FISHERY MANAGEMENT INVESTIGATIONS

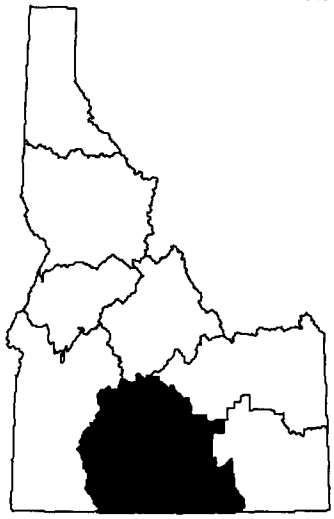
IDAHO DEPARTMENT OF FISH AND GAME

FISHERY MANAGEMENT ANNUAL REPORT

Cal Groen, Director

MAGIC VALLEY REGION

2005



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November 2008
IDFG 08-135

2005 Magic Valley Region Fishery Management Report

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Surveys and Inventories - Mountain Lakes

ABSTRACT

A standard mountain lake survey was conducted at South Amber Lake in the Wood River drainage. No fish were collected during sampling efforts and no suitable spawning habitat was identified – either along the perimeter of the lake or the outlet. Current water conditions indicated habitat was suitable for survival of salmonids, invertebrates, and amphibians. Numerous long-toed salamanders *Ambystoma macrodactylum*, in adult and larval life stages, were observed. Past fishery reports may have mixed stocking reports for the adjacent North Amber Lake (Amber #1) in which case South Amber Lake was never stocked and the fishless results would be expected.

INTRODUCTION

South Amber Lake (Amber Lake #3) is located in the headwaters of the North Fork of the Big Wood River (UTM – 703,160 E, 4, 856, 630 N, Z11). South Amber has a surface area of approximately 0.9 ha at full pool and a surface elevation of 2,782 m. The lake is considered an alpine moraine formation. The Amber Gulch trail beginning at the confluence of the North Fork and West Fork of the Big Wood River provides access to the lake. Warren et al. 2003 reported South Amber had previously been stocked with cutthroat trout *Oncorhynchus clarkii* and golden trout *O. aquabonita*. No state stocking record was found. A standard mountain lake survey was conducted at South Amber Lake to evaluate the success of reported stockings.

METHODS

A standard mountain lake survey was conducted using IDFG standard protocol on July 25 and 26. 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 if lake size and or low fish abundance prohibit the full net set. A description of equipment used in mountain lake surveys is listed in Appendix A.

No fish were captured in sampling efforts, therefore no population information is recorded. Alkalinity, pH, and bottom temperature were not measured. 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.

RESULTS AND DISCUSSION

No fish were collected. No suitable spawning habitat was identified. Current water conditions indicated habitat was suitable for survival. Surface water temperature was 15 °C with a secchi depth of approximately 5 m. Specific conductance measured 51.7 µS. Zooplankton and other invertebrate fauna were numerous and included representatives from the orders Decopoda (fairy shrimp), Coleoptera (water beetles), Megaloptera, Tricoptera, and Copepoda. Vertebrate fauna were also numerous, primarily western long toed salamanders in adult and larval form. Although, access to the lake was good, little evidence of recent use was found. Three old fire pits and a small amount of litter were present.

It is believed that information reported in Warren et al. (2003) was incorrect and stocking did not occur in South Amber Lake. North Amber Lake (Amber Lake #1) located a short distance from South Amber Lake was reportedly stocked (state records) last in 2004. The two lakes may have been confused in the previously mentioned report as stocking allotments mentioned in Warren et al. (2003) match those recorded for North Amber Lake. It is recommended that South Amber Lake remain un-stocked acting as a source water body for amphibian populations.

MANAGEMENT RECOMMENDATION

- North Amber Lake should be re-surveyed in three years to evaluate out-plant success.

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Surveys and Inventories – Lowlakes and Reservoirs

ABSTRACT

Anderson Ranch Reservoir kokanee *O. nerka* abundance and escapement monitoring was conducted in an effort to identify management needs for maintaining the fishery. Total abundance of kokanee among all strata and age groups was estimated at 597,675 fish and a density of 395.55 fish/ha. Estimated kokanee standing crop was 9.28 kg/ha. Total count of kokanee spawners was 18,573 fish. Estimates of kokanee abundance and density were above the long term average beginning in 1993. Escapement was also above average and the second highest count recorded.

Largemouth bass *Micropterus salmoides* were surveyed in Lower Salmon Falls Reservoir to evaluate survey inconsistencies noted or suspected in previous year's sampling and to assess regulation effects on current size structure including an estimate of exploitation. Largemouth bass population indices together with proportional stock density (PSD) and relative stock density (RSD) were used to evaluate current population size structure and the effect of slot limit angling restrictions in place on the reservoir (Anderson and Neuman 1996). PSD of largemouth bass was 59. RSD-P of largemouth bass was 13. Survey results from 2005 are an indication that larger older age cohorts are present contradicting 2004 survey results.

An avian predator investigation was conducted on Connor Pond and Emerald Lake to evaluate the utility of stocking trout at night to limit the initial exposure of stocked rainbow trout *O. mykiss* to avian predators. Hagerman State Fish Hatchery stocked rainbow trout after dark on April 19 in both waters. Prior to stocking, a total of three and 25 birds were counted on Connor Pond and Emerald Lake, respectively. Following the out-plant, a total of 64 and 334 birds were counted on Connor Pond and Emerald Lake, respectively. Resulting bird counts on both waters indicated varying stocking by day time was not successful at eliminating increased avian predation following out-plants.

Lake Walcott smallmouth bass *M. dolomieu* were sampled independently in open and closed boating access areas to evaluate the influence of boating access and/or exploitation on smallmouth bass population structure. Catch per unit effort (CPUE) for closed boating and boating areas were 30 and 26, respectively.

A standard lowland lake survey was completed on Magic Reservoir. The purpose of the sampling effort was to estimate species composition and CPUE for long-term trend monitoring. Specific goals included determining the yellow perch *Perca flavescens* stock structure and smallmouth bass relative abundance. A total of 942 fish were collected from Magic Reservoir. The relative abundance of yellow perch, rainbow trout, smallmouth bass, and brown trout *Salmo trutta* were approximately 34, 26, 14, and 1 percent, respectively. Yellow perch estimated to be 1, 7, and 8 years old. Rainbow trout made up approximately 72% of the total catch biomass and averaged 316 mm total length. The PSD for rainbow trout, smallmouth bass, and yellow perch were estimated at 53, 5, and 99, respectively.

Standardized forage monitoring was conducted on Oakley Reservoir to monitor walleye *Sander vitreus* forage availability in relation to walleye population dynamics. Forage fish

sampled included: spottail shiner *Notropis hudsonius* (40.12%), walleye (7.09%) and yellow perch (50.15%). Resulting trends in CPUE varied by species, but indicated overall abundance was high.

Walleye investigations were undertaken on Salmon Falls Creek Reservoir (SFCR) to gather information on abundance, growth, mortality, reproduction, exploitation, and diet. Walleye were sampled for investigation of population dynamics primarily using fall walleye index netting (FWIN) protocol developed in Ontario. Geometric mean catch per net for walleye ≥ 450 mm was 3.32, nine ages were sampled, maximum age was 14, and female diversity index was 0.76. Results indicated walleye were abundant, healthy, and stable. Six tags of 111 released for walleye exploitation estimates were returned for an uncorrected exploitation of 6%.

Forage monitoring was also continued to follow trends in forage abundance relative to walleye population dynamics. Forage fish sampled included: black crappie *P. nigromaculatus* (1.39%), smallmouth bass (10.76%), spottail shiner (0.87%), walleye (1.74%) and yellow perch (84.90%). Resulting trends in CPUE varied by species, but indicated overall abundance was high.

In addition, a stocking evaluation was initiated to determine the success of stocking fingerling trout strains in SFCR. Steelhead, rainbow trout, and rainbow x cutthroat hybrid fingerlings were stocked for evaluation. Returns have not been documented

An angler creel survey was also completed on SFCR to provide angler effort, harvest, and catch rate data to relate to walleye investigations and fingerling trout evaluation. Anglers fished 68,440 hours and harvested 20,292 rainbow trout, 545 kokanee, 1,193 walleye, 2,204 yellow perch, and 621 smallmouth bass. Average season catch rate for all salmonids was 0.52 fish/hr and 0.24 fish/hr for non salmonids. Results indicated catch rates and harvest were up for rainbow trout and reduced for walleye.

INTRODUCTION

Anderson Ranch Reservoir

Anderson Ranch Reservoir is a Bureau of Reclamation (BOR) impoundment on the South Fork Boise River in Elmore, County with a maximum storage capacity of 493,180 acre-feet, of which 28,980 acre-feet 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 various other nongame fish species are also present. Kokanee are managed for a consumptive fishery with a daily bag limit of 25 fish and a possession limit of 50 fish. Trends in reservoir kokanee abundance are typically monitored on an annual basis using trawling techniques.

The South Fork Boise River upstream, a major tributary of Anderson Ranch Reservoir, flows mostly through U.S. Forest Service lands in Elmore and Camas counties. Kokanee migrate upstream from Anderson Ranch Reservoir to spawn in the river from late August into early October. Annual kokanee spawner counts have been conducted in an effort to monitor kokanee escapement from Anderson Ranch Reservoir since 1989. Escapement estimates may be used to evaluate the need for supplementation or limitation of spawner escapement in an effort to balance abundance and growth.

Monitoring of abundance and escapement of Anderson Ranch Reservoir kokanee was continued in 2005 in an effort to identify management needs for maintaining the fishery.

Bell Rapids – Snake River

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

Results from a 2004 largemouth bass survey suggested the absence of large older age class cohorts (Ryan et al., in review). A survey of largemouth bass was completed in 2005 in order to evaluate missing cohorts and address suggested limitations of work completed in 2004 related to sampling location and timing. Sample efforts were also used to evaluate regulation effects on current size structure. In addition, cooperatively with IDFG fisheries research personnel, a tagging effort was completed to estimate exploitation on largemouth bass.

Lake Walcott – Snake River

Lake Walcott was formed in 1906 following completion of Minidoka Dam. Irrigation diversion and subsequent power production were the primary purposes for construction. The reservoir covers an area of approximately 4,900 ha at an elevation of 1,385 m. The Minidoka National Wildlife Refuge surrounds Lake Walcott, which is located about 19 km northeast of the town of Rupert, Idaho in Minidoka County. The reservoir is relatively shallow and composed of large marsh areas along shoreline reaches. The system currently supports a substantial non-game fish community comprised primarily of Utah chub *Gila atraria*, carp, and various sucker species. Game fish species present include: smallmouth bass, rainbow trout, and yellow perch. Largemouth bass were introduced into the reservoir in the 1970's, but were not successful (Grunder et al. 1988). Smallmouth bass were introduced in 1988 and 1990 and have expanded through natural recruitment (IDFG Stocking Records).

Reservoir boating access is restricted on Lake Walcott by the Minidoka National Wildlife Refuge. Within the wildlife refuge boating access is split into three open and three closed boating zones. In recent years anglers have expressed concern over excessive harvest of smallmouth bass in open boating areas specifically in the Gifford Springs area. No noticeable change in smallmouth bass population structure or catch has been identified despite angler perception. Boating restrictions are believed to limit exploitation in closed boating areas. Low exploitation areas may serve as source populations for higher exploitation open boating areas. In 2005, Lake Walcott smallmouth bass were sampled independently in open and closed boating access areas to evaluate the influence of boating access and/or exploitation on smallmouth bass population structure. Information will be used to identify potential management needs for open and closed boating areas.

Magic Reservoir

Magic Reservoir is a large reservoir located approximately 48 km north of Shoshone, Idaho, on the Big Wood River. 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 Big Wood River and Camas Creek drainages provide inflow to the reservoir. It has approximately 1,529 ha surface acres of water when full with a maximum storage of approximately 24 ha km. The reservoir is subject to extreme draw downs associated with hydroelectric power production and 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 occasionally smallmouth bass. Most of the rainbow trout are hatchery origin, some are wild origin and all of the brown trout are of wild origin. Most of the wild trout originate from the Big Wood River. Rainbow trout and yellow perch are vulnerable to lethal and non-lethal entrainment through the hydroelectric facility or over the spillway.

The purpose of the sampling effort was to estimate species composition and catch-per-unit-effort for long-term trend monitoring. Specific goals included determining the perch stock structure and smallmouth bass relative abundance. Data collected will help evaluate the current status and future management actions needed to maintain or enhance the current perch population.

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, sculpin species *Cottus spp.*, sucker species and spottail shiner *Notropis hudsonius*. Spottail shiners were introduced in 1989 to provide additional forage base for walleye.

Annual standardized forage monitoring was conducted in Oakley Reservoir to monitor walleye forage availability. Trends are used to project annual walleye population success.

In addition, evaluation of walleye out plant success in relation to natural recruitment has been conducted since 2002. Out- plants in 2004 marked with oxytetracycline (OTC) were use to distinguish hatchery stock from naturalized sources. Hatchery source walleye constituted 26.8% of sampled fish, respectively in the fall of 2004. Results indicated the majority of walleye in the 0+ age class were from natural recruitment (Ryan et al. 2004, in review). Evaluation of hatchery walleye out plant success through the first year and recruitment into the fishery was also of interest to provide insight on overall success of hatchery supplementation in low water years. Evaluation of hatchery supplementation through the first year was conducted in 2005 to address this interest.

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. SFCR is unique to the Magic Valley Region in that a large inactive storage capacity remains in the reservoir even in low water years providing consistent productive fish habitat. SFCR is managed as a mixed species fishery for walleye, rainbow trout, kokanee, yellow perch, smallmouth bass, and black crappie. SFCR is one of only three waters in Idaho providing a sanctioned walleye fishery.

SFCR has been of significant interest from the angling public in recent years. Organized angling groups recently have been influential in proposing various restrictive regulations for this fishery including: reduced bag limit on trout and yellow perch and size restrictions on walleye. In addition, stocking allocations of both rainbow trout and walleye have been under scrutiny from the active angling public. In an effort to address public interests and provide management guidance for SFCR, several projects were initiated. Initiated projects included a year long creel survey to address current angler use and harvest, strain evaluation of stocked steelhead, and a survey of walleye population structure to evaluate the potential effects of alternative walleye management strategies. In addition, annual monitoring of walleye forage availability was continued. To provide better understanding of the influence forage availability has on walleye success in SFCR diet analysis of collected walleye was completed.

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 A.

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 catch per unit of effort (CPUE). Population indices including 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.

Trends in Anderson Ranch Reservoir kokanee abundance were monitored using nighttime trawling techniques described by Rieman (1992). Sample dates were on or around a new moon period. Reservoir sample strata were defined in Figure 1. Designated strata

followed historical protocol (Partridge and Warren 1995). Five tows were taken per strata. Trawling tows were completed using a 4.46 m2 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 one meter intervals from 24 m to 7 m. In the event reservoir depth did not allow for completing all depth strata identified, maximum depth was adjusted.

Kokanee sampled during trawl efforts were measured to total length (mm) and weighed (g). A portion of the kokanee were determined in the field to be young of the year and were counted and batch weighed. Otoliths were sampled from a representative group of fish from each age class. Age classes were roughly defined in the field by length. Otoliths were aged in whole view in the lab using a dissecting microscope under 10X – 40X magnification.

Abundance, relative density, and standing crop were estimated 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 measured by calculating within an elevation contour using Alltopo mapping software (iGage Mapping Corporation).

Kokanee escapement was monitored between August 19 and October 8 with counts of spawning adult fish at 13 sites on the South Fork Boise River and Trinity Creek. These are standard sites at which counts have been made since 1989 for spawner trend information, except for the trap site just downstream of the Pine Bridge, which was added to the survey in 1990 (Partridge and Corsi 1993). Survey sites are accessed by way of a paved and gravel graded road that follows the river from Pine to the confluence of Big Smokey Creek. Site locations are listed in association with Table 4.

Largemouth bass were sampled from Lower Salmon Falls Reservoir (Bell Rapids) on May 17 through 19 to address suggested limitations of sampling efforts made in 2004, evaluate potential missing cohorts, and tag bass for estimation of exploitation.

Two electrofishing boats operated by regional and research personnel were used to sample fish. Fish were sampled at locations considered to be likely bass habitat. Sample locations were not randomly selected. However, a large portion of the reservoir was sampled. Regional personnel collected fish in 15 minutes effort units. CPUE was reported in 15 minute units and by per hour.

All fish were measured by total length to the nearest 5 mm. Weights (g) were taken from a representative sample of fish. Otoliths were taken from a representative sample of largemouth bass for aging. Aging of otoliths was conducted at the IDFG regional lab. Aging was completed in split and/or whole view depending on individual otolith clarity. A 10X – 40X dissecting microscope (National Optical & Scientific Instruments, Inc., San Antonio, Texas) was used in aging.

Largemouth bass 150 mm to 305 mm and > 406 mm were tagged with a t-bar anchor type tag. All tags were individually marked and printed with a phone number for return. Associated tagging and reporting methods as well as results were reported by fisheries research (Aurthur Butts, IDFG fisheries research, personal communication).

Population indices including PSD and RSD values for largemouth bass were used to evaluate current population size structure (Anderson and Neuman 1996). Slot-limit length restrictions were evaluated by comparing current relative abundance of bass within the sampled population in designated size groups associated with the slot-limit length restriction to expected abundances. Slot-limit length restrictions were also evaluated using protocol described by Wilde 1997. Wilde described six hypotheses for evaluation of length limits on largemouth bass including: increase in the relative abundance of stock-size fish that are also ≥ 305 mm in length (PSD), increase in the relative abundance of stock-size fish that are also ≥ 380 mm in length (RSD), increase in abundance of largemouth bass, increase in weight of harvested bass, increase in number of harvested bass, and increase in bass catch rates. Increases in these values would be interpreted as a successful implementation of a length limit. Fishery and Simulation Software (FAST) (Auburn University, Alabama) was used in calculating population indices for analysis of population structure and evaluation of current regulations.

Lake Walcott smallmouth bass were sampled at night using boat electrofishing equipment with bow mounted anodes as described in the general methods. A total of four 15 minute units of effort were completed by IDFG Magic Valley Region personnel in each of the main reservoir access areas. The main reservoir area was considered as that area upstream of Minidoka dam to the boundary of the Smith Springs boating zone. Sampling efforts were completed in areas considered to be likely bass habitat. No designated sample sites were set.

IDFG Southeast personnel sampled areas above the main reservoir. Sampled fish were measured and weighed following protocol described in the general methods. Summarized catch statistics, CPUE, and catch per hour by access zone were reported for use in monitoring trends. Catch at age was used to estimate annual mortality by access zone. Annual mortalities were used to evaluate difference in exploitation by access allowances. IDFG Southeast Region personnel reported on catch at age and annual mortality results for all sampled areas. In addition, Southeast Regional personnel monitored movements of radio tagged smallmouth bass throughout Lake Walcott in 2005 and 2006.

Magic Reservoir was sampled with six standard lowland lake sampling units in June (see general lake sampling methods). The electrofishing component of the sampling effort was slightly less than 6 units (5.6 h). Sample sites were randomly selected for all netting and electrofishing efforts. Otoliths were collected from a representative subsample of yellow perch for age determination. Whole otoliths were excised in the field and stored in paper envelopes. Ages were determined by reading whole otoliths with a direct light source.

Water quality data were collected at three sites located at the upper, middle, and lower sections of the reservoir.

Forage monitoring was conducted following standardized protocol for Oakley Reservoir on August 9. Protocol consisted of 10 minutes of electrofishing at 10 standard locations. Location coordinates are listed in Table 10. Resulting data were used to follow trends in catch per effort and relative abundances of forage species and project annual success of walleye. Prior to 2004, forage samples were collected using a beach seine and not comparable to electrofishing data therefore results from 2005 were only compared to 2004.

Age 1+ walleye were collected on 27 and 28 October, 2005 to evaluate hatchery supplementation success from 2004. Walleye were collected using gillnets. Walleye that were determined to be age 1+ by length group were frozen then sent to Ron Brooks at the Fisheries and Illinois Aquaculture Center and Department of Zoology at Southern Illinois University in

Carbondale, Illinois for analysis. Otoliths were inspected for the presence of OTC marks. Marked and unmarked fish were represented as a percentage of the total sample. Age 1+ walleye sampled in gillnets and defined by length group were confirmed through otolith aging in the IDFG regional lab.

A stratified random creel was initiated on April 9 on SFCR. Survey efforts will be continued into 2007. Survey design included 35 day interval periods stratified by day type. Three week day and three week end/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. During weather unsuitable for boat travel, counts were conducted at three primary access points on the reservoir by vehicle. Interviewed anglers were asked to report on their residency, length of outing, method of angling, and catch. Fish encountered during interviews were identified and measured to total length.

Estimated effort and harvest were compared to previous creel efforts. 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 to estimate harvest per effort/day.

An additional angler questionnaire was incorporated in 2005 into creel interviews to gauge angler interests related to SFCR. The survey was incorporated to provide management guidance during rules cycles and management plan renewal. Anglers were questioned to determine preferences on general SFCR species management, specific walleye management, and to gauge angler satisfaction with current SFCR fishing conditions. Questions used in the angler survey are listed in Table 13.

A strain evaluation was initiated in June/Sept to evaluate the success of stocked steelhead and rainbow trout fingerlings in SFCR. On June 30, 2005 a total of 19,796 steelhead were out-planted at 221 mm average length. Of those stocked steelhead, 13,187 were marked with a right ventral fin clip. On September 15 a total of 176,600 rainbow trout fingerlings of 89 mm average length were stocked with adipose fins removed. Fish observed in creel survey efforts were inspected for marks.

A survey of SFCR walleye population structure was completed in 2005. Efforts were directed at evaluating current population status for use in evaluating potential effects of alternative walleye management strategies in SFCR. Fish were sampled opportunistically throughout the reservoir using a Smith-Root electrofishing boat setup as described in the general methods. Samples were collected on May 3, May 13, July 8, September 28, and October 17. Attempts were made to sample otoliths for aging from 10 fish per age class. Length and weight were taken from all fish. Lengths and otoliths were also collected from tournament caught walleye in June. Otoliths were not collected from all tournament caught fish. An age key was used to apply ages to all fish collected based on length. Due to regulation cycle requests modeling results were necessary prior to completing all otolith collections and analysis. Therefore, length at age and catch at age data were taken from data collected in 2001 (Warren et al., in review).

Population modeling software, Fishery Analysis and Simulation Tool (FAST), was used to identify the range of possible effects proposed walleye management strategies may have on the SFCR walleye population. Proposed walleye management strategies modeled included reduced bag limit and reduced harvest of large walleye (≥ 610 mm (24")). FAST provided projected population responses through the input of multiple driving population parameters. Parameters included measures of mortality, growth, recruitment, and exploitation. Parameters were based on the best available information. Model input parameters and associated sources are listed in Table WALLEYE INPUT. Measures of mortality were derived from catch at age data collected in 2001 and estimated from natural mortality estimators in FAST. Natural mortality estimates were based on growth rates. Growth rates were determined from length at age data also collected in 2001. Recruitment values were derived from rough mark recapture population estimates of age 0+ fish in 2002. Recruitment in 2002 was considered to be minimal due to low water conditions. High recruitment levels were roughly gauged from low level estimates. Exploitation was estimated from angler harvest data collected in an ongoing creel survey. Estimated exploitation was considered to be exaggerated. To identify the range of population parameter effects population models were run at increasing exploitation levels from five to thirty percent under fixed and fluctuating natural mortalities.

To provide better understanding of the influence forage availability has on walleye success in SFCR, diet analysis was initiated on collected fish in 2005. Stomachs were removed for diet analysis from all walleye sacrificed for age estimation and population modeling. Stomachs were removed whole and placed in 10% formalin for storage. Stomach contents have not been analyzed. Results will be reported in 2006.

Forage monitoring was conducted on August 9 following standardized protocol designated for SFCR. Protocol consisted of 10 minutes of electrofishing at 10 standard locations. Location coordinates are listed in Table 14. Forage fish were arbitrarily designated as fish equal to or less than 150 mm. Resulting data were used to follow trends in catch per effort and relative abundances of forage species and make projections on annual success of walleye. Prior to 2004, forage samples were collected using a beach seine. Seine samples were not considered comparable to electrofishing data. Therefore, results from 2005 were only compared to 2004.

RESULTS AND DISCUSSION

Anderson Ranch Reservoir

Anderson Ranch Reservoir kokanee were sampled on August 3 and 4. Reservoir elevation on sample dates was approximately 1,269 m. Kokanee trawls were completed in all three designated strata (Table 1).

Inconsistent ages were determined for total lengths from 310 mm to 350 mm. Annuli on aged otoliths within this length range were not clearly defined. Spawning kokanee assumed to be age 3+ collected in the South Fork Boise River above Anderson Ranch Reservoir during a trend monitoring effort averaged 332 mm (SD 32 mm). These known age fish were use to define age within the problematic length range. Ages 3+ kokanee were defined within one standard deviation of the mean (300 mm to 364 mm).

Total abundance of kokanee among all strata and age groups was estimated at 597,675 fish at a density of 395.55 fish/ha. Reservoir densities of age zero, one, two, and three kokanee in 2005 were estimated at 348.32, 25.14, 8.43 and 13.67 fish/ha, respectively. Abundance and density estimates by age from 2005 to 1993 are summarized in Table 2. Standing crop estimated for 2005 among all strata and age groups was 9.28 kg/ha.

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 2005 (Table 3). A large proportion (88%) of the estimated kokanee abundance was in the age 0 year class. Age 0 year class strength may reflect hatchery supplementation in the spring of 2005. Approximately 200,000 kokanee fry were stocked in 2005 due to low spawner counts in the fall of 2004.

Kokanee abundance and density estimates of age 1 kokanee in 2003 were less than half the estimates of age 3 fish in 2005. Discrepancies in population estimates are not unique to this age class and make population projections by year class of minimal value. No consistent trends were observed in 2005 analysis or in previous years. Trawl tow rates used from 1993 to 2003 were considered inadequate for sampling older age class kokanee (Doug Megargle, IDFG, personal communication) and may have influenced the variability of abundance estimates and their resulting utility. A new trawl boat and net was acquired in 2005. The new trawling equipment was able to tow at higher rates (1.59 m/s). Higher tow rates may increase trawl efficiency and ideally the utility of resulting estimates. Inconsistent trends in kokanee trawl data may also be an indicator of the presence of limiting factors other than typical kokanee population dynamics. Other potential limiting factors may include reservoir water levels during spawning periods influencing migration to river spawning areas and summer reservoir levels influencing entrainment through Anderson Ranch Dam.

The total count of kokanee spawners among all sites combined across dates was 18,573 fish (Table 4). Kokanee spawner counts prior to 2005 were in decline following an all time high in 1998 (Figure 2). Average spawner count for years 1989 to 2004 was 5,832 fish. Total spawner count for 2005 was well above the previous average and was the second highest count recorded since 1998. High kokanee spawner numbers were detected in the river despite low reservoir water levels associated with drought conditions suspected to negatively affect kokanee spawner access to the South Fork Boise River. Water elevation in late August 2005 was considered low at 1,265 m, but reservoir drawdown was not as severe as the previous year at 1,263 m.

Current spawner count methods require consistent river conditions, consistent stream channel shape from year to year, and consistent investigator accuracy for meaningful comparisons between years. These requirements are not met, creating highly variable data.

Bell Rapids – Snake River

A total of 8.6 hours of electrofishing were completed between crews on Lower Salmon Falls Reservoir (Bell Rapids). CPUE for 15 minute units were reported only for regional efforts as research personnel did not differentiate time intervals, only total time. The Regional electrofishing crew completed 8.4 units of effort with a mean CPUE for largemouth bass of 13. Largemouth bass catch per hour for all efforts was 44 fish/hr. Proportional stock density (PSD) of largemouth bass was 59 indicating a population with balanced size structure (Anderson and

Neumann 1996). Relative stock density of preferred size bass (RSD-P) for sampled fish was 13 indicating a relatively small proportion of preferred size bass. No bass of memorable (≥ 510 mm) sizes were collected. Catch data from 2005 and previous sampled years were summarized in Table 5. Survey results from 2005 are an indication that larger older age cohorts are present contradicting 2004 survey results. Survey timing was likely an important component of effective sampling largemouth bass in Lower Salmon Falls Reservoir and is likely responsible for misleading results in 2004.

Limited abundance of larger size fish was suspected to be related to maximum growth potential. Theoretical maximum age was determined as 12 years by catch curve regression in FAST. Regression results closely reflect the sampled population with one fish collected in the sample aged at 13 years. Length at age 13 was 490 mm, below the 510 mm memorable size class.

Evaluation of the current size structure of largemouth bass in Lower Salmon Falls Reservoir under slot - limit restrictions suggested current regulations may not be appropriate biologically in this system. Slot – limit length restrictions are typically recommended in populations with high recruitment and slow growth (Anderson 1976). (Dillon 1992) suggested Idaho bass populations are limited by inconsistent recruitment related to regional weather patterns and water level management. Therefore, slot-limit length restrictions would not be suitable for most Idaho largemouth bass populations. Relative abundance of largemouth bass in the catch by designated size groups indicated 52.36% of the population was less than 305 mm and 97.32% of the population was less than 406 mm. Only 41.62% of the sampled population was within the protected slot range of 305 mm to 406 mm and only 6.02 % was above the protected range (> 406 mm). Anderson 1976, defined the proper function of slot-length limits as increasing numbers of protected sized fish, promoting growth of smaller fish by reducing interspecific competition through angler harvest, and increasing production of trophy fish. Relative abundances of the current population in the designated size groups did not indicate reduction of the number of fish below the slot – limit length range to result in reduced interspecific competition or a large component of trophy fish. The relative percentage of protected size fish was generally high, but was not considered to be proportionally greater than the percentage of fish below the slot –limit. Slot –limit length restrictions in this system appear to function more as a minimum length limit.

Limited historical trend information was available for evaluation of length restrictions using Wilde's 1997 protocol. Due to data limitation only changes in PSD and RSD were evaluated. PSD and RSD values for largemouth bass sampled in 1997 were 71 and 50, respectively (Warren et al. 2001). Both PSD and RSD-P declined from 1997 to 2005 indicating slot-length limits were not effective at manipulating largemouth bass population structure. Data used in calculating population indices for 1997 were considered limited (n = 25). Due to limited sample size values may not reflect true population structure. However, for the purpose of this evaluation values were considered of value. Data collected in 2004 were not included in annual comparisons because sample results were not considered to fully represent the population due to limitations in sample timing addressed in this report.

Exploitation of largemouth bass in this system was believed to be minimal. Ongoing research designed to estimate exploitation of largemouth bass in this system will help to better define the current level. Low exploitation levels may generally limit the need and/or utility of length restrictions in this system. To date no angler comments have been received that express discontent regarding current Lower Salmon Falls Reservoir largemouth bass regulations and/or size structure.

Lake Walcott – Snake River

Lake Walcott smallmouth bass were sampled on June 13 and 14. Four units of effort of approximately fifteen minutes each were completed in both the non-boating and boating zones. Surface water temperature taken at the time of sampling was 16 °C. Catch statistics and catch per effort summaries are summarized in Table 6. Proportional stock density values (Anderson and Neumann 1996) of non-boating and boating zones were 62 and 15, respectively.

Summarized catch data and PSD values suggest two distinct smallmouth bass populations exist in the main reservoir. Non-boating zone samples suggest a well balanced population with a significant component of larger fish. In contrast the boating zone samples suggested a population with high mortality and few harvestable size fish.

Sample timing should have coincided with high vulnerability of most age classes. Sample efforts were conducted around the pre-spawn period for smallmouth bass in this reservoir, evident in general observations of fish condition. However, if fish movements were such that up-reservoir areas were used as primary spawning areas and pre-spawn adults were congregated up-reservoir then results might have been biased by sample timing.

Available habitat potentially influenced smallmouth bass distribution throughout the main reservoir and upstream locations. Habitat was notably variable from location to location. However, no habitat measures were made. Anecdotally, concentrations of fish were found where rocky shoreline was in or adjacent to deeper water. It was felt that more of this type of habitat was available in closed boating sections. In addition, annual water manipulations that influence the lower main reservoir area heavily might limit perceived quality habitat during winter months. It may be important to evaluate habitat formally to better understand population trends throughout the system.

Variability in findings might also represent angling influences on mortality, based on boating access. Results and discussion regarding Lake Walcott access zones and associated smallmouth bass population effects and movements were compiled by IDFG Southeast Region personnel.

The Lake Walcott lowland lake survey in 2004 was believed to be biased by the timing of sampling efforts (Ryan et al., in review). Smallmouth bass sampled in July of 2004 during efforts that were not partitioned by access zone resulted in low captures of smallmouth bass and a PSD of 29. Areas sampled within the non-boating zone in 2005 were also sampled in 2004. Differences in survey results from 2004 and 2005 support the suspected sample timing bias of 2004 and lend credit to concerns of bias in 2005 potentially attributed to fish movements to up-reservoir areas.

Magic Reservoir

A total of 942 fish were collected from Magic Reservoir. Gamefish species captured include rainbow trout, brown trout *Salmo trutta*, smallmouth bass, and yellow perch. Nongame fish species captured include bridgelip sucker *C. columbianus*, fathead minnow *Pimephales promelas*, longnosed dace *Rhinicthys cataractae*, speckled dace *R. osculus* and redside shiner *Richardsonius balteatus*.

The total CPUE was 166 fish. The relative abundance of yellow perch, rainbow trout, smallmouth bass, and brown trout were approximately 34, 26, 14, and 1 percent, respectively (Table 7). Yellow perch were aged at 1, 7, and 8 years old (Figure 3). Rainbow trout made up approximately 72% of the total catch biomass and averaged 316 mm (+124 mm) total length (Table 8; Figure 4). The PSD for rainbow trout, smallmouth bass, and yellow perch were estimated at 53, 5, and 99, respectively (Table 8).

Water quality data collected identified no limitations for the resident fish population. Water temperatures ranged from approximately 13-22°C and dissolved oxygen ranged from approximately 4-10 µg/l. Vertical temperature and dissolved oxygen profiles are presented in Figure 5. Secci disc and conductivity data collected were consistent with mesotrophic lakes and reservoirs (Table 9).

Results indicated yellow perch, smallmouth bass, and brown trout populations were unbalanced. Inconsistent recruitment is believed to be the primary cause of unbalance for both yellow perch and brown trout populations. Recruitment limitations were observed in both length frequencies and reported PSD values for these species. Length frequencies of smallmouth bass in the catch suggested consistent recruitment has occurred. However, few fish observed were greater than 305 mm. Growth limitations are likely related to water temperatures experienced in the reservoir.

Inconsistencies in recruitment for yellow perch and brown trout were likely related to reservoir water level management. Drought related water management in Magic Reservoir has resulted in significant fish habitat changes including decrease in shallow water habitat, shoreline miles, and vegetated habitat especially important for yellow perch spawn. Severe draw downs also limit the available river channel present for brown trout spawning migration.

Relative abundance of smallmouth bass was limited at 14% of the total catch. However, comparable data was not available to evaluate current trends in relative abundance. Anecdotally, smallmouth bass observations are believed to have increased from previous years. It is recommended that smallmouth bass abundance continue to be monitored using comparable sampling methodologies in order to evaluate trends in abundance and to describe how smallmouth bass population trends influence the productivity of rainbow trout and perch fisheries.

Relative abundance of yellow perch also appeared to be limited relative to expected potential densities. Comparable data was also not available to evaluate current trends in relative abundance. Estimated ages suggested successful recruitment had not occurred in several years. Abundance of age one yellow perch in the sample does suggest successful recruitment occurred in 2004.

Oakley Reservoir

Forage fish sampled included: spottail shiner (40.12%), walleye (7.09%) and yellow perch (50.15%) (Table 11). Sucker species made up the remaining 2.64% of the total catch. Catch of all species by number was relatively high (Table 11). Data suggested forage is abundant and availability is not limited. Trends from 2004 indicated significant increases in catch per effort for most species (Table 12) (Ryan et al. 2004, in review). Forage preferences and the influence of relative abundance are not clearly understood at this time. Ongoing

walleye diet analysis in Salmon Falls Creek Reservoir may provide insight on this topic. A similar investigation may be useful on Oakley Reservoir given a slightly different fish community structure. It is expected that 2005 walleye recruitment followed forage trends. Higher spring reservoir levels likely contributed to good recruitment of both forage and walleye specifically. Continued monitoring of forage species is recommended. Electrofishing at standardized locations for sampling forage species should also be continued for evaluation of trends. It is suggested that Oakley Reservoir be considered for a long term walleye population monitoring program. Evaluation of population trends in association with forage availability, annual recruitment, and supplementation may allow for development of adaptive management strategies.

Forty five presumed age 1+ walleye were examined for OTC marks. No OTC marks were identified. Data suggested 2004 supplementation was a failure. However, results also indicated some inconsistency in ageing. Not all 45 fish were confirmed as age 1+.

Reservoir water levels may have played a role in the lack of out-plant success. Oakley Reservoir water levels throughout 2004 and 2005 were well below full pool. Reservoir storage level was likely only slightly over 25% capacity in 2004. Although, conditions improved in early 2005, reservoir levels were still low late in 2005.

Salmon Falls Creek Reservoir

Creel survey results were reported for dates between April 9 and January 6, 2005 including eight interval periods. A total of 86,683 hours of angler effort were estimated for the designated time period. Average season catch rate for all species was 0.21 fish per hour. Anglers were estimated to have harvested a total of 11,057 (±661) rainbow trout, 848 (±160) walleye, 528 (±62) yellow perch, and 336 (±14) smallmouth bass. Catches of other species were considered negligible. Effort and harvest by species were summarized in Table 15. Trends in creel data for years 1995, 2002, and 2005 indicated a decline in effort/days and relatively stable harvest per effort/day for all species excluding yellow perch (Table 16).

A total of 253 combined anglers and angler groups were solicited for answers to the survey questionnaire used in combination with the creel survey. Of those surveyed only 244 provided answers to the question regarding rating their fishing experience. A total of 93 provided comments on how they rated their fishing experience that day. Survey results are summarized in Table 17. Species preferences across the designated creel survey period indicated anglers were targeting rainbow trout (44.66%) and walleye (27.67%) or did not have a preference (anything that bites 22.53%).

Estimated trends in harvest levels were believed to be tied to population abundance. Catch of yellow perch in beach seining efforts from 1995 and 2002 demonstrate a decline similar to that detected in harvest trends. Although, walleye harvest was determined to be relatively stable in the documented years, anecdotal angler reports indicated harvest rates from the late 1990's were considerably higher. The late 1990's time period also corresponds to reported presence of high abundance and stunted growth in SFCR walleye. Angling preferences are also likely influenced by species abundance. Few anglers were contacted in

2005 that specifically targeted perch. Despite changes in angler success for yellow perch and potentially walleye, angler effort over documented years was stable to slightly declining (Table 16).

Angler questionnaire responses indicated targeted species by anglers followed seasonal patterns (Figure 6). Anglers targeting multiple specified species were not included in Figure 6. Anglers targeting multiple specified species were not abundant (< 15%), with the exception of trout/bass anglers in the month of September during which they made up 28% of all effort. Although, rainbow trout were the preferred species to target over the surveyed period, other preferences were identified seasonally. Anglers preferring to fish for walleye, were most abundant in June, July, and September. Anglers with no preference were most abundant in August. Table 18 lists the number of anglers contacted in all months by species preference. Resulting species preferences demonstrate anglers utilized SFCR as a multi-species reservoir and provide support for current management direction of the reservoir as such.

Estimated walleye harvest of 848 fish (Table 15) in 2005 suggested exploitation of walleye in SFCR was limited. No formal population estimate was available to confirm the relative portion of the population harvested. Understanding exploitation is important for determining the effects of harvest regulations on population structure. A range of exploitation (5% to 30%) was used in modeling population change under varying regulation scenarios in 2005. The applied range was considered exaggerated.

Despite significant annual out-plants of kokanee, little to no kokanee harvest has been detected in creel survey efforts from 1995 - 2005. Lack of kokanee harvest indicates limited out-plant survival and/or limited angler effort on kokanee specifically. No anglers contacted in 2005 indicated they targeted kokanee. Miscellaneous incidental angler reports indicated kokanee have been harvested in previous years.

Average season catch rate for all salmonids and all species was below the directed management goal of 0.50 fish per hour for salmonids as listed in the 2001-2006 Idaho Fish and Game Fisheries Management Plan. Catch rates approached or exceeded this level in only two intervals (Appendix B). Given the majority of anglers surveyed (~59%) indicated fishing was good or excellent, catch rates below the directed goal were not considered problematic. Approximately 51.5% of anglers who provided comments regarding how they rated their fishing experience indicated catch rates were the primary factor. It is recommended that management goals associated with catch rates be evaluated to determine if in fact they are realistic and achievable.

Strain/fingerling evaluations will be reported in 2006 - 2007 as fish may not recruit fully to the fishery until late 2006. To date only one report of a marked fish was made from creel survey efforts. Creel efforts will be continued into 2006 and 2007 for completion of strain evaluation.

A total of 55 walleye were collected from all electrofishing efforts. An additional 159 walleye were provided from tournament catches. Walleye catch statistics were listed in Table 19. Mean length of sampled walleye varied by sample method. Walleye sampled using electrofishing averaged 506 mm with a PSD of 87. Tournament caught walleye averaged 346 mm with a PSD of 21.

Modeled annual mortality provided from 2005 number at age (catch curve) data was well below that determined from 2001 data and the reported range of annual mortality for unexploited walleye populations. Annual mortality ranged from 13.5% to 15.2% as determined from combined data sources. Data collected in 2001 was modeled at annual mortality rate of 38%. Kocovsky and Carline (2001), summarized estimated annual mortality rates on unexploited walleye populations in the mid-west to range from 32% to 41%. Due to

inconsistencies in SFCR data between years and with reported mortality ranges data collected in 2005 was suspected to mis-represent the age structure and subsequent determination of annual mortality in the SFCR population.

Catch data depicted two different populations and subsequently inferred biased samples by collection method. Due to suspected biases, 2005 data was considered inappropriate for further walleye population modeling efforts. It is recommended that alternate collection methods be evaluated for limiting sample biases. Fall walleye index netting (FWIN) has been used extensively in Ontario and several states in the U.S. Similar methods should be considered for use in Idaho.

Model results based on 2001 catch data indicated expected current levels of exploitation are not limiting population numbers or structure. At current estimated levels of exploitation (<5%) restrictive harvest regulations would likely change total population numbers little (<1.0%) from current conditions. Increases of fish within the population measuring 24 inches and greater would also change little (<4%) from current conditions. Proposed regulations would be more likely to influence population levels given significant increases in exploitation (30% +). Modeling efforts under fixed natural mortality provided evidence that given significant increases in exploitation reduced bag limits would be most influential to the population and to fish 24 inches (610 mm) and larger within the population.

Restrictive harvest limits are useful tools when exploitation is significant and influential. Brousseau and Armstrong (1987), provide an overview on the role of size limits in walleye management. In their overview they describe the following criteria for use of maximum size limits: necessary for protection of brood stock (typically needed in highly exploited populations with low densities of mature fish) and where recruitment may be low. Exploitation as described in Salmon Falls Creek Reservoir is low. In addition, although recruitment may be low in given years, brood stocks are not considered to be the limiting component, but rather environmental conditions.

Environmental factors including reservoir water level and forage availability are believed to be most influential to population numbers and structure. Annual water level variability is believed to be a critical element in recruitment success. Low water conditions during spring spawning periods limit suitable spawning habitat. Success of forage species are also directed by spring water levels and their influence on spawning and rearing habitat. Forage limitations generally occur in cyclic patterns typical of predator prey cycles. In this scenario most likely good water equals good fishing.

Fish equal to or less than 150 mm sampled in forage monitoring efforts included: black crappie (19%), smallmouth bass (9%), spottail shiner (3%), and yellow perch (68%) (Table 20). Walleye, sucker spp., sculpin spp. and northern pikeminnow made up the remaining 1% of the total catch. Trends from 2004 indicated large increases in catch across sample sites in most species (Table 21) (Ryan et al. 2004, in review).

Data suggested forage was abundant. Despite increases in catch of smallmouth bass the relative abundance of bass in the catch declined. Forage preferences and the influence of relative abundance are not clearly understood at this time. Walleye diet analysis in SFCR may provide insight on this topic. Higher spring reservoir levels likely contributed to good recruitment of forage species. Age 0+ walleye were not abundant in samples with only seven fish collected. Walleye catches did represent an increase in catch of age 0+ walleye from 2004, but did not reflect the trends of other forage. Age 0+ walleye catches from shoreline electrofishing efforts

may reflect low sampling efficiency. Similar difficulties were believed to exist with electrofishing capture of older age class walleye.

Forage trends from 2004 to 2005 may have been influenced by differences in netting effort. Although, forage monitoring protocol designated sample location and timed effort, the number of netters was not consistent. Only one netter was used in 2004. Two netters were used in 2005. Netting effort was not considered to create significant biases in resulting trends due to what was considered overwhelming increases in forage fish sampled in 2005. Relative abundance measures should not have been influenced by the number of netters as netting efforts attempted to net all fish equally.

Evaluation of population trends in association with forage availability and walleye supplementation may allow for development of adaptive management strategies.

MANAGEMENT RECOMMENDATIONS

- It is recommended that trends in kokanee abundance in Anderson Ranch Reservoir continue to be monitored with new trawl equipment and that reservoir water levels are investigated as limiting factors influencing kokanee abundance outside of typical kokanee population dynamics. Supplementation does not appear to be necessary given current population levels.

- Due to inconsistencies in current methods for counting spawning kokanee in the South Fork Boise River, it is recommended that alternate methods continue to be investigated. In 2005, construction of a weir structure on the South Fork Boise River north of Pine, Idaho was not completed. Construction of the structure is still planned provided funding is adequate. In the event a weir is constructed, escapement modeling is recommended for managing recruitment escapement balances.

- It is recommended that population trends and angler satisfaction be monitored periodically to identify any changes over time at Bell Rapids. Due to the ineffectiveness of the current regulation and limited exploitation, changes may be warranted and acceptable provided a desire for increasing angler satisfaction and/or rules simplification exists.

- Given a perceived increasing interest in warm water fish species in the Magic Valley Region and associated potential increases in angling influences on these fish populations, it is recommended that trends in population structure continue to be monitored on a staggered schedule in Lake Walcott. In addition, it is recommended that a review of IDFG Southeast Region findings on smallmouth bass mortality by access zone and movement patterns be completed to address questions on sample bias.

- It is recommended that Magic Reservoir yellow perch recruitment continue to be monitored in relation to water level management in an effort to better describe possible management strategies for increasing consistency.

- It is recommended that walleye supplementation evaluations be continued within Oakley Reservoir to confirm 2005 results and to evaluate supplementation effects in better water years.

- Use of kokanee in SFCR should be evaluated to ensure survival of stocked fish is not limiting angler returns. If in fact little to no harvest has occurred due to low survival, discontinuation of kokanee out plants should be considered.

- It is recommended that walleye exploitation be formally evaluated in SFCR for use in better understanding population change in response to varying regulation scenarios.

- It is recommended that SFCR population modeling of differing regulation scenarios be reevaluated when missing data gaps are filled. Primary data needs include estimated exploitation and an accurate representation of population structure.

- Continued monitoring of forage species is recommended. Electrofishing at standardized locations for sampling forage species should be continued for evaluation of trends. It is also suggested that SFCR be considered for a long term walleye population monitoring program.

- Continue a structured creel survey on SFCR for at least one more year to evaluate fingerling stocking contribution of steelhead and rainbow x cutthroat trout hybrids to the fishery.

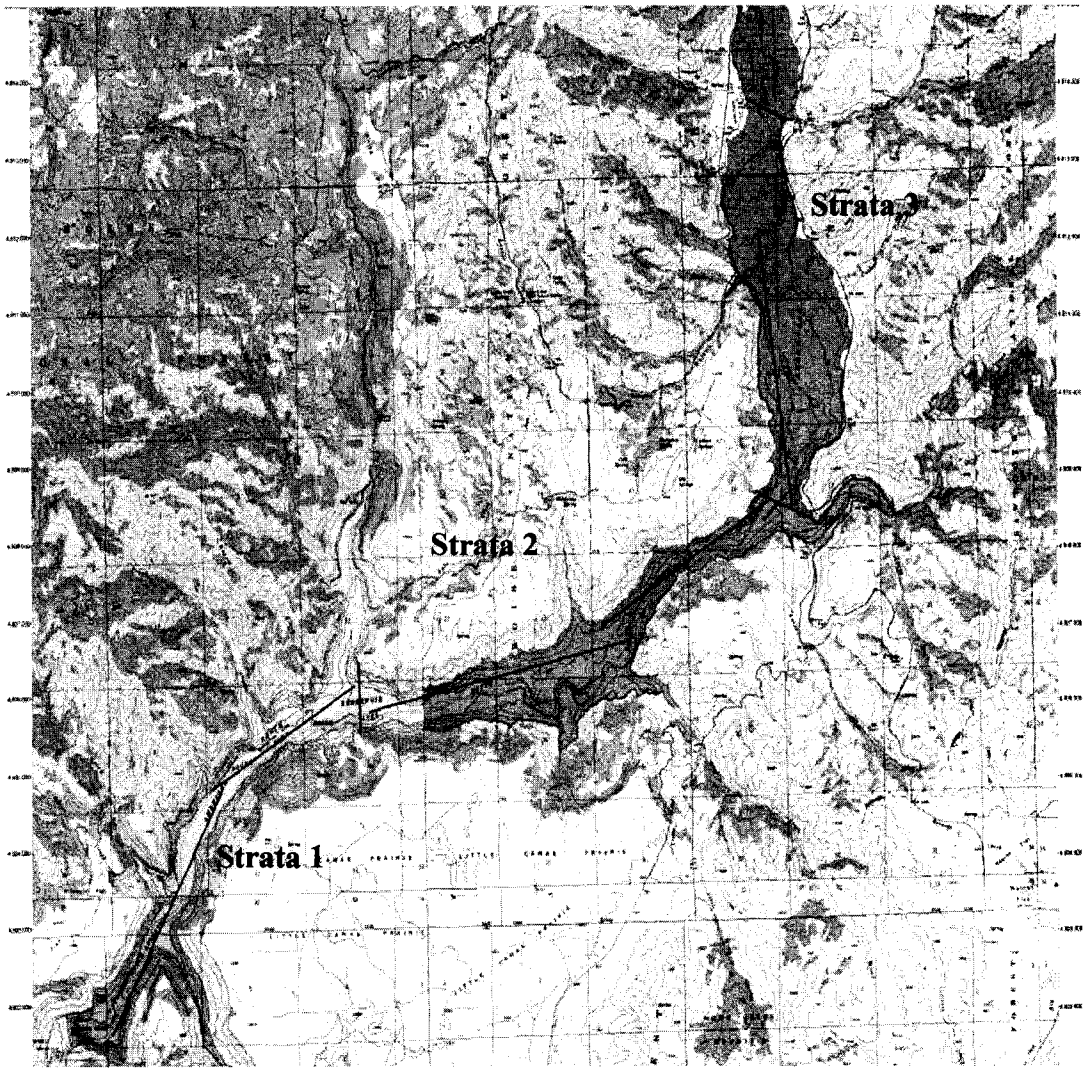


Figure 1. Anderson Ranch Reservoir kokanee trawl strata and transect locations. Transects represent approximate paths on which trawls were completed. No transect exactly overlapped a previous transect.

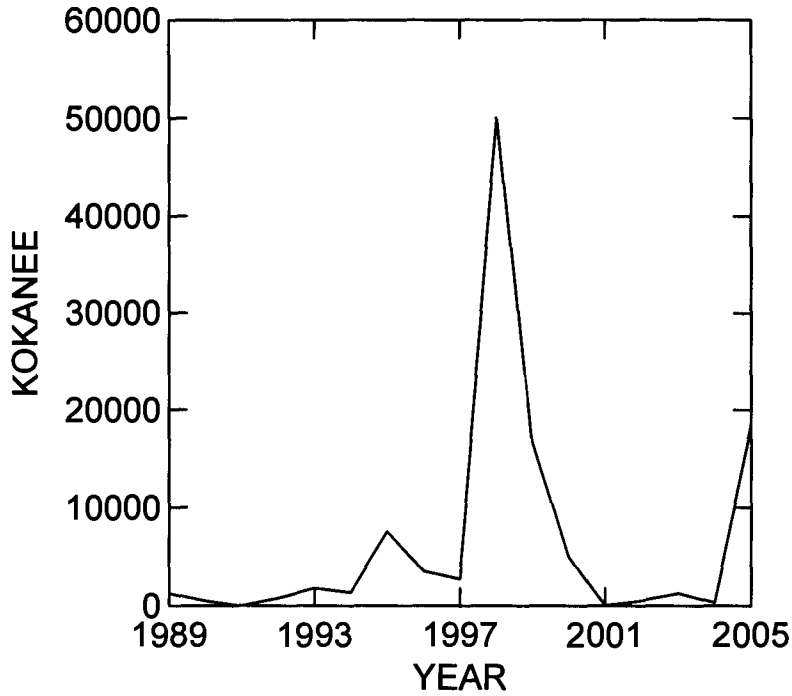


Figure 2. Total counts of spawning kokanee from combined survey sites across years on the South Fork of the Boise River. Counts represent totaled counts from mid August to mid October.

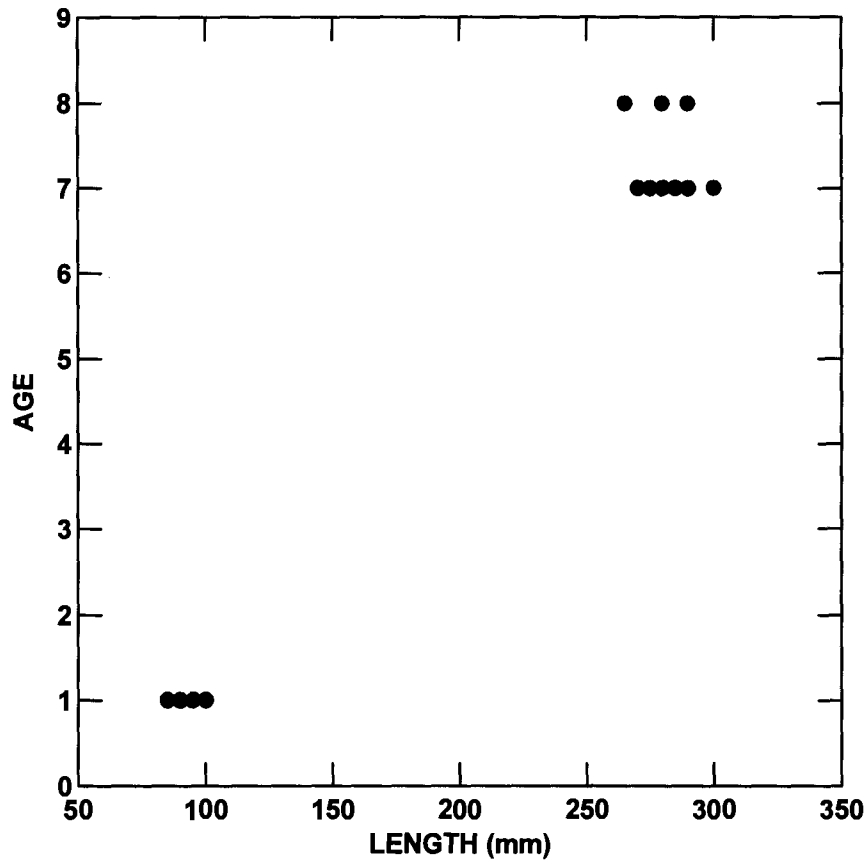


Figure 3. Length (TL) at age of yellow perch sampled from Magic Reservoir in June 2005.

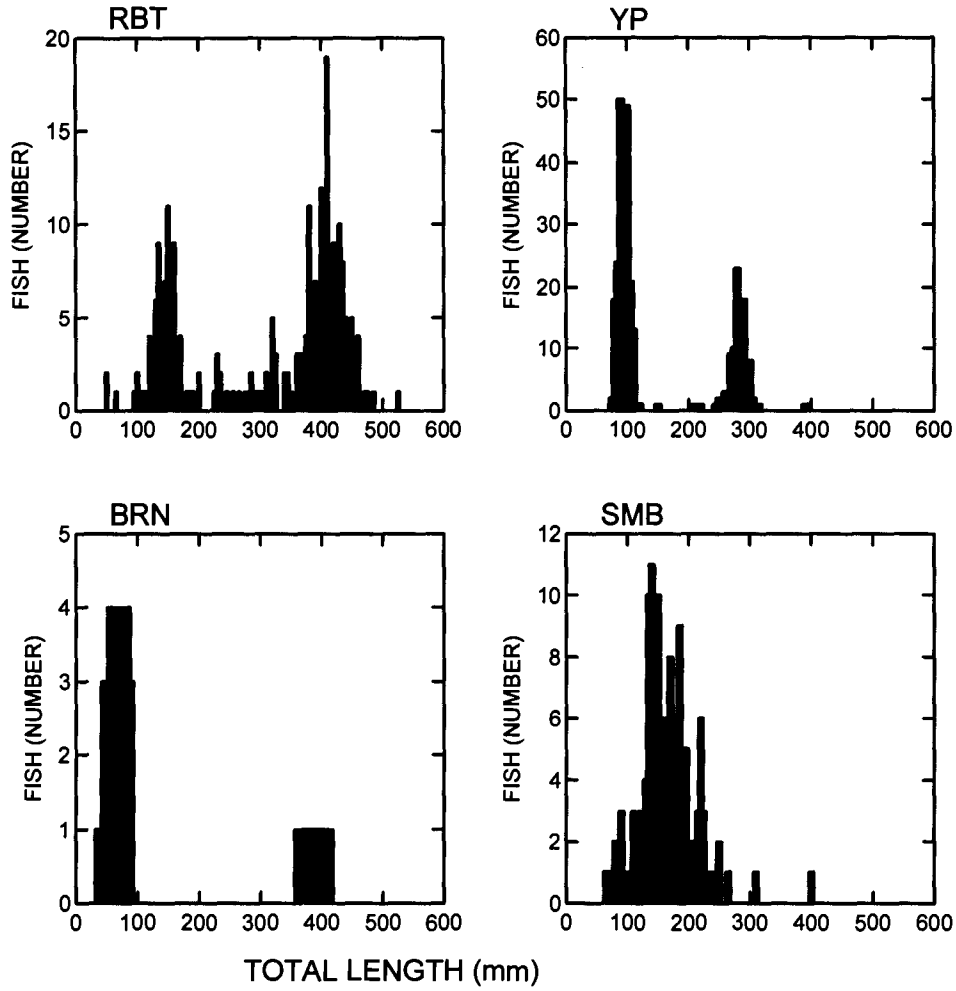


Figure 4. Length frequency histogram (mm) in 10 mm bins of rainbow trout, brown trout, yellow perch and smallmouth bass caught in Magic Reservoir in July 2005.

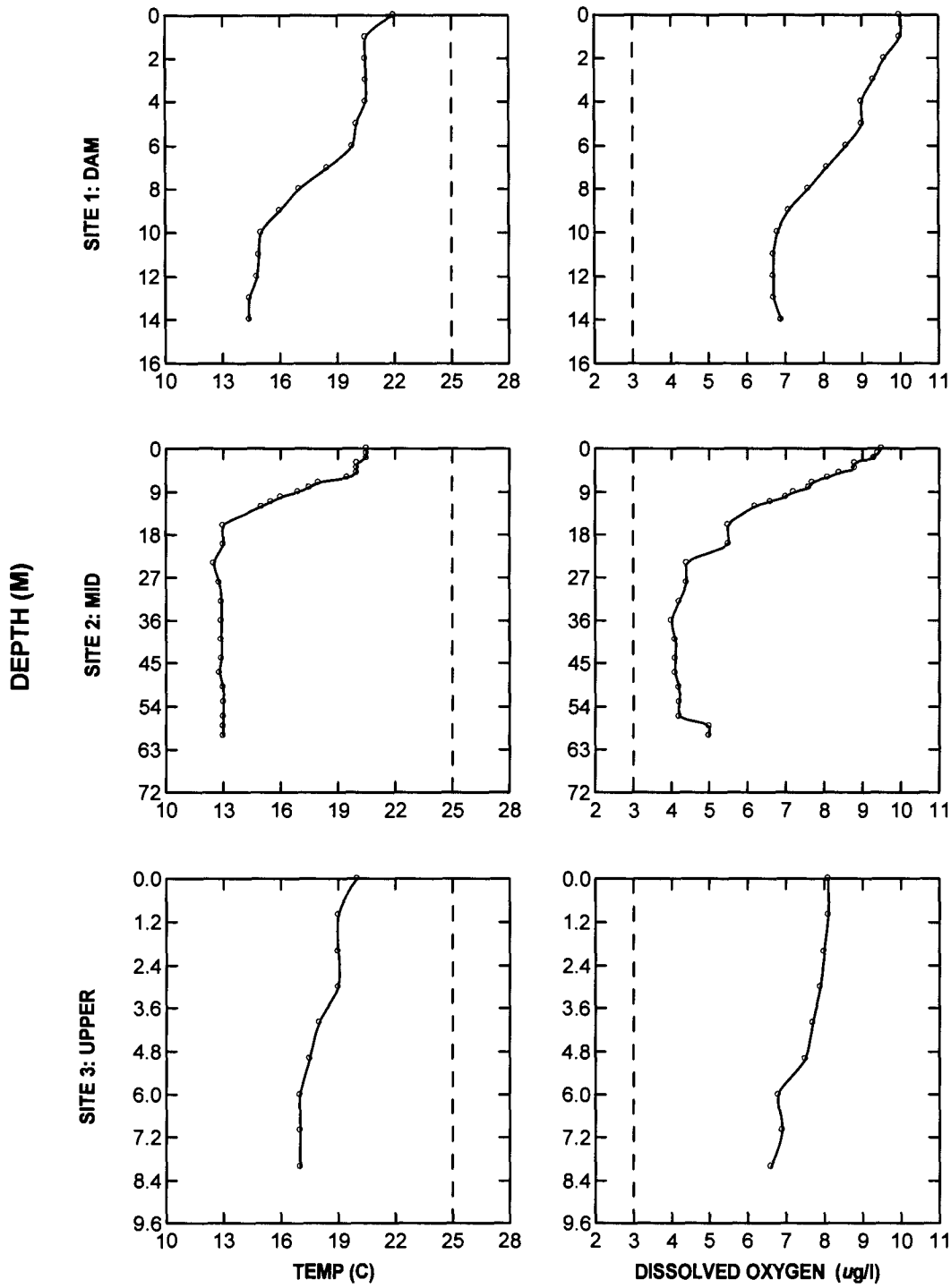


Figure 5. Water temperature and dissolved oxygen profiles from three sites in Magic Reservoir on July 11, 2005. Dashed line denotes maximum water temperature and minimum dissolved oxygen levels for rainbow trout.

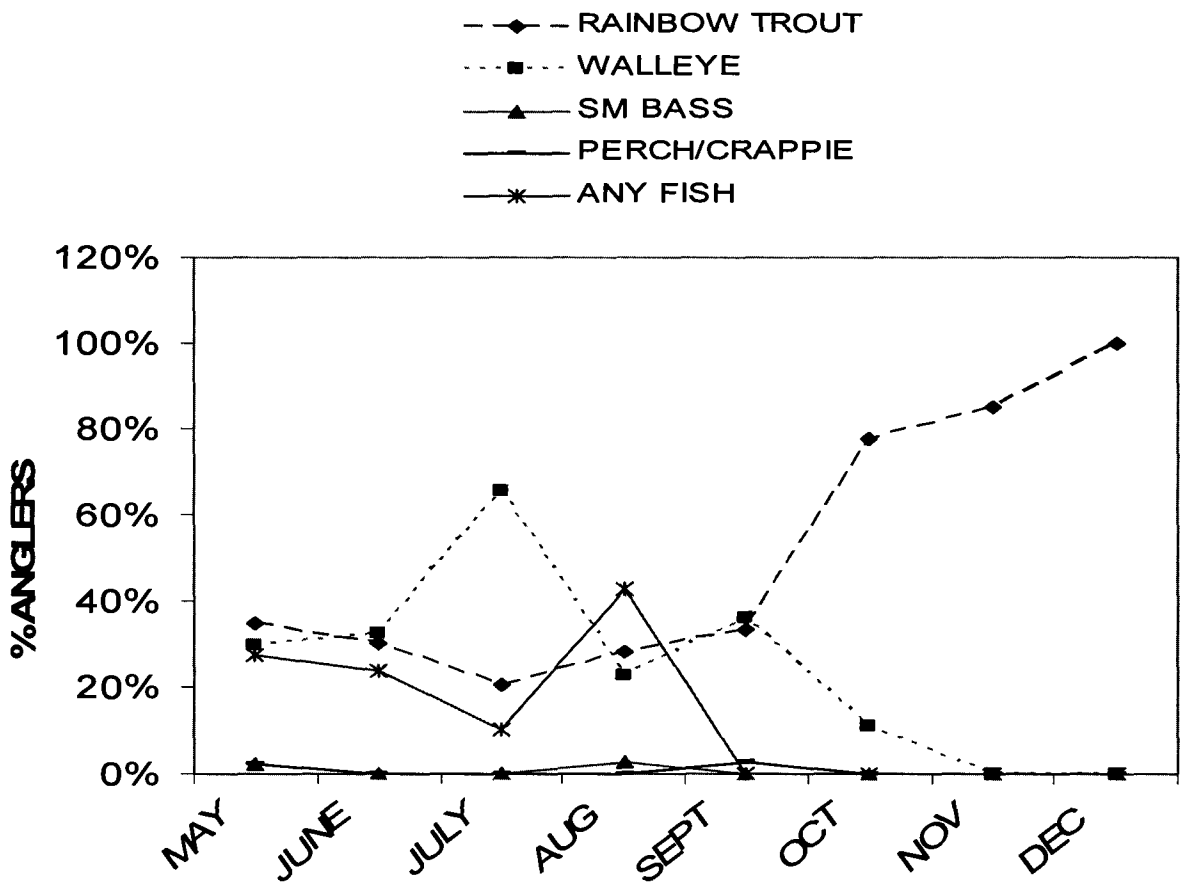


Figure 6. Angler reported target fish species plotted by month for the time period May through December. Plotted values represent the percentage of total anglers questioned within a given month targeting a given species.

Table 1. Trawl method statistics by strata and transect (TRAN). 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	8	180	47.50	80	24
1	2	8	180	47.75	80	24
1	3	8	180	48.00	80	24
1	4	8	180	48.25	80	24
1	5	8	180	48.50	80	24
2	1	8	180	47.75	80	24
2	2	6	180	47.50	64	24
2	3	6	180	47.75	64	24
2	4	7	180	48.25	72	24
2	5	7	180	48.50	72	24
3	1	6	180	47.50	64	24
3	2	6	180	47.75	64	24
3	3	6	180	48.00	64	24
3	4	6	180	48.25	64	24
3	5	6	180	48.50	64	24

Table 2. Anderson Ranch Reservoir kokanee population estimates by year and age class.

2005		Age-0	Age-1	Age-2	Age-3
Strata 1 (5 Trawls)					
	Pop. Est. +/- 95%C.I.	410,609 +/- 122,574	8,402 +/- 7,913	4,850 +/- 2,297	1,334 +/- 3,703
	Density Est. (Fish/ha)	792.68	16.22	9.36	2.58
	S.D. of Density Est.	190.68	12.31	3.57	5.76
Strata 2 (5 Trawls)					
	Pop. Est. +/- 95%C.I.	85,321 +/- 80,657	22,153 +/- 21,332	3,621 +/- 5,160	5,303 +/- 9,011
	Density Est. (Fish/ha)	159.78	41.48	6.78	9.93
	S.D. of Density Est.	121.71	32.19	7.79	13.6
Strata 3 (5 Trawls)					
	Pop. Est. +/- 95%C.I.	30,376 +/- 12,019	7,425 +/- 6,534	4,265 +/- 3,948	14,015 +/- 10,955
	Density Est. (Fish/ha)	66.18	16.18	9.29	30.53
	S.D. of Density Est.	21.1	11.47	6.93	19.23
Whole Reservoir					
	Pop. Est. +/- 95%C.I.	526,307 +/- 113,860	37,980 +/- 18,282	12,736 +/- 5,322	20,652 +/- 11,320
	Density Est. (Fish/ha)	348.32	25.14	8.43	13.67
Previous year's whole reservoir population and density estimates					
2004	Pop. Est. +/- 95%C.I.	--	--	--	--
	Density Est. (Fish/ha)	--	--	--	--
2003	Pop. Est. +/- 95%C.I.	166,214 +/- 108,094	9,062 +/- 8,475	3,790 +/- 4,377	1,091 +/- 2,641
	Density Est. (Fish/ha)	111.55	6.08	2.54	0.73
2002	Pop. Est. +/- 95%C.I.	18,744 +/- 14,339	3,775 +/- 7,775	1,965 +/- 3,103	0
	Density Est. (Fish/ha)	13	3	1	0
2001	Pop. Est. +/- 95%C.I.	33,702 +/- 23,245	64,570 +/- 61,034	28,736 +/- 18,606	0
	Density Est. (Fish/ha)	41	78	35	0
2000	Pop. Est. +/- 95%C.I.	819,828 +/- 1,076,117	54,455 +/- 40,645	4,189 +/- 6,488	0
	Density Est. (Fish/ha)	565	38	3	0
1999	Pop. Est. +/- 95%C.I.	1,446,945 +/- 521,699	12,549 +/- 5,578	15,210 +/- 8,980	0
	Density Est. (Fish/ha)	1,201	10	13	0
1998[a]	Pop. Est.	117,620	32,815	10,039	0
	Variance of Pop. Est.	5.0×10^8	8.0×10^8	8.9×10^6	--
	Density Est. (Fish/ha)	109	29	8	0

Table 2. Cont.

1997 [a]	Pop. Est.	853,932	34,582	5,831	0
	Variance of Pop. Est.	7.0×10^8	5.0×10^7	2.1×10^6	--
	Density Est. (Fish/ha)	497	23	4	0
1996 [a]	Pop. Est.	109,400	7,733	3,551	0
	Variance of Pop. Est.	2×10^8	4×10^7	7×10^6	--
	Density Est. (Fish/ha)	64	6	2	0
1995 [a]	Pop. Est.	3,134	15,995	38,364	0
	Variance of Pop. Est.	3×10^6	3×10^7	5×10^7	--
	Density Est. (Fish/ha)	2	11	25	0
1994 [a]	Pop. Est.	230,411 (wild)	444,791 [b]	33,709	0
	Variance of Pop. Est.	2×10^{10}	1×10^{11}	5×10^8	--
	Density Est. (Fish/ha)	191	368	28	0
	Pop. Est.	126,916 (hatchery)	--	--	--
	Variance of Pop. Est.	6×10^8	--	--	--
	Density Est. (Fish/ha)	106	--	--	--
1993	Pop. Est.	212,788 (wild)	2,380	1,427	660
	Variance of Pop. Est.	5×10^9	6×10^6	2×10^6	4×10^5
	Density Est. (Fish/ha)	212	2	1	1
	Pop. Est.	33,564 (hatchery)	--	--	--
	Variance of Pop. Est.	4×10^8	--	--	--
	Density Est. (Fish/ha)	26	--	--	--

[a] Based on model by Rieman (1992)

[b] Estimate of wild and hatchery fish combined for year.

Table 3. Anderson Ranch Reservoir kokanee densities (fish/ha) by age class (0-3) for years from 1993 to 2005. 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
MEAN	282	50	11	5	344
SD	349	102	12	7	365

Table 4. Kokanee observed at standard sites on the South Fork Boise River during spawning surveys in 2005. 10/8 No fish observed, last count for the year.

Location[a]	19-Aug	26-Aug	2-Sep	9-Sep	16-Sep	23-Sep	30-Sep	7-Oct
1	15	10	10	5	0	0	0	0
2	25	12	20	15	5	0	2	0
3	0	25	10	0	5	1	0	0
4	375	175	50	15	15	20	0	0
5	0	0	0	2	20	7	1	0
6	1250	900	900	200	70	75	18	2
7	0	40	50	20	3	12	1	0
8	2250	250	350	60	20	13	3	0
9	1500	1750	1250	325	40	7	1	0
10	300	25	450	90	60	4	1	0
11	250	350	450	450	260	140	100	10
12	300	1250	450	125	10	15	0	0
13	0	700	450	125	5	1	1	1
Total:	6265	5487	4440	1432	513	295	128	13

[a]Site descriptions:

1 - Trap site: NW1/4, NE1/4, Sec 30, T2N, R10E
2 - Prospect hole: NW1/4, NE1/4, Sec 18, T2N, R10E
3 - Johnson hole: SW1/4, NE1/4, Sec 5, T2N, R10E
4 - Paradise hole: SW1/4, NW1/4, Sec 33, T3N, R10E
5 - Trinity Creek: SE1/4, SW1/4, Sec 9, T3N, R10E
6 - Section 10 hole: SE1/4, NE1/4, Sec 10, T3N, R10E
7 - Chaparral campground: NE1/4, NE1/4, Sec 12, T3N, R10E
8 - Ranger station hole: NE1/4, NE1/4, Sec 8, T3N, R11E
9 - Virginia Gulch Bridge: SE1/4, SE1/4, Sec 9, T3N, R11E
10 - Baumgartner campground hole: SE1/4, SE1/4, Sec 7, T3N, R12E
11 - Deadwood confluence: NE1/4, NE1/4, Sec 22, T3N, R12E
12 - Big hole: SE1/4, SW1/4, Sec 18, T3N, R13E
13 - Smoky Creek confluence: SE1/4, SW1/4, Sec 9, T3N, R13E

Table 5. Lower Salmon Falls Reservoir largemouth bass electrofishing trend data summarized by year for month sampled, total bass sampled (N), average total length of catch in millimeters (AVG TL), standard deviation of around average total length (SD TL), average weight of catch in grams (AVG WT), standard deviation around average weight (SD WT), proportional stock density of sample (PSD), relative stock density of preferred size bass (RSD-P), and catch per hour of effort (CPUE).

YEAR	MONTH	N	AVG TL	SD TL	AVG WT	SD WT	PSD	RSD-P	CPUE
2005	MAY	388	287	81	464	373	59	13	44
2004	AUG	101	120	78	55	148	72	0	--
1997	JULY	25	243	--	--	--	71	50	--
1995	OCT/NOV	39	217	--	--	--	--	--	--

Table 6. Lake Walcott 2005 catch data summarized by access zone for total smallmouth bass sampled (N), average total length of sampled fish (AVG TL), standard deviation around the mean length of sampled fish in millimeters (SD TL), average weight of sampled fish in grams (AVG WT), standard deviation around the mean weight of sampled fish (SD WT), mean catch per 15 minute unit effort (CPUE), and catch per hour.

ACCESS	N	AVG TL	SD TL	AVG WT	SD WT	CPUE	CATCH/HR
NON-BOATING	120	308	120	663	613	30	119
BOATING	102	166	72	110	236	26	98

Table 7. Total and relative catch (count and weight) for each fish species by gear type standardized to one lowland lake sampling unit (RBT=rainbow trout, BRN=brown trout, SMB=smallmouth bass, YP=yellow perch, FHM=fathead minnow, BLS=bridgelip sucker, LND=longnose dace, RSS=redside shiner, SPD=speckled dace)

		Sportfish				Non-game					
Measure [a]	Method	RBT	BRN	SMB	YP	FHM	BLS	LND	RSS	SPD	TOTAL
Catch (#)	Electro	24	2	23	53	1	16	<1	22	<1	141
	Gill net	19	<1	0	3	0	1	0	0	0	23
	Trap net	1	0	0	1	0	<1	0	0	0	2
	All gear	44	2	23	57	1	17	<1	22	<1	166
Catch (%)	Electro	17	2	16	37	<1	11	<1	16	<1	~100
	Gill net	79	1	0	14	0	5	0	0	0	~100
	Trap net	25	0	0	65	0	10	0	0	0	~100
	All gear	26	1	14	34	<1	10	<1	13	<1	~100
Wgt (g)	Electro	7,891	6	1,845	3,606	1	557	<1	43	<1	13,949
	Gill net	11,177	208	0	985	0	78	0	0	0	12,448
	Trap net	372	0	0	280	0	7	0	0	0	659
	All gear	19,440	214	1,845	4,871	1	642	<1	43	<1	27,056
Wgt (%)	Electro	57	0	13	26	0	4	<1	<1	<1	~100
	Gill net	90	2	0	8	0	1	0	0	0	~100
	Trap net	56	0	0	42	0	1	0	0	0	~100
	All gear	72	1	7	18	0	2	<1	<1	<1	~100

[a] Data were rounded to the nearest whole number

Table 8. Summary of total lengths and weights of fish species captured with 6 standard lowland lake survey units in Magic Reservoir, Idaho in August 2005 (RBT=rainbow trout, BRN=brown trout, SMB=smallmouth bass, YP=yellow perch, BLS=bridgelip sucker, FHM=fathead minnow, LND=longnose dace, RSS=redside shiner, SPD=speckled dace)

		Sportfish				Non-game				
		RBT	BRN	SMB	YP	BLS	FHM	LND	RSS	SPD
Length (mm)	Ave	316	113	166	151	127	64	60	57	60
	SD	124	117	47	87	59	9	7	12	7
	n	248	14	130	323	96	4	2	123	2
	Min	50	50	65	75	45	55	55	35	55
	Max	525	400	400	390	250	75	65	90	65
	PSD	53	--	5	99	--	--	--	--	--
Weight (g) [a]	Ave	458	92	80	86	38	2	2	1	2
	SD	340	227	101	128	45	0	0	0	0
	n	248	14	130	323	96	4	2	123	2
	Min	1	1	1	2	1	2	2	1	2
	Max	1,100	690	1,000	430	180	2	2	3	2

[a] includes estimated weights

Table 9. Water quality data collected at three sites in Magic Reservoir on July 11, 2005.

Site	UTM Coordinate			Time (h)	Secchi (m)	Ambient conductivity (μS)
	Easting	Northing	Zone			
Upper Res.	710,685	4,799,726	11	1115	5.4	233.5
Mid Res.	713,357	4,795,994	11	1130	4.0	224.2
Dam	714,543	4,792,911	11	1215	4.5	208.1

Table 10 . Sample locations by UTM for the standard Oakley Reservoir forage survey.

Site	Location
1	42 11 2.741 N 113 56 23.653 W
2	42 10 29.610 N 113 56 15.161 W
3	42 9 44.949 N 113 56 19.082 W
4	42 9 12.714 N 113 56 20.487 W
5	42 8 38.286 N 113 56 17.734 W
6	42 8 19.240 N 113 56 9.321 W
7	42 9 27.709 N 113 56 1.863 W
8	42 11 45.177 N 113 55 3.661 W
9	42 11 31.922 N 113 55 21.800 W
10	42 11 17.205 N 113 55 40.836 W

Table 11. Total catch (N), relative abundance (%), and catch per hour (CPUE) of forage species <150 mm in Oakley Reservoir across all sample sites for 2005.

SPECIES	N	%	CPUE
SUCKER SPP	26	2.64%	3
SCULPIN SPP	0	0.00%	<1
SPOTTAIL SHINER	396	40.12%	44
WALLEYE	70	7.09%	8
YELLOW PERCH	495	50.15%	55

Table 12. Catch per hour (CPUE) of primary forage species >150 mm in Oakley Reservoir across all sample sites in 2004 and 2005.

SPECIES	2004	2005
SUCKER SPP	<1	3
SCULPIN SPP	3	<1
SPOTTAIL SHINER	4	44
WALLEYE	8	8
YELLOW PERCH	21	55

Table 13. Questions presented to anglers on Salmon Falls Creek Reservoir during creel survey interviews.

WHAT FISH SPECIES ARE YOU TARGETING TODAY AT SFCR?

a. rainbow trout
b. walleye
c. smallmouth bass
d. perch/crappie
e. kokanee
f. anything that bites

SFCR WALLEYE ARE CURRENTLY MANAGED BY A GENERAL 6 FISH LIMIT WITH NO SIZE RESTRICTION. WOULD YOU PREFER...

a. walleye regulations remain the same
b. restricted harvest of large walleye (18 + inches)
c. I have no opinion

HOW WOULD YOU RATE YOUR FISHING EXPERIENCE TODAY?

a. excellent
b. good
c. fair
d. poor
e. no opinion

WHY? Just a few brief notes regarding the reason for the rating response

Table 14. Sample locations by UTM for standard Salmon Falls Creek Reservoir forage survey.

Site	Location
1	42 12 39.771 N 114 43 53.135 W
2	42 11 22.172 N 114 44 50.228 W
3	42 9 59.465 N 114 44 54.323 W
4	42 9 30.881 N 114 44 4.147 W
5	42 8 43.329 N 114 43 50.780 W
6	42 7 50.831 N 114 43 41.649 W
7	42 7 7.525 N 114 44 57.551 W
8	42 6 15.393 N 114 45 15.955 W
9	42 6 0.680 N 114 44 56.829 W
10	42 4 37.308 N 114 45 57.813 W

Table 15. Salmon Falls Creek Reservoir 2005 estimated angler effort (hrs) and species harvest by survey interval. Confidence bounds (95%) are listed in parenthesis. Results summarized for the time period of 9 April, 2005 to 6 January, 2006.

INTERVAL	EFFORT	RBT	CRP	KOK	SMB	WE	YP
1	14190 (6391)	1763	0	0	0	0	0
2	11030 (9972)	549	0	0	0	59	59
3	20975 (6718)	1450	0	0	41	528	205
4	12466 (9493	339	0	0	22	232	135
5	11532 (3886)	1362	0	0	29	29	130
6	7339 (391)	4158	0	0	0	0	5
7	7995 (5226)	1267	0	0	244	0	0
8	1156 (785)	169	0	0	0	0	0
TOTAL	86683 (7216)	11057(661)	0	0	336 (14)	848 (160)	528 (62)

RBT – rainbow trout
CRP – carp
KOK – kokanee
SMB – smallmouth bass
WE – walleye
YP – yellow perch

Table 16. Historical creel comparison for 2005, 2002, and 1995. Data summarized by year for standardized effort per number of scheduled creel days (EFFORT/DAY) and estimated harvest effort/day by species.

		ESTIMATED HARVEST PER EFFORT/DAY					
YEAR	EFFORT/DAY	*RBT	*CRP	*KOK	*SMB	*WE	*YP
2005	318	35	0	0	1	3	2
2002	340	36	0	0	3	8	4
1995	433	26	1	1	1	7	64

*RBT – rainbow trout
CRP – carp
KOK – kokanee
SMB – smallmouth bass
WE – walleye
YP – yellow perch

Table 17. Summarized responses to creel questionnaire incorporated into the 2005 Salmon Falls Creek Reservoir creel survey effort. Summaries indicate the total number of responses (N) and percentage of responses (% RESPONSE) by answer option. Survey questions were used to gauge angler preferred species, interest in alternative walleye management, and general satisfaction with that days angling experience.

SPECIES PREFERENCE		
SPECIES	N	% RESPONSE
RAINBOW TROUT	113	44.66%
WALLEYE	70	27.67%
BASS	3	1.19%
PERCH/CRAPPIE	1	0.40%
KOKANEE	0	0.00%
ANYTHING	57	22.53%
TROUT/WALLEYE	8	3.16%
TROUT/BASS	1	0.40%

WALLEYE MANAGEMENT		
OPTION	N	% RESPONSE
NO CHANGE	75	29.64%
MAX LENGTH	82	32.41%
NO OPINION	96	37.94%

FISHING EXPERIENCE		
RATING	N	% RESPONSE
EXCELLENT	75	30.74%
GOOD	68	27.87%
FAIR	54	22.13%
POOR	31	12.70%
NO OPINION	16	6.56%

CATEGORIZED EXPERIENCE RATINGS		
CATEGORY	N	% RESPONSE
CATCH RATES	50	51.55%
EXPERIENCE	21	21.65%
WEATHER	12	12.37%
CATCH/EXP	4	4.12%
CATCH/WEATHER	10	10.31%

Table 18. Angler questionnaire responses by month regarding fish species targeted while fishing Salmon Falls Creek Reservoir in 2005.

SPECIES	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
RAINBOW TROUT	14	14	6	10	12	21	23	13
WALLEYE	12	15	19	8	13	3	0	0
SMALLMOUTH BASS	1	0	0	1	0	0	0	0
Y. PERCH/CRAPPIE	1	0	0	0	1	0	0	0
ANYTHING	11	11	3	15	0	0	0	0
TROUT/BASS	1	0	0	0	10	3	4	0
TROUT/WALLEYE	0	6	1	1	0	0	0	0
TOTAL	40	46	29	35	36	27	27	13

Table 19. Summarized catch statistics of walleye sampled in Salmon Falls Creek Reservoir in 2005. Catch summarized by collection source for the number of fish caught (N), average total length in millimeters (AVG TL), standard deviation around the average total length (SD TL), average weight in grams (AVG WT), and standard deviation around the average weight (SD WT).

SOURCE	N	AVG TL	SD TL	AVG WT	SD WT	PSD
IDFG	55	506	124	1501	1167	87
CLUB	159	346	58			21
COMBINED	214	387	106			38

Table 20. Catch and relative abundance of forage species ≤150 mm in Salmon Falls Creek Reservoir 2005 summed across all sample sites.

SPECIES	N	%	CPUE
BLACK CRAPPIE	270	16.2%	34
NORTHERN PIKEMINNOW	1	0.1%	<1
SCULPIN SPP	8	0.5%	1
SMALLMOUTH BASS	414	24.9%	52
SPOTTAIL SHINER	38	2.3%	5
SUCKER SPP	1	0.1%	<1
WALLEYE	11	0.7%	1
YELLOW PERCH	919	55.3%	115

Table 21. Catch per hour (CPUE) of forage species ≤150 mm in Salmon Falls Creek Reservoir across standard sample sites in 2004 and 2005.

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

2005 Magic Valley Region Fishery Management Report

Surveys and Inventories – Rivers and Streams

ABSTRACT

A pre-stream enhancement project fishery survey and a brown trout redd count was completed on the Big Wood River. A total of 590 fish were captured including brook trout *S. fontinalis*, rainbow trout, brown trout, mountain whitefish *Prosopium williamsoni*, bridgelip sucker, sculpin spp., and speckled dace. Salmonid catch rates (fish/hr electrofished) were 8, 9, 23, and 226 for brook trout, brown trout, mountain whitefish, and rainbow trout, respectively. The 2005 brown trout redd count totaled 215 which were high relative to the long term average.

Water temperatures were monitored on the Little Wood River in the vicinity of the Main Dietrich Canal Diversion from August 2 to November 10. Results suggested water temperatures in all sampled sections were likely limiting rainbow trout due to temperatures above lethal limits.

The Silver Creek fishery was sampled to examine potential sampling bias in 2004. Results indicated the relative abundance and capture efficiency was similar to those found in 2004 ruling out habitat specific sampling bias. A fish kill was investigated and determined to be caused by a naturally occurring gas bubble disease outbreak.

Total abundance of rainbow trout and mountain whitefish ≥ 100 mm were determined to be 602 and 336 individuals, respectively in South Fork Boise River surveys. Very few rainbow trout were collected above the minimum length limit (355 mm). Abundance estimates in 2005 were comparable to historic abundances determined in trend monitoring efforts since 1991. The conservative fishing regulations do not appear to be resulting in larger trout.

INTRODUCTION

The Big Wood River

The Big Wood River originates in the Smokey 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, ID forming the Malad River. The Big Wood River is impounded by Magic Dam located west of state highway 75, forming Magic Reservoir. The river is used extensively for irrigation and no longer consistently maintains water in its channel past the Richfield Canal head gates located below Magic Reservoir.

The Big Wood River provides a popular fishery with angling opportunities for rainbow trout, brown trout, and mountain whitefish. The Big Wood River has been managed as a trophy wild rainbow trout fishery from the Glendale Diversion upstream to its headwaters since 1977. Restrictive regulations were expanded in 1990 to increase the trophy quality of the Big Wood River fishery. These changes were based on public input and data provided by Thurow (1990). The Big Wood River fishery is currently managed with three regulation combinations including a slot limit (two trout limit with none between 305 mm and 406 mm allowed), catch-and-release, and general regulations. Hatchery supplementation is currently limited to the North Fork of the Big Wood River, Big Wood River upstream of the North Fork confluence, Magic Reservoir, and intermittently below Magic Reservoir in the Richfield Canal section. These locations coincide with areas managed by general regulations.

The Big Wood River fishery has been monitored on intermittent years since the 1980's in part to evaluate its evolution since implementation of the restrictive regulations in the 1990's (Partridge et al. 1994, Thurow 1990 and Warren et al. 1997, 2000, and 2003). Population monitoring has occurred at standard sites using electrofishing equipment to generate population estimates. Standard sample efforts have included two sites in both the slot-limit and catch-and-release reaches. In addition, 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.

In 2005, brown trout redd counts were completed in an effort to continue monitoring trends in brown trout abundance. In addition, a single pass electrofishing survey was completed in cooperation with the Wood River Land Trust as a pre-evaluation (relative density) of a large-woody debris project to be completed by the Land Trust in 2006.

A single pass electrofishing survey was completed on the Big Wood River in cooperation with the Wood River Land Trust as a pre-evaluation of a large-woody debris habitat project to be completed by the Land Trust in 2006. The survey was conducted using a canoe electrofishing assembly as described in the general methods. Sample efforts focused on that section of the river from below the District 44 Canal head gate to a point approximately 275 m downstream. The reach sampled encompassed the area above and below the proposed site for the habitat project. Equal effort was given to capture all fishes. Trout and whitefish were measure with a selected sub-sample of trout weighed. Other fishes were counted and recorded. Catch per hour was determined by species for post-project comparison. Length frequency histograms for rainbow trout, brown trout, and mountain whitefish were constructed also for post-project comparison.

Little Wood River

The Little Wood River originates in the Pioneer Mountain range of south central Idaho. The river flows south – south west from its origin to its confluence with the Big Wood River west of Gooding, ID forming the Malad River. The Little Wood River is impounded by Little Wood Reservoir located northwest of Carey, ID. The river is used extensively for irrigation and no longer consistently maintains water in its channel below Little Wood Reservoir to Carey. The Little Wood River below the confluence with Silver Creek is also used heavily for irrigation, but maintains water year round due to spring flows in the Silver Creek drainage.

The Little Wood River provides angling opportunities for rainbow trout, brown trout, and mountain whitefish. The reach of the Little Wood River between the Silver Creek confluence downstream to the town of Richfield has been stocked annually with rainbow trout fingerlings. It is believed that Silver Creek also contributes fish to this reach. Little Wood River fishing opportunities include fly-fishing catch-and-release only year round and general regulations.

Currently, irrigation diversion on the lower Little Wood River near the town of Richfield, ID may be influencing water temperatures in the lower river by diverting Little Wood River water and replacing in-stream water with irrigation outflow. Resulting temperature changes might influence potential trout habitat downstream. In 2005 water temperatures were monitored in this area to evaluate the influence of a major irrigation diversion structure on downstream water temperature.

Silver Creek

Silver Creek is a tributary to the Little Wood River in Blaine County, Idaho. Silver Creek originates from numerous springs east of State Highway 75 near Timmerman crossing. Stalker Creek, a main spring tributary, originating on private land, flows eastward for approximately 7.5 km before merging with Grove Creek on The Nature Conservancy's Silver Creek Preserve. Silver Creek and its tributaries provide a popular destination fishery. Fishing rules provide restrictive angling in the upper portions of the stream. The fishery has been the focus of several studies over the past 10 years focusing on topics including: telemetry monitored movements of brown trout and rainbow trout (Young et al. 1997), identification of community structure (Wilkison 1996), genetic analysis studies (Williams et al. 2000), and whirling disease (Spall et al. 1996). In 2001 regional IDFG fishery personnel assisted the U.S. Geological Survey (USGS) with a biological survey that included a determination of fish species presence and a survey to estimate population densities of game fish on Silver Creek and Stalker Creek.

South Fork Boise River

The South Fork Boise River (SFBR) upstream of Anderson Ranch Reservoir flows mostly through U.S. Forest Service lands in Elmore and Camas counties. Access between Pine and Big Smoky Creek is by a good paved and graded gravel road which follows the river most of its length. The SFBR maintains a fishery for rainbow trout and mountain whitefish. The fishery in the reach from the bridge at Pine upstream 39 km to the Beaver Creek confluence is managed with no exceptions to the general fishing rules for rivers and streams. The 16 km reach from Beaver Creek upstream to the Big Smoky Creek confluence has been managed since 1992 with a two trout limit, none less than 356 mm and fishing gear restricted to artificial flies and lures with a single barbless hook. The reach upstream from Big Smoky Creek including all tributaries is managed with no exceptions to the general rules. General rule

sections are stocked with catchable-sized rainbow trout for a put-and-take fishery. Since January 1, 1996 there has been no open season for bull trout, which are known to be present in the SFBR. Kokanee are also known to migrate upstream from Anderson Ranch Reservoir to spawn in the river from late August into early October.

Trends in population abundance have been monitored in the special regulation reach of the SFBR since just prior to the regulations inception in 1992. Trends have been monitored every three years. Abundance of rainbow trout and mountain whitefish were estimated in 2005 as a continuation of trend monitoring efforts.

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. A description of equipment used in lowland lake surveys is listed in Appendix A.

Quantitative streams surveys are completed using a modified Peterson mark recapture, Schnabel multiple mark recapture, or removal-depletion maximum likelihood estimate techniques. Mark recapture efforts are completed with one marking run and one recapture run separated by at least one week. Fish are marked by a single fin punch. Multiple mark recapture efforts are completed with multiple (typically three) passes separated by approximately one week. Fish are marked on all passes except the final pass with fin punches. Depletion estimates utilize multiple passes with removal. The sampled reach is blocked with nets during depletion estimates. Removal passes in depletion estimates are discontinued when no fish are captured or the number of fish captured 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 A.

Water temperatures were monitored on the Little Wood River in the vicinity of the Main Dietrich Canal Diversion from August 2 to November 10 to evaluate the influence of the diversion on downstream water temperatures. Hobo temperature loggers were used to log water temperatures three times daily at 06:48, 14:48, and 22:48. Temperature loggers were placed at three locations including the Main Dietrich Canal Diversion, below Jim Brown Bridge (upstream of the main diversion), and at the HWY 26/93 bridge below Taber Reservoir (below primary irrigation return sources). Designated temperature logger locations are listed in Table 25. One-way analysis of variance (ANOVA, $\alpha = 0.05$) was used to evaluate differences in water temperature profiles.

Fish were sampled by electrofishing Silver Creek at night on June 15. Sample efforts were directed at confirming rainbow trout population structure trends identified in the 2004 standard survey. Results indicated rainbow trout recruited poorly to older age classes. It was suspected that 2004 survey efforts may have been ineffective at capturing larger older age class rainbow trout.

One reach of Silver Creek was sampled. The sampled reach referred to as the S-Turns is located on The Nature Conservancy's Silver Creek property. The sample reach was selected based on perceived habitat preferences by rainbow trout in the system. Fish were collected in one pass using drift boat electrofishing techniques as described in the general methods. Only rainbow and brown trout were netted. Netted fish were held in an oxygenated live well. Fish were identified to species, measured and weighed. Reach coordinates designating sample boundaries are listed in Table 26.

Length distributions of rainbow trout were compared by sample reach using calculated PSD values. Compared sample reaches included the S-Turns sampled in 2005,Stalker Creek, the Cabin reach, and the Martin Bridge reach all sampled in 2004 (Ryan et al., in review). PSD values were calculated in FAST (Fishery Analysis and Simulation Tools, Auburn University). Stock and quality lengths were set at 250 mm and 400 mm, respectively (Anderson and Neumann 1996).

An additional sampling effort was made on July 21. Efforts were directed at detecting the presence of reported gas bubble disease in rainbow and brown trout located in Sullivan Pond. Sullivan Pond is a small pond located adjacent to Silver Creek proper on Nature Conservancy property. Sullivan Pond is formed by several springs. Although, historically connected by a passable channel to Silver Creek, it is believed to be currently isolated from fish passage. Gas bubble disease in Sullivan Pond has been reported in previous years, but not formally documented. Fish were collected using drift boat mounted electrofishing gear as described in the general methods. All trout were inspected for external evidence of acute gas bubble disease. Evidence consisted of present gas bubbles on the gills, outer dermal layer, or fins of the fish and/or presence of bulging swollen eyes (Schlotfeld and Alderman 1995).

Abundance of rainbow trout and mountain whitefish were estimated in the special regulation section of the SFBR above Anderson Ranch Reservoir on August 15 and 23 as a continuation of trend monitoring. Bull trout although present were limited and not sampled in sufficient numbers to complete a population estimate. Sampling was completed using canoe electrofishing equipment methodology described in the general methods. Sample reach boundaries are listed in Table 30. Modified Peterson mark – recapture protocol were followed to generate abundance estimates (Ricker 1975).

Collected fish were identified, measured in five millimeter increments, and representative samples were weighed to the nearest gram. Greater effort was made to net stunned game fish than non-game fish species. Rainbow trout and mountain whitefish > 100 mm were marked with an upper caudal punch for use as recapture identification.

Abundance analysis was completed using Fisheries Analysis + (Montana Fish, Wildlife, and Parks, Bozeman MT). Abundance estimates were generated in 100 mm increments. Length groups were combined when recaptures were considered insufficient (< 5 recaptures). Due to identification/data recording errors wild and hatchery source rainbow trout were

combined for analysis (more marked hatchery trout were identified as recaptured than were marked). To define potential effects of the restrictive regulation on rainbow trout size structure in the standard reach, differences were evaluated in the percentage of rainbow trout equal or greater than 200 mm across sampled years. Percentages of rainbow trout within 10 mm length intervals from 200 mm to 399 mm were compared using one-way analysis of variance (ANOVA).

Habitat measures were collected on October 19. Sample reach length and width were measured using a 300 m tape and digital range finder. Stream width was measured every 50 m.

RESULTS AND DISCUSSION

Big Wood River

A total of 215 redds were counted among all reaches surveyed for redd counts (Table 23). Total counts for 2005 were high relative to historical counts. Although redd counts were high, anecdotal angler reported catches of brown trout in Magic Reservoir were low in 2005. High redd counts may reflect fish access to the river under moderate flows. Spawner redd counts from 2001 to 2003 were relatively low (Table 23). Data was not reported in 2004. These low counts correspond to drought years with low river flow and low fall reservoir levels. Survey results for the Wood River Land Trusts' large-woody debris habitat project pre-evaluation are reported in (Table 24). Length frequency histograms of sampled rainbow trout, brown trout, and mountain whitefish are found in Figure 7.

Little Wood River

A summary of water temperature data including mean, minimum, and maximum water temperature by site was included in Table 25. Results indicated mean water temperature was greatest below the Main Dietrich Canal Diversion at the Highway 26/93 bridge following irrigation returns. However, differences in water temperature by selected locations were not significant (ANOVA, df = 2, P = 0.229). Plotted temperature profiles by site demonstrated the overlap in water temperature (Figure 8). Maximum water temperatures exceeded the approximate lethal limit for rainbow trout (25 °C) at both the Jim Brown Bridge and the Highway 26/93 bridge below Taber Reservoir. Although maximum temperature did not exceed this limit at the main diversion it was only two degrees below at approximately 23 °C. Results suggested water temperatures in all sampled sections were limiting area use by rainbow trout.

Silver Creek

One pass of electrofishing in the S-Turn sample reach provided a total of 65 and 79 rainbow trout and brown trout, respectively. Mean total length and weight of collected rainbow and brown trout were reported in Table 27. Relative abundance of rainbow and brown trout were 45% and 55%, respectively. Relative abundance in this reach was similar to that detected in other reaches in 2004 (Ryan et al., in review).

Mean PSD for rainbow trout across all reaches was 9.56 indicating a relatively small component of the population was of quality size or greater. PSD values calculated for the S-Turn sample reach in 2005 fell within the range of values for all sample reaches (Table 28), suggesting 2004 standard sample efforts were not biased by sample techniques and locations. The Martin Bridge sample reach, sampled in 2004, had the highest PSD value indicating a larger relative proportion of quality size and greater rainbow trout present. However, total number of rainbow trout sampled in this reach was low at 26 individuals limiting the significance of this difference.

Low PSD values and differences in length and age structure between reaches suggested recruitment is probably not a limiting factor, but survival and seasonal or life history stage movements may be influencing current population structure. Given the range of Silver Creek sampled and the low quality of available habitat not sampled, movement of larger rainbow trout is not suspected. If changes in population structure are occurring and survival to older age classes is a limiting factor, changes may reflect influences such as perceived shifts in relative abundance of rainbow trout and brown trout and a potential competitive interaction, angling mortality influences, and/or habitat/temperature changes. Due to inconsistencies in data collection methods prior to 2004 it is difficult to define a true change in population structure over time. Perceived change in population structure at this time is primarily related to angler reports.

A total of 46 rainbow trout and one brown trout were collected from Sullivan Pond. Of those rainbow trout collected 89% showed external evidence of acute gas bubble disease (Table 29). As mentioned previously, gas bubble disease has been historically reported in Sullivan Pond fish. Presence of numerous fish in multiple age classes indicated effects of gas bubble disease are not completely lethal on a population level. Gas saturation levels were not tested although it is probable that high levels of gas originate from source springs forming the pond. Management strategies for reducing potential fish impacts by gas bubble disease are considered limited. Allowing passage to Silver Creek proper is one strategy that may provide fish an escape to more favorable habitat. However, Schlotfeld and Alderman 1995 indicated fish may not avoid waters with saturated gas levels in natural systems, limiting the potential effectiveness of providing passage. Due to limited management options and historical presence of fish despite reported gas bubble disease no action is recommended at this time.

South Fork Boise River

Fish species collected during the South Fork of the Boise River standard survey included: bridgelip sucker, bull trout, cutthroat trout, kokanee, longnose dace, mountain whitefish, northern pikeminnow *Ptychocheilus oregonensis*, rainbow trout (naturalized and hatchery), and sculpin spp.. A summary of survey data including relative abundance, mean length and mean weight of sampled fishes is listed in Table 31. Summarized survey data included only fish captured in the marking run. Total abundance of rainbow trout and mountain whitefish ≥ 100 mm were determined to be 602 and 336 individuals, respectively (Table 32). Confidence intervals and density estimates were listed in Table 32. Total sampled stream length was 1,250 m. Mean stream width was measured as 22.8 m.

Abundance estimates in 2005 were comparable to historic abundances determined in trend monitoring efforts since 1991 (Table 33) (Partridge and Warren 1994; Warren and Partridge 1996; Warren et al. 2003; Warren et al., in review). Mean abundance of rainbow trout and mountain whitefish from standard population estimates beginning in 1991 were 611 (SD

145) and 506 (SD 188) individuals, respectively. Rainbow trout estimates from 2005 were comparable to the long term average. However, mountain whitefish estimates indicated a perceived decline in abundance. Although, abundance of rainbow trout in 2005 includes fish identified to be of hatchery stock, only 11 individuals were identified as such. Despite identification/recording error it is not suspected that numerous hatchery rainbow trout were misidentified. Given a limited number of hatchery trout present in the sample, their influence was considered minimal.

Current regulations preclude harvest of fish less than 355 mm. Only one fish collected in 2005 sample efforts was greater that 355 mm. In addition, few fish greater than 355 mm were reported in data collections from 1991 to 2002 (Partridge and Warren 1994; Warren and Partridge 1996; Warren et al. 2003; Warren et al., in review). No current creel data was available to evaluate the influence of harvest on rainbow trout in the South Fork Boise River special regulation section. However, it is suspected that limitations in the frequency of fish greater than the minimum length limit are not harvest related.

Warren et al. 2003, suspected an increasing trend in the percentage of rainbow trout equal or greater than 200 mm from 1991 to 1998 following the implementation of the special regulation in 1992. Evaluation of the percent of rainbow trout equal or greater than 200 mm in years sampled from 1991 to 2005 indicated there was not a significant difference between years (ANOVA, $\alpha = 0.05$, $P = 0.31$) (Figure 9). Given no evident shift in population structure at this level, it is suspected that population structure and underlying growth of rainbow trout is influenced primarily by system productivity. The South Fork Boise River is considered a relatively infertile system. Productivity is likely tied to kokanee runs from Anderson Ranch Reservoir.

If in fact kokanee presence relates to system productivity and rainbow trout growth and success in the upper river, kokanee management in Anderson Ranch Reservoir may play heavily into management of the fishery upstream.

MANAGEMENT RECOMMENDATIONS

- Continue monitoring brown trout redds on the Big Wood River upstream of Magic Reservoir to develop trend data for use in developing regulations for this reach of the river.

- It is recommended that upstream water management practices and habitat conditions in the Little Wood River be investigated to determine if they could be manipulated to reduce thermal input in order to decrease downstream water temperatures.

- It is recommended that the standard sampling protocol developed in 2004 be continued on a three year cycle. Population length/age structure should be monitored during standard sampling in association with relative abundance, angling trends, and habitat characteristics to better understand the influences on rainbow trout population structure.

- It is recommended that trend monitoring continue in the South Fork Boise River. In addition, it would be beneficial to evaluate related angling influences and a measure of productivity to define more effectively the systems limitations.

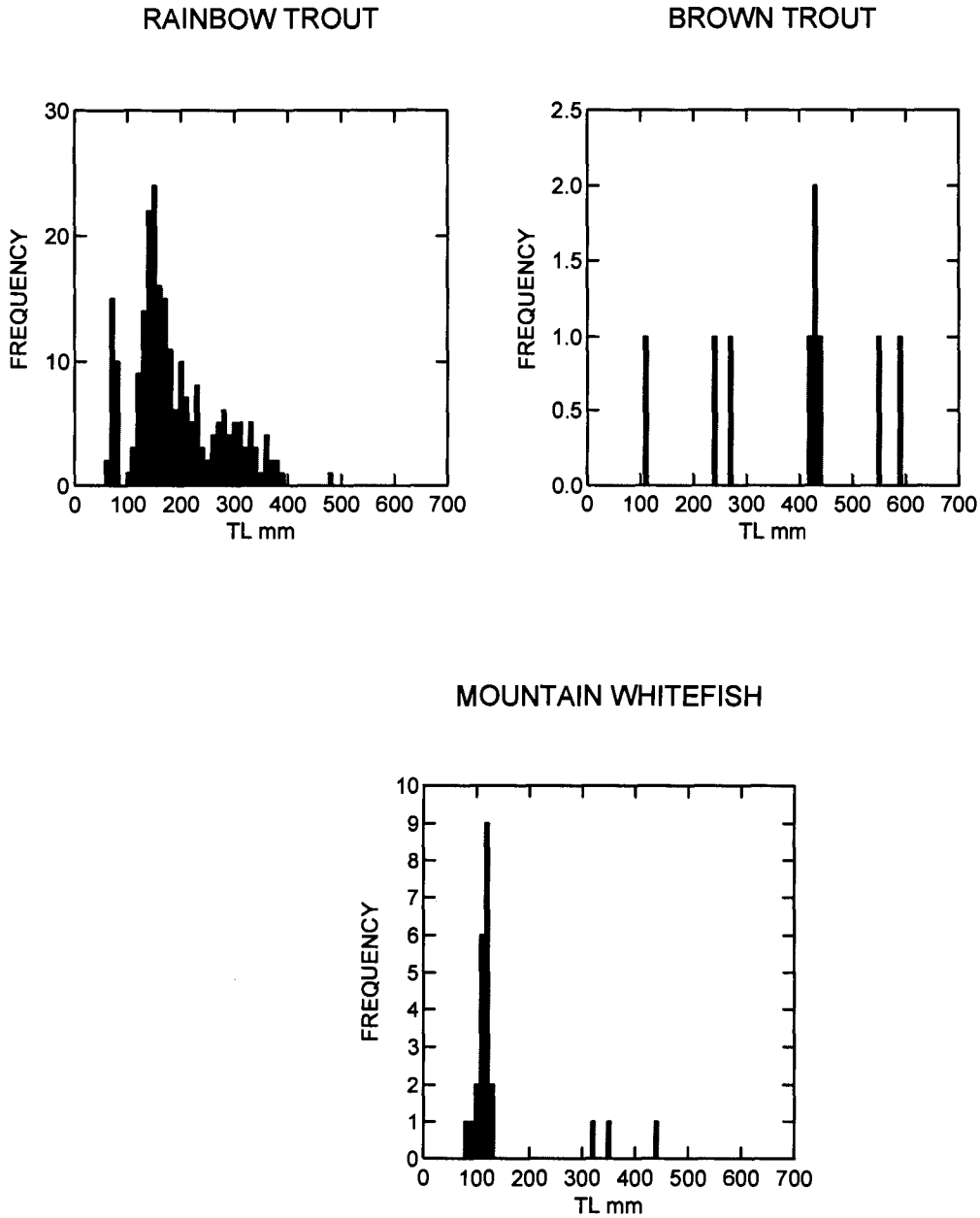
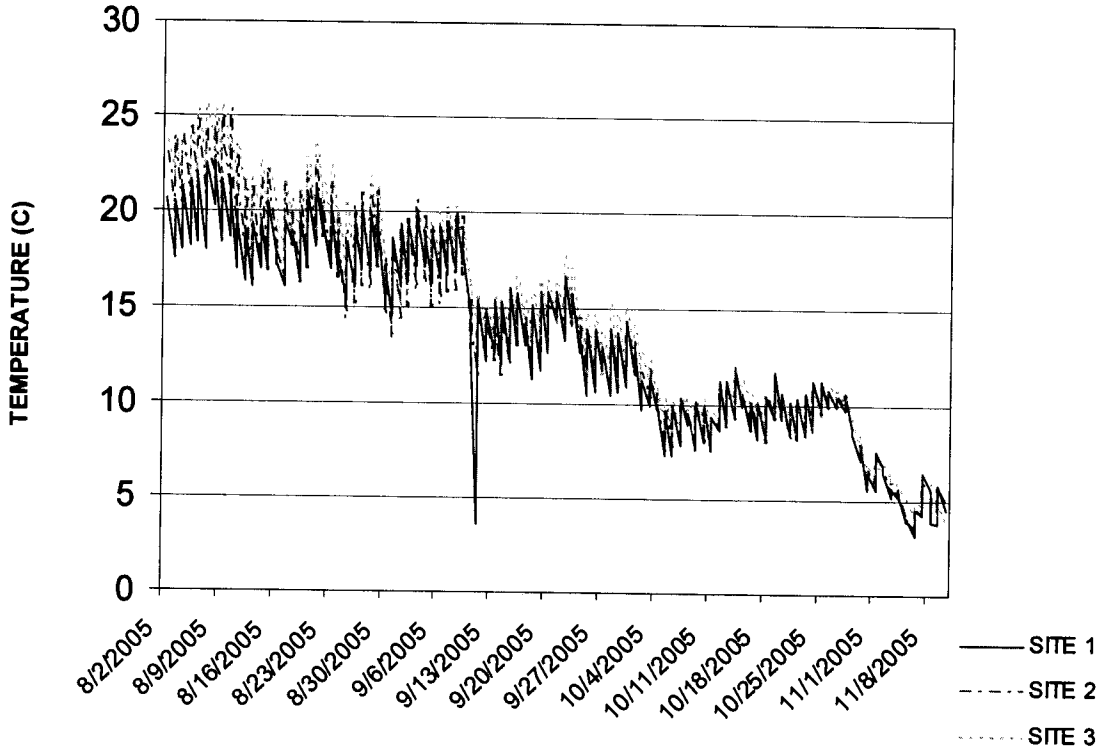


Figure 7. Length frequency histograms by species for rainbow trout, brown trout, and mountain whitefish sampled in the Big Wood River large-woody debris habitat project pre-evaluation survey. Frequencies of catches are plotted by total length (TL).

Figure 8. Water temperature (°C) plotted by day and time at for designated sites at the Main Dietrich Canal Diversion (SITE 1), Jim Brown bridge (SITE 2), and Hwy 26/93 bridge below Taber Reservoir (SITE 3).



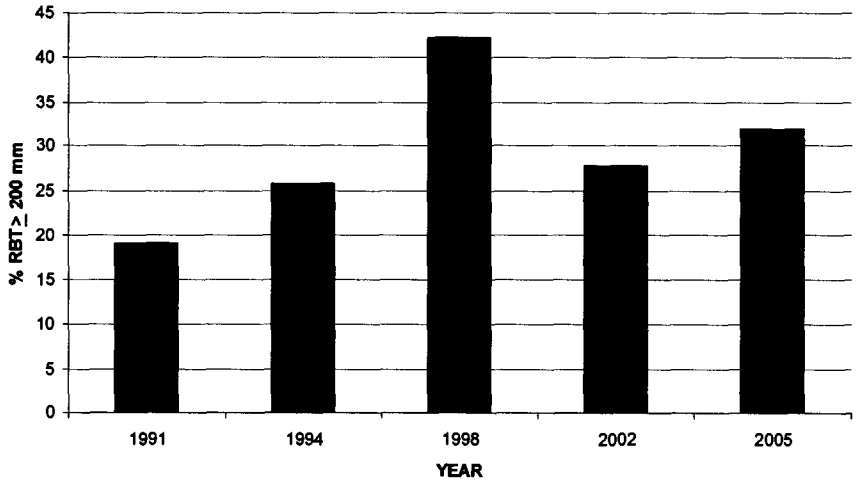


Figure 9. Percent of rainbow trout ≥ 200 mm collected in South Fork Boise River standard reach in sampled years from 1991 to 2005.

Table 22. Big Wood River brown trout redd locations.

REACH	UPPER UTM COORDINATE
STANTON CROSSING - DAVIS POND	717,853.8 M E, 4,801,781.6 M N Z11
USGS GUAGING STATION - STANTON CROSSING	717,418.6 M E, 4,800,641.3 M N Z11
SHEEP BRIDGE - FENCE (USGS GAUGING STATION)	715,608.1 M E, 4,800,423.7 M N Z11
ROCK CREEK - SHEEP BRIDGE	714,111.0 M E, 4,800,580.4 M N Z11
* ROCK CREEK - LOCATION ONLY	712,363.0 M E, 4,800,350.8 M N Z11

Table 23. Historic Big Wood River brown trout redd counts by standard reach from 1986 to 2005.

DATE	BIG WOOD RIVER[a] 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]

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 24. Summary of Big Wood River large-woody debris habitat project pre-evaluation survey results. Catch summary by species includes: total number sampled (N), average total length (AVG TL), average weight (AVG WT), and catch per hour (CPUE).

SPECIES	N	AVG TL (mm)	AVG WT (g)	CPUE
BKT	8	126	--	8
BLS	13	131	--	10
BRN	9	384	1144	9
MWF	24	142	290	23
RBT	234	185	188	226
SCU	298	65	--	288
SDC	4	--	--	4

Table 25. Little Wood River 2005 temperature summary listed by site.

SITE	UTM	ZONE	TEMPERATURE °C		
			AVG	MIN	MAX
(1) Main Dietrich Diversion	732,928 E 4,769,405 N	11	13.58	3.17	22.94
(2) Below Jim Brown Bridge	737,331 E 4,773,932 N	11	13.97	3.48	25.36
(3) Hwy 26/93 bridge at Taber Res.	718,675 E 4,758,655 N	11	14.32	3.81	25.68

Table 26. Upper and lower bounds for 2005 Silver Creek sample in the S-Turn reach located on The Nature Conservancies Silver Creek Ranch.

SITE	UTM	ZONE	DATUM
S -TURNS BEGIN	731,739.5 M E, 4,799,743.3 M N	11	NAD27
S -TURNS END	731,973.5 M E, 4,799,483.7 M N	11	NAD27

Table 27. Silver Creek rainbow trout and brown trout collected in 2005 sampling efforts. Summary by species for total sampled (N), average total length in millimeters (AVG TL), standard deviation of average total length (SD TL), average weight in grams (AVG WT), standard deviation of average weight (SD WT), and percent composition of the catch (% COMP).

SPECIES	N	AVG TL	SD TL	AVG WT	SD WT	% COMP
RAINBOW TROUT	65	268	92	239	183	45%
BROWN TROUT	79	386	77	615	351	55%

Table 28. Silver Creek rainbow trout PSD by location and year. Length data for 2004 was collected during standard trend monitoring efforts (Ryan et al., in review).

LOCATION	DATE	PSD
STALKER	2004	6.78
CABIN	2004	7.09
S TURN	2005	7.69
MARTIN	2004	16.67

Table 29. Summary of trout sampled from Sullivan Pond 21 July, 2005. Results listed by species and include total sample fish (n) and percent of fish with evidence of gas bubble disease externally present and not present.

SPECIES	n	GAS BUBBLE DISEASE	
		Present	Not Present
Brown Trout	1	100%	0%
Rainbow Trout	46	89%	11%

Table 30. South Fork Boise River standard trend survey locations and UTM coordinates.

LOCATION	DATUM	UTM	ZONE
START	NAD27	661,103.6 M E 4,827,524.0 M N	11
END	NAD27	662,301.3 M E 4,827,323.2 M N	11

Table 31. Summary of catch data from the South Fork Boise River standard reach in August, 2005. Data summarized by first pass catch only. Summary by species includes number of fish caught (N), relative composition of total catch (% COMP), average total length in millimeters (AVG TL), standard deviation of measured lengths (SD – TL), average measured weight in grams (AVG WT), and standard deviation of measured weights (SD – WT).

SPECIES	N	% COMP	AVG TL	SD - TL	AVG WT	SD - WT
BRIDGELIP SUCKER	19	4.48%	162	46	3	13
BULL TROUT	12	2.83%	255	51	154	96
CUTTHROAT TROUT	1	0.24%	125	--	20	--
HATCHERY RAINBOW TROUT	2	0.47%	263	11	165	35
KOKANEE	32	7.55%	277	129	273	162
LONGNOSE DACE	20	4.72%	109	22	0	0
MOUNTAIN WHITEFISH	160	37.74%	267	64	204	119
NORTHERN PIKEMINNOW	1	0.24%	410	--	580	--
RAINBOW TROUT	141	33.25%	178	57	71	82
SCULPIN SPP.	36	8.49%	72	22	0	3

Table 32. Population estimates of rainbow trout and mountain whitefish in the South Fork Boise River standard reach August, 2005. Estimates listed by size group (SIZE mm). Values listed include: number fish marked (M), total fish caught in second pass (C), total fish recaptured (R), population estimates (POP EST), 95% confidence interval for the true value (95% CI), linear density of fish per 100 m (FISH/100 m), and volume density of fish per 100 m2 (FISH/100 m2).

SPECIES	SIZE (mm)	M	C	R	POP EST	95% CI	FISH/100 m	FISH/100 m^2
RAINBOW TROUT	100 - 199	96	84	16	484	182	38.72	1.70
	200 - 499	44	52	19	118	30	9.44	0.41
	≥100	140	136	35	602	184	48.16	2.11
MOUNTAIN WHITEFISH	100 - 199	16	20	4	70	42	5.6	0.25
	200 - 299	75	50	27	137	46	10.96	0.48
	300 - 399	54	39	16	128	38	10.24	0.45
	≥100	145	109	47	336	63	26.88	1.18

Table 33. Population estimates by year for rainbow trout and mountain whitefish in the South Fork Boise River standard reach. Estimates listed are for all fish > 100 mm. Rainbow trout estimates listed include only wild rainbow trout except in 2005. Current data includes hatchery source rainbow trout. Data summarized species for population estimates (POP EST), and 95% confidence intervals for the true value (95% CI).

YEAR	SPECIES	POP EST (> 100 mm)	± 95% CI
2005	RAINBOW TROUT	602	184
	MOUNTAIN WHITEFISH	336	63
2002	RAINBOW TROUT	484	134
	MOUNTAIN WHITEFISH	399	147
1998	RAINBOW TROUT	858	352
	MOUNTAIN WHITEFISH	683	272
1994	RAINBOW TROUT	576	146
	MOUNTAIN WHITEFISH	377	107
1991	RAINBOW TROUT	534	252
	MOUNTAIN WHITEFISH	735	231

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APPENDICES

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

Appendix A (cont)

	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
	Anesthetic	Clove oil (alcohol solution) MS-222
Rivers and streams	Power boat electrofisher	Smith-root © model SR-18 w/ model 5.0 pulsator - see above for specs.
	Canoe	4.9 m-long aluminum
	Anode	13.7 m-long power cord; 2.4 m-long fiberglass handle; 0.4 m diameter steel hoop
	Cathode	Boat
	Live well	208 L plastic garbage can; O_2 supplemented
	Drift boat	4.5 m-long aluminum
	Boom	4.3 m-long fiberglass
	Anode	Octopus-style steel danglers (1 m-long)
	Cathode	Boat
	Live well	208 L rubber stock watering tub; O_2 supplemented
	Scales	AND© 5000g,electronic, OHAUS© 3000g,electronic Pesola ©: , 300 g, 1 kg, 2.5 kg, 5.0 kg scales
	Oxygen stone	35.6 X 3.8 cm (135 m^2); fine pore
	Generator	Honda © ; model EG5000x; 5,000 watt
	Electrofishing control box	Coffelt © Model 15 VVP
	Oxygen stone	35.6 X 3.8 cm (135 m^2); fine pore
	Dip nets	2.4 m-long handles ; trapezoid heads (0.6 m^2); 9.5 mm bar-mesh
	Backpack electrofisher	Smith-root © model 15-D; single anode
	Conductivity meter	Yellow Springs Instrument © (YSI) model 30

Appendix B. Summary of estimated angler catch rates from Salmon Falls Creek Reservoir.

Catch Rate Estimates

Summary by Day Type and Interval

Species 1 to 8

10:00:31 AM

Date: 3/23/2006
Time:
Body of Water: SALMON FALLS CREEK
1704021310300.00

EPA Number:

Section No.: All
Interval: All
Day Type: All

Date Range: Between 4/9/2005 and 1/6/2006
Time Range: All

Angler Type: All
Preferred Species: All
Completed Trip: All

Hours: Total

Sec	Int	Day Type	CR - Total (All Species) Kept	Relsd	Cght	Rainbow Trout Kept	Relsd	Smallmouth Kept	Relsd	SteelHead Kept	Relsd	Walleye Kept	Relsd	Yellow Perch Kept	Relsd	Black Crappie Kept	Relsd	Kokanee (Late Kept	Relsd	Species 8 Kept	Relsd
1	1	Weekday	0.19	0.49	0.68	0.19	0.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	1	Weekend	0.09	0.16	0.25	0.09	0.15	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	2	Weekday	0.16	0.08	0.24	0.15	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	2	Weekend	0.04	0.13	0.16	0.03	0.11	0.00	0.01	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	3	Weekday	0.13	0.06	0.19	0.10	0.03	0.00	0.02	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	3	Weekend	0.07	0.04	0.12	0.02	0.02	0.00	0.01	0.00	0.00	0.04	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	4	Weekday	0.05	0.03	0.07	0.03	0.01	0.00	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	4	Weekend	0.10	0.14	0.24	0.03	0.03	0.00	0.04	0.00	0.00	0.04	0.04	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1	5	Weekday	0.17	0.11	0.28	0.14	0.06	0.00	0.05	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	5	Weekend	0.08	0.05	0.13	0.08	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1	6	Weekday	0.24	0.01	0.25	0.07	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	6	Weekend	0.17	0.06	0.23	0.16	0.04	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	7	Weekday	0.19	0.10	0.29	0.15	0.10	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	7	Weekend	0.17	0.13	0.30	0.09	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	8	Weekday	0.20	0.00	0.20	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	8	Weekend	0.00	1.25	1.25	0.00	1.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix B Cont.

Sec	Int	Day Type	CR - Total (All Species) Kept	Relsd	Cght	Rainbow Trout Kept	Relsd	Smallmouth Kept	Relsd	SteelHead Kept	Relsd	Walleye Kept	Relsd	Yellow Perch Kept	Relsd	Black Crappie Kept	Relsd	Kokanee (Late Kept	Relsd	Species 8 Kept	Relsd
Sec 1 Weekday			0.14	0.09	0.22	0.11	0.07	0.00	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sec 1 Weekend CR:			0.11	0.10	0.20	0.08	0.07	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sec 1 Sson CR:			0.12	0.09	0.21	0.09	0.07	0.00	0.01	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wkday Season CR:			0.14	0.09	0.22	0.11	0.07	0.00	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wkend Season CR:			0.11	0.10	0.20	0.08	0.07	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ave Season CR:			0.12	0.09	0.21	0.09	0.07	0.00	0.01	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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