Elect-fish	711638	4796145	11	Wgs84	Bass
Rock Cr.	1	Thermograph		4681336	11	Wgs84	Hobo Temp
	2	Thermograph	722105	4692587	11	Wgs84	Hobo Temp
	3	Thermograph	713730	4707367	11	Wgs84	Hobo Temp
Salmon Falls Cr. Res.	1	Floating Gill	687127	4674818	11	Wgs84	Trt. Eval.
	2	Floating Gill	685924	4672771	11	Wgs84	Trt. Eval.
	3	Floating Gill	687050	4669902	11	Wgs84	Trt. Eval.
	4	Floating Gill	685924	4672771	11	Wgs84	Trt. Eval.

Water	Site	Gear	E	N	Z	Datum	Note
	5	Floating Gill	686620	4665460	11	Wgs84	Trt. Eval.
	6	Floating Gill	686087	4671219	11	Wgs84	Trt. Eval.
	7	Floating Gill	687466	4667937	11	Wgs84	Trt. Eval.
	8	Floating Gill	686828	4667376	11	Wgs84	Trt. Eval.
	9	Floating Gill	686465	4664366	11	Wgs84	Trt. Eval.
	10	Floating Gill	685831	4662895	11	Wgs84	Trt. Eval.
	11	Floating Gill	685809	4663606	11	Wgs84	Trt. Eval.
	12	Floating Gill	686133	4665452	11	Wgs84	Trt. Eval.
Stalker Cr.	1	Elect-Fish	730007	4799575	11	Wgs84	Stream Surv.
	2	Elect-Fish	730224	4799882	11	Wgs84	Stream Surv.
Silver Cr.	1	Elect-Fish	731001	4799887	11	Wgs84	Stream Surv.
	2	Elect-Fish	731305	4799708	11	Wgs84	Stream Surv.
	1	Elect-Fish	734534	4800807	11	Wgs84	Stream Surv.
	2	Elect-Fish	734486	4800611	11	Wgs84	Stream Surv.
Sixmile Cr.	1	Elect-Fish	6324589	812345	12		YCT Transplant
Stone Res.	1	Elect-Fish	4661275	360966	12		Bass
	2	Elect-Fish	4661249	360728	12		Bass
	3	Elect-Fish	4661249	360728	12		Bass
	4	Elect-Fish	4661158	360554	12		Bass
	5	Elect-Fish	4660862	360255	12		Bass
	6	Elect-Fish	4661275	360966	12		Bass
	7	Elect-Fish	4661249	360728	12		Bass
	8	Elect-Fish	4661249	360728	12		Bass
	9	Elect-Fish	4612389	367453	12		Bass
	10	Elect-Fish	4657830	360255	12		Bass
S.F. Boise R.	1	Kokanee Cnt.	6369200	4815810	11	Wgs84	
	2	Kokanee Cnt.	6370941	4819520	11	Wgs84	
	3	Kokanee Cnt.	6381872	4822070	11	Wgs84	
	4	Kokanee Cnt.	6390469	4823490	11	Wgs84	
	5	Kokanee Cnt.	6390158	482960	11	Wgs84	
	6	Kokanee Cnt.	6422563	4830173	11	Wgs84	
	7	Kokanee Cnt.	6448900	4830388	11	Wgs84	
	8	Kokanee Cnt.	6479954	4830721	11	Wgs84	
	9	Kokanee Cnt.	6496975	4829698	11	Wgs84	
	10	Kokanee Cnt.	6560664	4829619	11	Wgs84	
	11	Kokanee Cnt.	6609644	4827757	11	Wgs84	
	12	Kokanee Cnt.	6650225	4828407	11	Wgs84	
	13	Kokanee Cnt.	6682277	4830024	11	Wgs84	

APPENDIX B. EQUIPMENT.

Fisheries type	Equipment	Description
Mountain lakes	Mountain lake gill net	Swedish made Lundgren's 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
	Secchi disc	Standard; decimeter graduation
	pH meter	Oakton© hand held pH meter - Model 35624.2
Lakes & res.	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
	Secchi 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.
	Outcast Power Drifter Raft	3.35 m
	Anode	13.7 m-long power cord; 2.4 m-long fiberglass handle; 0.4 m diameter steel hoop
	Cathode	Boat
	Live well	208 L plastic garbage can; O_2 supplemented
	Drift boat	4.5 m-long aluminum

Fisheries Type	Equipment	Description
	Anode	Octopus-style steel danglers (1 m-long)
	Boom	4.3 m-long fiberglass
	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
	Rangefinder	Leica LRF 900 Rangemaster rangefinder
	GPS	Magellan Sporttrack Topo Global Positioning System©

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