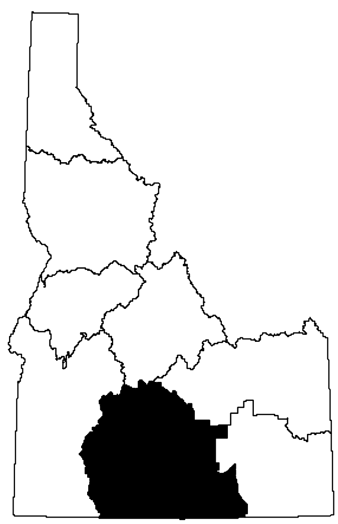
FISHERY MANAGEMENT INVESTIGATIONS

IDAHO DEPARTMENT OF FISH AND GAME

FISHERY MANAGEMENT ANNUAL REPORT

Cal Groen, Director



MAGIC VALLEY REGION

2007

Robert G. Ryan, Regional Fishery Biologist
Erin Gutknecht, Fishery Technician
Douglas J. Megargle, Regional Fishery Manager

November 2008
IDFG 08-114

TABLE OF CONTENTS

2007 Magic Valley Region Fishery Management Report

2007 Magic Valley Region Fishery Management Report

Surveys and Inventories - Mountain Lakes

ABSTRACT

Bass Lakes #1 and #2 along with Little Bear Lake were sampled in 2007 using standard Idaho Department of Fish and Game (IDFG) protocol. All three lakes are located in the Ross Fork drainage of the Sawtooth National Recreation Area which is a popular destination for mountain lake anglers.

Fish sampled in all three bodies of water indicate current management is providing a viable fishery in each lake with either rainbow trout *Oncorhynchus mykiss*, cutthroat trout *O. clarkii*, or hybrids (rainbow x cutthroat trout) being captured in gill net sets. Diverse invertebrate populations were noted at each lake.

No amphibians were observed in shoreline surveys and human use indicators of the lakes is best described as moderate with five or less camp sites or fire rings detected at each lake.

INTRODUCTION

Bass Lakes #1 and #2

Bass Lakes #1 and #2 are located in the headwaters of the Ross Fork of the Boise River (Appendix A). Bass Lake #1 has a surface area of approximately 1.32 ha and a surface elevation of 2,666 m. Bass Lake #2 has a surface area of approximately 0.94 ha and a surface elevation of 2,669 m. Both lakes have a north east exposure. Rainbow trout are stocked on a three year rotation in both lakes. A standard mountain lake survey was conducted at both lakes to evaluate hatchery stocking.

Little Bear Lake

Little Bear Lake is located in the headwaters of the Ross Fork of the Boise River (Appendix A). Little Bear Lake has a surface area of 1.07 ha and a surface elevation of 2,689 m with a north east exposure. Cutthroat trout are stocked on a three year rotation. In 2006 westslope cutthroat trout were stocked. Prior to 2006 Yellowstone cutthroat were stocked. In 2007 a standard mountain lake survey was conducted to evaluate hatchery stocking.

METHODS

Mountain Lake surveys are conducted using IDFG standard protocol. Fish are sampled with one overnight gill net set. Nets are set and retrieved using a small inflatable raft or tube. Mountain lake gill nets, Swedish-made Lundgrens Type A lightweight multi-filament sinking gill nets measuring 1.5 m wide with six - 7.6 m panels in bar mesh sizes: 46, 38, 33, 30, 25, and 19 mm are set overnight or at the discretion of the survey crew. Lake size and or low fish abundance may prohibit the full net set. A description of equipment used in mountain lake surveys is listed in Appendix B.

All fish are identified to species, measured to total length (mm), and weighed (g). Catch data is summarized by species for length, weight, relative abundance, and catch per unit of effort (CPUE). Otoliths are taken from a representative sample of collected fish and used identify sampled age classes.

A cursory survey of amphibians is made near the shoreline by turning over rocks and logs and visually searching the littoral zone of the lake. Angler use and area development is observed around the lake.

Bass Lakes #1 and #2 and Little Bear Lake were sampled on July 31 and August 1. One gill net was set overnight (2030 to 0730 hours) in Bass Lake #1. One short term (1730 to 2145 hours) gill net was set in Bass Lake #2. A short term net set was used in Bass Lake #2 because fish were observed prior to sampling; creating concerns of over fishing in an overnight set. One gill net was set overnight (2100 to 0910 hours) in Little Bear Lake. Water quality parameters identified in the standard mountain lake survey protocol were not collected due to time and manpower limitations.

RESULTS AND DISCUSSION

Bass Lake #1

Water conditions indicated habitat suitable for survival of sportfish. Surface water temperature was 15 °C. Maximum depth was approximately 5.5 m with approximately 50% of the lake being less than 2 m. Available depth refuge for over winter survival appeared to be suitable.

Zooplankton and other invertebrate fauna were numerous and included representatives from the orders Coleoptera, Diptera, Hemiptera, Odonata, and Tricoptera. Vertebrate fauna observed included larval long-toed salamanders *Ambystoma macrodactylum*.

A lack of suitable spawning habitat was observed. One inlet and one outlet were present. Minimal spawning substrate, estimated at less than five percent of the total present wetted area, was observed in the available tributary. Silt dominated the outlet substrate. No fish were observed in the inlet or the outlet to the lake.

A total of 25 rainbow trout were collected in the gill net sample (Table 1). Total length ranged from 115 mm to 355 mm (Figure 1). Fish condition was good. Sampled fish represented hatchery out-plants from 2000, 2003, and 2006. Estimated ages from sampled fish suggested minimal natural recruitment occurred between stocking years. Observed fish densities suggested stocked rainbow trout experience moderate survival.

Observed use and signs of use in the area surrounding Bass Lakes #1 and #2 was considered low. A well marked trail with a steep grade provided good access. However, trailhead access was difficult by vehicle. Five dispersed historic campsites were present between the two lakes.

Bass Lake #2

Two inlets and one outlet were present. Minimal spawning substrate, estimated at less than five percent, was observed in both available tributaries. Silt and cobble dominated both streams. No fish were observed in either inlets or the outlet

Present water conditions indicated habitat may be limiting survival. Surface water temperature was 16 °C. Maximum depth was approximately 4 m with 70% to 80% of the lake being less than 2 m. Available depth refuge for over winter survival was minimal.

Zooplankton and other invertebrate fauna were numerous and included representatives from the orders Coleoptera, Tricoptera, and Diptera. No vertebrate fauna were observed.

One rainbow trout was collected in the gill net sample. Total length and weight of the sample fish was 184 mm and 90 g, respectively (Table 1). Fish condition was good. Few other fish were observed in the lake. Those observed were similar in size to the sampled fish. The sampled fish likely represents a hatchery out-plant from 2006. Low observed fish presence suggested stocked rainbow trout experience low survival.

Natural recruitment was not observed. It is recommended that Bass Lake #2 be considered for removal from the stocking rotation provided use is believed to be low and the adjacent Bass Lake #1 supports a fishery.

Little Bear Lake

Present water conditions indicated habitat suitable for survival was present. Estimated surface water temperature was 15 - 16 °C. Maximum depth was approximately 3 m with 50% of the lake being deeper than 2 m. Available depth refuge for over-winter survival appeared to be suitable.

Zooplankton and other invertebrate fauna were numerous and included representatives from the orders Coleoptera, Diptera, Ephemeroptera, and Tricoptera. Vertebrate fauna observed included a common garter snake *Thamnophis spp*. No amphibians were observed.

One inlet and one outlet were present. Minimal spawning substrate, estimated at approximately 10% of the total available area, was observed in the lake tributary. Cobble dominated the outlet substrate. Fingerling and fry were observed in the outlet.

A total of 16 cutthroat trout and five rainbow x cutthroat hybrid trout were collected in the gill net sample (Table 1). Total length of sampled fish ranged from 175 mm to 300 mm (Figure 2). Fish condition was good. Sampled fish represented multiple year classes including non-stocking years and suggested natural recruitment has occurred consistently over the past six to eight years (Figure 3). However, it was uncertain what proportions of fish were in stocking years were of hatchery origin. Observed fish densities and the presence of year classes up to 12 years suggested trout experience good survival.

Rainbow trout were not recorded in historic Little Bear Lake stocking records; creating some uncertainty as to the origin of rainbow x cutthroat trout hybrids. Little Bear Lake is connected by a tributary to the Ross Fork Boise River which supports rainbow trout. However, stream gradient between the two water bodies is likely a barrier to passage. Hybrid presence may reflect error in past stocking or stocking records.

Observed use and signs of use in the area surrounding Little Bear Lake was considered low. Lake access was poor with no trail and a steep gradient. In addition, trailhead access was difficult by vehicle. No campsites were present but five historical campfire locations were observed.

MANAGEMENT RECOMMENDATIONS

- Maintain Bass Lake #1 in the stocking rotation.
- Consider removing Bass Lake #2 from the stocking rotation.
- Consider removing or reducing from stocking rotation and relying on natural recruitment for maintaining the present low use fishery at Little Bear Lake.

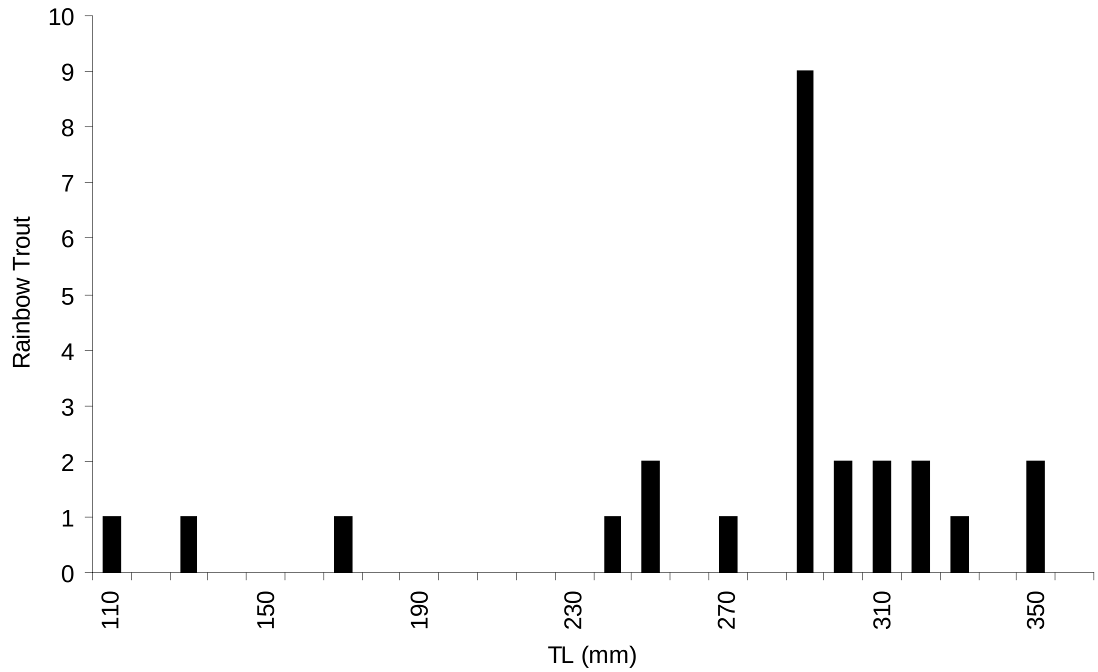


Figure 1. Length frequency of rainbow trout sampled in Bass Lake #1.

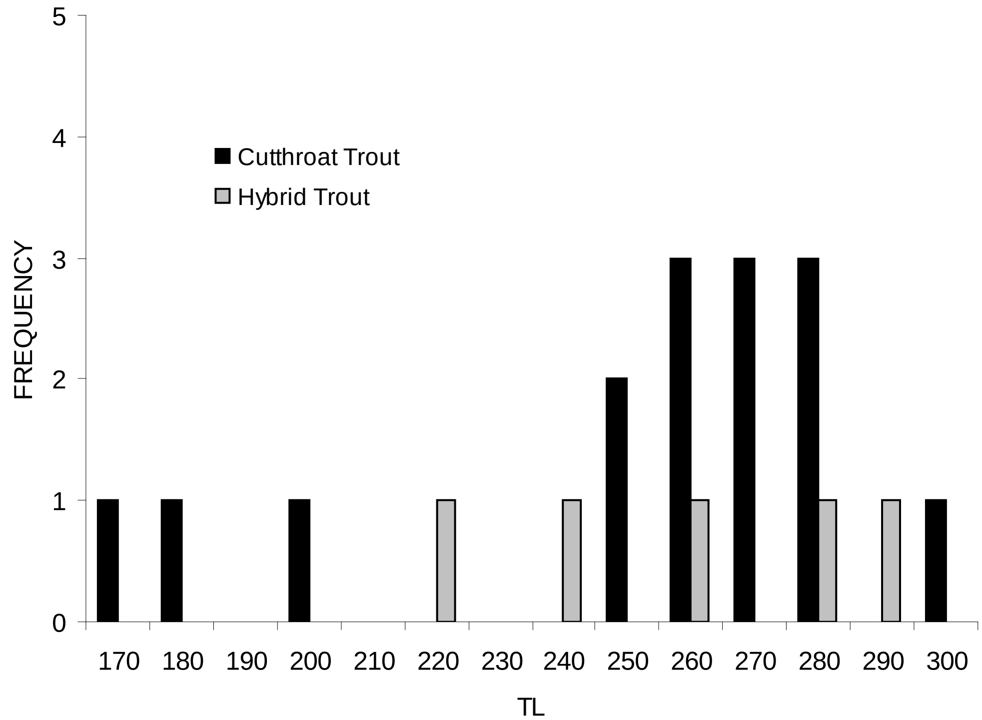


Figure 2. Length (mm) frequency of sampled cutthroat and rainbow x cutthroat trout hybrids in Little Bear Lake.

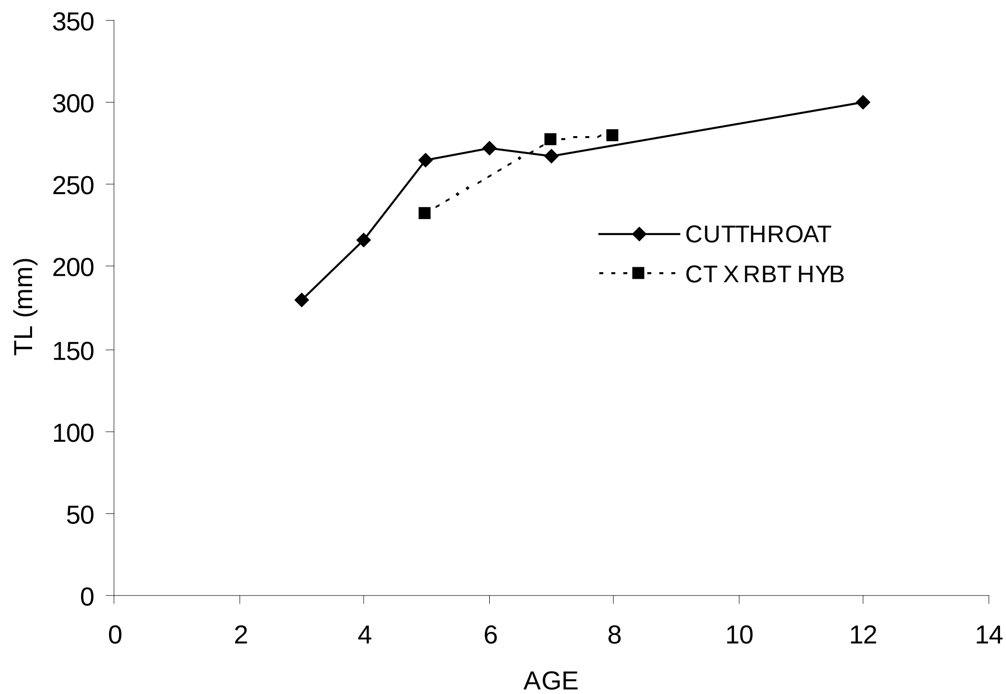


Figure 3. Mean total length at age of cutthroat trout and cutthroat x rainbow trout hybrids sampled from Little Bear Lake.

Table 1. Results summary from mountain lake surveys in the Magic Valley Region.

Lake Name	Surface Area (ha)	Depth[a]	Species Present	Natural Production	Amphibians Present	Gill Net CPUE	Campfire Rings	Access Difficulty	Angler Use
Bass Lake #1	1.32	Shallow	RBT	Minimal	Yes (LTS)	25	2	Moderate	Low
Bass Lake #2	0.94	Shallow	RBT	None	No	1	3	Moderate	Low
Little Bear	1.07	Shallow	CT HCT	Common	No	21	5	Difficult	Low

[a]_ Depth was estimated as shallow (<25% of lake over 6 m), moderate (<50% of lake 6 m), or deep (75% of lake over 6 m)

2007 Magic Valley Region Fishery Management Report

Surveys and Inventories – Lakes and Reservoirs

ABSTRACT

Smallmouth bass *Micropterus dolomieu* and kokanee *O. nerka* monitoring was conducted at Anderson Ranch Reservoir. A total of 533 smallmouth bass were collected among all locations. Age estimates indicated approximately seven years were necessary to produce a 305 mm smallmouth bass. Total abundance of kokanee among all strata and age groups was estimated at 1,698,602 fish, representing a density of 1,359 fish/ha. Reservoir densities of age zero, one, two, and three kokanee were estimated at 554; 673; 78; and 53 fish/ha, respectively. Standing crop was estimated among all strata and age groups as 57.98 kg/ha.

A total of 6,194 fish were collected from Carey Lake. The catch was primarily yellow perch *Perca flavescens* (67%) followed by largemouth bass *M. salmoides* (22%), bluegill *Lepomis macrochirus* (5%), pumpkinseed *L. gibbosus* (4%), brown bullhead *Ameiurus nebulosus* (1%) and bridgelip sucker *Catostomus columbianus* (<1%). Largemouth bass and yellow perch made up approximately 85% of catch biomass.

An angler creel survey was conducted on Magic Reservoir. A total of 33,608 (± 7,634, 80% CI) hours of angler effort were estimated. Average catch rates for rainbow trout and yellow perch were 0.97 fish/hour (± 0.49, 80% CI) and 2.58 fish/hour (± 1.14, 80% CI). Harvest estimates by species included: rainbow trout 19,199 (± 7,768, 80% CI), brown trout *Salmo trutta*, 0 (± 0, 95% CI), yellow perch 22,173 (± 12,862, 80% CI), and smallmouth bass 49 (± 89, 80% CI). Data collected indicates a stable trend in effort/days with corresponding stable to increasing harvest per effort/day. Brown trout redd counts from above Magic Reservoir were below the historical average.

A total of 1,006 smallmouth bass were collected among all sample locations in Milner Reservoir. Observed length at age indicated it takes approximately five years to attain 305 mm. Population and conditional indices show the Milner Reservoir smallmouth bass population is dominated by stock sized fish of good relative condition.

A stratified random roving creel survey was attempted on Mormon Reservoir. Due to insufficient angler observations, the survey was only conducted during the June interval and then discontinued.

Walleye *Sander vitreus* and walleye forage monitoring was conducted on both Oakley and Salmon Falls Creek Reservoirs. Data indicates adequate forage continues to exist in both waters and walleye condition indices are showing a positive correlation.

INTRODUCTION

Anderson Ranch Reservoir

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 (U.S.G.S. 1996). Anglers fishing Anderson Ranch Reservoir target primarily kokanee, rainbow trout, smallmouth bass, and yellow perch. Bull trout *Salvelinus confluentus* and several non-game fish species are also present. Kokanee are managed for a consumptive fishery with a daily bag limit of 25 fish and a possession limit of 50 fish. Trends in reservoir kokanee abundance are monitored on an annual basis using trawling techniques.

Anderson Ranch Reservoir has become an increasingly popular tournament bass fishery. The current quality of the smallmouth bass fishery is unknown and recently some concern has been expressed by anglers regarding the long term stability of the fishery under increasing angling pressure.

In 2007 we initiated a smallmouth bass population monitoring program on Anderson Ranch Reservoir. Information gathered from this survey and future surveys will be used to provide insight on smallmouth bass population dynamics in relation to increasing angling pressure by tournament and non-tournament anglers as well as influences of reservoir water level management and their associated population management implications.

In addition, Anderson Ranch Reservoir kokanee abundance monitoring was continued in 2007 in an effort to identify management needs for maintaining a quality fishery.

Carey Lake

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 ha. Most of the lake is shallow and marsh-like; however, deeper areas exist (4.5 m to 5.5 m) due to dragline operations conducted in August 1977. Carey Lake supports populations of largemouth bass, bluegill, yellow perch and brown bullhead. Largemouth bass and bluegill were first planted in the lake around 1949. Supplemental stockings of adult largemouth bass and bluegill were made periodically between 1965 and 1975. These species supported a popular fishery for many years. Yellow perch were illegally introduced into Carey Lake about 1973 and have since become the dominant member of the fish community. Angling for perch in the winter through early summer period has increased in popularity. Drought conditions (e.g., 1977) and numerous winterkills (1973 to present) have in some instances almost completely eliminated fish populations from Carey Lake.

Carey Lake has been subject to periodic drought conditions over the past five years which likely impacted the resident fishery. The purpose of sampling this fishery was to evaluate the existing fishing opportunities.

Magic Reservoir

Magic Reservoir is located approximately 48 km north of Shoshone, Idaho, within the Big Wood River drainage. The earthen dam was first constructed in 1909 and enhanced in 1917 to a maximum height of 34.4 m. Reservoir management includes irrigation, downstream flood control, hydroelectric power production, and recreation. The reservoir is approximately 1,529 ha when full with a maximum storage of approximately 24 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.

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

A creel survey was completed in 2007 to estimate angler effort and associated harvest for use in monitoring reservoir trends.

Milner Reservoir

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

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

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

Milner Reservoir has become an increasingly popular tournament bass fishery. The current quality of the smallmouth bass fishery has remained stable to this point despite increasing angling pressure. However, recently some concern has been expressed by anglers regarding the long term stability of the fishery under increasing angling pressure.

In 2007 we instigated a smallmouth bass population monitoring program on Milner Reservoir. Information gathered from this survey and future surveys will be used to provide insight on smallmouth bass population dynamics in relation to increasing angling pressure by tournament and non-tournament anglers as well as influences of reservoir water level management.

Mormon Reservoir

Mormon Reservoir is located approximately 8 km south of Fairfield, Idaho at an elevation of 1,538 m above sea level. The reservoir covers 1,093 ha when full, has a water storage capacity of 2,641 hectare-meters, and a water depth of 2.4 m. The reservoir is an irrigation impoundment that provides water for local agriculture purposes. Reservoir discharge is entirely based on demand from the water right holders with the occasional spill through the overflow during above average runoff events. Demands for water have approached total reservoir storage capacity several times over the past decade resulting in severely compromised fish habitat and water quality.

Mormon Reservoir is highly eutrophic. The reservoir is relatively shallow and is recharged through snowmelt and several large underground springs. The reservoir is nutrient rich due to adjacent land use practices. This relative shallow and nutrient rich reservoir has been over-run with a dense stand of water smartweed *Polygonum sp.* and other seasonal macrophytes which restrict boat access. The heavy aquatic vegetation load often results in low dissolved oxygen levels and high biological oxygen demand during fall and winter months which greatly reduces fish survival and carryover.

The fishery is hatchery supplemented and managed under general rules for rainbow trout. IDFG has stocked rainbow trout into Mormon Reservoir since before 1968 and continues, to date. Very little natural recruitment occurs largely due to insufficient spawning habitat and seasonal reservoir storage fluctuations. This nutrient rich environment can produce tremendous trout growth rates (> 2.54 cm / month) which led to IDFG evaluating its potential as a trophy trout fishery. Inconsistent carryover of both fish and water, largely due to the combined drought conditions and heavy organic load, prompted a switch from trophy trout harvest rules to general rules in 2005.

Oakley Reservoir

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

Walleye investigations were undertaken on Oakley Reservoir in 2007 to gather information on abundance, growth, mortality, and reproduction. Forage monitoring was also continued in 2007 to follow trends in forage abundance relative to walleye population dynamics.

Salmon Falls Creek Reservoir

Salmon Falls Creek Reservoir (SFCR) is a 1,376 ha irrigation impoundment located on Salmon Falls Creek in Twin Falls County, Idaho. SFCR is unique to the Magic Valley Region in that when the dam was constructed a large inactive storage capacity was created in the reservoir and subsequently, productive fish habitat remains even in low water years. SFCR is managed as a mixed species fishery for, rainbow trout, walleye, kokanee, yellow perch, smallmouth bass, and black crappie *Pomoxis nigromaculatus*. SFCR is one of only three waters in Idaho providing a sanctioned walleye fishery.

Walleye investigations were undertaken on SFCR in 2007 to continue gathering information on abundance, growth, mortality, reproduction, and exploitation. Forage monitoring was also continued in 2007 to follow trends in forage abundance relative to walleye population dynamics.

Approximately 500,000 micro fry walleye were stocked in SFCR in June of 2007. Stocked walleye were not marked with oxytetracycline (OTC).

METHODS

Lowland lake surveys are conducted utilizing IDFG standardized protocols. One unit of effort under standard protocol consists of one trap net night, one sinking gill net night, one floating gill net night and one hour of nighttime electrofishing. Sample locations are typically randomly selected initially and maintained for future surveys. A description of equipment used in lowland lake surveys is listed in Appendix B.

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

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

Anderson Ranch Reservoir smallmouth bass monitoring included collection of data necessary for evaluation of relative population abundance, stock structure, fish condition, growth, and survival. Fish were sampled using boat electrofishing equipment as described in the general methods. Electrofishing samples followed standard bass population monitoring methods at randomly chosen sample sites throughout the reservoir (Appendix A). Only the target species was sampled. Relative abundance was measured as average CPUE.

Smallmouth bass 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 30X – 40X. Otoliths were coated with mineral oil for better viewing clarity. Mean length at age was calculated from the sub-sample of fish from which age was estimated. Growth potential was estimated from mean length at age using the von Bertalanffy growth function generated in Fisheries Analysis and Simulation Tools, Version 2.1 (FAST).

Stock structure and condition indices were generated in FAST (Anderson and Neumann 1996). PSD was used to describe the available size structure of the present population. Relative weights were calculated and summarized by angler designated size groups to describe the relative physical condition of the smallmouth bass population.

Mortality and survival were estimated to evaluate the effects of exploitation and other limiting factors. Smallmouth bass annual mortality and survival were estimated from an un-weighted catch curve generated in FAST (Van Den Avyle 1993).

Trends in Anderson Ranch Reservoir kokanee abundance were monitored using night-time trawling techniques described by Rieman (1992). Sample dates were on or around a new moon period. Reservoir sample strata were defined in Figure 4. Designated strata followed historical protocol (Partridge and Warren 1995). Seven transect tows were taken per strata. Trawling tows were completed using a 4.46 m^2 framed trawl net pulled at approximately 1.59 m/s. Net hauls were made on 180 s intervals per depth strata. Net hauls were made at three-meter depth intervals from 9 m to 30 m.

Kokanee sampled during trawl efforts were measured to total length (mm) and weighed (g). Otoliths and scales were sampled from representative centimeter groups. Ages were estimated from otoliths and scales. Otoliths were viewed in whole and or half view in the lab using a dissecting microscope under 10X – 40X magnification. Scales were placed between two glass slides and viewed with a microfiche reader.

Abundance, relative density, and standing crop were estimated by age group using an Excel© spreadsheet developed by IDFG fisheries research personnel (Bill Harryman, IDFG, personal communication). Kokanee densities were calculated using strata area determined by measuring area within the current reservoir water elevation. Water elevation was taken from the States Department of Interior, Bureau of Reclamation website (www.usbr.gov). Area was estimated from a rule curve generated from measured area within elevation contours.

Density estimates in strata one and two were based on incomplete kokanee layer samples. Kokanee layers in these strata's were deeper than available trawl equipment allowed. Due to equipment limitations population estimates were based on sampled densities assumed to be uniform throughout the kokanee layer.

The Carey Lake fishery was sampled using standard lowland lake sampling protocols. Two sampling units were required based on the lake's full pool surface area. Netting was conducted on May 1-2. Nighttime electrofishing occurred on May 9. See Appendix B for equipment and sampling gear details.

An angler creel survey was initiated at Magic Reservoir on April 12 to follow trends in angler effort and harvest. The CAS creel survey program (CAS Creel Application Software, Version 2.0) was used to analyze creel survey data. Survey design included monthly interval periods stratified by day type. Four weekday and two weekend/holiday days per interval were randomly selected and scheduled from one half hour before to one half hour after sunrise and sunset, respectively. Equal probability of day time was given to each selection. An additional count was added to each scheduled angler count approximately three hours either earlier or later than the scheduled count depending on time. Typically, additional counts were added three hours later than surveys scheduled early in the day and three hours earlier for surveys scheduled late in the day. Additional counts around mid-day surveys were left to the discretion of the creel clerk. Angler counts were conducted by boat as allowed by weather. Interviewed anglers were asked to report length of outing, method of angling, catch, and harvest. Fish encountered during interviews were identified and measured to total length.

Estimated effort and harvest were compared to previous survey results. Effort was standardized to the total number of days encompassed by the creel survey by using the ratio of estimated effort to total creel days (EFFORT/DAYS). Harvest was standardized by harvest per effort/day.

Brown trout redds were counted on November 15 from the mouth of Rock Creek to a point north of Stanton Crossing on the Big Wood River above Magic Reservoir. Survey reach descriptions were listed in Appendix A. Survey reaches were walked. Redds were visually identified and counted. 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 discernable depression was typically considered one redd.

Milner Reservoir smallmouth bass monitoring included collection of data necessary for evaluation of relative population abundance, stock structure, fish condition, growth, and survival. Fish were sampled using boat electrofishing equipment as described in the general methods. Electrofishing samples consisted of 15 minute units of effort beginning at randomly chosen sample sites throughout the reservoir (Appendix A). All sampling was conducted at night. Two netters were used. Only the target species were sampled. Relative abundance was measured as average CPUE.

All smallmouth bass collected were measured (TL, mm) and weighed (g). Otoliths were collected from a representative sample. Smallmouth bass otoliths were prepared as previously described. Mean length at age was calculated from the sub-sample of fish from which age was estimated. Growth potential was estimated from mean length at age using the von Bertalanffy growth function generated in FAST.

Stock structure and condition indices were generated in FAST (Anderson and Neumann 1996). PSD was calculated to represent the available size structure of the present populations. Wr were calculated and summarized by angler designated size groups to represent the relative physical condition of the smallmouth bass population.

Mortality and survival were estimated to evaluate the effects of exploitation and other limiting factors. Smallmouth bass annual mortality and survival were estimated using a catch curve (Van Den Avyle 1993). Catch Curves were generated in FAST.

A stratified random roving creel survey was completed on Mormon Reservoir. Survey intervals were stratified by month from June through September and pressure surveys were completed on four week day and two weekend/holiday days per interval. Survey dates and times were randomly scheduled and were conducted by boat.

Angler interviews were completed following pressure surveys when angler contacts were possible. Interview data collected included time fished, angling method, fish caught/harvests by species, trip completion, and angler species preference. Harvested fish were identified and measured during anger interviews.

The Mormon Reservoir fishery was sampled using standard lowland lake sampling protocols. Six sampling units were required based on the lake's full pool surface area. All netting occurred between April 24 and 26. Nighttime electrofishing occurred on May 15 and 16. See Appendix B for equipment and sampling gear details.

Subsamples were taken to determine species specific length-at-age, estimated weight (g), and, in some instances, gear specific catch. Fish age was determined from otoliths. No age determinations were made for rainbow trout given their recent hatchery origin.

Data were compiled and analyzed in Excel© software and population analysis were conducted using FAST software.

Standard Fall Walleye Index Netting (FWIN, Morgan 2002) protocol described in the Manual of Instructions – Fall Walleye Index Netting was used in sampling efforts on Oakley and Salmon Falls reservoirs. Based on a maximum reservoir surface area a sample size of 16 gill net nights was targeted for each water body. A biological threshold of 300 walleye was set prior to sampling on both reservoirs. Sampling was discontinued when either sample size or biological threshold were met. Gill nets were eight panel monofilament nets 1.8 m deep, 61.0 m long, with 7.6 m panels measuring 25 mm, 38 mm, 51 mm, 64 mm, 76 mm, 102 mm, 127 mm, and 152 mm stretched mesh. Net locations were randomly selected and net locations are listed in Appendix A. Net sets were equally split between two depth strata including 2 – 5 m and 5 – 15 m depths. All nets were placed perpendicular to the shoreline. Netting was conducted when water temperatures were between 15 °C and 10 °C.

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

Mortality and survival were estimated to evaluate the effects and interaction of exploitation and natural limiting factors on the fishery. Walleye annual mortality and survival were estimated using a catch curve (Van Den Avyle 1993). Catch Curves were generated in FAST.

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

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

Benchmark classifications developed for Ontario walleye management (George Morgan, Laurentian University Sudbury, Ontario, personnel communication) were used to describe the SFCR fishery. Benchmarks were used to classify the relative condition of the walleye population. Classification parameters included: CPUE for walleye ≥ 450 mm, number of age classes present, maximum age, and female diversity index (Table 2). Parameters represented measures of abundance, growth, age structure, and recruitment potential. Parameters were scored from one to three, three reflecting a healthy stable population. The average score among all parameters reflected the overall health of the population.

Forage sampling protocol on Oakley Reservoir took place in August and consisted of 10 minutes of electrofishing at 10 standard locations. Coordinates are listed in Appendix A. Forage fish were designated as fish equal to or less than 150 mm. Resulting data were used to follow trends in CPUE of forage species. Results from 2007 were compared to results from 2004 to 2006.

To estimate exploitation in SFCR, walleye equal or greater than 305 mm were tagged with Floy tags labeled to encourage angler return or contact. Seven tagged fish were below the 305 mm threshold. Tagging efforts were in cooperation with a statewide IDFG exploitation project. Spawning walleye were collected with trap nets in late March 2007. A total of 684 walleye were tagged. At least 50% of all fish were double tagged for evaluating tag retention. Tags provided a return phone number and individual tag identification number. Tag return information was taken by phone and/or direct return by anglers.

Tagged fish recaptures associated with the FWIN survey were used to estimate the population abundance. Walleye collected in gill nets were inspected for tags. Angler reported tags prior to December 7 were subtracted from the marked populations. Population estimation was completed using a modified Peterson equation.

Car counters were placed at several regional waters in an effort to generate modeled relationships between accessing vehicles and angler effort. Modeled relationships will be used in the future to generate estimates of angler effort with minimal personnel time requirements. Counters were placed at Mormon Reservoir, Roseworth Reservoir, and SFCR at key access points (Appendix A). TRAFX© (Trafx Research Ltd., Conmore, Alberta) magnetic car counters were used to count vehicles. Counters were buried adjacent to accessing roadways. Corresponding angler counts were conducted on the water at the convenience of the available creel clerk. Count data was downloaded approximately every two months. Data will be reported in a future report.

RESULTS AND DISCUSSION

Anderson Ranch Reservoir

Six units of sampling efforts were completed on June 12, 2007. A total of 533 smallmouth bass were collected among all sample locations. Average CPUE was 89 ± 5 (80% C.I.) smallmouth bass. Reservoir catch rate was indicative of a moderate to high density population within the Magic Valley Region. Catch rate of Milner Reservoir smallmouth bass in the same year was 63. Catch rates from other waters using comparable methods were not available, but continued use of standard bass monitoring techniques will allow future comparisons of catch rates between years and other fisheries.

Total length of sampled fish ranged from 45 mm to 325 mm (Figure 5). Average total length was 114 mm ± 4 mm (95% CI). Age estimates indicated approximately five to seven years were necessary to reach 305 mm smallmouth bass (Figure 6). Estimated maximum length and age were 7 years and 321 mm. Observed length at age five in 2007 was less than the statewide smallmouth bass average and estimates from Anderson Ranch Reservoir of 298 to 365 in 1985 and 1991 reported by Dillon 1992. Warren et al. 2001, estimated mean length at age five of Anderson Ranch smallmouth bass to be 263 mm, also representing a large potential decline in growth rate from 1997. Smallmouth bass greater than age five and larger than 305 mm (legal harvest length) were absent or nearly absent from the sample. However, sampled fish did not represent average catches from annual bass tournament report data including 2007 (IDFG, unpublished data). Report data indicated consistent catches of smallmouth bass greater than 305 mm. Inconsistencies suggest a potential bias in the size structure of fish collected.

Population and conditional indices suggest the Anderson Ranch Reservoir smallmouth bass population is dominated by stock and sub-stock fish of good relative condition. PSD was 17.39 (6.44 – 28.0, 95% C.I.). Mean relative weights were 95, 90, and 87 for sub-stock, stock, and quality smallmouth bass, respectively. PSD of sampled fish did not represent average catches from annual bass tournament report data (Figure 7) (IDFG, unpublished data). Inconsistencies in conditional indices also support suggested biases in the size structure of fish collected.

Estimated annual mortality of Anderson Ranch Reservoir smallmouth bass was 56.7% (Figure 8). Associated annual survival was 43%. Estimated annual mortality was moderate to high relative to other known regional smallmouth bass fisheries. Smallmouth bass exploitation is believed to be low in the reservoir. Estimated harvest of 1,140 smallmouth bass in 1997 supports this assumption (Warren et al. 2001). Size-biased population sampling, as suggested by the previously reported sample age stratification and PSD, may have influenced the mortality estimate by eliminating or reducing present year classes used in the estimate. Mortality rates may have also been influenced by water level fluctuations common to the reservoir.

Potential biases within the sampled population may reflect the timing and or sample locations used in the survey. The timing of sample efforts was designed to encounter as many size classes as possible during a pre-spawn to spawning period. However, the perceived bias toward smaller size classes may reflect a disproportionate number of large fish not present because the timing of the survey was earlier or later than the target period. In addition, only six units of effort were completed due to crew illness during sampling. Although six units were statistically valid for determining the mean catch rate, the total area sampled may not have reflected all available habitats. It is recommended that smallmouth bass monitoring be repeated within the next work cycle to better describe the current status of the smallmouth bass fishery and address potential sampling biases.

Anderson Ranch Reservoir kokanee were sampled on August 14 and 15. Reservoir elevation on sample dates was approximately 1,262 m. Kokanee trawls were completed in all three designated strata (Table 3).

Total abundance of kokanee among all strata and age groups was estimated at 1,698,602 fish, representing a density of 1,359 fish/ha. Reservoir densities of age zero, one, two, and three kokanee in 2007 were estimated at 554, 673, 78 and 53 fish/ha, respectively. Abundance and density estimates by age from 2007 are summarized in Table 4. Standing crop estimated for 2007 among all strata and age groups was 57.98 kg/ha. Mean total length of age three fish was 298 mm and represents a decline in annual growth from 2006 (Figure 9). Similar declines in growth were described in all age classes present.

Estimates of kokanee density suggested density dependant growth is occurring. Estimates of kokanee abundance and density are among the highest reported since 1993. Summed density (fish/ha) of kokanee across all age classes was greater than the average from 1993 to 2007 (Table 5). A decline in mean total length of all age classes suggested densities are limiting kokanee growth. Age zero year class strength in 2007 likely reflected greater than average escapement 2006. Density estimates of age three kokanee indicated the potential for another high recruitment year from 2007. It is recommended that kokanee escapement be limited in 2008 in an effort to reduce kokanee abundance with a goal of improving growth rates and size of age three fish returning to the creel.

It is also recommended that future kokanee escapement be measured through trapping at the newly constructed weir on the South Fork Boise River. Accurate escapement monitoring would ideally provide valuable information for modeling kokanee population dynamics in combination with trawl data. It is also recommended that angling data (catch rates and average catch size) be incorporated into modeling efforts. Defining a balance between catch size and catch rates is important to providing quality angling.

<u>Carey Lake</u>

Two full sampling units were not completed. Only one electrofishing sampling unit was implemented largely due to excessive fish numbers and available sampling time (Table 6). All other gear types were implemented fully (n=2 units).

A total of 6,194 fish were collected during the survey. The standardized catch was largely made up of yellow perch (67%) followed by largemouth bass (22%), bluegill (5%), pumpkinseed (4%), brown bullhead (1%) and bridgelip sucker (<1%). Largemouth bass and yellow perch made up approximately 85% of catch biomass (Table 7).

The yellow perch population was dominated by age-2 fish. The average length within the catch was 167 mm with an overall population PSD of 9 (Figure 10 and Table 8). The weighted catch curve regression results estimated annual mortality at 78% with a theoretical maximum age of 7.1 years (Figure 11 and Table 8).

Largemouth bass were the second most abundant fish in the catch. Their average total length was 163 mm with fish caught between 85 -370 mm TL. PSD was estimated at 6 (Table 8). There were five year classes represented in the catch and the theoretical maximum age estimated was 5.3 years of age (Figure 10). Annual mortality, estimated with a weighted catch-curve regression, was 79 % (Figure 12).

Bluegill and pumpkinseed were caught in similar numbers. Bluegill biomass was five fold greater than pumpkinseed. Most pumpkinseed were smaller (mean TL=138 mm) than bluegill (mean TL=166 mm) which translated into PSD values of 29 and 88 for pumpkinseed and bluegill, respectively (Table 8 and Figure 13).

Brown bullhead and bridgelip sucker were caught in relatively low numbers. Only one bridgelip sucker was sampled. The brown bullhead PSD estimate (42) indicated the fishery holds reasonable sized fish with a mean length of 227 mm and a range from 160-350 mm.

The majority of largemouth bass present in Carey Lake were from the age-1 and age 2 cohorts and were < 225 mm in length. Very few were over the minimum length limit (305 mm) and represented a low PSD (PSD=6). The maximum age was estimated at 5.2 years at which point the largemouth bass averaged about 350 mm in length. Therefore, angler harvest would typically be directed at relatively few age-4 and age-5 largemouth bass which rarely exceed lengths of 350 mm. Age-4 largemouth bass were absent in the catch; however, there were age-4 bluegill, pumpkinseed, and yellow perch present ruling out a community-wide winter or summer kill. The absence of age-4 largemouth bass might best be explained by either an aging error or extremely heavy angling pressure.

Past sampling indicates the fishery has the potential to grow larger largemouth bass. Warren et. al. 2001 reported a substantially higher PSD (PSD=43) than those estimated in 2007. Although records were not obtained for this report, IDFG personnel reports of extreme low water conditions since the 2001 may have increased angler success by concentrating the fishery and increasing access. Additionally, low water has increased the abundance of aquatic vegetation which may increase biological oxygen demand during summer and winter months thus increasing annual mortality if not resulting in major fish kills. Increased water supply and storage potential may improve largemouth bass survival.

The fishery was dominated by age-2 yellow perch. Relatively few yellow perch were found over 200 mm which is typically desired by anglers. The population appears stunted as evidenced by similar lengths-at-age for age-3 to age-5 yellow perch. Average lengths in 2007 were similar to those reported from samples in July 1985 (169 mm) and in June 2001 (192 mm) (Olsen and Bell 1987, Warren et al 2001). Additionally, a persistent relatively high annual mortality likely means few age-2 cohorts will survive to reach desirable sizes. The fishery will likely persist similarly unless perch numbers are reduced through predation or extremely heavy harvest (which is unlikely).

Bluegill and pumpkinseed were present; however the population was skewed towards older-aged fish. Catch-curve regressions were not possible due to apparent inconsistent population recruitment. Bluegill PSD in 2007 (PSD=88) was substantially greater than those reported in 2001 (PSD=38) (Warren et al 2001). Pumpkinseed appear to be achieving maximum growth given the overlapping lengths at ages 2-4. Their relatively low numbers in the catch do not indicate stunting. A high PSD only means the majority of fish in the catch was greater than the preferred size and does not innately imply a robust population. It is very possible that the largemouth bass population is increasing and placing heavy mortality upon the age1-3 bluegill and pumpkinseed. Alternatively, poor habitat during spawning periods may also be limiting recruitment. Regardless, the centrarchidae population structure is suitable to produce larger fish over the next few years.

Brown bullheads continue to survive in the fishery. No fish were caught <160 mm in length. Available sized fish represented a PSD=42 which should meet with angler satisfaction. There was no evidence of recent natural recruitment found. Bullhead typically spawn in the open lake habitat within Carey Lake which has been heavily impacted by drought. Open water, outside of the canal system, has been lost early summer most years since 2001. Additionally, small bullheads are likely preyed upon heavily by largemouth bass. Interestingly, no channel catfish were sampled despite an out-plant of 1,000 fish in 2002.

Overall, the fishery is performing poorly. Anglers mainly fish Carey Lake seasonally for largemouth bass and bluegill in the summer along with yellow perch in the winter. Anglers might see positive changes in the size structure of bluegill and largemouth bass in the next couple of years provided harvest is not the actual culling mechanism. Yellow perch will continue to provide a lucrative fishery however sizes will not likely be optimal.

Magic Reservoir

Creel survey results were reported for dates including June through September, 2007. A total of 33,608 (± 7,634, 80% CI) hours of angler effort were estimated for the designated time period (Table 9). Estimated average catch rate of all species was 3.61 fish/hour (Table 10). Estimated average catch rate for rainbow trout and yellow perch by were 0.97 fish/hour (± .49, 80% CI) and 2.58 fish/hour (± 1.14, 80% CI). Harvest estimates by species included: rainbow trout 19,199 (± 7,768, 80% CI), brown trout, 0 (± 0, 95% CI), yellow perch 22,173 (± 12,862, 80% CI), and smallmouth bass 49 (± 89, 80% CI) (Table 11).

Creel data for years 1992, 1993, and 2007 indicated a stable trend in effort/days with corresponding stable to increasing harvest per effort/day (Table 12). Rainbow trout harvest was comparable to previous survey years. Yellow perch harvest per effort/day increased considerably from previous survey years and provided a fishery. The 2007 - 2008 winter fishery, although not quantified, also provided a substantial perch fishery. Smallmouth bass harvest also increased from previous years. No smallmouth bass harvest was documented prior to 2007, although their presence has been documented for some time.

Reservoir water levels may have influenced estimated catch and harvest rates. Fall reservoir water levels were extremely low. The associated decline in reservoir volume congregated fish and may have increased angler catch rates and harvest due to the increase in relative density.

Region wide yellow perch populations and associated harvest have increased in the last three years (Ryan and Megargle (2005) in review, Ryan and Megargle (2006) in review, Ryan and Megargle this report). Anecdotal evidence from angler reports suggested smallmouth bass populations in several regional waters have also demonstrated similar increases. The mechanism for these increasing trends has not been clearly defined. It is speculated that reservoir water levels play a major role. Associated trends in the rainbow trout fishery appear to be unaffected at this time by the increases in yellow perch and smallmouth bass. It is recommended that monitoring of yellow perch and smallmouth abundance be continued in an effort to describe the casual mechanism of population trends and there influence on the available trout fishery in the reservoir.

A combined total of 100 redds were observed among all reaches surveyed up-stream of Magic Reservoir (Table 13). Total counts in 2007 were below the historical average. Although redd counts were down, some indication existed that active spawning still was occurring at the time of the survey. Numerous fish were observed on or around redds. Numerous brown trout were also observed in the river unassociated with observed redds.

Low reservoir water levels may have influenced the timing and amount of spawning activity observed. Consistent low counts were observed from 2001 to 2003. These low counts correspond to drought years with low river flow and low fall reservoir levels. Similar water conditions occurred in 2007.

Milner Reservoir

Sampling efforts were conducted on May 29 and 30. Sixteen units of effort were completed. A total of 1,006 smallmouth bass were collected among all sample locations. Average catch was 63 (± 6, 80% CI) smallmouth bass per unit effort. Reservoir catch rate was indicative of a moderate to high density population within the Magic Valley Region. Catch rate of Anderson Ranch Reservoir smallmouth bass in the same year was 89 (See Anderson Ranch Reservoir in this report). Catch rates from other waters using comparable methods were not available, but continued use of standard bass monitoring techniques will allow future comparisons of catch rates between years and other fisheries.

Total length of sampled fish ranged from 55 mm to 415 mm (Figure 14). Average total length was 197 mm ± 5 mm (95% CI). Observed length at age indicated it takes approximately five years to attain 305 mm (Figure 15). Estimated maximum length and age were 12 years and 442 mm. Observed length at age in 2007 was comparable to a statewide average reported by Dillon 1992 and comparable to Warren et al. (2001) that reported in 1997 that Milner Reservoir smallmouth bass required on average four years to reach 305 mm and had a maximum growth potential of 430 mm. Warren and Megargle (in review) reported that in 2003, Milner Reservoir smallmouth bass required on average five years to reach 305 mm and had a maximum growth potential of 614 mm. Inconsistency in length at age five from 1997 results and maximum growth potential from 2003 are unlikely related to population scale changes over the sampled time period, but may have reflected increased variability due to small sample sizes used to estimate mean length at age.

Population and conditional indices indicated the Milner Reservoir smallmouth bass population is dominated by stock sized fish of good relative condition. Proportional stock density was 28 (25 – 32, 95% CI) and represented a decline in value from 40 in 2003 (Warren and Megargle, in review). Mean relative weights for sub-stock, stock, and quality smallmouth bass were 104, 93, and 91, respectively.

The decline in reported PSDs from 2003 suggests a reduction in the number of quality size smallmouth bass. Tournament report data received annually from tournament bass anglers did not suggest the average smallmouth bass weighed or average number of fish weighed-in by angler or team has declined through 2006 (Figure 16) (2007 data not yet received) thus contradicting survey results. Survey methods and desired sample goals differed between sample years and may explain resulting differences.

Estimated annual mortality was considered low to moderate relative to other regional smallmouth bass fisheries at 41.5% (Figure 17). Associated annual survival was 58.5%. Exploitation of smallmouth bass is believed to be low in the reservoir suggesting natural mortality is the primary loss within the estimated annual mortality. In 2003, estimated smallmouth bass harvest from April through October was 2,612 ± 1,418 (95% CI) representing an estimated harvest of 5% supporting an assumption of low exploitation (Warren and Megargle, 2003 data). In 2006, IDFG research personnel tagged smallmouth bass to estimate exploitation. Preliminary results indicated an adjusted exploitation of approximately 18 %, also supporting the assumption of reasonably low exploitation. Angler reports indicated interest in catching tagged fish with dollar values used in the study may have inflated exploitation.

It does not appear that angling limitations are occurring. However, inconsistencies in available historical information make strong conclusions difficult. Continued monitoring of the smallmouth bass population under standard protocol should provide a better understanding of population dynamics and associated management implications.

Mormon Reservoir

The creel survey was initiated but not completed. Survey efforts were conducted only during the June survey interval and the survey was discontinued due to insufficient angler observations. Only five anglers were observed in the June interval which was much less than anticipated.

Previous effort and harvest estimates were substantially higher than appeared in 2007. It was estimated that anglers fished 4,979 hours to harvest 940 rainbow trout from May 30th to July 24th in 1998 (Warren et al. 2003). The decreased fishing effort noted in 2007 is likely due to the prolonged drought conditions (e.g. decreased water levels) and decreased navigability. Smartweed has expanded in density and distribution as shallow water habitat increased with drought conditions. Much of Mormon Reservoir is accessed by boat which has been difficult due to the shallow water and heavy vegetation. Our creel initiated in June and open water was not available to the creel clerk by mid June.

Only 4.5 electrofishing sampling units were implemented largely due to excessive small age 1 perch numbers and available sampling time (Table 14). This is 1.5 units less than the standard sampling protocol. All other gear types were implemented fully (n=6 units).

A total of 18,892 fish were collected during the survey. The overall catch was largely made up of yellow perch (95%) followed by rainbow trout (3%) and bridgelip sucker (2%). The standardized catch (catch/lowland lake sampling unit) is reported in Table 15.

The yellow perch catch was dominated by age-1 fish. Yellow perch averaged 137 mm TL (range 80-275 mm) but the vast majority was < 150 mm TL (Figure 18 and Table 16). Yellow perch PSD was relatively low (PSD=18). The weighted catch curve regression results estimated annual mortality at 79% with a theoretical maximum age of 7.2 years (Figure 19 and Table16).

Rainbow trout sampled were relatively small and averaged 266 mm TL. Fish TL ranged from 170-415 mm and PSD was very low (PSD=1) (Figure 20 and Table 16).

Bridgelip sucker were caught at rates similar to rainbow trout. Length frequency summary indicated there may have been 3-4 age classes represented in the catch (Figure 20). Bridgelip sucker lengths ranged from 85-330 mm TL and averaged 199 mm.

The fishery was largely dominated by age-1 yellow perch. This strong cohort is likely the result of favorable reservoir conditions in 2006 when the reservoir was nearly fully recharged and maintained significantly higher winter storage levels. The high annual mortality estimate is biased in that the catch curve regression assumption of consistent recruitment was violated. Sporadic yellow perch recruitment beyond the first winter is not unusual in Mormon Reservoir due to intermittent winter kills that may nearly eliminate an entire young-of-year (YOY) cohort. Some yellow perch will survive through the winter at natural spring sources where open water remains throughout winter months; however, it is highly unlikely many age-1 perch will survive to recruit to the fishery in 2008 and 2009 given the low water levels going into winter 2007-2008.

Relatively few rainbow trout were caught during the sampling effort. The low PSD and relatively small size of rainbow trout in the catch indicate those fish originated from the 2006 fingerling and catchable hatchery rainbow trout out-plants as well as those stocked during the 2007 sampling period. Carryover was limited to one year.

The bridgelip sucker component of the catch represented approximately four age classes as determined from the length frequency histogram. Abundance within each cohort reflects what would be found in a stable population with the exception of relatively few caught in the YOY (estimated) cohort. The low number of bridgelip sucker YOY found in the catch is likely a sampling bias against the smaller size fish.

Overall, the fishery is not performing well. Drought related reservoir conditions have greatly reduced carryover potential of rainbow trout and yellow perch essentially eliminating the chances of catching larger sized fish. The reservoir would need a minimum of three normal or high water storage years to restore the fishery to its potential; however, the encroachment and expansion of water smartweed greatly reduces the probability of suitable winter habitat regardless of winter water storage levels.

Management changes must be addressed if drought conditions persist. Mormon Reservoir historically provided the opportunity to catch very large rainbow trout as evidenced by the attempt to maintain trophy trout management in the recent past. This expectation may not be feasible if winter kills become persistent. IDFG may need to adopt management that emphasizes an early season put-and-take fishery excluding the fall fingerling program. Angler effort and catch should be evaluated periodically - possibly in conjunction with at least one exploitation estimate; if harvest can not be precisely estimated. Car counters might be used to monitor trends in angler effort.

IDFG should continue to work with water users and associated canal companies in relation to reservoir storage and aquatic vegetation control options. Mormon Reservoir water storage is entirely allocated and is currently used to provide water for organic status agriculture products. Use of common herbicides to control vegetation is not supported due to water right holder concerns that this action would threaten organic status. IDFG should continue exploring alternative vegetation control methods including biological controls.

<u>Oakley Reservoir</u>

FWIN was initiated in October 2007 in an effort to monitor walleye population trends and better understand population dynamics in SFCR and Oakley Reservoir. FWIN data will be use in future regulation evaluations.

FWIN was completed October 9 - 11. A total of 12 net nights were completed prior to meeting the biological threshold. A total of 310 walleye were collected comprising 39% of the total catch. Bi-catch species collected in association with walleye netting included: brook trout *S. fontinalis* (0.12%), rainbow trout (6.11%), spottail shiner (0.50%), Utah sucker (52.74%), yellow perch (1.75%), and Yellowstone cutthroat trout (0.12) (Table 17). Mean length and weight for collect species were listed in Table 17.

CPUE ranged from 6 to 61 walleye per net. Relative abundance measured as arithmetic and geometric mean CPUE for all age classes were 26 and 21, respectively (Table 18). Geometric CPUE for walleye ≥ 450 mm was 1.94 (Table 19).

Mean total length of sampled walleye was 339 mm (Table 17). Total length ranged from 125 mm to 810 mm (Figure 21). Mean weight of sampled walleye was 571 g. PSD of the sampled population was 20.7 (16.0 – 25.4, 95% CI). Walleye of stock size (at least 249 mm) and greater made up 92% of the sampled population. Seven percent of the sampled walleye were of preferred length (at least 509 mm) or greater (Figure 21).

Sixteen age classes were present in the sampled walleye. Ages ranged from zero to 17. Thirteen age classes were present with greater than one sample represented. Age classes zero, 14, 15, and 17 were represented by only one sample. No walleye were collected in age class 10 (Figure 22). Missing cohorts observed in age frequencies were also observed in walleye length frequencies (Figure 21).

Walleye annual mortality for combined sexes based on catch curve analysis was 19.3%. Corresponding survival was 80.7% (Figure 23). A greater annual mortality was observed for males (22.7%, age classes 2-17) than females (15.6%, age classes 2-16).

Walleye growth varied by sex. Female growth described by length at age was greater than comparable male growth when viewed over all age classes (Figure 24). Mean length at age two was 276 mm and 287 mm for males and females, respectively.

Sampled walleye were in good physical condition. Walleye had a mean gonadal somatic index of 1.76 and 1.40 for males and females, respectively. Mean visceral fat indices were 1.26 and 2.25 for male and female walleye, respectively. Relative weight ranged from 82 to 107 for males and from 83 to 108 for females and generally increased with fish length.

Female (46%) and male (54%) walleye abundance in the catch were roughly equivalent. However, larger size class fish were dominated by female walleye (Figure 24). Males were 59% mature and females being only 16% mature. Age and length at 50% maturity for female walleye were estimated at four years and 446 mm, respectively. Age and length at 50% maturity for male walleye were two years and 294 mm, respectively. Female diversity index was 0.94.

Benchmark classification scoring indicated the Oakley Reservoir walleye population was moderately healthy and stable (Table 19). The final classification score was of 2.75 out of three. CPUE for fish equal or greater than 450 mm in total length was below the optimal level for maximum classification, reducing the overall score.

Nine standard forage units were sampled on August 8. Two sites were not sampled due to low water and inaccessibility. Forage fish sampled included: spottail shiner (2.16%), walleye (3.60%), yellow perch (89.21%), and mottled sculpin (5.04%) (Table 18). Forage samples indicated relative abundance of forage species declined from previous years and was the lowest recorded catch. CPUE of yellow perch decreased most dramatically from previous sample years (Table 20) (Ryan et al., 2004 in review; Ryan and Megargle 2005 in review; Ryan and Megargle 2006 in review). Data suggested forage abundance is down, but remains to be primarily represented by yellow perch.

FWIN survey results indicated walleye were abundant in Oakley Reservoir. FWIN survey results from Washington State lakes and reservoirs were comparable with an average CPUE of 19 (WDFW 2005). In contrast, CPUE from FWIN surveys conducted across the province of Ontario ranged from 2.8 to 10.7 fish per net (Ministry of Natural Resources (MNR) 2005). Observed catch rate in 2007 also are comparable to catch rates observed in SFCR, Idaho.

Condition indices indicated walleye were healthy. Relative weight values indicated average to above average weight for a given length. Relative weights increased with fish length potentially suggesting forage availability for larger fish may be greater. Visceral fat content of walleye from all size classes was observed to be good. Benchmark classifications also identified the SFCR walleye population as healthy and stable

PSDs indicated a relative small proportion of the population is quality size or greater. Observed length and age frequencies demonstrated the population is dominated by age classes one to four. The observed PSD potentially reflects both inconsistent recruitment and survival. Annual mortality estimates suggested mortality is low. However, severe reservoir draw downs believed to increase mortality are known to have occurred in the last 10 years.

Forage availability has been suggested to be negatively correlated to walleye catch rates (VanDeValk 2005). Forage monitoring indicated forage levels were up in 2005 and 2006. Results from the 2007 forage survey indicated a subsequent reduction in forage availability. Information regarding angler catch rates has not been collected. It is recommended that the relationship between walleye catch rates, forage abundance, and walleye abundance continue to be evaluated to provide guidance in further walleye management and regulation setting activities.

Forage monitoring results suggested forage was not abundant. High spring reservoir levels likely did not contributed to good forage recruitment. Spring weather patterns were inconsistent and may have contributed to poor recruitment of forage species including walleye. Continued monitoring of forage abundance is recommended for evaluation of trends in relation to walleye investigations.

Understanding exploitation is important for determining the effects of harvest regulations on walleye population structure. It is recommended that exploitation be estimated and combined with a population estimate to better understand the impact of current fishing regulations.

Salmon Falls Creek Reservoir

FWIN was completed on October 1 - 3. A total of 12 net nights were completed prior to meeting the biological threshold. A total of 395 walleye were collected comprising 31% of the total catch. Bi-catch species collected in association with walleye netting included: black crappie (2.21%), bridgelip sucker (1.82%), chiselmouth chub *Acrocheilus alutaceus* (0.08%), largescale sucker *C. macrocheilus* (24.01%), northern pikeminnow *Ptychocheilus oregonensis* (3.71%), rainbow trout (1.50%), smallmouth bass (2.69%), spottail shiner (0.24%), and yellow perch (32.54%) (Table 21). Mean length and weight for collect species were listed in Table 21.

CPUE ranged from 4 to 59 walleye per net. Relative abundance measured as arithmetic and geometric mean CPUE for all age classes were 33 and 28, respectively. Geometric CPUE for walleye ≥ 450 mm was 5.68.

Total length of sampled walleye ranged from 180 mm to 800 mm (Figure 25). Mean total length was 390 mm. Mean weight of sampled walleye was 866 g. PSD of the sampled population was 54.43 (50.22 - 60.64, 95% CI). Walleye of stock size (at least 249 mm) and greater made up 89% of the sampled population. Twelve percent of the sampled walleye were of preferred length (at least 509 mm) or greater (Figure 26).

Fifteen age classes were present in the collected samples. Ages ranged from zero to 16. Thirteen age classes were present with greater than one sample represented. Age classes zero, 12, and 14 were represented by only one sample. No walleye were collected in age class 15 (Figure 27). Missing cohorts observed in age frequencies were also observed in walleye length frequencies (Figure 25).

Walleye annual mortality for combined sexes based on catch curve analysis was 23.3%. Corresponding survival was 76.7% (Figure 28). A greater annual mortality was observed for males (24.1%, age classes 2-16) than females (17.1%, age classes 2-16).

Walleye growth rates varied by sex. Female growth described by length at age was greater than comparable male growth when viewed over all age classes (Figure 29). Mean length at age two was 350 mm and 369 mm for males and females, respectively.

Observed walleye had a mean gonadal somatic index of 0.89 and 1.90 for males and females, respectively. Mean visceral fat indices were 3.75 and 2.83 for male and female walleye, respectively. Relative weight ranged from 86 to 107 for males and from 88 to 114 for females.

Female (47%) and male (53%) walleye abundance in the catch were roughly equivalent. However, larger size class fish were dominated by female walleye (Figure 30). Sample males were 54% mature with females being only 17% mature. Age and length at 50% maturity for female walleye were estimated at four years and 471 mm, respectively. Age and length at 50% maturity for male walleye were two years and 349 mm, respectively. Female diversity index was valued at 0.96.

Benchmark classification scoring indicated the SFCR walleye population was moderately healthy and stable (Table 22). The final classification score was of 2.75 out of three. The maximum age of collected fish was one year below maximum classification, reducing the overall score.

A total of eight forage sample units were completed on August 7. Low water levels precluded completion of all 10 standard sites. Forage fish sampled included: smallmouth bass (96%), walleye (< 1%) and yellow perch (3%) (Table 21). CPUE for yellow perch declined considerably from 2005 and 2006, but was comparable to levels observed in 2004 (Table 23) (Ryan et al. in review, Ryan and Megargle, in review, Ryan and Megargle, in review). Smallmouth bass continued to make up a major component of the sample in contrast to the absence of other species typically sampled (Table 24) (Ryan et al. 2004, in review). Walleye abundance in the catch remained low.

Tagging efforts resulted in 684 tagged walleye. A total of 85 tags were returned as of December 7, 2007 for a draft corrected exploitation rate of 9.7% (Kevin Meyer, IDFG, personal communication). Final exploitation results will be reported by IDFG fisheries research personnel. Three tagged fish from 2007 and one tagged fish from 2006 were recaptured in FWIN efforts.

A total population estimate of 50,807 ± 28,466 (80% C.I.) walleye equal or greater than 305 mm was generated from tag returns during the FWIN survey. Only three tagged fish were returned from 2007 exploitation tagging efforts. Walleye harvest on SFCR was last estimated in 2006 at approximately 2,500 fish. At this harvest level exploitation associated with the 2007 population estimate would be approximately 2.5%.

FWIN survey results indicated walleye were abundant in SFCR. FWIN survey results from Washington State lakes and reservoirs were comparable with an average CPUE of 19 (WDFW 2005). In contrast, CPUE from FWIN surveys conducted across the province of Ontario ranged from 2.8 to 10.7 fish per net (Ministry of Natural Resources (MNR) 2005). Observed catch rate in 2007 also represented an increase from 2006 in the same reservoir.

Condition indices indicated walleye and healthy. Relative weight values indicated average to above average weight for a given length. Relative weights increased with fish length potentially suggesting forage availability for larger fish may be greater. Visceral fat content of walleye from all size classes was observed to be high. Proportional stock density indicated a large proportion of the population is quality size or greater reflecting a quality fishery. Benchmark classifications also identified the SFCR walleye population as healthy and stable.

Anecdotal angler perception in 2007 reflected an increase in walleye density. Noted angler comments likely reflect an observed decrease in forage abundance. Forage availability has been suggested to be negatively correlated to walleye catch rates (VanDeValk 2005). Forage monitoring indicated forage levels were down in 2005 and 2006. Results from the 2007 forage survey indicated a corresponding reduction in forage availability. It is recommended that the relationship between walleye catch rates, forage abundance, and walleye abundance continue to be evaluated to provide guidance in further walleye management and regulation setting activities.

Forage monitoring results suggested forage was not abundant. Spring weather patterns were inconsistent and may have contributed to poor recruitment of forage species. Continued monitoring of forage abundance is recommended for evaluation of trends in relation to walleye investigations.

Understanding exploitation is important for determining the effects of harvest regulations on walleye population structure. Estimated walleye exploitation in 2007 suggested walleye harvest in SFCR was limited and an available surplus for angling harvest may exist. The rough estimate of walleye exploitation in 2006 based on the 2007 population estimated was comparable and also suggested current harvest is limited. It is recommended that exploitation evaluations continue and ideally be combined with a population estimate to better understand the impact of current fishing regulations.

MANAGEMENT RECOMMENDATIONS

- Consider timing and location of smallmouth bass sampling activities to limit sample biases on Anderson Ranch Reservoir.
- Continue monitoring Anderson Ranch Reservoir kokanee densities as a tool for providing a consistent quality fishery.
- Evaluate potential of using kokanee density estimates for predicting catch rates and catch size for the Anderson Ranch population.
- Consider limiting 2008 kokanee escapement on the South Fork Boise River using the newly constructed weir.
- Consider incorporating hydroacoustic population estimates in standard monitoring for the Anderson Ranch kokanee population.
- Consider stocking an additional predator fish species into the Carey Lake fishery to reduce perch, bluegill, and pumpkinseed populations. (e.g. channel catfish, muskellunge (*Esox masquinongy*).
- Consider reducing the Carey Lake aquatic vegetation load via intermittent chemical herbicide applications to improve fish habitat conditions.
- Consider improving habitat (deep water) through excavation of existing canal systems on Carey Lake.
- Continue monitoring of yellow perch and smallmouth abundance in Magic Reservoir in an effort to describe the casual mechanism of population trends and their influence on the available trout fishery in the reservoir.
- Continue to monitor brown trout spawning redds up-stream of Magic Reservoir to supplement the current data set and monitor their contribution to the sport fishery.
- Continue monitoring Milner Reservoir following standard protocol to provide insight on smallmouth bass population dynamics in relation to increasing angling pressure by tournament and non-tournament anglers as well as influences of reservoir water level management and their associated management implications.
- Consider adjusting Mormon Reservoir hatchery stocking to emphasize early put-and-take rainbow trout stocking.
- Evaluate future angler effort, harvest, and hatchery trout return in Mormon Reservoir.
- Work with water users and associated canal companies in relation to Mormon Reservoir storage and aquatic vegetation control options.
- Continue FWIN surveys - annual data will provide a better understanding of the role of exploitation, angling regulations, forage abundance, and stocking in Oakley and Salmon Falls Creek Reservoir walleye management.

- Continue forage monitoring for use with walleye population trend monitoring in Oakley and Salmon Falls Creek Reservoirs.
- Estimate walleye exploitation and abundance in Oakley and Salmon Falls Creek Reservoirs.
- Use available trend data following three years of sampling to evaluate current and potential regulation scenarios and their effectiveness at providing angling opportunities for walleye on Oakley and Salmon Falls Creek Reservoirs.

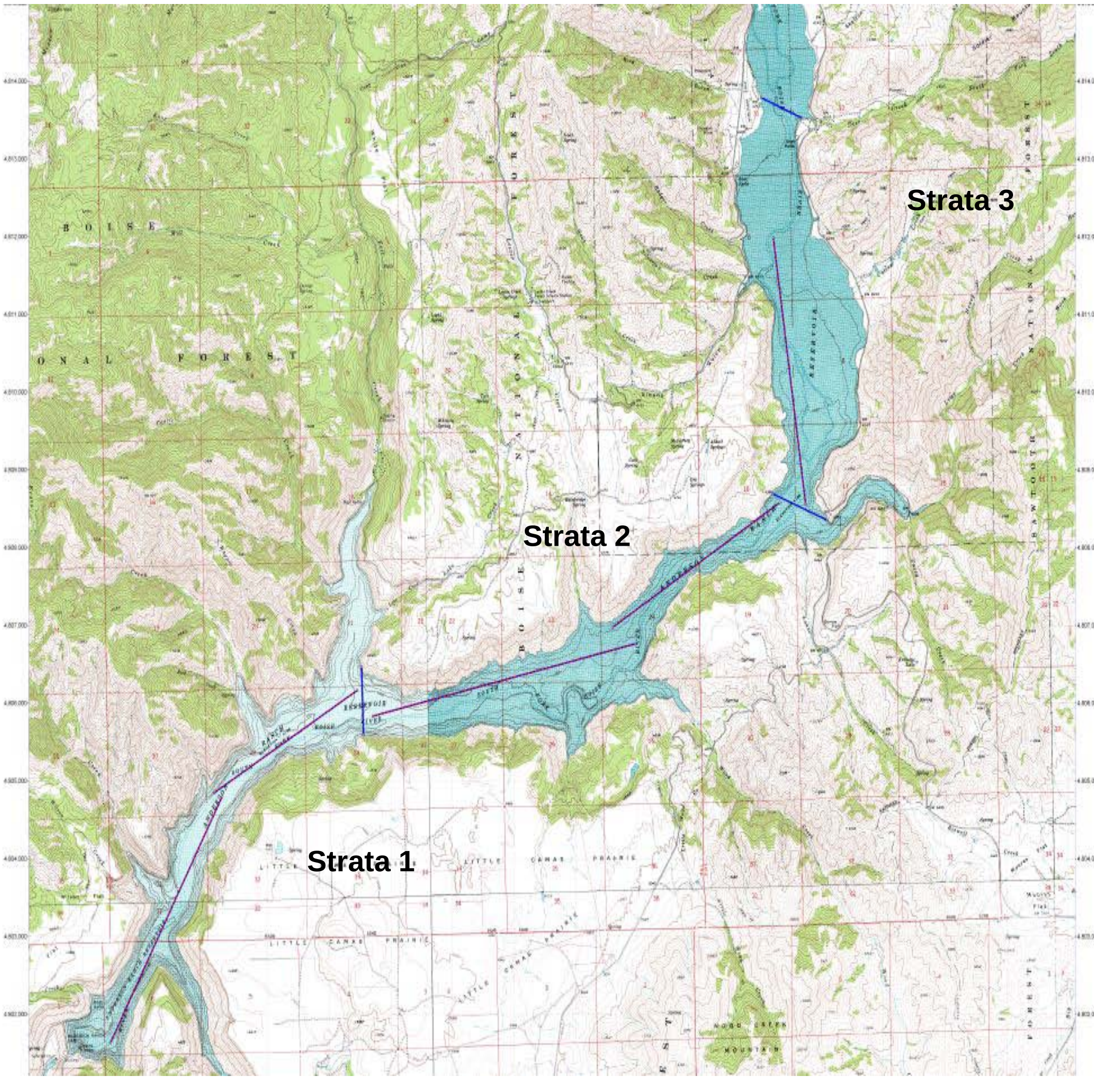


Figure 4. Kokanee trawl strata and transect locations on Anderson Ranch Reservoir, Idaho. Transects represent approximate paths on which trawls were completed. No transect exactly overlapped a previous transect.

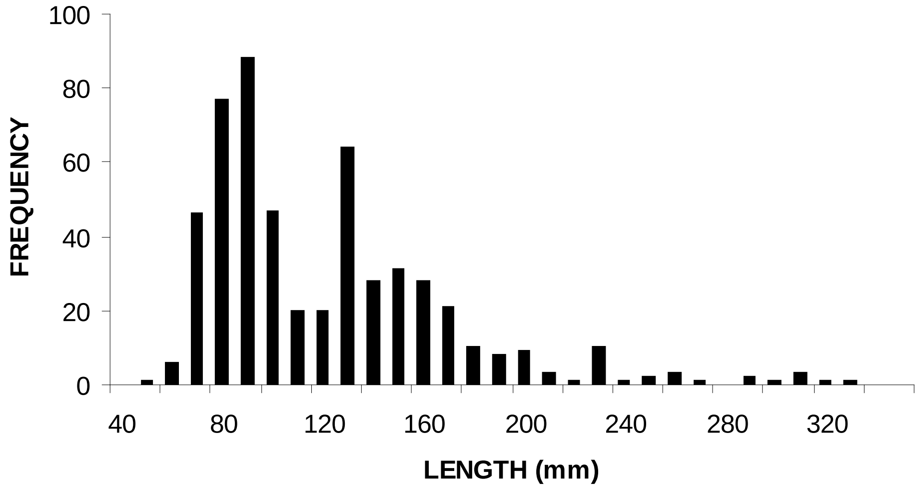


Figure 5. Frequency of smallmouth bass by 10 mm length groups sampled in 2007 from Anderson Ranch Reservoir, Idaho.

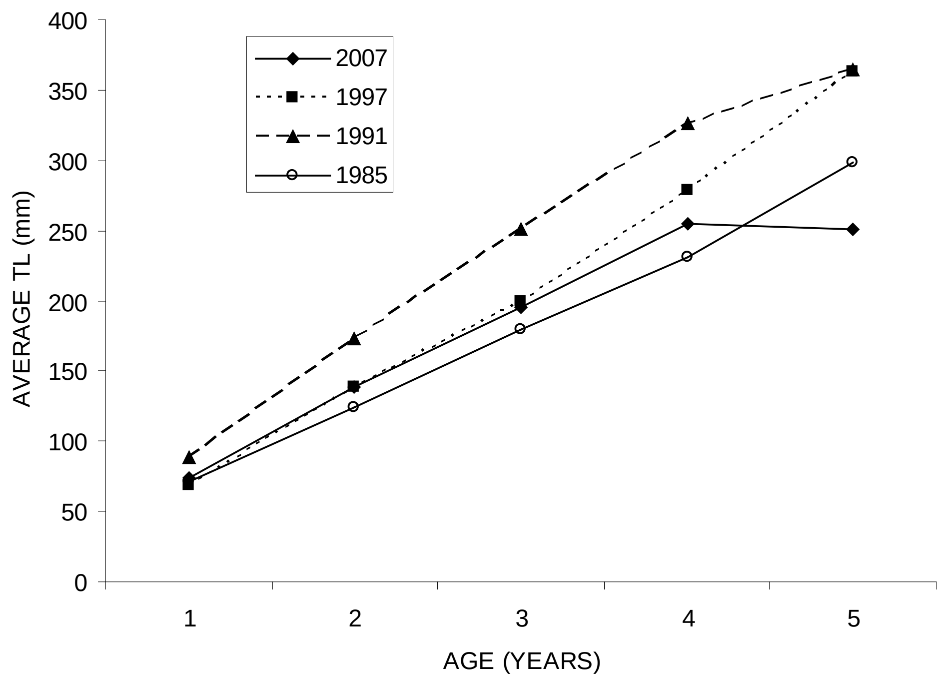


Figure 6. Average total length of smallmouth bass by age class from Anderson Ranch Reservoir, Idaho in 2007, 1997, 1991, and 1985.

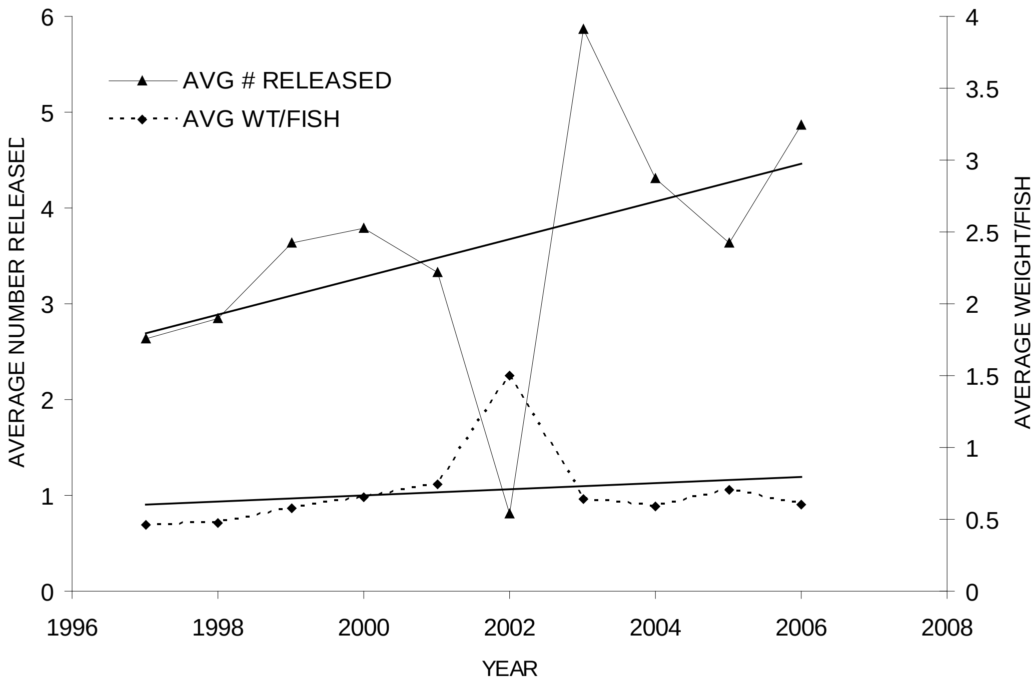


Figure 7. Average number of smallmouth bass released per angler/team and average weight of an individual smallmouth bass weighed in by year from Anderson Ranch Reservoir permitted fish tournaments. Average number of bass released represents the number of bass weighed-in but does not account for mortality.

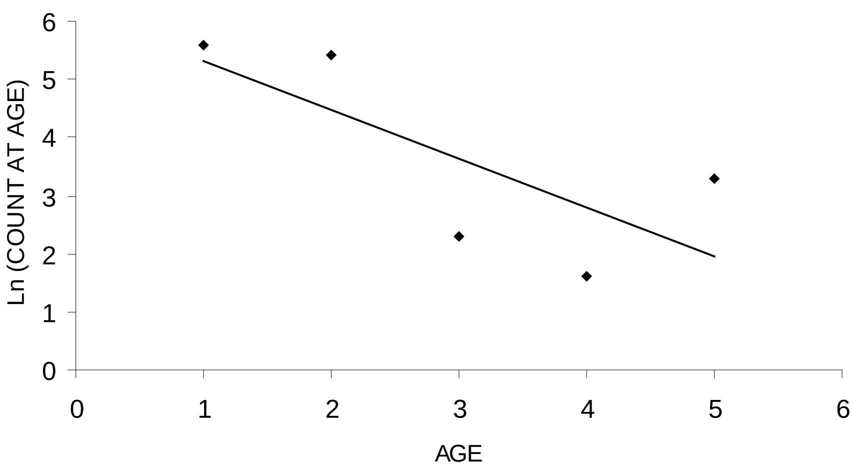


Figure 8. Natural log of summed smallmouth bass sampled by age group from Anderson Ranch Reservoir, Idaho 2007.

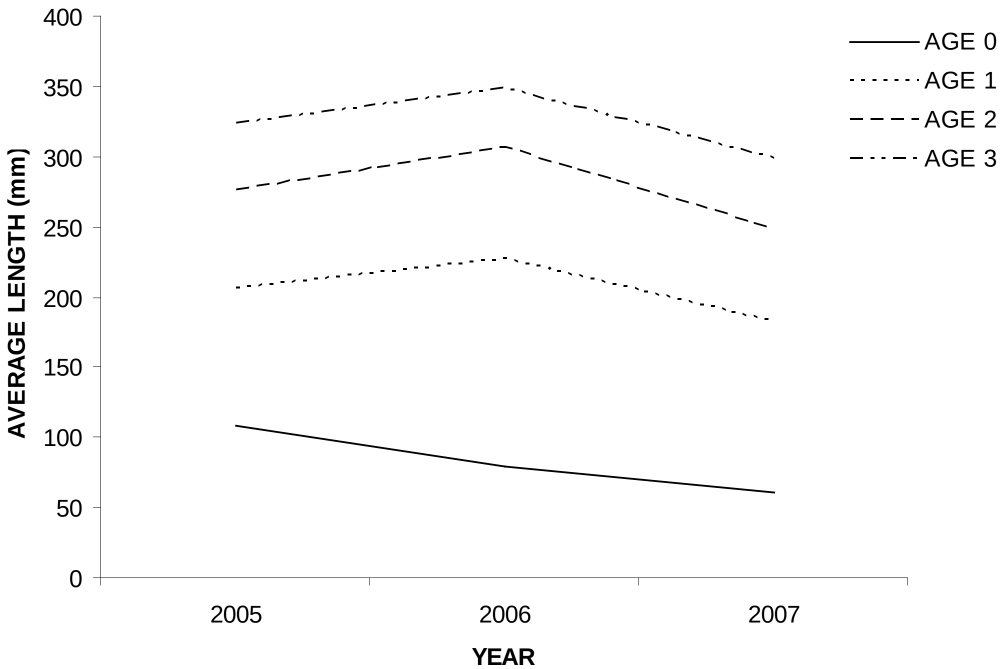


Figure 9. Kokanee average length at age for age classes zero to three from 2005 to 2007 in Anderson Ranch Reservoir, Idaho.

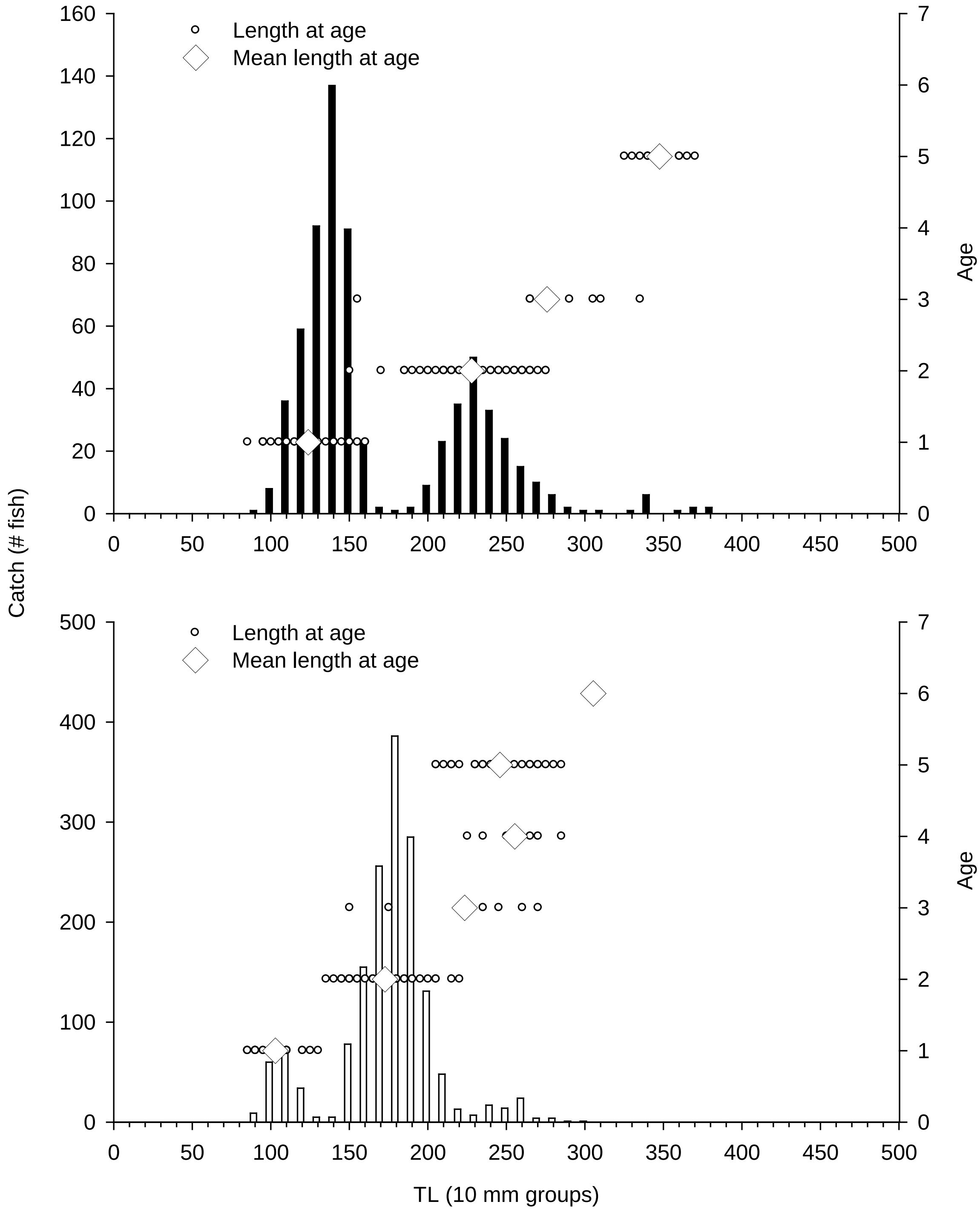


Figure 10. Length frequency histogram of measured largemouth bass (top) and yellow perch (bottom) with length and mean length at age from Carey Lake, Idaho in May 2007.

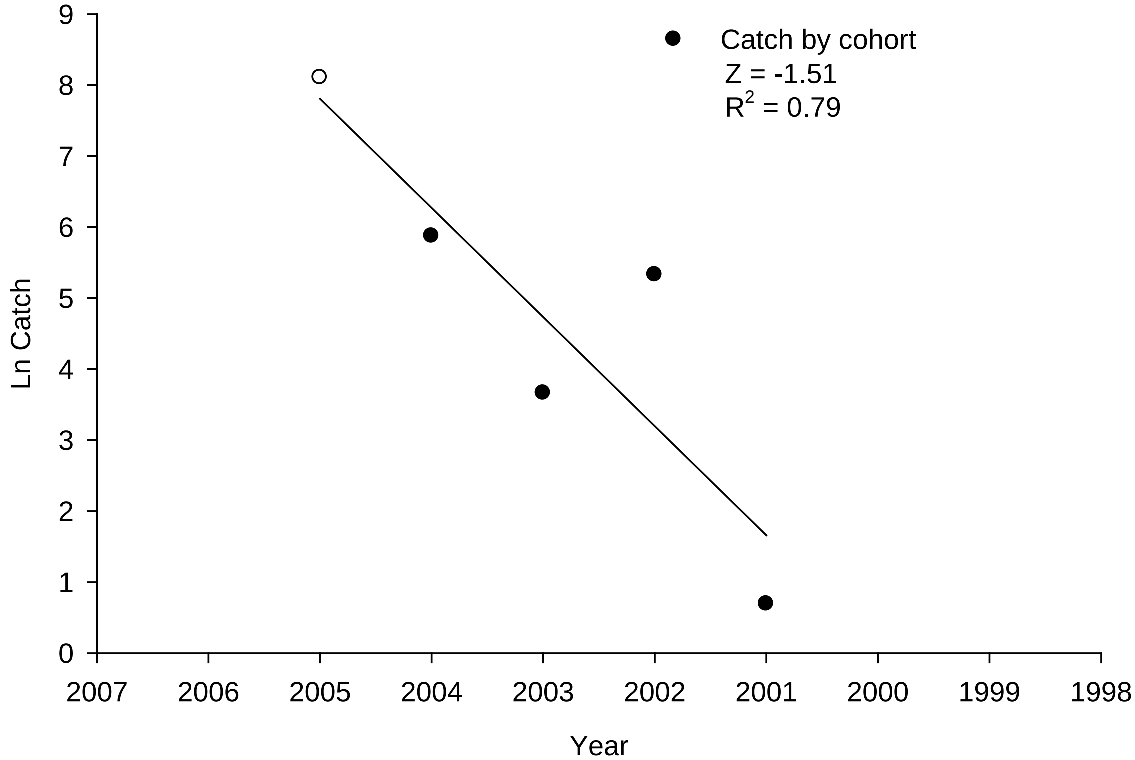


Figure 11. Yellow perch catch curve (weighted) from Carey Lake sampled in April and May 2007.

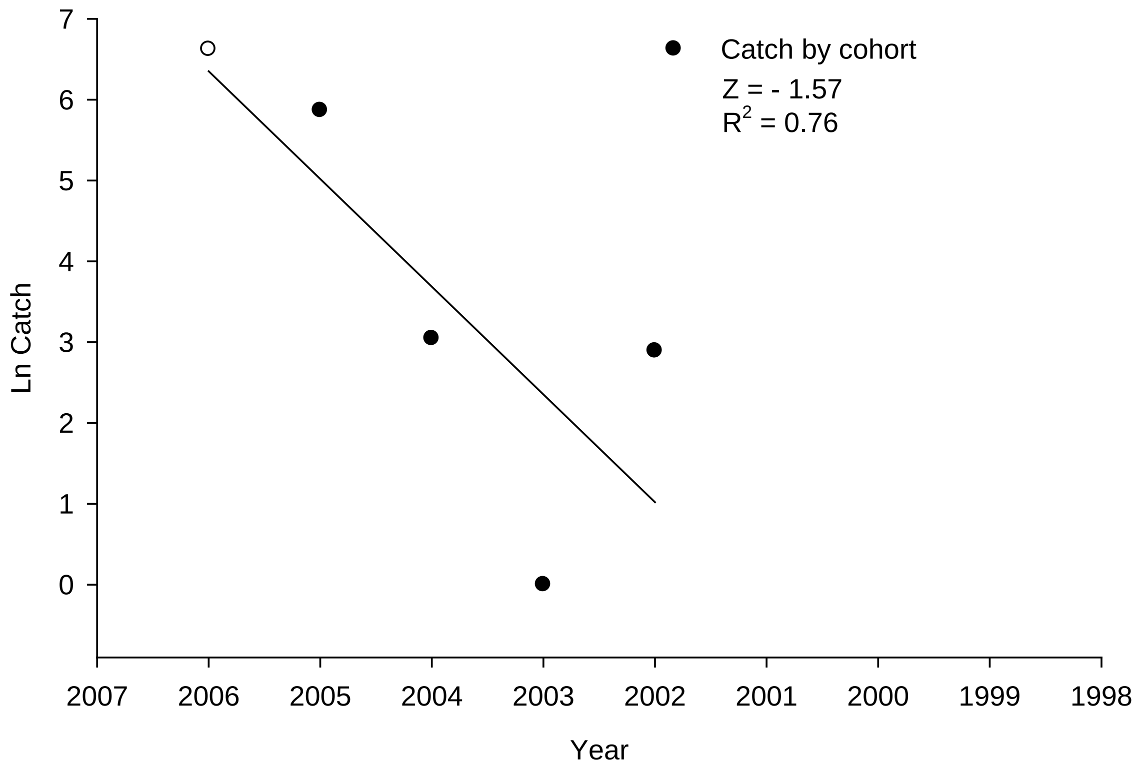


Figure 12. Largemouth bass catch curve (weighted) from Carey Lake, Idaho sampled in April and May 2007.

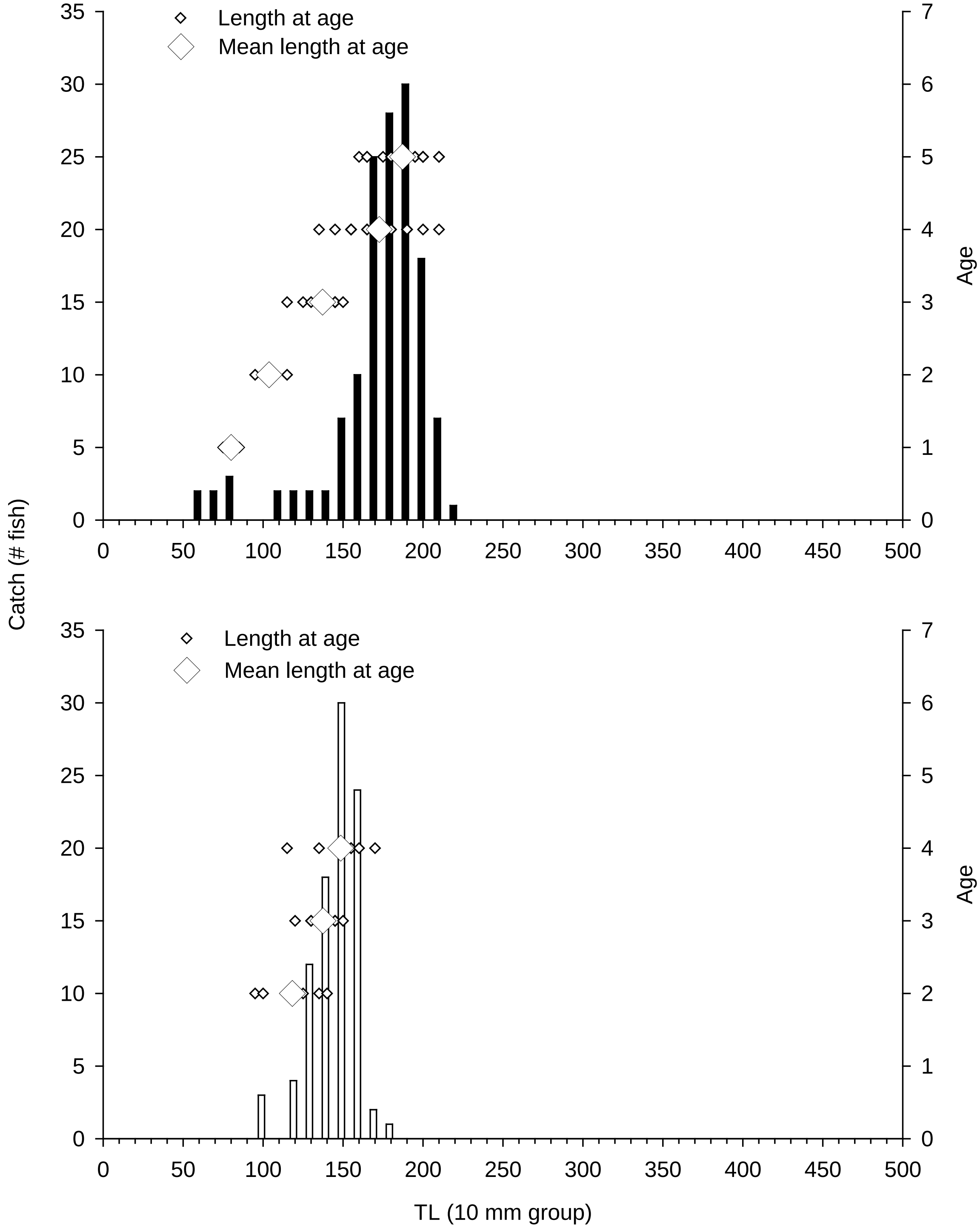


Figure 13. Length frequency histogram of measured bluegill (top) and pumpkinseed (bottom) with length and mean length at age from Carey Lake, Idaho in May 2007.

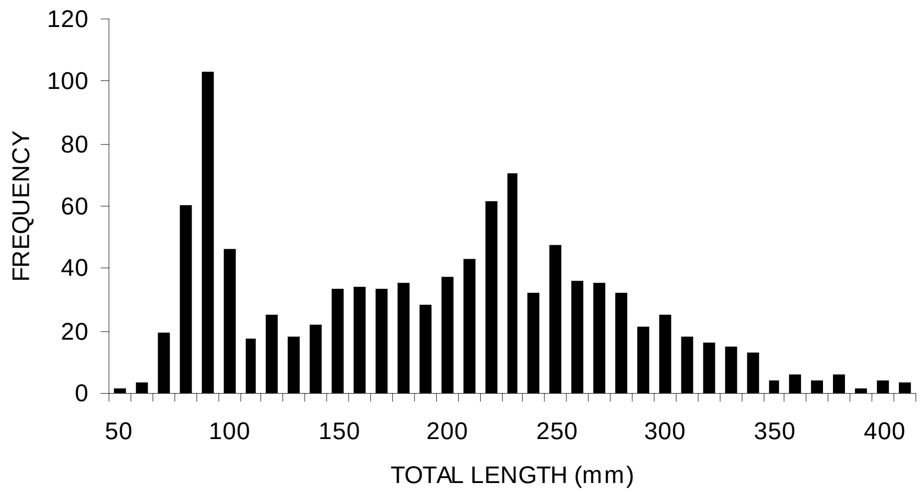


Figure 14. Frequency of smallmouth bass by 10 mm length group sampled in 2007 from Milner Reservoir, Idaho

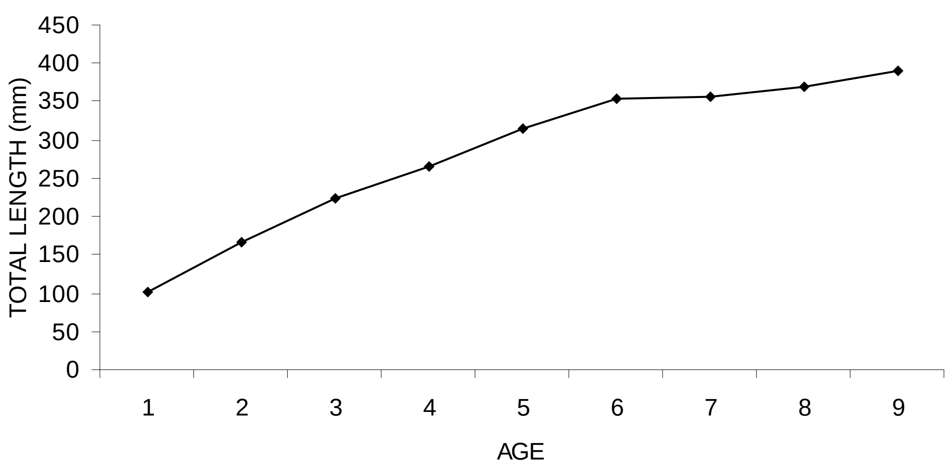


Figure 15. Average total length of smallmouth bass by age class from Milner Reservoir, Idaho 2007.

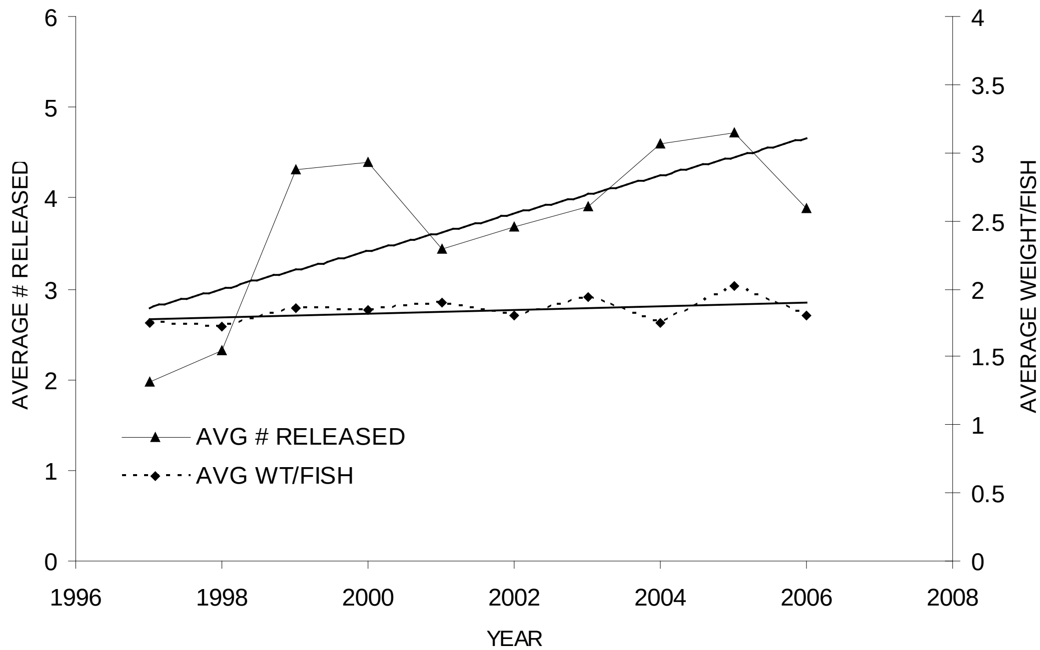


Figure 16. Average number of smallmouth bass released per angler/team and average weight of an individual smallmouth bass weighed-in by year from Milner Reservoir, permitted angling tournament. Average number of bass released represents the number of bass weighed-in but does not account for mortality.

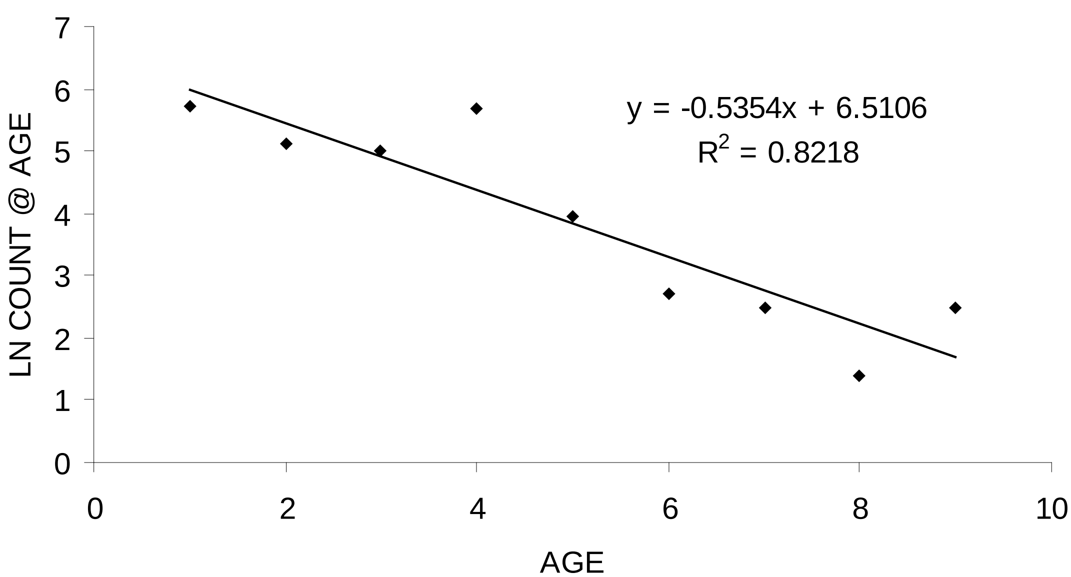


Figure 17. Natural log of summed smallmouth bass sampled by age group from Milner Reservoir, Idaho 2007.

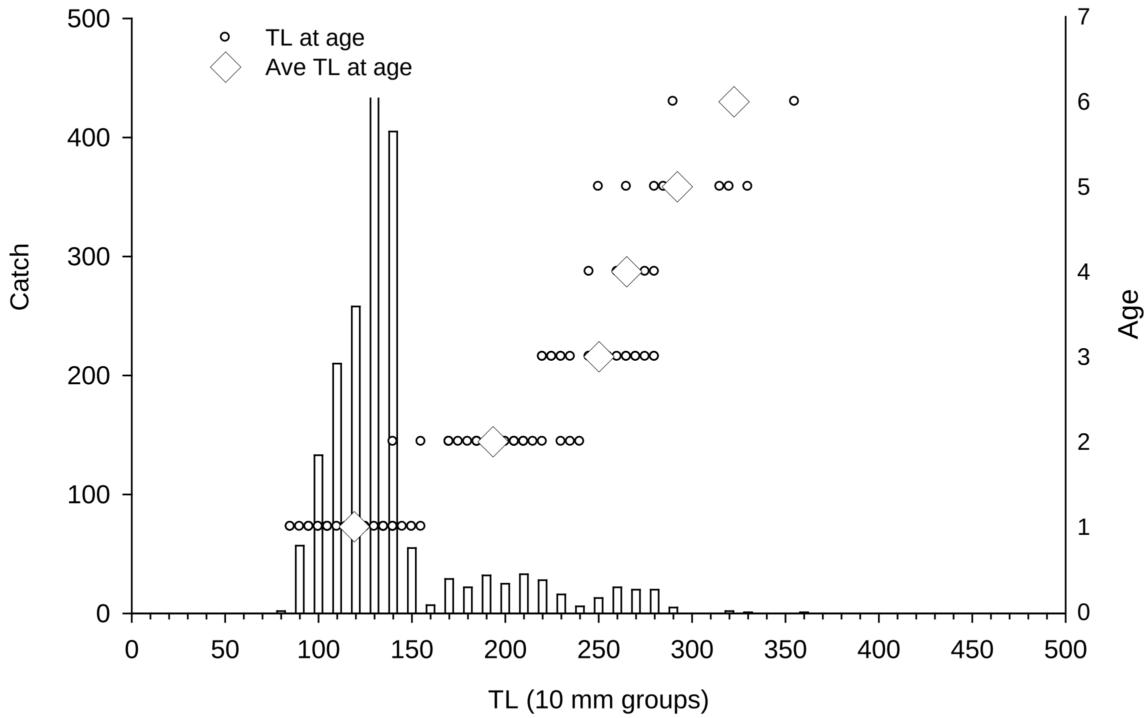


Figure 18. Length frequencies and length at age of yellow perch caught and measured from Mormon Reservoir, Idaho in April and May 2007. The histogram represents only measured fish and does not represent complete catch.

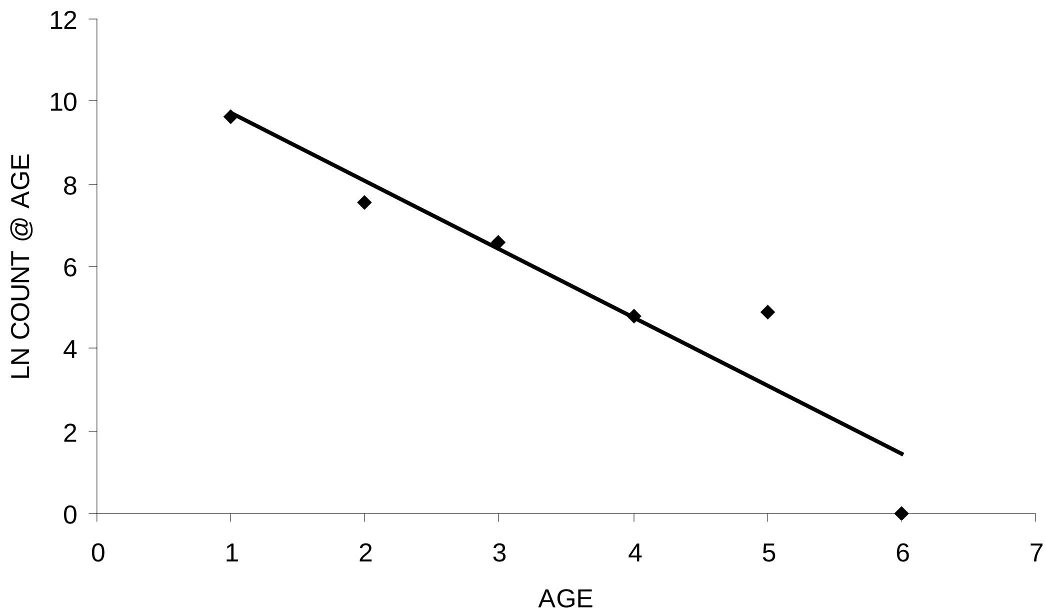


Figure 19. Yellow perch catch curve (weighted) from Mormon Reservoir, Idaho sampled in April and May 2007.

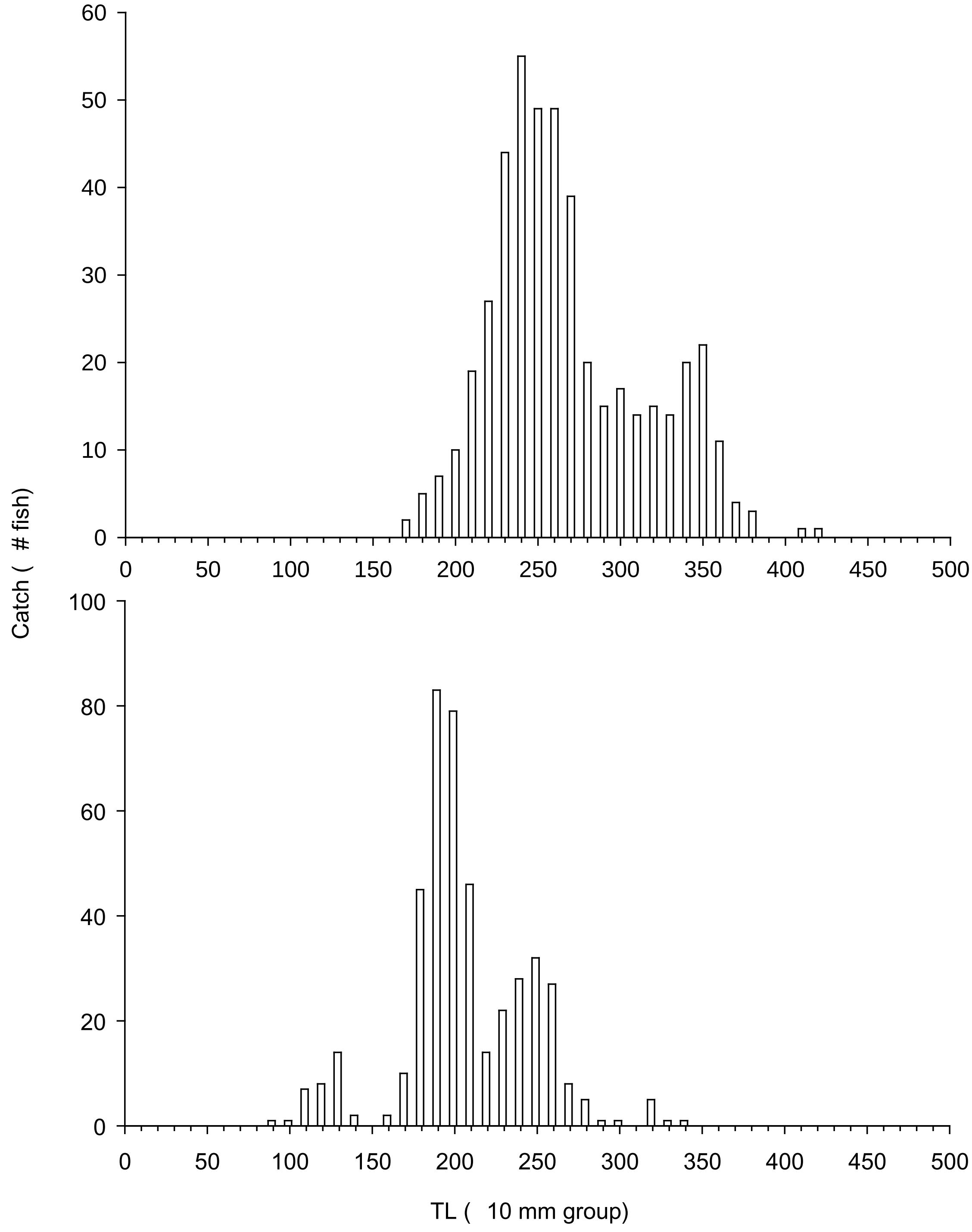


Figure 20. Length frequency histogram of rainbow trout (top) and bridgelip sucker (bottom) caught and measured (subsample) at Mormon Reservoir, Idaho in spring 2007.

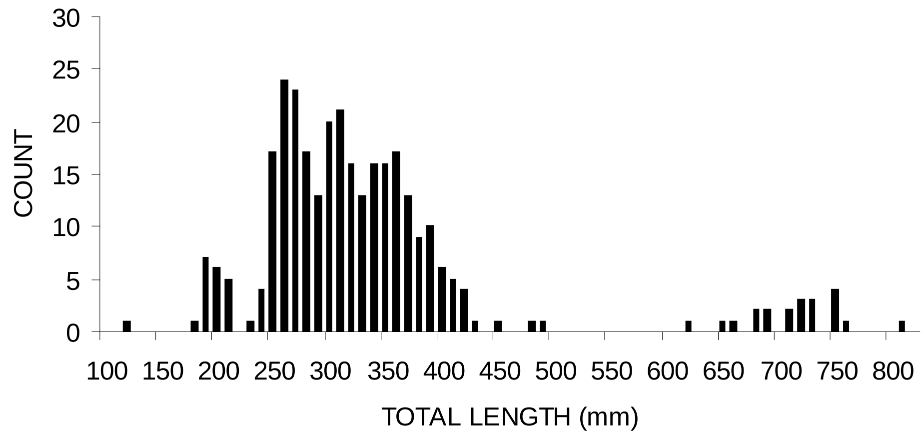


Figure 21. Length frequency of walleye sampled in Oakley Reservoir, Idaho 2007.

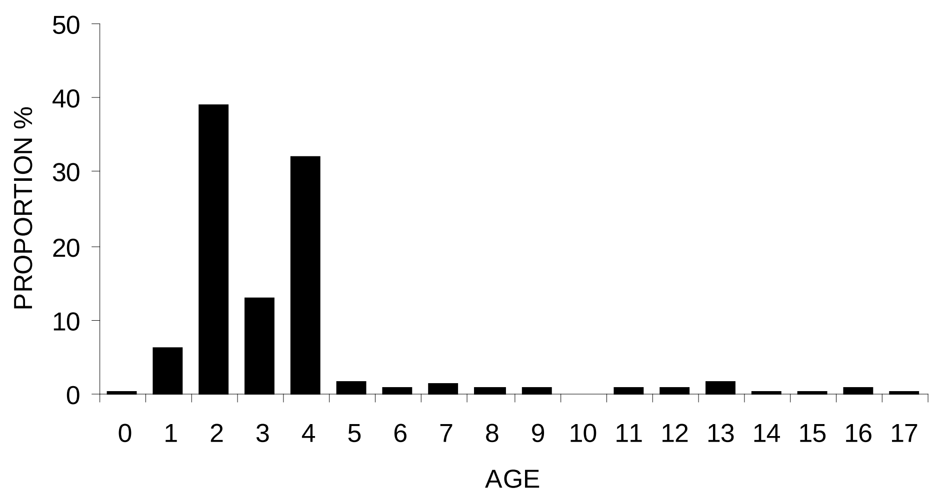


Figure 22. Proportions of sampled walleye by age class from Oakley Reservoir, Idaho 2007.

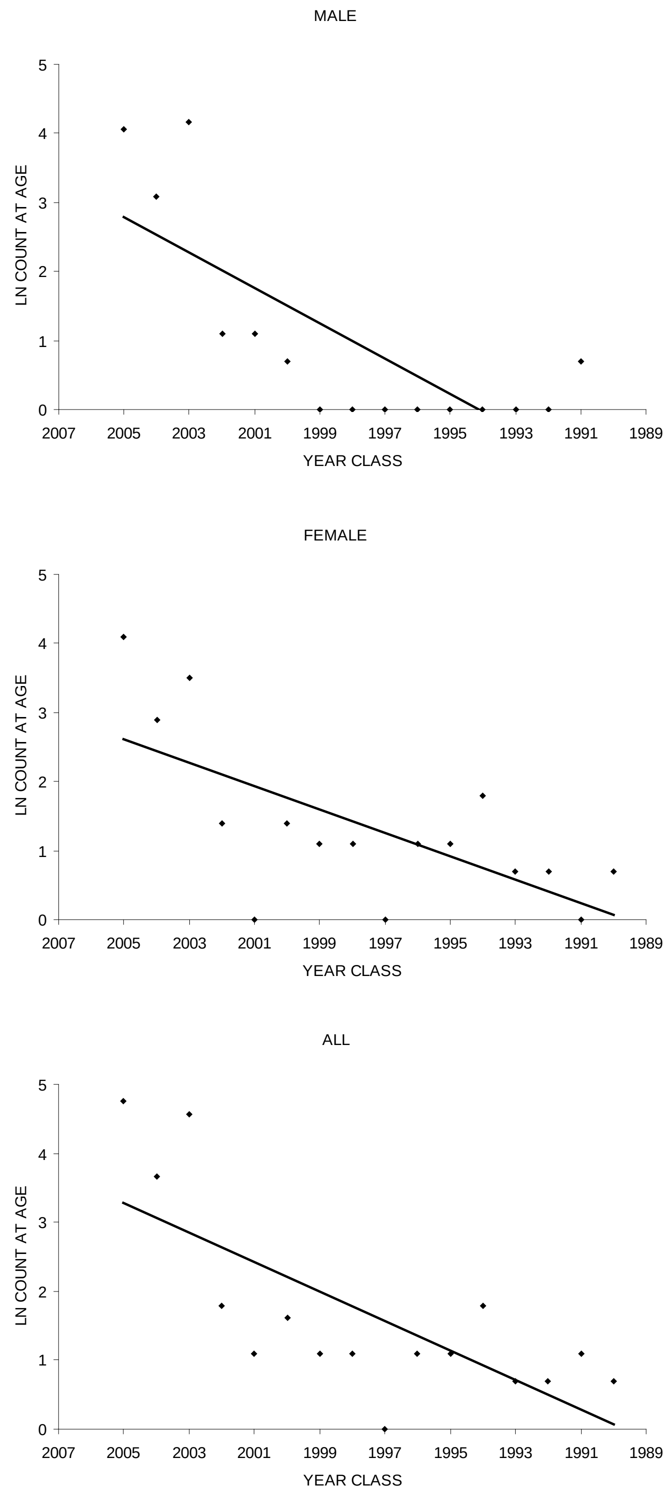


Figure 23. Catch curves for walleye collected in Oakley Reservoir, Idaho 2007.

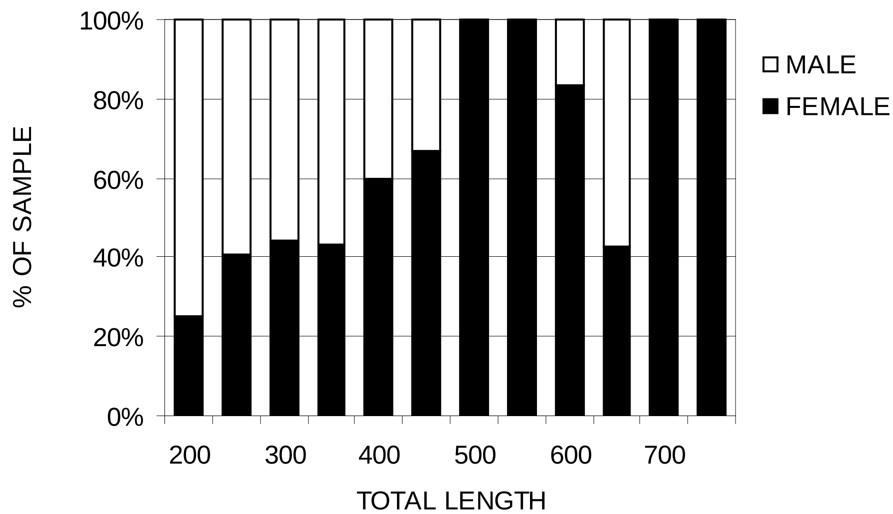


Figure 24. Proportion of male and female walleye by 10 mm length group sampled in Oakley Reservoir, Idaho 2007.

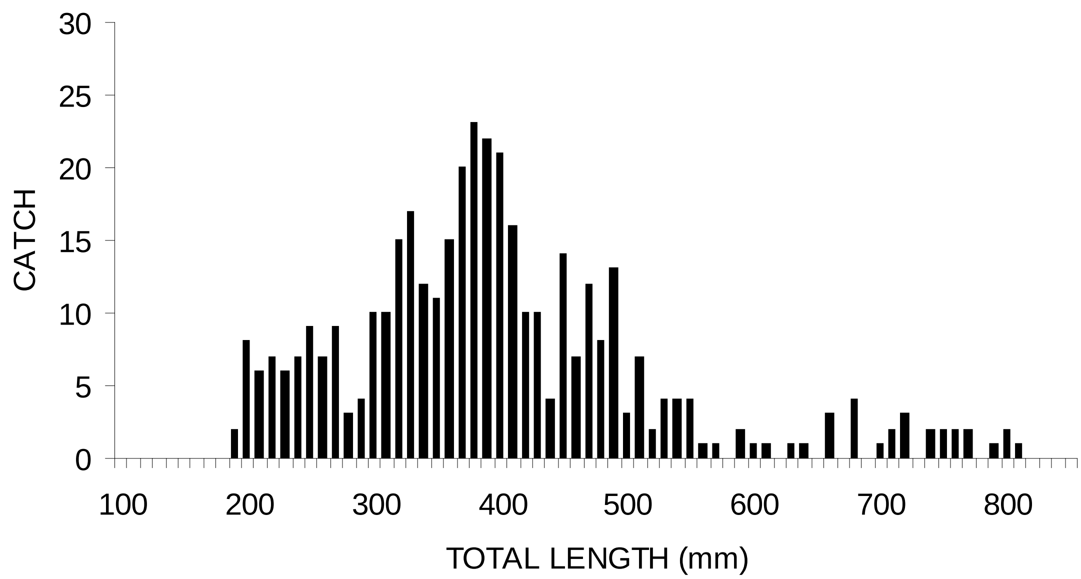


Figure 25. Length frequency of walleye sampled in Salmon Falls Creek Reservoir, Idaho 2007.

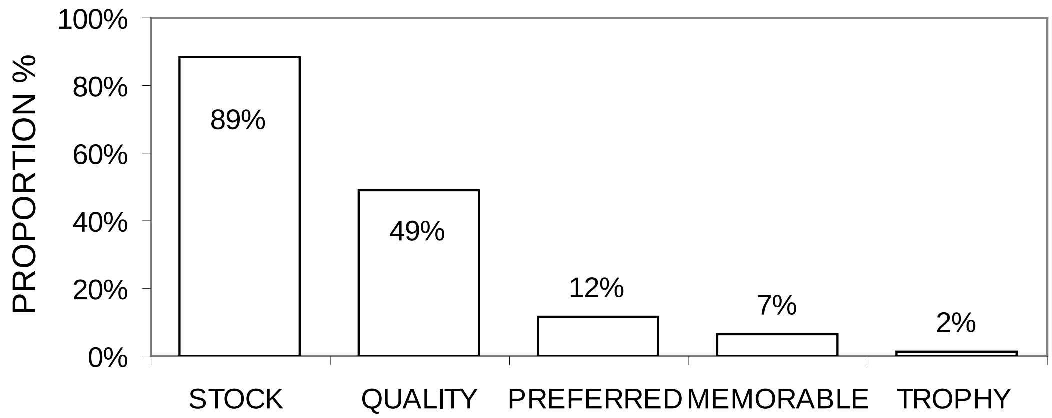


Figure 26. Relative population proportions of walleye by angling size class sampled in the Salmon Falls Creek Reservoir, Idaho 2007 FWIN survey.

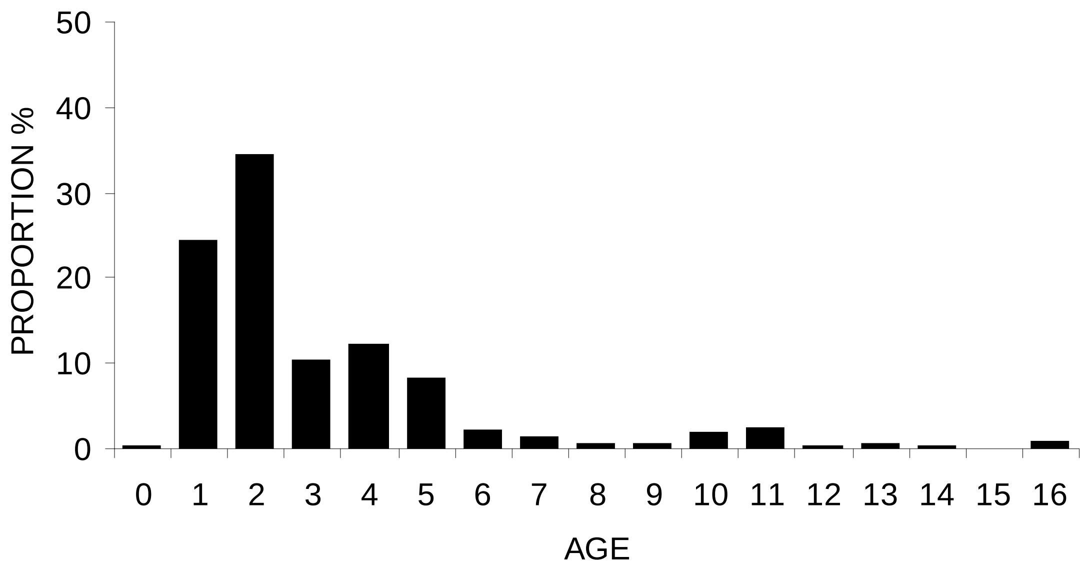


Figure 27. Proportions of sampled walleye by age class from Salmon Falls Creek Reservoir, Idaho 2007.

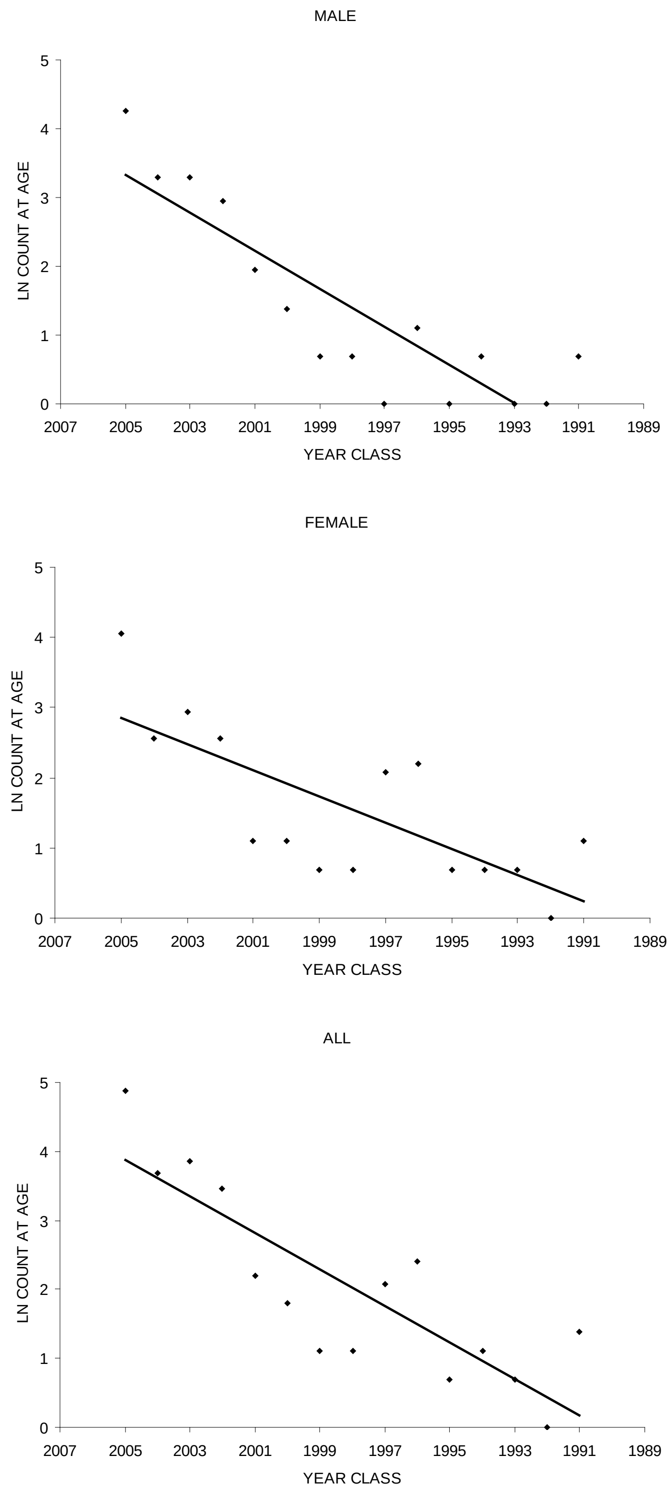


Figure 28. Catch curves for walleye collected in Salmon Falls Creek Reservoir, Idaho 2007.

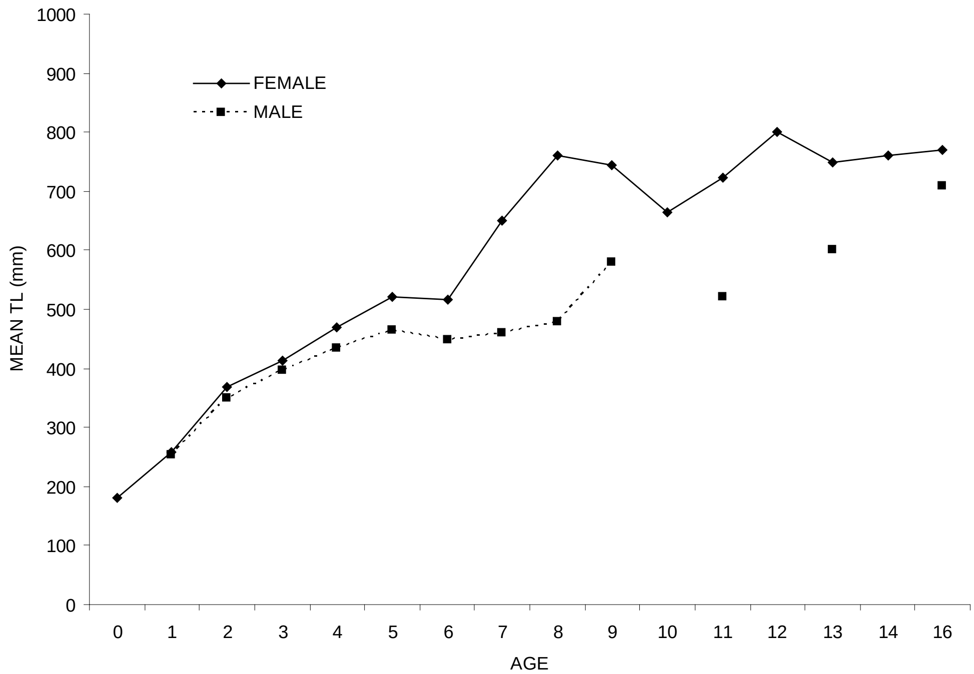


Figure 29. Length at age for male and female walleye collected in Salmon Falls Creek Reservoir, Idaho 2007.

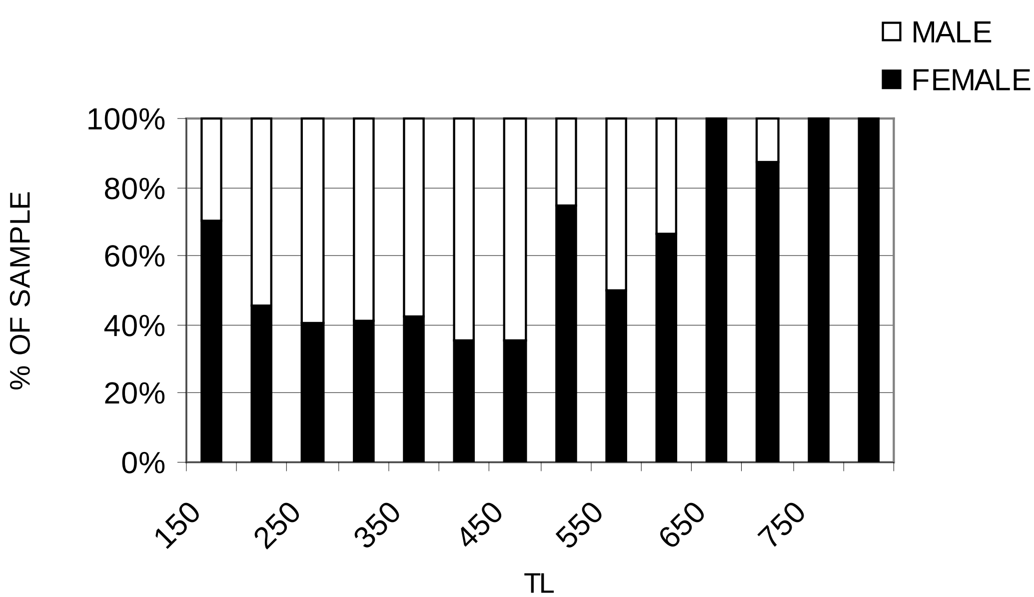


Figure 30. Proportion of male and female walleye by 50 mm length group sampled in Salmon Falls Creek Reservoir, Idaho 2007.

Table 2. Benchmark classifications and ranges developed by the Ontario Ministry of Fisheries to evaluate individual walleye waters.

Parameter	Healthy/Stable	Stressed/Unstable	Unhealthy/Collapsed
CPUE≥450mm	≥2.00•net-1	0.44 to 1.99•net-1	≤0.43•net-1
Number of age classes	≥11 age classes	6 to 10 age classes	≤5 age classes
Maximum age	>16 years	14 to 16 years	≤13 years
Female diversity index	≥0.66	0.56 to 0.65	≤0.55

Table 3. Trawl method statistics by strata and transect (TRAN) from Anderson Ranch, Idaho 2007. Statistics summarized include number of steps completed (STEPS), time per step (TIME), mean time between steps (TBS), maximum depth sampled (MAX D), and minimum depth sampled (MIN).

STRATA	TRAN	STEPS	TIME (s)	TBS (s)	MAX D (m)	MIN D (m)
1	1	5	180	27	30	15
1	2	5	180	26	30	15
1	3	5	180	25	30	15
1	4	5	180	26	30	15
1	5	5	180	26	30	15
1	6	5	180	29	30	15
1	7	5	180	25	30	15
2	1	4	180	26	27	15
2	2	5	180	24	30	15
2	3	5	180	26	30	15
2	4	5	180	26	30	15
2	5	5	180	24	30	15
2	6	3	180	21	20	12
2	7	4	180	22	22	12
3	1	3	180	24	15	9
3	2	3	180	21	15	9
3	3	3	180	29	15	9
3	4	3	180	20	15	9
3	5	3	180	21	15	9

Table 4. Anderson Ranch Reservoir, Idaho 2007 kokanee population and density estimates by age class, trawl strata, and reservoir.

2007	Age-0	Age-1	Age-2	Age-3
Strata 1 (7 Trawls)				
Pop. Est. +/- 95%C.I.	546,610 ± 427,135	662,938 ± 121,679	46,293 ± 37,741	10,048 ± 18,446
Density Est. (Fish/ha)	1051.17	1274.88	89.02	19.32
S.D. of Density Est.	888.29	253.05	78.49	38.36
Strata 2 (7 Trawls)				
Pop. Est. +/- 95%C.I.	145,502 ± 149,558	178,380 ± 145,178	50,433 ± 41,917	56,596 ± 40,615
Density Est. (Fish/ha)	391	356.76	100.87	113.19
S.D. of Density Est.	323.49	314.01	90.66	87.85
Strata 3 (5 Trawls)				
Pop. Est. +/- 95%C.I.	592 ± 1642	103 ± 285	1,106 ± 1,893	0.0 ± 0.0
Density Est. (Fish/ha)	2.57	0.45	4.81	0
S.D. of Density Est.	5.76	1	6.64	0
Whole Reservoir				
Pop Est +/- 95%C.I.	692,704 ± 474,169	841,421 ± 180,692	97,832 ± 54,213	66,644 ± 40,270

Table 5. Anderson Ranch Reservoir, Idaho kokanee densities (fish/ha) by age class (0-3) for years from 1993 to 2007. Mean and standard deviation (SD) of density estimates were reported for the listed time period.

YEAR	0	1	2	3	TOTAL
1993	238	2	1	1	242
1994	297	368	28	--	693
1995	2	11	25	--	38
1996	64	6	2	--	72
1997	497	23	4	--	524
1998	109	29	8	--	146
1999	1201	10	13	--	1224
2000	565	38	3	--	606
2001	41	78	35	--	154
2002	13	3	1	--	17
2003	12	6	3	1	21
2004	--	--	--	--	--
2005	348	25	8	14	396
2006	802	130	27	7	966
2007	554	673	78	53	1359
MEAN	339	100	17	15	461
SD	355	191	21	22	455

Table 6. Total sampling effort by gear type used to sample the Carey Lake, Idaho fishery in May 2007.

Gear	Unit	Hr	Min
Electofishing	1	1	0
Floating gill net	2	33	35
Sinking gill net	2	33	20
Trap net	2	38	45

Table 7. Standardized catch (fish #) and weight (kg) of each fish species by gear type from Carey Lake, Idaho in May 2007.

			Nets			
Unit	Species	Electrofished	Floating gill	Sinking gill	Trap	Total
Catch	Bluegill	211	3	3	20	236
	Largemouth bass	888	78	9	39	1014
	Pumpkinseed	55	26	0	88	168
	Brown bullhead	6	29	6	13	53
	Yellow perch	1669	488	451	433	3041
	Bridgelip sucker	0	0	1	0	1
	Total	2829	623	468	592	4512
Weight	Bluegill	29.6	0.4	0.4	2.9 [a]	30.4
	Largemouth bass	68.1	10.2	1.9	3.4 [a]	80.2
	Pumpkinseed	4.3	2.0	0.0	6.9 [a]	6.3
	Brown bullhead	0.8 [a]	6.5	1.5	2.1 [a]	8.0
	Yellow perch	67.3	33.8	31.3	31.7	164.1
	Bridgelip sucker	0.0	0.0	< 0.1	0.0	0.0
	Total	169.3	52.9	35.1	31.7	289.0

[a] Overall length frequencies (all gear types) were used to assign group counted fish into 10 mm length bins as opposed to using gear specific length frequencies (i.e. not enough gear specific measured fish).

Table 8. Total length and associated population characteristics for a subsample (measured fish) of fish caught in Carey Lake, Idaho in May 2007.

	Length						
Species	n	Mean	SD	Range	PSD	PSD (CI)	Annual mort.
Bluegill	141	166	31	50-210	88	83-94	-1.37 [a]
Largemouth bass	678	163	55	85-370	6	3-9	0.79
Pumpkinseed	94	138	14	95-170	29	19-38	-0.57 [a]
Brown bullhead	79	227	42	160-350	42	31-53	--
Yellow perch	1610	167	32	80-295	9	8-11	0.78
Bridgelip sucker	1	185	--	--	--	--	--

[a] Catch curve regression not possible due to inconsistent annual recruitment

Table 9. Estimated angler pressure (P, hrs) including standard error (SE) and confidence intervals (CI) from June through September 2007 on Magic Reservoir, Idaho

Interval	P	SE	80% CI	95% CI
June	17,308	5,145	6,595	10,084
July	7,304	2,016	2,585	3,952
August	3,345	749	960	1,468
September	5,650	2,087	2,676	4,091
Total	33,608	5,954	7,633	11,671

Table 10. Catch rate (CPE,hr), harvest rate (HPE, hr), and release rate (RPE, hr) estimates, standard errors, and 80% confidence intervals (CI) by all anglers and anglers targeting a given species from June through September on Magic Reservoir, Idaho 2007.

EST TYPE	SPECIES	CPE	SE	80% CI	HPE	SE	80% CI	RPE	SE	80% CI
All Anglers	Rainbow trout	0.97	0.38	0.49	0.57	0.28	0.36	0.40	0.12	0.15
All Anglers	Yellow Perch	2.58	0.89	1.14	0.66	0.34	0.44	1.92	0.62	0.80
All Anglers	Smallmouth bass	0.06	0.05	0.06	0.00	0.00	0.00	0.06	0.05	0.06
All Anglers	Brown trout	---	---	---	---	---	---	---	---	---
Overall	All	3.61	1.20	1.53	1.23	0.52	0.67	2.37	0.74	0.95
Targeted	Yellow Perch	21.14	1.25	1.60	8.60	1.36	1.74	12.54	0.11	0.15
Targeted	Smallmouth bass	6.75	---	---	0.00	---	---	6.75	---	---
Targeted	Brown trout	---	---	---	---	---	---	---	---	---
Targeted Any	Rainbow trout	2.78	0.23	0.29	0.74	0.06	0.08	2.04	0.20	0.26

Table 11. Catch, harvest, and release estimates, standard errors (SE), and 80% confidence intervals (CI) by species for June through September from Magic Reservoir, Idaho 2007.

SPECIES	CATCH	SE	80% CI	HARVEST	SE	80% CI	RELEASE	SE	80% CI
Rainbow trout	32,601	6,161	7,898	19,199	6,059	7,768	13,402	1,350	1,731
Yellow Perch	86,697	21,522	27,592	22,173	10,032	12,862	64,523	14,355	18,403
Smallmouth bass	1,917	1,655	2,122	49	69	88	1,867	1,653	2,120
Brown trout	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	121,215	23,241	29,795	41,421	11,870	15,217	79,794	15,475	19,839

Table 12. Estimated effort per survey period day (effort/day) and associated harvest by year from Magic Reservoir, Idaho.

		HARVEST/EFFORT DAY			
YEAR	EFFORT/DAY	Rainbow trout	Brown trout	Yellow perch	Smallmouth bass
1992	316	65.19	0.28	0.60	0.00
1993	252	60.91	0.40	0.27	0.00
2007	282	67.98	0.00	78.51	0.17

Table 13. Brown trout redd counts on the Big Wood River and Rock Creek upstream of Magic Reservoir, ID since 1986.

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

[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
Rock Creek - Highway 20 to mouth
[b] _ Combined with previous reach
[c] _ A total of 42 female brown trout were trapped and spawned from this reach by Hayspur Hatchery in 1987
[d] _ Not surveyed

Table 14. Total sampling effort by gear type used to sample the Mormon Reservoir, Idaho fishery in spring, 2007.

Gear	Units	Hours	Minutes
Electofishing	4.5	4	30
Floating gill net	6.0	120	24
Sinking gill net	6.0	115	22
Trap net	6.0	115	4

Table 15. Standardized catch (fish #) and weight (kg) of each fish species by gear type from Mormon Reservoir, Idaho in spring 2007.

			Nets			
Unit	Species	Electrofished	Floating gill	Sinking gill	Trap	Total
Catch	Yellow perch	2536	24	74	998	3632
	Rainbow trout	29	14	25	17	85
	Bridgelip sucker	26	13	23	19	80
	Total	2592	50	122	1033	3797
Weight	Yellow perch	58.9	1.3	8.1	46.9	115.2
	Rainbow trout	5.5	4.1	6.5	4.3	20.4
	Bridgelip sucker	2.2	1.0	2.9	2.4	8.5
	Total	66.6	6.4		53.6	144.1

Table 16. Total length and associated population characteristics for a subsample (measured fish) of fish caught in Mormon Reservoir, Idaho in spring 2007.

	Length						
Species	n	Mean	SD	Range	PSD	PSD (CI)	Annual mort.
Yellow perch	1867	137	39.6	80-275	18	15-20	0.79
Rainbow trout	463	266	46.7	170-415	1	0-2	--
Bridgelip sucker	443	199	38.7	85-330	--	--	--

Table 17. Summary of catch data from Oakley Reservoir, ID 2007. Catch data include: total catch (N), % of total catch, average total length (AVG TL), standard deviation of total length (SD TL), average weight (AVG WT), and standard deviation of weight (SD WT) were summarized by species.

SPECIES	N	% CATCH	AVG TL	SD TL	AVG WT	SD WT
Yellowstone cutthroat	1	0.12	440	--	982	--
Brook trout	1	0.12	290	--	258	--
Rainbow trout	49	6.11	385	33	603	152
Spottail shiner	4	0.50	109	8	8	2
Utah sucker	423	52.74	506	55	1659	432
Walleye	310	38.65	339	117	571	1104
Yellow Perch	14	1.75	202	37	126	78

Table 18. Relative abundance (%) and catch per unit effort (CPUE) by specie for fish collected in the 2007 forage survey in Oakley Reservoir, Idaho.

SPECIES	N	%	CPUE
SUCKER SPP	0	0.00	0
MOTTLED SCULPIN	7	5.04	1
SPOTTAIL SHINER	3	2.16	<1
WALLEYE	5	3.60	1
YELLOW PERCH	124	89.21	14

Table 19. Benchmark classification parameters for walleye in Oakley Reservoir, Idaho 2007.

PARAMETER	VALUE	POINT	NOTE
CPUE≥450	1.94	2	Geometric Mean
AGE CLASSES	13	3	With > 1 in sample
MAXIMUM AGE	17	3	
FEMALE DIVERSITY	0.94	3	
	SCORE	2.75	

Table 20. Historic catch per unit effort (CPUE) by specie and year for fish collected in Oakley Reservoir, Idaho forage survey.

SPECIES	2004	2005	2006	2007
SUCKER SPP	<1	3	<1	0
SCULPIN SPP	3	0	0	1
SPOTTAIL SHINER	4	44	6	<1
WALLEYE	8	8	1	1
YELLOW PERCH	21	55	87	14

Table 21. Summary of catch data from Salmon Falls Creek Reservoir, Idaho 2007. Catch data include: total catch (N), % of total catch, average total length (AVG TL), standard deviation of total length (SD TL), average weight (AVG WT), and standard deviation of weight (SD WT) were summarized by species.

SPECIES	N	% CATCH	AVG TL	SD TL	AVG WT	SD WT
Black Crappie	28	2.21	174	40	101	54
Bridgelip Sucker	23	1.82	216	54	348	324
Chisel Mouth Chub	1	0.08	180	--	50	--
Largescale Sucker	304	24.01	431	121	996	747
Northern Pikeminnow	47	3.71	261	63	210	270
Rainbow Trout	19	1.50	361	80	597	397
Smallmouth Bass	34	2.69	287	53	371	187
Spottail Shiner	3	0.24	108	8	8	3
Yellow Perch	412	32.54	212	34	172	63
Walleye	395	31.20	390	123	866	1187

Table 22. Benchmark classification parameters for walleye in Salmon Falls Creek Reservoir, Idaho 2007.

PARAMETER	VALUE	POINT	NOTE
CPUE≥450	5.68	3	GEOMETRIC MEAN
AGE CLASSES	13	3	WITH > 1 IN SAMPLE
MAXIMUM AGE	16	2	
FEMALE DIVERSITY	0.96	3	
	SCORE	2.75	

Table 23. Catch per unit effort (CPUE) by specie and year for fish collected in Salmon Falls Creek Reservoir, Idaho forage survey.

SPECIES	2004	2005	2006	2007
BLACK CRAPPIE	2	34	2	0
NORTHERN PIKEMINNOW	0	<1	<1	0
SCULPIN SPP	0	1	0	0
SMALLMOUTH BASS	7	52	12	23
SPOTTAIL SHINER	<1	5	1	0
SUCKER SPP	<1	<1	<1	0
WALLEYE	0	1	2	<1
YELLOW PERCH	2	115	98	1

Table 24. Relative abundance (%) and catch per unit effort (CPUE) by specie for fish ≤ 150 mm collected in forage survey in Salmon Falls Creek Reservoir, Idaho 2007.

SPECIES	N	%	CPUE
BLACK CRAPPIE	0	0	0
NORTHERN PIKEMINNOW	0	0	0
SCULPIN SPP	0	0	0
SMALLMOUTH BASS	204	96	23
SPOTTAIL SHINER	0	0	0
SUCKER SPP	0	0	0
WALLEYE	1	0	<1
YELLOW PERCH	7	3	1

2007 Magic Valley Region Fishery Management Report

Surveys and Inventories – Rivers and Streams

ABSTRACT

A randomized creel survey was conducted on the Big Wood River between Stanton Crossing and the Bureau of Land Management's Sheep Bridge. Angler use (389 ± 141 hour) and harvest was low (< 4 trout). Angler catch rates ranged from 1.2 – 1.5 trout/hour.

Silver Creek was sampled at three locations (Stalker Creek, Cabin, Martin) to evaluate trends in population abundance and structure and to estimate rainbow trout and brown trout abundance. Brown trout densities ranged from 308 to 640 fish (>100mm)/km in the Cabin and Martin sites, respectively. Rainbow trout densities ranged from 95 fish (>100mm)/km in the Martin site to 1,726 in the Cabin site. Trout densities in Stalker and Martin reaches were relatively stable; however, trends in the Silver Creek Cabin transect showed declines in both rainbow and brown trout numbers from previous surveys. The relative proportions of rainbow trout and brown trout in the catch from combined sample transects were 46% and 54%, respectively.

INTRODUCTION

Big Wood River

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

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

A creel survey of the Big Wood River fishery above Magic Reservoir was completed in 2007 to quantify use and harvest related to the fall brown trout spawning migration from Magic Reservoir. Angler comments have consistently indicated the fishery is used heavily and associated harvest is high. A need for conservative regulations has been suggested by both anglers and IDFG conservation officers.

Silver and Stocker Creeks

Silver Creek is a tributary to the Little Wood River in Blaine County, Idaho. Silver Creek originates at the confluence of 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 destination fishery for rainbow and brown trout. Several regulation scenarios exist throughout the Silver Creek drainage allowing multiple angling opportunities including fly fishing only, catch and release; no bait, barbless hook, catch and release; bait allowed, none between 12 inches and 16 inches; and general rules.

The Silver Creek fishery, including it's tributaries, has been the focus of several studies over the past 10 years including; monitoring 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 defined in 2004.

In 2007 a standard population monitoring survey was completed to evaluate long-term trends in population abundance and structure.

METHODS

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

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

A randomized creel survey was conducted from October 15 to November 30 on the Big Wood River. The creel survey encompassed that portion of the river upstream of Magic Reservoir approximately between Stanton Crossing and the Bureau of Land Management's Sheep Bridge (Appendix A). Survey dates and times were randomly scheduled for two weekend days and four week days during daylight hours in October and four weekend days and four week days during daylight hours in November.

Angler counts were conducted at randomly scheduled times. A second angler count was made approximately three hours prior to or following the scheduled time. Angler counts were made from several pre-selected vantage points.

Observed anglers were interviewed to provide information on angler catch rates, angler harvest, and the duration of angling trips. Anglers whom had not completed a fishing trip at the time of the interview were given a post card to provide a final report. Requested information included dates and time fished, number of fish caught by species, number of fish harvested, and gear type used.

The Silver Creek system was sampled in 2007 at three locations encompassing Silver Creek and Stalker Creek to evaluate trends in population abundance and structure. Sampled segments included: lower Stalker Creek; Silver Creek, Cabin Site; and Silver Creek, Martin Bridge (Appendix A). Sample efforts were conducted using a drift boat electrofishing setup (Appendix B). Fish were sampled on two passes separated by seven days. Sampling was conducted during daylight hours on the lower Stalker Creek reach and during dark hours on the remaining two reaches.

Fish were identified, measured (TL), weighed (g), marked, and released during the first sampling pass - marking run. Weights were taken only during the marking run. Caudal fin clips were used to mark rainbow and brown trout equal or greater than 100 mm for identification in the recapture run. Other collected species were not marked. Rainbow and brown trout were counted, measured, and observed for marks in the second (recapture run) electrofishing pass.

Estimates of rainbow trout and brown trout abundance were made using a modified-Peterson mark-recapture estimator (Ricker 1975). Calculations were completed in FA+ (Fisheries Analysis Software, Version 1.0.8). Estimates were calculated in 100 mm increments for fish equal or greater 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. Estimates of rainbow and brown trout equal or greater than 100 mm were reported for evaluation of long term trends.

Marking run data were used to describe the sampled fish community and estimate population parameters. Estimated population parameters included relative stock density and relative weight. Relative stock densities (RSD – 400) were determined for rainbow trout and brown trout collected in each transect to describe the available preferred component of the fishery. 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).

Population estimates and relative stock densities (RSD-400) from 2007 were compared to population estimates and RSD-400 values generated from 2001 and 2004 data (Warren et al. 2001, Ryan and Megargle 2004). Standard locations were sampled among all years. Comparisons of population estimates by species were for all fish equal or greater than 100 mm.

Mean length at age and annual mortality of rainbow and brown trout were estimated from collected otoliths. Otoliths were collected from representative groups of rainbow trout and brown trout. One sample group for each species was collected from a combination of all sampled transects. Age was estimated from otoliths by cleaning and reading in whole view using a dissecting microscope at 30X-40X magnification. Otoliths were cut using a rotary cutting tool or broken and read in cross-section if the whole view was not considered to be clear. Estimated ages were applied to an age-length key, extrapolated to all sampled fish in the marking pass, and used to determine mean length at age (Devries and Frie 1996). Mean length at age was determined for all age classes sampled. Mean length at age four was reported as a benchmark of growth over time.

Catch curves were used to estimate mortality and survival. (Van Den Avyle 1993). Catch Curves were generated in FAST.

Habitat data was collected on a separate date following electrofishing efforts. Transect lengths and widths were measured with an electronic rangefinder (Leica, LRF 900 Rangemaster) and or measuring tape at set intervals. Interval distance was chosen randomly prior to conducting measurements. Transects waypoints were marked for future replication using a Magellan Sporttrack Topo Global Positioning System (GPS) (Appendix B).

RESULTS AND DISCUSSION

Big Wood River

Estimated angler effort on the Big Wood River in the surveyed sectioned and time period was 389.23 hours (± 141.38, 80% CI). Average angler catch rates on rainbow and brown trout during the surveyed period were 1.50 fish/hour (± 0.82, 80% CI) and 1.23 fish/hour (± 0.96, 80% CI), respectively. Estimated harvest of brown trout was 3.69 fish (± 6.05, 80% CI). No rainbow trout harvest was observed in the survey period.

Results suggested angler use and harvest is low. Angler observations and angler contacts during the survey were minimal and precluded concise estimates of effort, catch rate, and harvest as evident from estimate confidence intervals. However, minimal angler observations support the suggested low use and harvest. Results indicated a shift to conservative regulations is not warranted.

Angler effort may be related to brown trout migration timing and duration. Observed brown trout and brown trout redds were low until mid November. Typically, brown trout migrate into the river and have spawned by mid November when annual redd surveys are conducted in the creel survey reach. Observations suggested few brown trout had migrated into the fishery until late in the survey period. Minimal fish presence may have discouraged anglers early and subsequently limited effort late in the survey period. Angler observations did not increase with fish observations. Brown trout redd counts were reported in the Magic Reservoir section of this report.

Silver and Stocker Creeks

Silver Creek mark and recapture electrofishing samples were completed from June 19 to 21 and June 26 to 28, respectively. Habitat data was collected on July 7. Transect length at the lower Stalker Creek; Silver Creek, Cabin site; and Silver Creek, Martin Bridge locations were 795 m, 1,190 m, and 840 m, respectively. Mean transect widths at the lower Stalker Creek, Silver Creek - Cabin site, and Silver Creek - Martin Bridge locations were 9.00 m, 29.74 m, and 18.12 m, respectively.

Fish sampled in the Stalker Creek transect included wild rainbow trout (39%), brown trout (43%), bridgelip sucker (13%), longnose dace *Rhinichthys cataractae* (3%), and speckled dace *R. osculus* (3%) (Table 25).

Mean total length of sampled rainbow trout was 178 mm and ranged from 105 mm to 395 mm (Figure 31). Relative stock density (RSD – 400) was zero (Figure 32). Relative weight of rainbow trout ranged from 0.93 to 0.79 for fish greater than or equal to 100 mm and decreased with total length. Rainbow trout annual mortality was estimated at 55% for ages one to six (Figure 33). Mean length of rainbow trout at age four for all transects was estimated at 345 mm (Figure 34).

Mean total length of sampled brown trout was 254 mm and ranged from 64 mm to 610 mm (Figure 35). Relative stock density (RSD – 400) was 31 (Figure 32). Relative weight of brown trout ranged from 0.90 to 0.82 for fish greater than or equal to100 mm and demonstrated no specific trend with size. Brown trout annual mortality was estimated at 37% for ages zero to nine (Figure 36). Mean length of brown trout at age four for all transects was estimated at 367 mm (Figure 34).

A total of 119 and 174 rainbow trout were collected in the Lower Stalker Creek transect during the marking and recapture runs, respectively. The capture efficiency rate (R/M ratio unadjusted for size selectivity) was 22% for fish equal or greater than 100 mm. The estimated number of rainbow trout in the sample reach (≥ 100 mm) was 768 ± 235 (95% CI), which equated to 1,073 rainbow trout/ha (Table 25).

A total of 131 and 374 brown trout were collected in the Lower Stalker Creek transect during the marking and recapture runs, respectively. The capture efficiency rate (R/M ratio unadjusted for size selectivity) was 36% for fish equal or greater than 100 mm. The estimated number of brown trout in the sample reach (≥ 100 mm) was 324 ± 77 (95% CI), which equated to 453 brown trout/ha (Table 25).

Fish sampled in the Silver Creek Cabin transect included wild rainbow trout (59%), brown trout (39%), longnose dace (1%), Paiute sculpin *Cottus beldingii* (< 1%), redside shiner *Richardsonius balteatus* (< 1%), and speckled dace (< 1%) (Table 26).

Mean total length of sampled rainbow trout was 178 mm and ranged from 75 mm to 433 mm (Figure 37). Relative stock density (RSD – 400) was 4 (Figure 32). Relative weight of rainbow trout ranged from 0.93 to 0.73 for fish greater than or equal to 100 mm and decreased with total length. Rainbow trout annual mortality was estimated at 53% for ages one to six (Figure 38).

Mean total length of sampled brown trout was 255 mm and ranged from 64 mm to 610 mm (Figure 39). Relative stock density (RSD – 400) was 33 (Figure 32). Relative weight of brown trout ranged from 0.91 to 0.78 for fish greater than or equal to 100 mm and decreased with total length (Figure 46). Brown trout annual mortality was estimated at 30% for ages zero to nine (Figure 40).

A total of 236 and 323 rainbow trout were collected in the Silver Creek Cabin transect during the marking and recapture runs, respectively. The capture efficiency rate (R/M ratio unadjusted for size selectivity) was 17% for fish equal or greater than 100 mm. The estimated number of rainbow trout in the sample reach (≥ 100 mm) was 2,054 ± 594 (95% CI), which equated to 580 rainbow trout/ha (Table 25).

A total of 158 and 186 brown trout were collected in the Silver Creek Cabin transect during the marking and recapture runs, respectively. Our capture efficiency rate (R/M ratio unadjusted for size selectivity) was 31% for fish equal or greater than 100 mm. The estimated number of brown trout in the sample reach (≥ 100 mm) was 366 ± 81 (95% CI), which equated to 103 brown trout/ha (Table 25).

Fish sampled in the Silver Creek Martin Bridge transect included wild rainbow trout (9%), brown trout (38%), bridgelip sucker (35%), longnose dace (2%), redside shiner (13%) and speckled dace (2%) (Table 25).

Mean total length of sampled rainbow trout was 210 mm and ranged from 45 mm to 385 mm (Figure 41). Relative stock density (RSD – 400) was zero (Figure 32). Relative weight of rainbow trout ranged from 1.06 to 0.73 and decreased with total length (Figure 46). Rainbow trout annual mortality was estimated at 42% for ages one to six (Figure 42).

Mean total length of sampled brown trout was 301 mm and ranged from 55 mm to 600 mm (Figure 43). Relative stock density (RSD – 400) was 24 (Figure 32). Relative weight of brown trout ranged from 1.07 to 0.76 for fish greater than or equal to 100 mm and generally decreased with total length (Figure 46). Brown trout annual mortality was estimated at 28% for ages zero to nine (Figure 44).

A total of 41 and 43 rainbow trout were collected in the Silver Creek Martin Bridge transect during the marking and recapture runs, respectively. Our capture efficiency rate (R/M ratio unadjusted for size selectivity) was 7.5% for fish equal or greater than 100 mm. Fewer than five total recaptures precluded a rainbow trout population estimate in the sample transect (Table 25). A total of 80 individual fish (≥ 100 mm) were sampled equating to a minimal estimate of 53 rainbow trout/ha (Table 26).

A total of 119 and 174 brown trout were collected in the Silver Creek Martin Bridge transect during the marking and recapture runs, respectively. Our capture efficiency rate (R/M ratio unadjusted for size selectivity) was 32% for fish equal or greater than 100 mm. Estimated number of brown trout in the sample reach (≥ 100 mm) was 538 ± 103 (95% CI), which equated to 353 brown trout/hectare (Table 25).

Relative abundances of species sampled within survey transects represented only minor transect specific changes from 2004 IDFG survey results (Ryan and Megargle in review). Notable observed shifts in relative abundance within the Stalker Creek transect included increases of 9% and 18% in rainbow and brown trout, respectively and a reduction of 9% abundance in redside shiner. Redside shiner observed in the sample catch also declined in the Silver Creek Martin Bridge sample transect by approximately 16%. Notable observed shifts in relative abundance within the Silver Creek Cabin transect included an increase of approximately 15% in rainbow trout and the absence of bridgelip sucker in the sample representing an approximate decline of 9%. In contrast the relative abundance of bridgelip suckers observed the sample catch within the Silver Creek Martin Bridge sample transect increased by approximately 16%. The relative proportions of rainbow trout and brown trout in the catch from combined sample transects were 46% and 54%, respectively. Observed proportions represent little to no change from 2007, but represented a potential stabilizing shift in the trend observed since 1977 (Figure 45) (Wilkison 1996, Ryan and Megargle 2004).

Trends in density estimates of rainbow and brown trout equal or greater than 100 mm including survey years 2001, 2004, and 2007 indicated sampled populations are stable in both the Stalker Creek and Silver Creek Martin Bridge sample transects (Figure 46). Density estimates in both transects varied by survey year, but overlapping confidence intervals suggest differences were not significant. Shifts in brown trout abundance from 2001 to 2004 in the Stalker Creek transect did not follow the observed trend and declined considerably. Brown trout relative stock densities (RSD - 400) within the Stalker Creek transect also declined in this period . A similar trend was observed from 2001 to 2007 in the Silver Creek Cabin transect.

Observed trends in density estimates from the Silver Creek Cabin transect indicated densities of both rainbow and brown trout have declined from previous survey levels (Figure 46). Density declines in rainbow and brown trout were significant from 2001 to 2007 and from 2004 to 2007. A considerable decline in brown trout relative stock density (RSD 400) values from 2001 to 2004 in the same transect was also observed.

Trends in rainbow trout density and associated population structure suggested that rainbow and brown trout populations have been stable with the exception of declines in both rainbow trout and brown trout abundance observed in the Silver Creek Cabin transect and the observed decline in brown trout density between 2001 and 2004 in Stalker Creek. Declines in brown trout density from the 2001 survey year likely do not reflect comparable shifts in density in either sample transect. Surveys in 2001 were completed in mid to late September. Seasonal upstream migration of both rainbow and brown trout in the Silver Creek system has been observed by Young et al. 1997 and may have inflated 2001 estimates in both locations. Observed RSD values support the suggestion that a greater proportion of large spawning size fish was present during this survey. It is recommended that survey sampling continue to be conducted in early to mid June and that trends in sample transects be maintained from 2004 for consistent comparisons among years.

Observed changes in rainbow and brown trout densities in the Silver Creek Cabin transect from 2004 to 2007 likely do reflect representative declines in density. Population declines in rainbow and brown trout appeared to parallel each other indicating consistent changes among species. Non overlapping confidence bounds provided an indication the declining trends were significant. The cause of the measured decline in abundance in both rainbow and brown trout was not specifically defined.

Changes in habitat within the Silver Creek, Cabin transect potentially relate to observed population declines. A noticeable decline in aquatic vegetation within the Silver Creek Cabin reach was observed during the 2007 sampling period; although, no measure of aquatic vegetation presence was made. Vegetation loss was not observed in Lower Stalker Creek, but was observed to a lesser degree in the Silver Creek, Martin Bridge transect. Habitat changes appeared to continue up Grove Creek. Aquatic vegetation loss had the potential to reduce available cover providing a causal agent of density declines. Aquatic vegetation loss also had the potential to reduce capture efficiencies by increasing the opportunity for fish to flee. However, estimated capture efficiencies remained comparable among all sample transects.

The cause of aquatic vegetation loss was unclear. A high water event occurred in 2006 and noticeably changed substrate composition. The observed change in substrate may have influenced vegetation growth. It is recommended that substrate composition be monitored to follow trends that may be associated with vegetation growth.

Annual mortality and conditional indices represented initial values for use in future trend monitoring. Values were not estimated in previous sample years. Estimated annual mortality and relative weight values in 2007 were considered reasonable in all transects. Estimated values were also comparable among transects with the exception of rainbow trout annual mortality in the Silver Creek, Martin Bridge transect. Rainbow trout annual mortality in the Martin Bridge transect was approximately ten percent less than that described in other transects.

MANAGEMENT RECOMMENDATIONS

- A shift to conservative harvest regulations on the Big Wood River is not current warranted.
- Consider reevaluating creel activity on the Big Wood River in a year with high fall reservoir water levels in Magic Reservoir.
- Maintain Silver Creek drainage survey sample timing in early to mid June for consistency.
- Continue Silver Creek drainage trend sampling transects from 2004 in combination with consistent survey timing and methods for comparisons among years.
- Monitor Silver Creek habitat variables including substrate composition in association with trout densities.

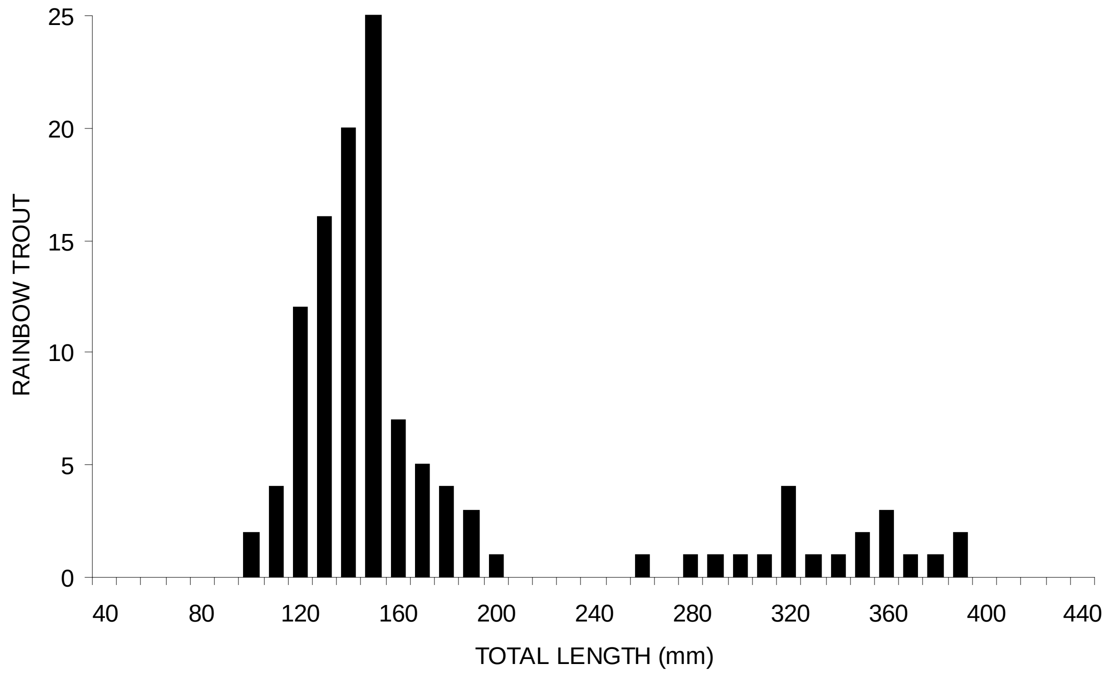


Figure 31. Length frequency histogram of rainbow trout collected in the Stalker Creek, Idaho 2007

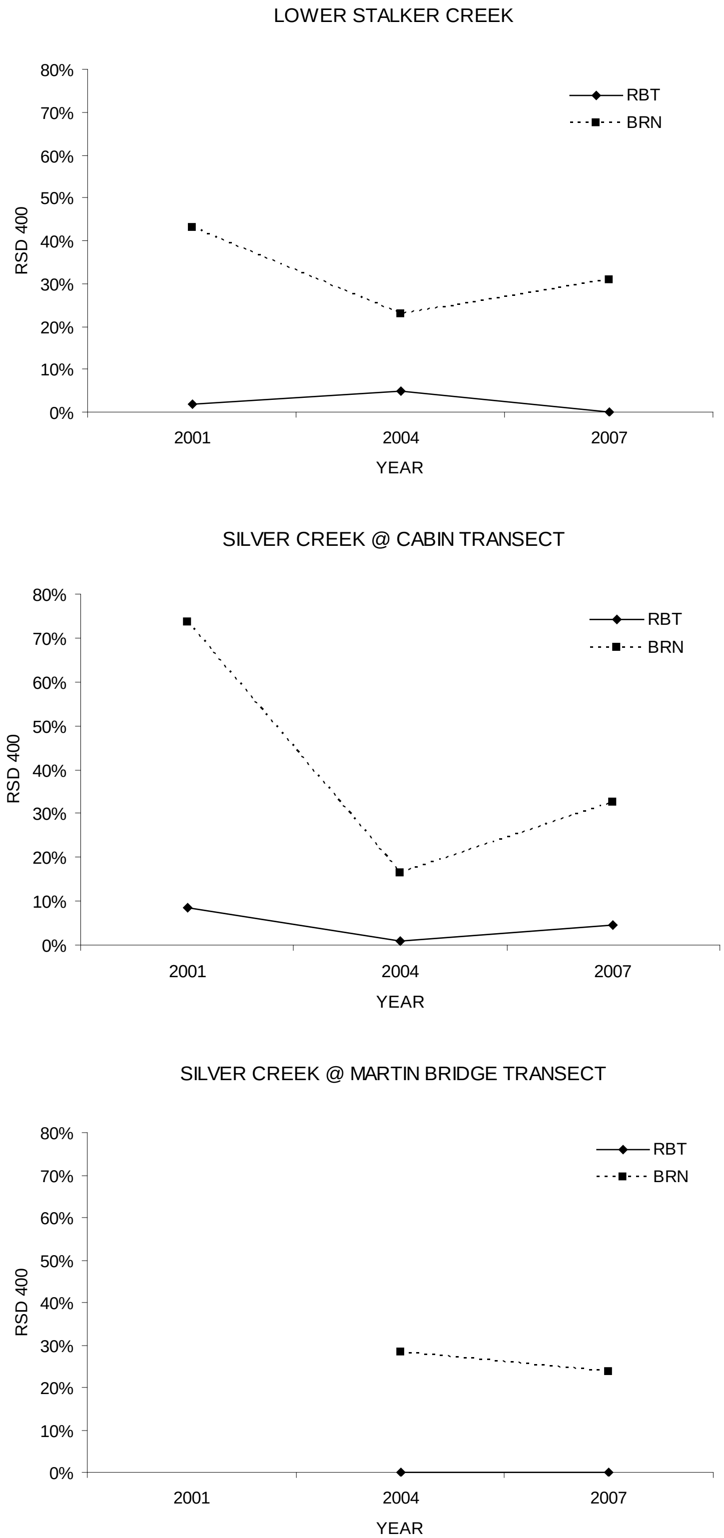


Figure 32. Relative stock density (RSD 400) of rainbow and brown trout by survey transect and year in Stalker Creek and Silver Creek, Idaho.

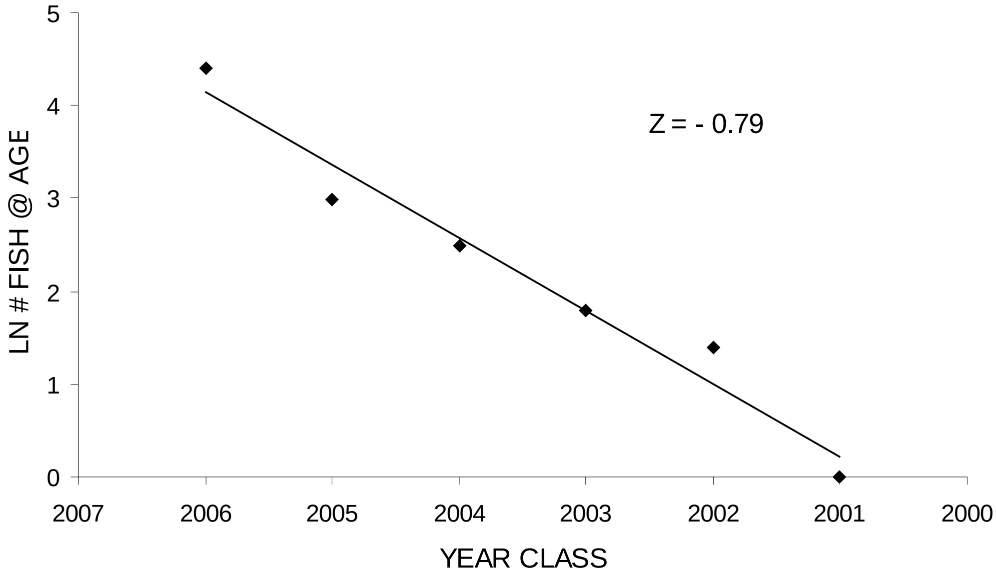


Figure 33. Catch curve representing rainbow trout collected in Stalker Creek, Idaho 2007.

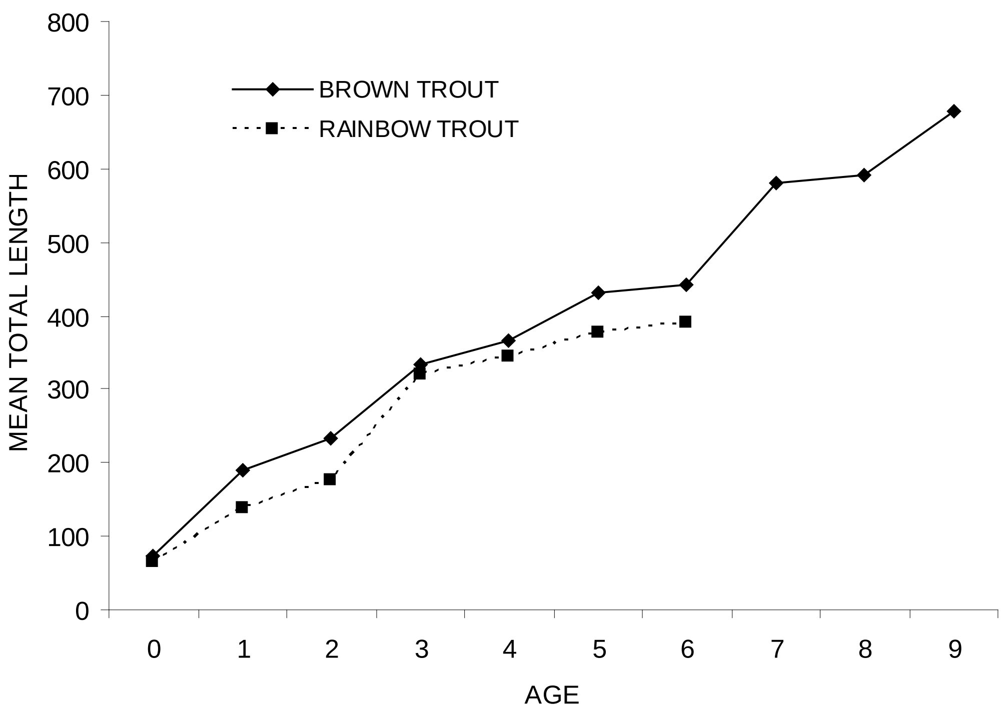


Figure 34. Estimated mean total length at age of rainbow and brown trout collected in Stalker Creek and Silver Creek, Idaho in 2007.

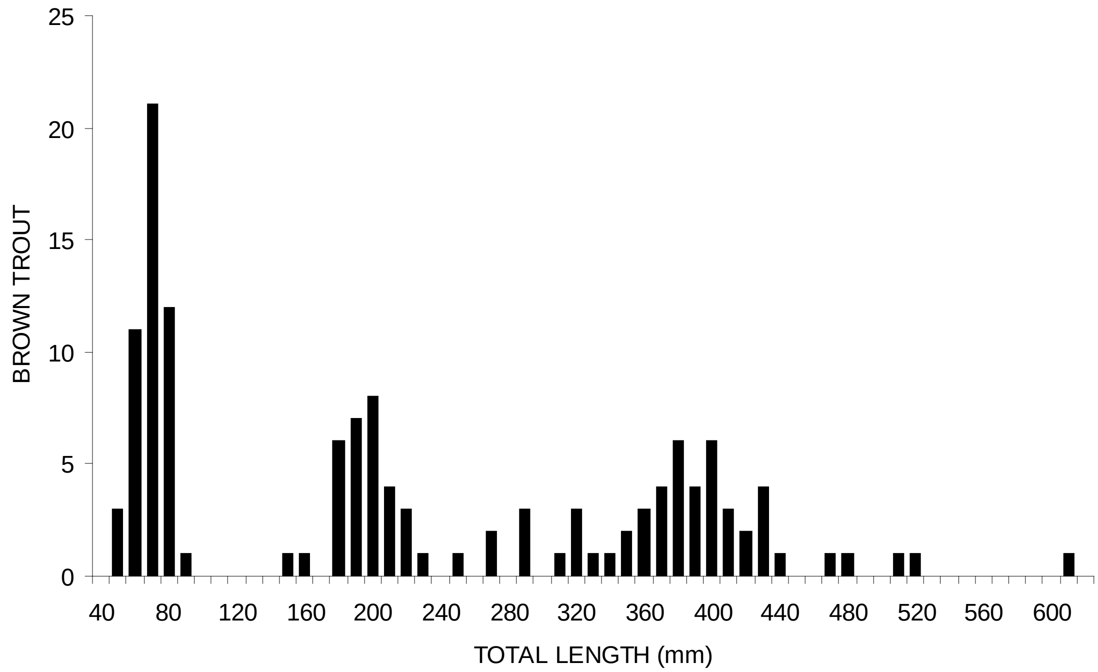


Figure 35. Length frequency histogram of brown trout collected in the Stalker Creek, Idaho 2007

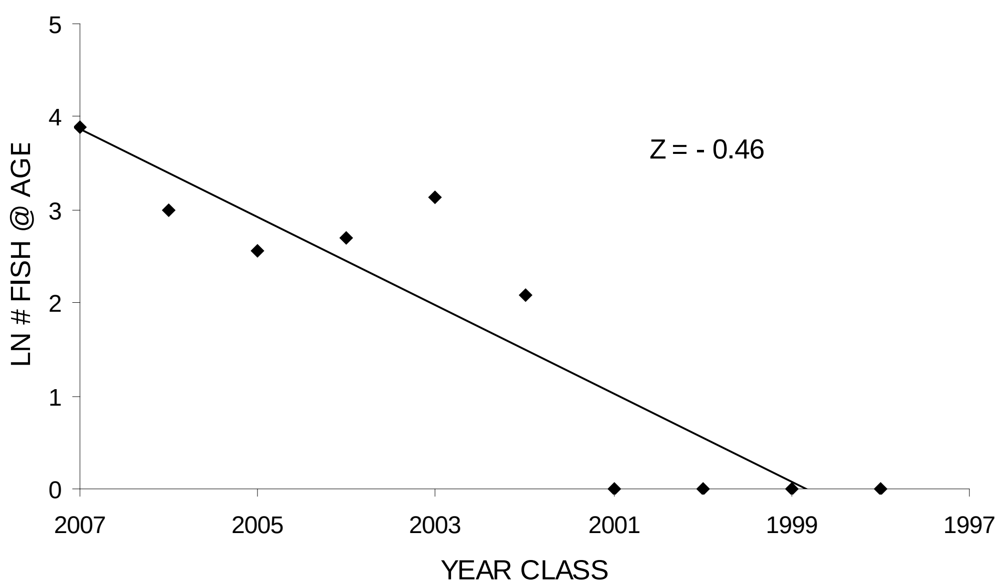


Figure 36. Catch curve representing brown trout collected in Stalker Creek, Idaho 2007.

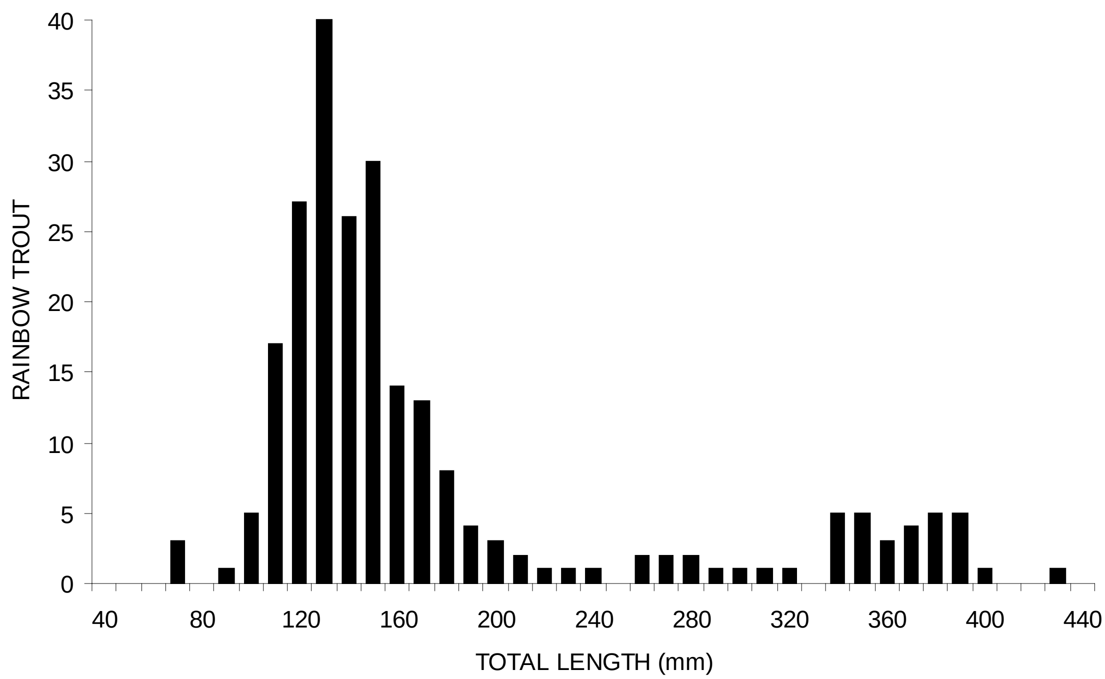


Figure 37. Length frequency histogram of rainbow trout collected in the Cabin transect Silver Creek, Idaho 2007

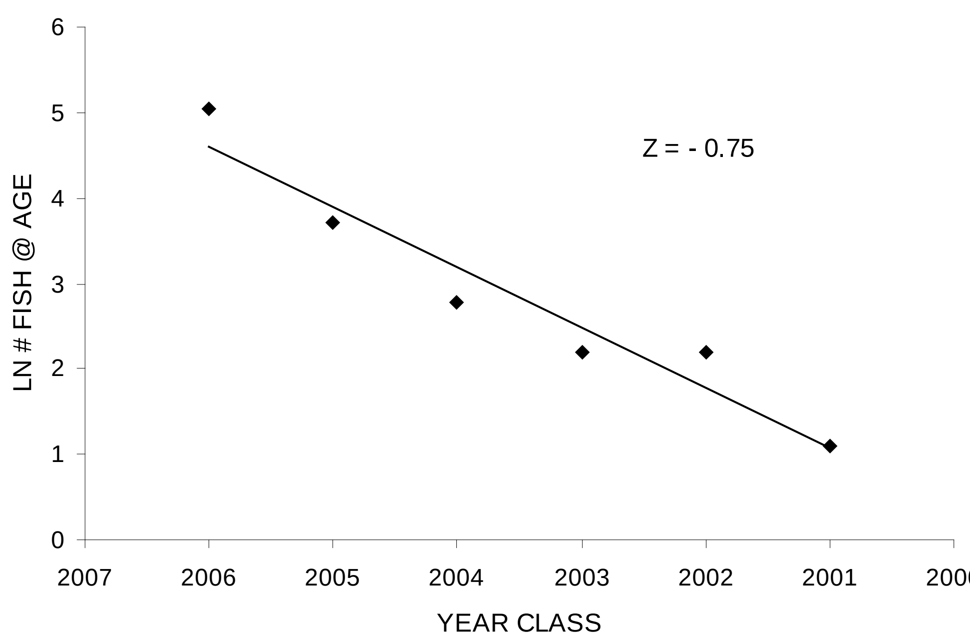


Figure 38. Catch curve representing rainbow trout collected at the Cabin site in Silver Creek, Idaho 2007.

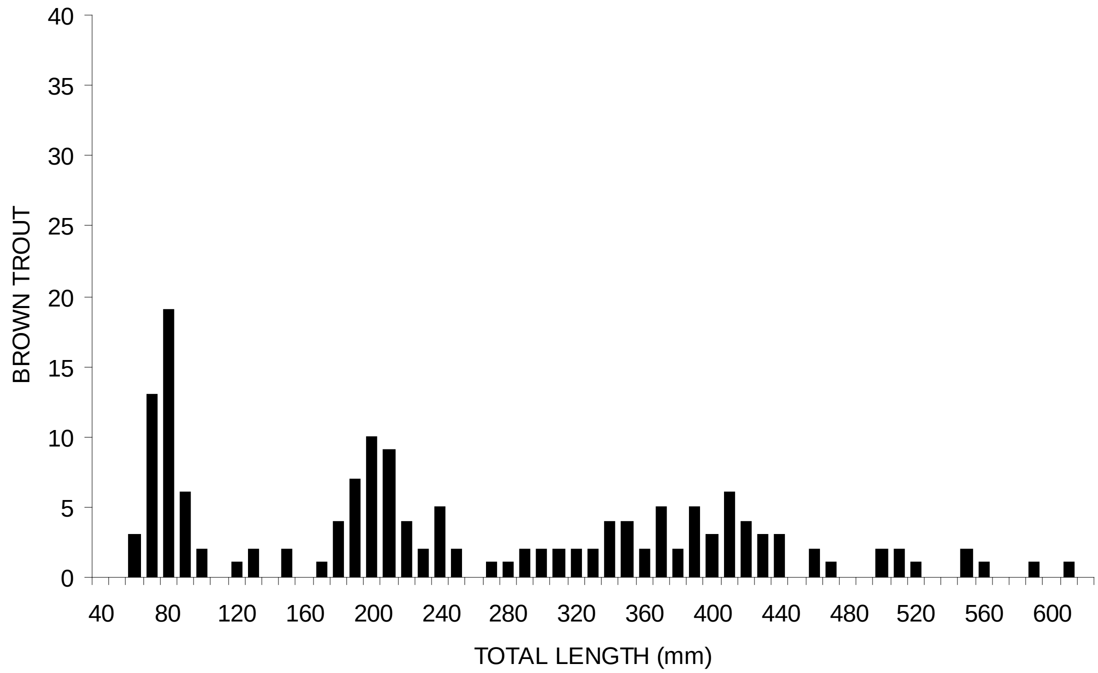


Figure 39. Length frequency histogram of brown trout collected in the Cabin transect Silver Creek, Idaho 2007

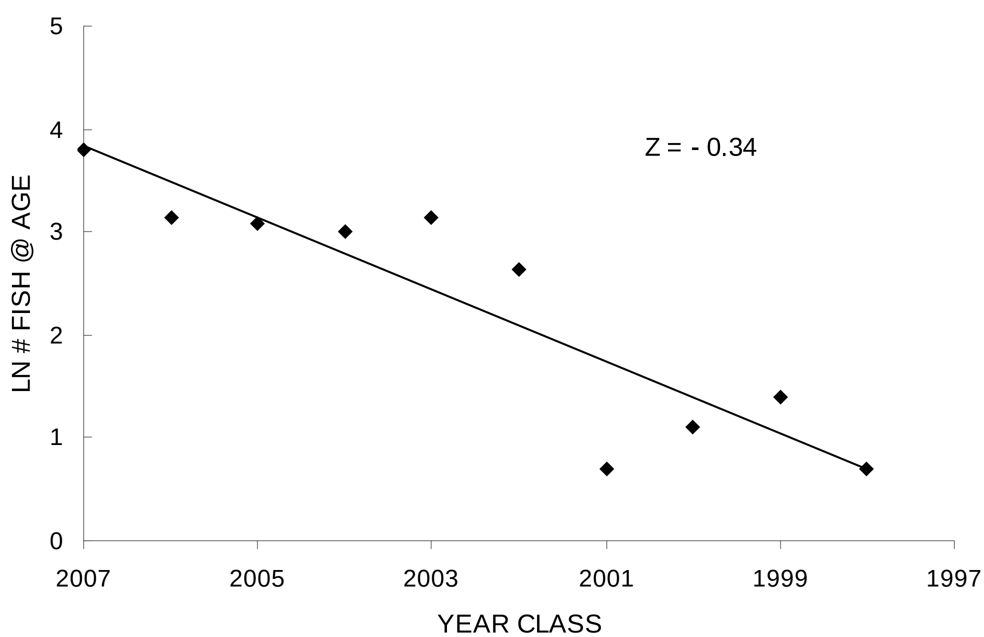


Figure 40. Catch curve representing brown trout collected at the Cabin site in Silver Creek, Idaho 2007.

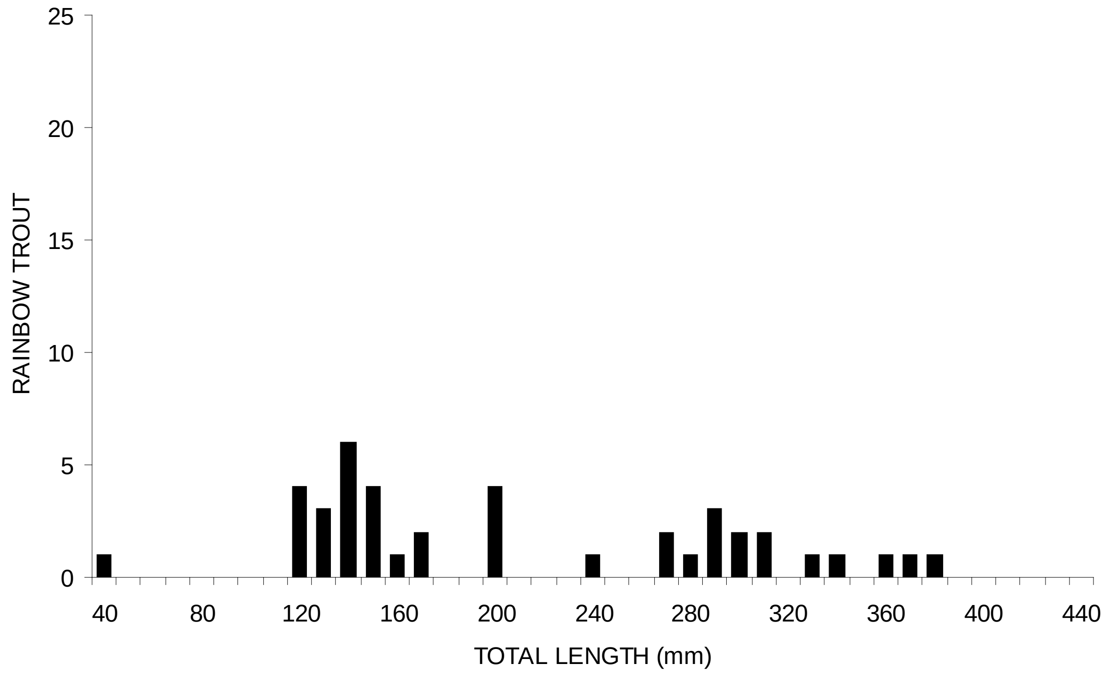


Figure 41. Length frequency histogram of rainbow trout collected in the Martin transect Silver Creek, Idaho 2007

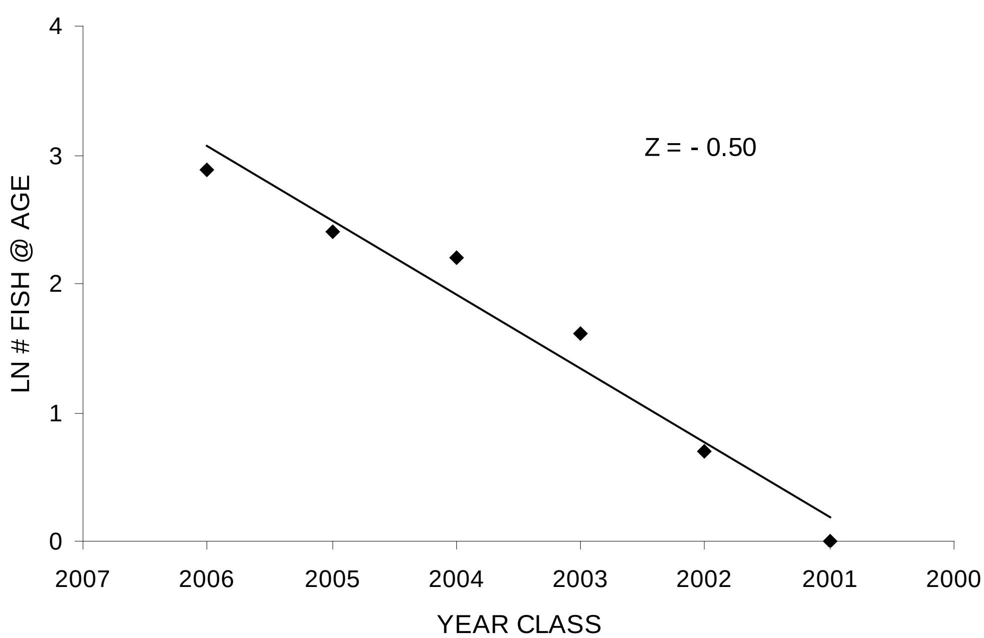


Figure 42. Catch curve representing rainbow trout collected at the Martin site in Silver Creek, Idaho 2007.

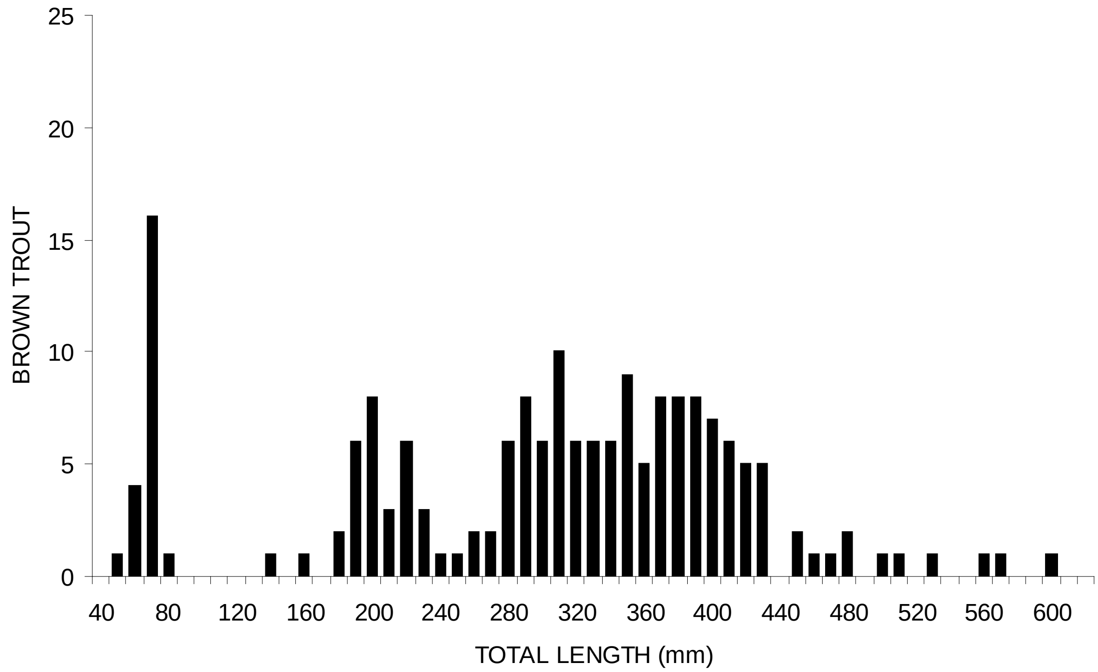


Figure 43. Length frequency histogram of brown trout collected in the Martin transect Silver Creek, Idaho 2007

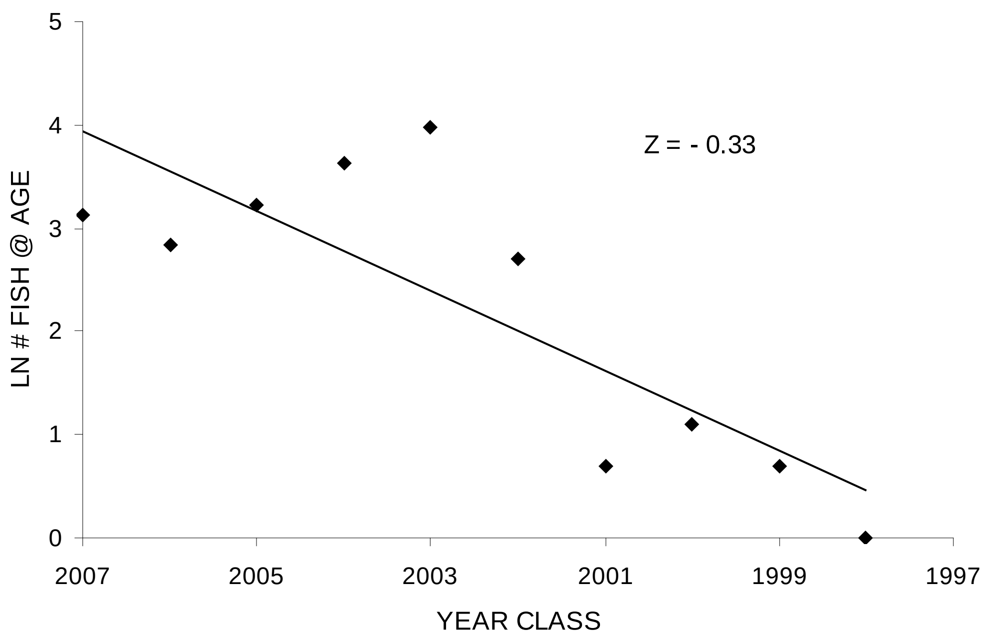


Figure 44. Catch curve representing brown trout collected at the Martin site in Silver Creek, Idaho 2007.

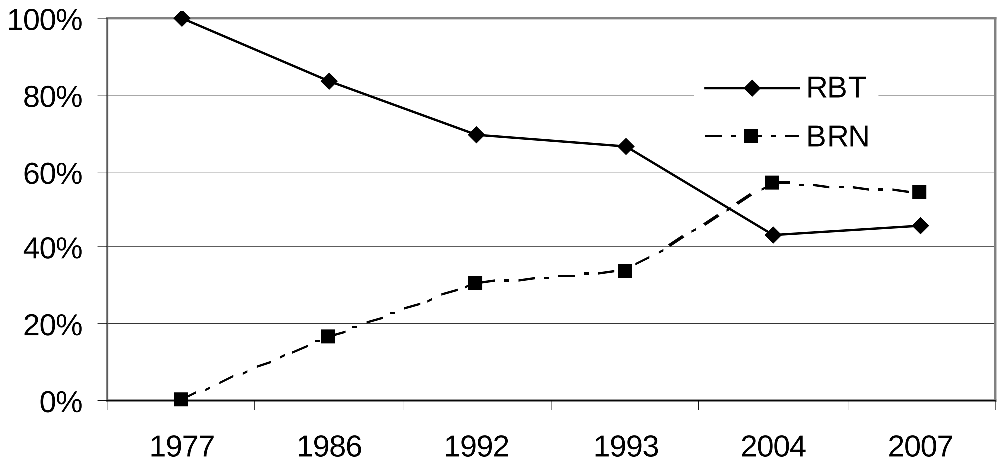


Figure 45. Relative proportions of rainbow and brown trout by year from combined sample sites on Silver Creek and Stalker Creek, Idaho upstream and including the Martin Bridge transect. Surveys represent a variety of sample techniques over time.

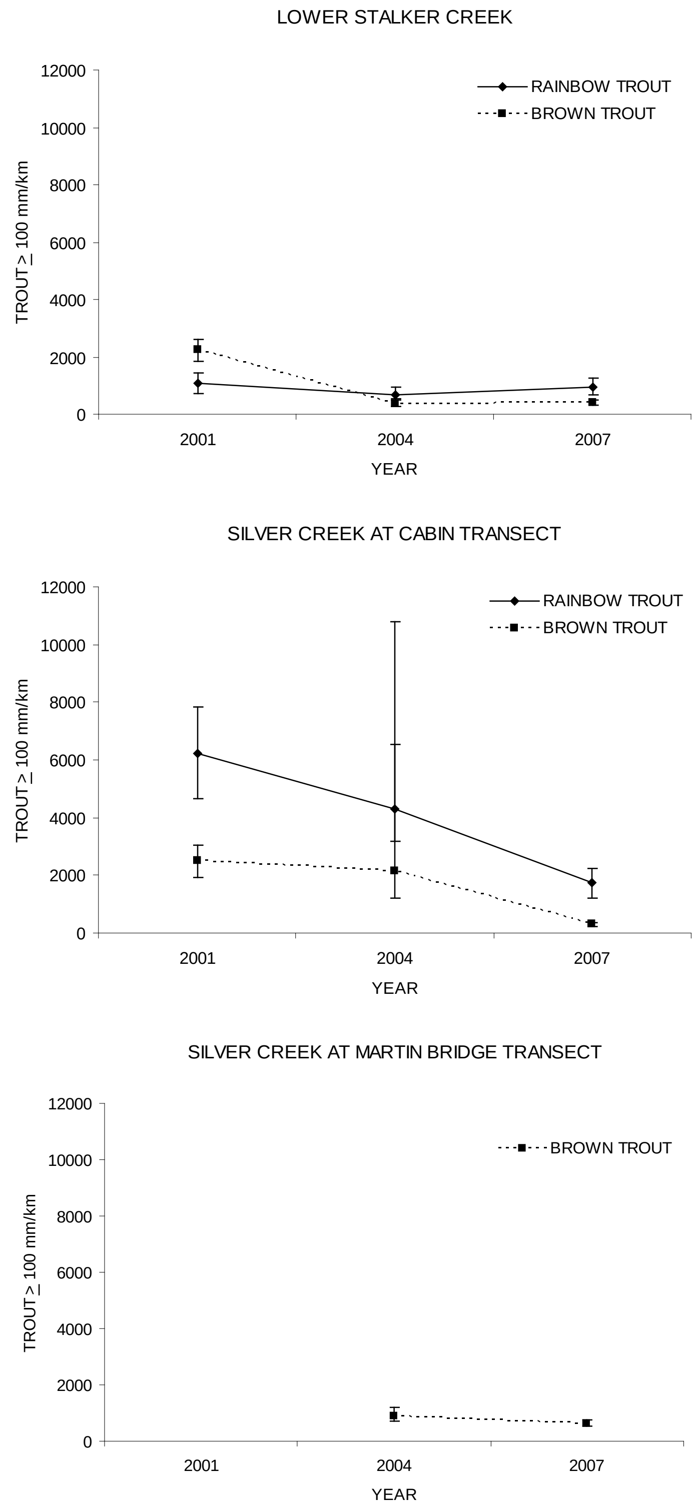


Figure 46. Density estimates and 95% confidence intervals of rainbow and brown trout equal or greater than 100 mm, per kilometer, by year from Stalker Creek and Silver Creek, Idaho.

Table 25. Population and density estimates of rainbow and brown trout by survey transect and size class from Stalker Creek and Silver Creek, ID 2007. Mark and recapture data values were summarize by marked fish (M), captured fish in the second sampling pass (C), recaptured fish in the second sampling pass (R), estimated population size in the sampled reach (EST), and the 95 % confidence interval of the population estimate (± 95% CI). Linear and area density estimates were standardized by kilometer (#/km) and hectare (#/ha).

TRANSECT	SPECIES	SIZE CLASS	M	C	R	EST	SD EST	± 95% CI	LENGTH	MEAN WIDTH	#/km	#/ha
STALKER	Rainbow trout	100 - 199 mm	98	136	16	797	160	320	795	9.0	1003	1114
STALKER	Rainbow trout	200 - 399 mm	21	33	8	82	17	35	795	9.0	103	115
STALKER	Rainbow trout	100 - 499 mm	119	172	26	768	118	235	795	9.0	966	1073
STALKER	Brown Trout	100 - 199 mm	15	33	5	90	25	49	795	9.0	113	126
STALKER	Brown Trout	200 - 299 mm	22	47	8	122	27	55	795	9.0	153	171
STALKER	Brown Trout	300 - 399 mm	25	25	9	67	13	25	795	9.0	84	94
STALKER	Brown Trout	400 - 599 mm	20	18	9	39	6	12	795	9.0	49	55
STALKER	Brown Trout	100 - 699 mm	83	123	31	324	38	77	795	9.0	408	453
CABIN	Rainbow trout	100 - 199 mm	184	258	27	1710	277	553	1190	29.7	1437	483
CABIN	Rainbow trout	200 - 299 mm	15	25	5	66	17	35	1190	29.7	55	19
CABIN	Rainbow trout	100 - 499 mm	231	309	34	2054	297	594	1190	29.7	1726	580
CABIN	Brown Trout	100 - 199 mm	19	20	3[A]	104	38	76	1190	29.7	87	29
CABIN	Brown Trout	100 - 299 mm	55	53	14	201	37	73	1190	29.7	169	57
CABIN	Brown Trout	200 - 299 mm	36	33	11	104	19	38	1190	29.7	87	29
CABIN	Brown Trout	300 - 399 mm	30	33	10	95	18	37	1190	29.7	80	27
CABIN	Brown Trout	400 - 699 mm	32	28	12	73	11	23	1190	29.7	61	21
CABIN	Brown Trout	100 - 699 mm	117	114	36	366	41	81	1190	29.7	308	103

Table 25. Continued

TRANSECT	SPECIES	SIZE CLASS	M	C	R	EST	SD EST	± 95% CI	LENGTH	MEAN WIDTH	#/km	#/ha
MARTIN	Rainbow trout	100 - 499 mm	40	43	3	**80*	NA	NA	840	18.1	**95*	**53*
MARTIN	Brown trout	100 - 199 mm	10	14	1[A]	82	40	80	840	18.1	98	54
MARTIN	Brown trout	100 - 299 mm	50	71	13	261	52	104	840	18.1	311	171
MARTIN	Brown trout	200 - 299 mm	40	57	12	182	36	71	840	18.1	217	120
MARTIN	Brown trout	300 - 399 mm	72	61	24	180	22	44	840	18.1	214	118
MARTIN	Brown trout	400 - 699 mm	35	41	13	107	18	36	840	18.1	127	70
MARTIN	Brown trout	100 - 699 mm	157	173	50	538	52	103	840	18.1	640	353

**Values represent minimum estimates bases on total fish sampled*
[A] *Values represent insufficient recaptures*

Table 26. Silver Creek and Stalker Creek 2007 catch summary by location and species. Includes only marking run data. Summary includes total caught (N), relative abundance in catch (% CATCH), mean total length (mm), standard deviation of total length (SD), mean weight (g), and standard deviation of weight (SD).

				TOTAL LENGTH		WEIGHT	
SITE	SPECIES	N	% CATCH	MEAN	SD	MEAN	SD
Stalker	Bridgelip sucker	39	12.79%	153	60	59	66
Stalker	Brown trout	131	42.95%	226	145	238	324
Stalker	Longnose dace	8	2.62%	71	19	4	3
Stalker	Rainbow trout	119	39.02%	178	76	84	125
Stalker	Specked dace	8	2.62%	74	7	4	1
Cabin	Brown trout	158	39.30%	254	145	286	360
Cabin	Longnose dace	4	1.00%	82	17	7	3
Cabin	Rainbow trout	236	58.71%	178	82	90	137
Cabin	Redside shiner	1	0.25%	80	--	5	--
Cabin	Paiute sculpin	2	0.50%	75	7	6	3
Cabin	Speckled dace	1	0.25%	76	--	4	--
Martin	Bridgelip sucker	163	34.98%	187	60	100	74
Martin	Brown trout	179	38.41%	301	120	363	316
Martin	Longnose dace	11	2.36%	72	14	4	2
Martin	Rainbow trout	41	8.80%	210	87	132	127
Martin	Redside shiner	61	13.09%	79	14	6	3
Martin	Speckled dace	11	2.36%	67	8	4	1

LITERATURE CITED

Anderson, R. O. and R. M. Neumann. 1996. Length, weight, and associated structural indices. Pages 447-482 in B.R. Murphy and D.W. Willis, editors. Fisheries techniques. 2nd edition. American Fisheries Society, Bethesda, Maryland.

Dillon, J.C. 1992. Lake and Reservoir Investigations. Job Completion Report, Project F-73-R-14. Idaho Department of Fish and Game, Boise.

Devries, D. R. and R. V. Frie. 1996. Determination of age and growth. Pages 483-508 in B. R. Murphy and D. W. Willis, editors. Fisheries Techniques. American Fisheries Society, Bethesda, Maryland.

Duffy, M. J., J. L. McNulty, and T. E. Mosindy. 2000. Identification of sex, maturity, and gonad condition of walleye (Stizostedian vitreum), Ontario Ministry of Natural Resources Northwest Science and Technology, Thunder Bay, Ontario, NWST FG-05.

Gangle, R. S. and D. L. Pereira. 2003. Biological performance indicators for evaluating exploitation of Minnestoa's large-lake walleye fisheries. North American Journal of Fisheries Management 23: 1303-1311.

Ministry of Natural Resources (MNR). 2005. Walleye state of the resource report for southern region. http://mrn.gov.on.ca

Morgan, G. E. 2002. Manual of instructions – fall walleye index netting (FWIN). Percid community synthesis, diagnostics, and sampling standards working group. Cooperative Freshwater Ecology Unit. Sudbury, Ontario.

Ney, J. J. 1993. Practical use of biological statistics. Pages 137-158 in C. C. Kohler and W. A. Hubert, editors. Inland fisheries management in North America. American Fisheries Society, Bethesda, Maryland.

Olsen, R.A. and R. Bell. 1987. Regional fisheries management investigation. 1985 Job Performance Report, Project F-71-R-10, Idaho Department of Fish and Game. Boise.

Partridge, F. E. and C. D. Warren 1995. Job completion report, project F-71-R-18, Regional fisheries management investigations. Idaho Department of Fish and Game. Boise.

Quinn, T. J., II, and R. B. Deriso. 1999. Quantitative fish dynamics. Oxford University Press, New York.

Ricker, W.E. 1975. Computations and Interpretation of Biological Statistics of Fish Populations. Bulletin No. 191. Bulletin of the Fisheries Research Board of Canada. Ottawa.

Rieman, B. E. 1992. Job Completion Report, Project F-73-R-14. Kokanee salmon population dynamics – kokanee salmon monitoring guidelines. Idaho Department of Fish and Game. Boise.

Ryan, R. G., D. J. Megargle, E. Gutknecht. In review. 2004 Job Completion Report, Project F-71-R-29, Boise. Regional fisheries management investigations. Idaho Department of Fish and Game. Boise.

Ryan, R.G. and D. J. Megargle. In review. 2005 Job Completion Report, Project F-71-R-30, Regional fisheries management investigations. Idaho Department of Fish and Game. Boise.

Ryan, R.G. and D. J. Megargle. In review. 2006 Job Completion Report, Project F-71-R-31, Regional fisheries management investigations. Idaho Department of Fish and Game. Boise.

Spall, R., W. Foster, and J. Griffith. 1996. Silver Creek whirling disease: 1995 survey. Final report to: The Nature Conservancy, Idaho Field Office.

Simpkins, D.G. and W.A. Hubert. 1996. Proposed revision of the standard-weight equation for rainbow trout. Journal of Freshwater Ecology 11(3):319-325

Teuscher, D. 1999. Project 8 – Hatchery Trout Evaluations. Project F-73-R-21; Subproject 2: Zooplankton Quality Index. IDFG Report No. 99-23. Idaho Department of Fish and Game. Boise.

U.S.G.S. (U.S. Geological Survey). 1996. Water Resources Data – Idaho, Water Year 1995, Vol. 2. Upper Columbia River Basin and Snake River Basin below King Hill. USGS, Boise.

Van Den Avyle, M. J. 1993. Dynamics of exploited fish populations. Pages 105-134 in C. C. Kohler and W. A. Hubert, editors. Inland fisheries management in North America. American Fisheries Society, Bethesda, Maryland.

VanDeValk, A. J., J. L. Forney, J. R. Jackson, L. G. Rudstam, T. E. Brooking, and S. D. Krueger. 2005. Angler catch rates and catchability of walleyes in Oneida Lake, New York. North American Journal of Fisheries Management 25(4): 1441-1447.

Warren, C.D., F.E. Partridge, and K. Frank 2001. Regional fisheries management investigations (1997). Idaho Department of Fish and Game. Job Completion Report, Project F-71-R-22, Boise.

Warren, C.D., F. Partridge, and K.A. Frank. 2003. 1998 Job Performance Report, Project F-71-R-23. Regional fisheries management investigation. Idaho Department of Fish and Game. Boise.

Warren, C.D., F. Partridge, D. Megargle, and K.A Frank. 2007. 2001 Job Performance Report, Project F-71-R-26, Regional fisheries management investigation. Idaho Department of Fish and Game. Boise.

Warren, C. D. and D. J. Megargle. In Review. 2003 Job Performance Report, Project F-71-R-28, Regional fisheries management investigation. Idaho Department of Fish and Game. Boise.

Washington Department of Fish and Wildlife (WDFW). 2005. Results of the 2005 WDFW fall walleye index netting (FWIN) surveys, Sprague Lake, Scooteny Reservoir, Moses Lake, Potholes Reservoir, Banks Lake and Lake Roosevelt. http://wdfw.wa.gov.

Wilkison, R.A. 1996. Fish Community Structure and Brown Trout Predation in Upper Silver Creek, Idaho. Master of Science Thesis. Idaho State University, Pocatello.

Williams, R.N., M.S. Powell, M.R. Campbell. 2000. Genetic analysis of rainbow trout Oncorhynchus mykiss from Silver Creek Preserve of The Nature Conservancy, Idaho. Center for Salmonid and Freshwater Species at Risk, and Aquaculture Research Institute Fish Genetics Lab, HFCES/University of Idaho.

Young, M.K., R.A. Wilkison, J.M. Phelps III, and J.S. Griffith. 1997. Contrasting movement and activity of large brown trout and rainbow trout in Silver Creek, Idaho. Great Basin Naturalist 57(3), pp. 238-244.

APPENDICES

Appendix A. Sample coordinates by location for Magic Valley Regional waters sampled in 2007.

Water	Location	Gear	Start / Set	End / Pull	Time (h:min)	E	N	Zone	Datum	Note
ANDERSON RANCH RESERVOIR	1	E-FISH			:15	634992	4806795	11	WGS84	SMB EVAL
ANDERSON RANCH RESERVOIR	2	E-FISH			:15	629654	4806357	11	WGS84	SMB EVAL
ANDERSON RANCH RESERVOIR	3	E-FISH			:15	636490	4812824	11	WGS84	SMB EVAL
ANDERSON RANCH RESERVOIR	4	E-FISH			~ :15	627447	4803093	11	WGS84	SMB EVAL
ANDERSON RANCH RESERVOIR	5	E-FISH			:15	631678	4806396	11	WGS84	SMB EVAL
ANDERSON RANCH RESERVOIR	6	E-FISH			:15	626095	4801734	11	WGS84	SMB EVAL
BASS LAKE #1	LAKE GENERAL	SINKING GILL NET	20:30	7:30	11:00	660671	4845262	11	WGS84	MT LAKE SURVEY
BASS LAKE #2	LAKE GENERAL	SINKING GILL NET	17:30	21:45	4:15	660773	4845019	11	WGS84	MT LAKE SURVEY
BIG WOOD RIVER	UPPER	REDD COUNT				717854	4801782	11	WGS84	REDD COUNTS
BIG WOOD RIVER	HWY 20 CROSSING	REDD COUNT				717419	4800641	11	WGS84	REDD COUNTS
BIG WOOD RIVER	USGS GAUGE	REDD COUNT				715608	4800424	11	WGS84	REDD COUNTS
BIG WOOD RIVER	SHEEP BRIDGE	REDD COUNT				714111	4800580	11	WGS84	REDD COUNTS
BIG WOOD RIVER	ROCK CREEK	REDD COUNT				712363	4800351	11	WGS84	REDD COUNTS
CAREY LAKE	1	TRAP NET	17:30	11:15	17:45	262605	4801808	12	WGS84	LOWLAKE
CAREY LAKE	2	TRAP NET	17:45	14:45	21:00	262681	4801850	12	WGS84	LOWLAKE
CAREY LAKE	3	FLOATING GILL NET	17:45	10:30	16:45	262854	4801733	12	WGS84	LOWLAKE
CAREY LAKE	4	SINKING GILL NET	18:10	10:45	16:35	262875	4801648	12	WGS84	LOWLAKE

Appendix A. Continued

Water	Location	Gear	Start / Set	End / Pull	Time (h:min)	E	N	Zone	Datum	Note
CAREY LAKE	5	SINKING GILL NET	18:15	11:00	16:45	263134	4801791	12	WGS84	LOWLAKE
CAREY LAKE	6	FLOATING GILL NET	18:20	11:10	16:50	262883	4801691	12	WGS84	LOWLAKE
CAREY LAKE	7	E-FISH			:15	262519	4801820	12	WGS84	LOWLAKE
CAREY LAKE	8	E-FISH			:15	262869	4801676	12	WGS84	LOWLAKE
CAREY LAKE	9	E-FISH			:15	262990	4801875	12	WGS84	LOWLAKE
CAREY LAKE	10	E-FISH			:15	263072	4801904	12	WGS84	LOWLAKE
LITTLE BEAR	LAKE GENERAL	SINKING GILL NET	21:00	9:10	12:10	662941	4845606	11	WGS84	MT LAKE SURVEY
MILNER	1	E-FISH			:15	277517	4710801	12	WGS84	SMB EVAL
MILNER	2	E-FISH			:15	262236	4714367	12	WGS84	SMB EVAL
MILNER	4	E-FISH			:15	257395	4712773	12	WGS84	SMB EVAL
MILNER	5	E-FISH			:15	261260	4713809	12	WGS84	SMB EVAL
MILNER	7	E-FISH			:15	268651	4714527	12	WGS84	SMB EVAL
MILNER	11	E-FISH			:15	274907	4711777	12	WGS84	SMB EVAL
MILNER	12	E-FISH			:15	262714	4714626	12	WGS84	SMB EVAL
MILNER	13	E-FISH			:15	275883	4711120	12	WGS84	SMB EVAL
MILNER	14	E-FISH			:15	271221	4715562	12	WGS84	SMB EVAL
MILNER	15	E-FISH			:15	272058	4715323	12	WGS84	SMB EVAL
MILNER	17	E-FISH			:15	269608	4714407	12	WGS84	SMB EVAL

Appendix A. Continued

Water	Location	Gear	Start / Set	End / Pull	Time (h:min)	E	N	Zone	Datum	Note
MILNER	18	E-FISH			:15	256239	4713530	12	WGS84	SMB EVAL
MILNER	19	E-FISH			:15	262695	4715025	12	WGS84	SMB EVAL
MILNER	20	E-FISH			:15	253689	4712714	12	WGS84	SMB EVAL
MILNER	23	E-FISH			:15	272855	4714586	12	WGS84	SMB EVAL
MILNER	24	E-FISH			:15	272855	4714586	12	WGS84	SMB EVAL
MORMON RESERVOIR	1	TRAP NET	16:10	10:00	17:50	678730	4793993	11	NAD27	LOWLAKE
MORMON RESERVOIR	2	TRAP NET	16:25	13:09	20:44	679038	4793031	11	NAD27	LOWLAKE
MORMON RESERVOIR	3	TRAP NET	16:50	15:00	22:10	678301	4793106	11	NAD27	LOWLAKE
MORMON RESERVOIR	4	FLOATING GILL NET	16:55	15:00	22:05	678143	4793225	11	NAD27	LOWLAKE
MORMON RESERVOIR	5	SINKING GILL NET	17:05	16:20	23:15	678326	4793253	11	NAD27	LOWLAKE
MORMON RESERVOIR	6	FLOATING GILL NET	17:15	16:20	23:05	679024	4793344	11	NAD27	LOWLAKE
MORMON RESERVOIR	7	SINKING GILL NET	17:30	10:30	17:00	677946	4792902	11	NAD27	LOWLAKE
MORMON RESERVOIR	8	FLOATING GILL NET	17:45	16:30	22:45	678396	4793564	11	NAD27	LOWLAKE
MORMON RESERVOIR	9	SINKING GILL NET	17:50	13:30	19:40	678630	4794119	11	NAD27	LOWLAKE
MORMON RESERVOIR	10	TRAP NET	18:10	10:10	16:00	677498	4790095	11	NAD27	LOWLAKE
MORMON RESERVOIR	11	FLOATING GILL NET	18:20	10:10	15:50	677924	4790617	11	NAD27	LOWLAKE
MORMON RESERVOIR	12	TRAP NET	18:39	13:10	18:31	675660	4791242	11	NAD27	LOWLAKE
MORMON RESERVOIR	13	FLOATING GILL NET	18:41	11:45	17:04	675729	4791301	11	NAD27	LOWLAKE

Appendix A Continued

Water	Location	Gear	Start / Set	End / Pull	Time (h:min)	E	N	Zone	Datum	Note
MORMON RESERVOIR	14	TRAP NET	19:11	14:00	18:49	675844	4792551	11	NAD27	LOWLAKE
MORMON RESERVOIR	15	SINKING GILL NET	19:30	12:10	16:40	677412	4791266	11	NAD27	LOWLAKE
MORMON RESERVOIR	16	SINKING GILL NET	19:43	14:40	18:57	675765	4790953	11	NAD27	LOWLAKE
MORMON RESERVOIR	17	SINKING GILL NET	19:00	14:50	19:50	675777	4792143	11	NAD27	LOWLAKE
MORMON RESERVOIR	18	FLOATING GILL NET	19:20	14:55	19:35	676060	4792329	11	NAD27	LOWLAKE
MORMON RESERVOIR	19	E-FISH			:15	675737	4790938	11	WGS84	LOWLAKE
MORMON RESERVOIR	20	E-FISH			:15	675573	4791252	11	WGS84	LOWLAKE
MORMON RESERVOIR	21	E-FISH			:15	676227	4792233	11	WGS84	LOWLAKE
MORMON RESERVOIR	22	E-FISH			:15	676453	4792641	11	WGS84	LOWLAKE
MORMON RESERVOIR	23	E-FISH			:15	676570	4792188	11	WGS84	LOWLAKE
MORMON RESERVOIR	24	E-FISH			:15	678297	4793277	11	WGS84	LOWLAKE
MORMON RESERVOIR	25	E-FISH			:15	678062	4793359	11	WGS84	LOWLAKE
MORMON RESERVOIR	26	E-FISH			:15	678227	4793104	11	WGS84	LOWLAKE
MORMON RESERVOIR	27	E-FISH			:15	678399	4794330	11	WGS84	LOWLAKE
MORMON RESERVOIR	28	E-FISH			:15	678735	4794171	11	WGS84	LOWLAKE
MORMON RESERVOIR	29	E-FISH			:15	679002	4793965	11	WGS84	LOWLAKE
MORMON RESERVOIR	30	E-FISH			:15	678767	4793786	11	WGS84	LOWLAKE
MORMON RESERVOIR	31	E-FISH			:15	679050	4793632	11	WGS84	LOWLAKE

Appendix A. Continued

Water	Location	Gear	Start / Set	End / Pull	Time (h:min)	E	N	Zone	Datum	Note
MORMON RESERVOIR	32	E-FISH			:15	679025	4793496	11	WGS84	LOWLAKE
MORMON RESERVOIR	33	E-FISH			:15	678887	4793266	11	WGS84	LOWLAKE
MORMON RESERVOIR	34	E-FISH			:15	677846	4793451	11	WGS84	LOWLAKE
MORMON RESERVOIR	35	E-FISH			:15	677700	4793090	11	WGS84	LOWLAKE
MORMON RESERVOIR	36	E-FISH			:15	677556	4792700	11	WGS84	LOWLAKE
MORMON RESERVOIR	RAMP	CAR COUNTERS				678416	4794230	11	NAD27	
OAKLEY RESERVOIR	1	E-FISH			:10	257136	4674383	12	WGS84	FORAGE
OAKLEY RESERVOIR	2	E-FISH			:10	257266	4673378	12	WGS84	FORAGE
OAKLEY RESERVOIR	3	E-FISH			:10	257134	4671937	12	WGS84	FORAGE
OAKLEY RESERVOIR	4	E-FISH			:10	257104	4671049	12	WGS84	FORAGE
OAKLEY RESERVOIR	5	E-FISH			:10	257148	4669935	12	WGS84	FORAGE
OAKLEY RESERVOIR	6	E-FISH			0	257294	4669374	12	WGS84	FORAGE
OAKLEY RESERVOIR	7	E-FISH			:10	257532	4671479	12	WGS84	FORAGE
OAKLEY RESERVOIR	8	E-FISH			:10	258998	4675653	12	WGS84	FORAGE
OAKLEY RESERVOIR	9	E-FISH			:10	258570	4675223	12	WGS84	FORAGE
OAKLEY RESERVOIR	10	E-FISH			:10	258142	4674793	12	WGS84	FORAGE
OAKLEY RESERVOIR	1	FWIN GILL NET	11:57	11:25	23:28	258452	4674140	12	WGS84	FWIN
OAKLEY RESERVOIR	2	FWIN GILL NET	12:12	10:23	22:11	259141	4675245	12	WGS84	FWIN

Appendix A. Continued

Water	Location	Gear	Start / Set	End / Pull	Time (h:min)	E	N	Zone	Datum	Note
OAKLEY RESERVOIR	3	FWIN GILL NET	11:21	11:16	23:55	257454	4672915	12	WGS84	FWIN
OAKLEY RESERVOIR	4	FWIN GILL NET	12:28	10:52	22:24	258200	4674777	12	WGS84	FWIN
OAKLEY RESERVOIR	5	FWIN GILL NET	11:05	11:00	23:55	257159	4671480	12	WGS84	FWIN
OAKLEY RESERVOIR	6	FWIN GILL NET	11:36	10:32	22:56	257879	4673734	12	WGS84	FWIN
OAKLEY RESERVOIR	7	FWIN GILL NET	12:57	10:43	21:46	258772	4674615	12	WGS84	FWIN
OAKLEY RESERVOIR	8	FWIN GILL NET	12:40	10:30	21:50	257360	4672203	12	WGS84	FWIN
OAKLEY RESERVOIR	9	FWIN GILL NET	11:58	10:25	22:27	257478	4671659	12	WGS84	FWIN
OAKLEY RESERVOIR	10	FWIN GILL NET	12:17	11:10	22:53	257425	4672680	12	WGS84	FWIN
OAKLEY RESERVOIR	13	FWIN GILL NET	13:45	11:15	21:30	257154	4672582	12	WGS84	FWIN
OAKLEY RESERVOIR	14	FWIN GILL NET	13:15	10:53	21:38	257543	4673710	12	WGS84	FWIN
ROSEWORTH	RRAMP	CAR COUNTERS				623227	4687969	11	WGS84	CAR COUNTER
ROSEWORTH	ROSE2	CAR COUNTERS				626948	4686580	11	WGS84	CAR COUNTER
SALMON FALLS CREEK RESERVOIR	DAM	CAR COUNTERS				646234	4690859	11	WGS84	CAR COUNTER
SALMON FALLS CREEK RESERVOIR	GREYS LANDING	CAR COUNTERS				689097	4666610	12	WGS85	CAR COUNTER
SALMON FALLS CREEK RESERVOIR	1	FWIN GILL NET	12:17	10:11	21:54	686667	4665046	11	WGS84	FWIN
SALMON FALLS CREEK RESERVOIR	2	FWIN GILL NET	10:48	10:09	23:21	687053	4669830	11	WGS84	FWIN
SALMON FALLS CREEK RESERVOIR	3	FWIN GILL NET	11:50	10:00	22:10	687473	4667393	11	WGS84	FWIN
SALMON FALLS CREEK RESERVOIR	4	FWIN GILL NET	11:36	10:08	22:32	686968	4668752	11	WGS84	FWIN

Appendix A. Continued

Water	Location	Gear	Start / Set	End / Pull	Time (h:min)	E	N	Zone	Datum	Note
SALMON FALLS CREEK RESERVOIR	5	FWIN GILL NET	12:05	10:06	22:01	686990	4665753	11	WGS84	FWIN
SALMON FALLS CREEK RESERVOIR	6	FWIN GILL NET	11:11	10:17	23:06	686590	4669782	11	WGS84	FWIN
SALMON FALLS CREEK RESERVOIR	7	FWIN GILL NET	2:04	11:34	9:30	685616	4664027	11	WGS84	FWIN
SALMON FALLS CREEK RESERVOIR	8	FWIN GILL NET	12:00	10:10	22:10	686571	4674595	11	WGS84	FWIN
SALMON FALLS CREEK RESERVOIR	9	FWIN GILL NET	1:34	10:57	9:23	686876	4668051	11	WGS84	FWIN
SALMON FALLS CREEK RESERVOIR	10	FWIN GILL NET	1:10	10:28	9:18	686139	4663446	11	WGS84	FWIN
SALMON FALLS CREEK RESERVOIR	11	FWIN GILL NET	1:55	11:15	9:20	686462	4671402	11	WGS84	FWIN
SALMON FALLS CREEK RESERVOIR	12	FWIN GILL NET	12:20	10:18	21:58	686468	4673850	11	WGS84	FWIN
SALMON FALLS CREEK RESERVOIR	1	E - FISHING			:10	687187	4675687	11	WGS84	FORAGE
SALMON FALLS CREEK RESERVOIR	2	E - FISHING			:10	685941	4673259	11	WGS84	FORAGE
SALMON FALLS CREEK RESERVOIR	3	E - FISHING			:10	685914	4670706	11	WGS84	FORAGE
SALMON FALLS CREEK RESERVOIR	4	E - FISHING			:10	687089	4669854	11	WGS84	FORAGE
SALMON FALLS CREEK RESERVOIR	5	E - FISHING			:10	687435	4668396	11	WGS84	FORAGE
SALMON FALLS CREEK RESERVOIR	6	E - FISHING			:10	687688	4666782	11	WGS84	FORAGE
SALMON FALLS CREEK RESERVOIR	7	E - FISHING			:10	685980	4665400	11	WGS84	FORAGE
SALMON FALLS CREEK RESERVOIR	8	E - FISHING			:10	685600	4663781	11	WGS84	FORAGE
SALMON FALLS CREEK RESERVOIR	9	E - FISHING			:10	686051	4663339	11	WGS84	FORAGE
SALMON FALLS CREEK RESERVOIR	10	E - FISHING			:10	684717	4660731	11	WGS84	FORAGE

Appendix A. Continued

Water	Location	Gear	Start / Set	End / Pull	Time (h:min)	E	N	Zone	Datum	Note
SILVER CREEK CABIN	START	E-FISH				731001	4799887	11	WGS84	STANDARD STREAM
SILVER CREEK CABIN	END	E-FISH				731305	4799708	11	WGS84	STANDARD STREAM
SILVER CREEK MARTIN BRIDGE	START	E-FISH				734534	4800807	11	WGS84	STANDARD STREAM
SILVER CREEK MARTIN BRIDGE	END	E-FISH				734486	4800611	11	WGS84	STANDARD STREAM
STALKER CREEK	START	E-FISH				730007	4799575	11	WGS84	STANDARD STREAM
STALKER CREEK	END	E-FISH				730224	4799882	11	WGS84	STANDARD STREAM

Appendix B. Specifications of sampling equipment used for fishery surveys.

Fishery type	Equipment	Description
Mountain lakes	Mountain lake gill net	Swedish made Lundgrens type-A lightweight multi filament sinking net 6 panel (46, 38, 33, 30, 25, 19 mm bar-mesh) 45.6 X 1.5 m
	Scale	Pesola ©: , 0-300 g, 0-1 kg, 0-2.5 kg scales
	Float tube	Creek Company©, round
	Conductivity meter	Yellow Springs Instrument (YSI) model 30
	Depth sounder	Hondex© portable depth sounder
	Secci disc	Standard; decimeter graduation
	pH meter	Oakton © hand held pH meter - Model 35624.2
Lowland Lakes & Reservoirs.	Power boat electrofisher	Smith-root © model SR-18 w/ model 5.0 pulsator
	Boom	Aluminum (2.6 m-long)
	Anode	Octopus-style steel danglers (1 m-long)
	Cathode	Boat and cathode array danglers - simultaneous
	Live well	Fresh flow aerated; 0.65 m^3
	Sinking gill net	6 panels (19, 25, 32, 38, 51, 64 mm bar-mesh); 38 x 1.8 m; monofilament
	Floating gill net	6 panels (19, 25, 32, 38, 51, 64 mm bar-mesh); 38 x 1.8 m; monofilament
	Walleye gill net (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

Appendix B. Continued

Fishery type	Equipment	Description
	Temperature / D.O. meter	Yellow Springs Instruments © (YSI); model 550A
	Dip nets	2.4 m-long handles ; trapezoid heads (0.6 m^2); 9.5 mm bar-mesh
	Secci disc	Standard; decimeter graduation
	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.
	Canoe	4.9 m-long aluminum
	Anode	13.7 m-long power cord; 2.4 m-long fiberglass handle; 0.4 m diameter steel hoop
	Cathode	Boat
	Live well	208 L plastic garbage can; O_2 supplemented
	Drift boat	4.5 m-long aluminum
	Boom	4.3 m-long fiberglass
	Anode	Octopus-style steel danglers (1 m-long)
	Cathode	Boat
	Live well	208 L rubber stock watering tub; O_2 supplemented
	Scales	AND© 5000g,electronic, OHAUS© 3000g,electronic Pesola © : , 300 g, 1 kg, 2.5 kg, 5.0 kg scales
	Oxygen stone	35.6 X 3.8 cm (135 m^2); fine pore
	Generator	Honda © ; model EG5000x; 5,000 watt
	Electrofishing control box	Coffelt © Model 15 VVP

Appendix B. Continued

Fishery type	Equipment	Description
	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

Submitted by:

Douglas Megargle
Regional Fishery Manager

Rob Ryan
Regional Fishery Biologist

Erin Gutknecht
Fishery Technician

Approved by:

Edward B. Schriever,
Fisheries Bureau Chief

William D. Horton
State Fishery Manager