FISHERY MANAGMENT INVESTIGATIONS

FEDERAL AID IN FISH RESTORATION

2003 ANNUAL PERFORMANCE REPORT

Cal Groen, Director

Program F-71-R-28

REGIONAL FISHERIES MANAGEMENT INVESTIGATIONS

MAGIC VALLEY REGION (Subproject I-E, II-E, III-E)

PROJECT I. SURVEYS AND INVENTORIES
Job a. Magic Valley Region Mountain Lakes Investigations
Job b. Magic Valley Lowland Lakes Investigations
Job c. Magic Valley Rivers and Stream Investigations
PROJECT II. TECHNICAL GUIDANCE
PROJECT III. HABITAT MANAGEMENT

By

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2003 ANNUAL PERFORMANCE REPORT

State of: Idaho

Program: Fisheries Management F-21-R-28

Project I: Surveys and Inventories

Subproject I-E: Magic Valley Region

Job: a

Title: Mountain Lakes Investigations

Contract Period: July 1, 2003 to June 30, 2004

ABSTRACT

Big Lost Lake and Johnson Creek Lake were investigated with a fisheries survey in August of 2003. Big Lost Lake is accessed by hiking approximately 3.5 km up the Norton Lakes Loop trail. It has been stocked with arctic grayling *Thymallus arcticus* fry seven years out of the last thirteen with the most recent in 2001. No fish were sampled in the gill netting survey indicating little or no survival. Angler use appears to be low. Johnson Creek Lake is managed by stocking rainbow trout *Oncoryhnchus mykiss* fry every three years. It is accessed by about a 10 km trek up the Johnson Creek trail then traveling about 3 km cross-country. No fish were sampled with the gill netting survey indicating little or no survival of fish in that lake. There is some evidence of public use by the presence of a fire pit and foot trail around part of the lake. An unidentified larval salamander species was observed to be present in low numbers in Big Lost Lake. Large numbers of long-toed salamander *Ambystoma macrodactylum* were noted to be present in Johnson Creek Lake and along the periphery of the shoreline.

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GRANT OBJECTIVES

To obtain current information for fishery management decisions on mountain lakes, including angler use and success, fish population characteristics, spawning potential, stocking success, limnology, morphology, and notes on other aquatic life and develop appropriate management recommendations.

GENERAL METHODS

Fish are sampled with one Swedish-made Lundgrens Type A lightweight multi-filament sinking gill net set overnight for 12 to 14 hrs. The nets measure 1.5 m tall, with six 7.6 m wide panels with bar mesh sizes: 46, 38, 33, 30, 25, and 19 mm. The nets are set using a small inflatable raft or a float tube and fished overnight. A cursory survey of amphibians was made near the shoreline by turning over rocks and logs and visually searching the littoral zone of the lake.

Water quality was measured from mid-lake surface samples for alkalinity ($CaCo_3$), and total hardness using a HACH kit and pH with an Oakton hand-held meter and specific conductivity with a Yellow Springs Instruments Model 30 conductivity meter within 48 hours of taking the water sample.

A cursory survey was made of the shoreline to estimate angler and camper use.

BIG LOST LAKE

Introduction

Big Lost Lake is a high mountain cirque lake located in the headwaters of Norton Creek, a tributary to Baker Creek and the upper Big Wood River. It is managed under general fishing rules and has been stocked seven times intermittently with 500 to 1,000 arctic grayling fry from 1991 to 2003. The most recent stocking prior to the survey was in 2001. The last fishery survey on Big Lost Lake was done in August 1996 (Warren et al. 2003). The purpose of returning to survey the lake in 2003 was to determine if the arctic grayling stocking program has been successful in providing a fishery.

Study Site

Big Lost Lake is approximately 3.5 ha in surface area and 2,790 m in elevation when full. It is located at UTM 688,300M E, 4,845,889M N, Zone 11. Maximum depth is approximately 6 m when full. It is fed primarily by snowmelt since there is no active inlet or outlet. Water elevation fluctuates with the total amount of snowmelt runoff. Angler access to the lake is by hiking approximately 3.5 km on a good trail from the Norton Lakes trailhead.

Methods

Fish in Big Lost Lake were sampled with the sinking gill net set on the evening of August 11, 2003 then pulled on August 12, 2003 for a total set time of approximately 12 hrs. Other measurements taken include total alkalinity, total hardness, pH, and specific conductivity.

Results

No fish were sampled with the gill netting efforts. There were low numbers of small larval salamanders of an unidentified species present in the lake near the water's edge.

Limnological measurements for total hardness were 39 mg/l, total alkalinity was 34 mg/l, pH was 9.1 and specific conductivity was 54.9 µ/cm.

Approximately half of the six to eight hikers encountered during the survey said that they were interested in fishing Big Lost Lake. The other half were not interested in fishing at all. There was one fire pit but not much evidence of heavy use by campers.

Discussion

A similar survey completed in August of 1996 sampled 65 grayling of a single year class that appeared to have been stocked the previous year (Warren et al. 2003). This indicates that over-winter survival does occur intermittently. Angler reports in recent years and the survey in 2003 suggest that carry-over is too sporadic to continue with the stocking program.

JOHNSON CREEK LAKE

Introduction

Johnson Creek Lake is an alpine cirque lake located in the headwaters of the South Fork Boise River. The fishery is managed under general fishing rules and by stocking 500 rainbow trout fry every three years fry for the last few decades. There are no recent reports of any angler or fishery surveys being done on the lake. The objective of this year's survey was to determine the status of the fishery under the current management program.

Study Site

Johnson Creek Lake is a 1.5 ha alpine cirque lake located in the headwaters of Johnson Creek, a tributary to the South Fork Boise. It is located at UTM 663,152.3 m E, 4,855,613.0 m N, Z 11 at an elevation of 2,655 m. The lake is accessed by about a 10 km hike up a developed trail from the confluence of Ross Fork Creek and the South Fork Boise River then about a 3 km cross-country hike up the outlet stream from the trail.

Methods

Fish in Johnson Creek Lake were sampled with the sinking gill net set on the evening of August 17, 2003 then pulled on August 18, 2003 for a total set time of approximately 14 hrs. Other measurements taken include total alkalinity, total hardness, pH, and specific conductivity. A bathometric survey was made to estimate depths and a visual survey to determine amount or presence of suitable spawning habitat.

Results

No fish were sampled with the gill netting efforts and none were observed in the lake. Long-toed salamander were seen in great abundance throughout the lake and in the periphery of the littoral zone.

Bathometric measurements indicate a maximum depth of approximately 4.6 m along the west side of the lake (Figure 1), which is the side against the rocky face of the cirque. The east shoreline is timbered and the north side is open. An examination of the outlet indicates that there is little or no spawning habitat available.

Limnological measurements for total hardness were 15 mg/l, total alkalinity was 17 mg/l, pH was 9.7 and specific conductivity was 63.9 μ/cm.

There is evidence of some public use by the presence of a single fire pit, a trail around part of the lake and some litter.

Discussion

Although there is suitable depth and perennial flow of water through the lake, it does not appear to have supported fish that were last stocked in 2000. The abundance of pelagic oriented larval salamanders is an indication the lake is void of any fish. Further investigation needs to be done to evaluate the stocking program for Johnson Creek Lake.

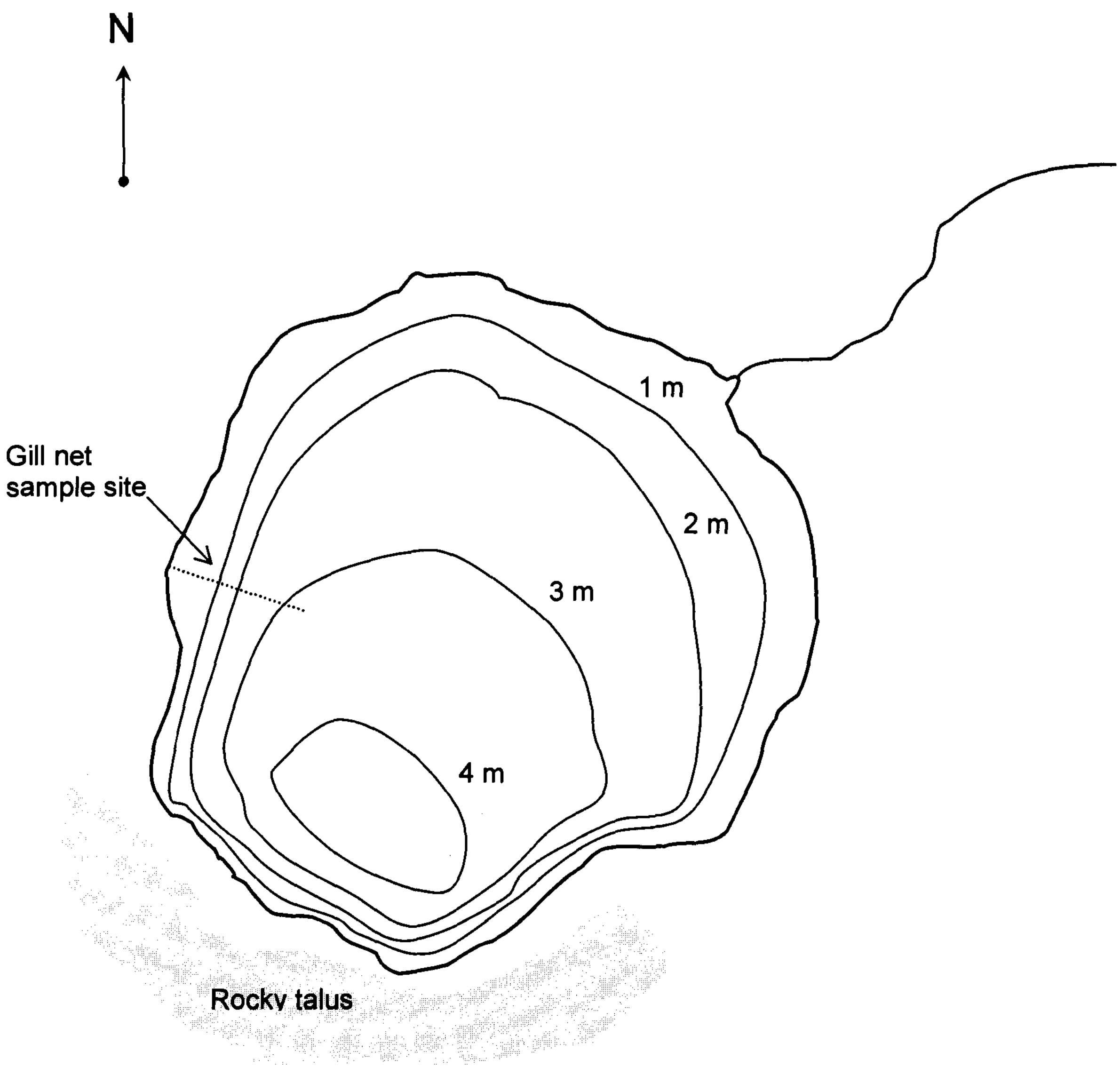

Figure 1. Bathymetric map of Johnson Creek Lake and location of August 2003 gill net sample site.

2003 ANNUAL PERFORMANCE REPORT

State of: Idaho

Program: Fisheries Management F-71-R-28

Project I: Surveys and Inventories

Subproject I-E: Magic Valley Region

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Contract Period: July 1, 2003 to June 30, 2004

ABSTRACT

The Anderson Ranch Reservoir kokanee *O. nerka* population was monitored using with nighttime midwater trawls and spawning run trend counts. The total population of young of the year kokanee was estimated at 166,214 fish (± 108,094). This estimate was higher than the previous two year estimates but much lower than the 1999 estimate of 1.5 million fish. There were a total of 1,261 spawning kokanee counted in 13 trend locations which was substantially less than the long-term average of 6,200. The zooplankton quality index ranged from 0.08 to 1.04 indicating competition for food may be occurring but is unlikely.

Bluegill Lake is a fishery recently purchased by the City of Twin Falls. The fishery was electofished to determine the status of the resident fishery. One brown bullhead *Ameiurus nebulosus* was sampled indicating the absence of any viable fish population. Basic water quality data show the impoundment is currently more suitable for warm water fish species.

A standardized lowland lake sample was used to sample the South Pond within the Bruneau Dunes State Park. Panfish (bluegill *Lepomis macrochirus* and pumkinseed *L. gibbosis*) dominated the fishery (combined 67%) followed by largemouth bass *Micropterus salmoides* (23%) and common carp *Cyprinus carpio* (10%). Additional netting with large-mesh gill nets resulted in few common carp in the catch. An eradication project is not warranted at this time.

Dierkes Lake was sampled using standard lowland lake sampling techniques to monitor the efficacy of protective largemouth bass regulation to increase bluegill proportional stock density (PSD). Results showed a slight increase and no change in bluegill and largemouth bass, respectively, since the rule was implemented in 1994. The protective largemouth bass regulation did not impact the bluegill PSD as hoped; however, anglers may still prefer the trophy largemouth bass rules.

Brown trout *Salmo trutta* redds were surveyed as part of an annual trend monitoring effort in Magic Reservoir. Redds were counted in November resulting in a total count of 76 redds. This total is less than half of the ten-year average of 179 redds indicating there was either a diminished reservoir population or poor spawning conditions.

The Milner Reservoir fishery was surveyed to evaluate the status of both the resident fishery and angler use. The fishery was surveyed using standard lowland lake sampling techniques and a randomized roving creel census. The fishery was dominated by Utah sucker *Catostomus ardens* (41%), Utah chub *Gila atraria* (30%), and smallmouth bass *Micropterus dolomieu* (23%) as determined by the lowland lake sampling catch. Other species sampled include common carp, bluegill, brown bullhead, redside shiner *Richardsonius balteatus*,

mountain whitefish *Prosopium williamsoni* and channel catfish *Ictalurus punctatus*. The catch biomass was dominated by nongame fish species (87%) including Utah sucker, common carp, and Utah chub with smallmouth bass comprising 11%. Smallmouth bass require five growing seasons to achieve a harvestable size of 305 mm. The bass proportional stock density was estimated at 39.5 and they reached maximum growth potential at 620 mm. Total angler effort on Milner Reservoir from April through October was estimated at 34,939 hours (± 7,218: 95% C.I.). An estimated 2,612 (± 1,418: 95% C.I.) smallmouth bass were harvested out of a total species catch of 56,586 (± 19,809: 95% C.I.). Approximately 5% of smallmouth bass caught were harvested.

Mormon Reservoir was surveyed using gill nets and a mid-winter water quality survey to assess rainbow trout winter survival. Adequate dissolved oxygen was recorded on January 15, 2003. The spring-time gill net catch also indicated there was winter survival of stocked rainbow trout and resident yellow perch *Perca flavescens*.

Forage fish were sampled to evaluate walleye *Sander vitreus* forage availability in Oakley Reservoir. Beach seines were used to sample shoreline habitat at four locations. Yellow perch (<100 mm) dominated the catch and their numbers indicated walleye forage abundance was likely sufficient.

Ponderosa Pond was electrofished to evaluate the resident fishery for future restoration consideration (e.g rotenone). Species captured included common carp, pumpkinseed, rainbow trout, redside shiner, smallmouth bass, Utah sucker, and yellow perch. Smallmouth bass dominated the catch (73%) however most fish were <100 mm TL. Additionally, smallmouth bass have apparently displaced the previously documented largemouth bass population. The fishery is unbalanced and heavily influenced by non-game fish species; therefore, a rotenone treatment is recommended.

Salmon Falls Creek Reservoir was sampled to evaluate the walleye hatchery supplementation program and to evaluate walleye *Sander vitreus* forage availability. Forage fish were sampled with a beech seine at five locations. The seine catch was made up of smallmouth bass, spottail shiner *Notropis hudsonius*, white crappie *Pomoxis annularis*, and yellow perch. The relatively low walleye forage catch rates indicate a depressed forage fish population. Gill nets were used to sample age-1 walleye. Age-1 walleye otoliths were harvested and evaluated for oxytetracycline (OTC) marks which indicate hatchery origin. Approximately 17% of the age-1 walleye were of hatchery origin.

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GRANT OBJECTIVES

To obtain current information for fishery management decisions on lowland lakes and reservoirs, including angler use, success, harvest and opinions, fish population characteristics, stocking success, return-to-the-creel for hatchery trout, limnology and develop appropriate management recommendations.

GENERAL METHODS

Fish sampling techniques used varied depending on the specific objectives of the survey for each lake or reservoir but followed general standardized protocols. Kokanee *Oncorhynchus nerka* were sampled with a nighttime midwater trawl following methods described by Rieman (1992) with population estimates made from the data using a Microsoft Excel spreadsheet developed by IDFG fishery research. Spawning adult fish and redds were counted as a measure of the naturally reproducing population of fish in lakes and reservoirs. This technique was used for monitoring trends in brown trout and kokanee populations as they moved upstream to spawn in the fall. For the Anderson Ranch Reservoir kokanee population fish were counted at twelve sites along the South Fork Boise River upstream of the reservoir and one site on lower Trinity Creek. These are the same sites that kokanee have been counted on a weekly basis during the run since 1989. For the Magic Reservoir brown trout population redds were counted in late November after the spawning run between Sheep Bridge and the outflow of a private pond on the east side of the Big Wood River approximately 1.5 km upstream of the Stanton Crossing Bridge.

Standardized fish sampling protocols were used to provide a full assessment of the fishery in lowland lakes. Fish are sampled with one or more units of sampling effort with each unit of effort equal to one floating gill net, one sinking gill net and one trap net set overnight and one hour of electrofishing effort. Gill nets were 38 m x 1.8 m variable mesh monofilament experimental nets with bar mesh sizes of 2.0 cm, 2.5 cm, 3.2 cm, 5.1 cm and 6.4 cm. Trap nets were constructed of a 1.8 x 0.9 m box and five 76 cm diameter hoops covered with 2 cm bar mesh netting. A Smith-Root Model SR-18 electrofishing boat with a Model 5.0 pulsator was used for nighttime electrofishing with two netters on the bow attempting to net all fish stunned regardless of size or species. Numbers and biomass of fish sampled are reported per unit of sampling effort.

A beach seine was used to monitor forage fish presence. The seine measured 15.2 m x 1.4 m with 6.2 mm bar mesh. Samples were taken by holding one end of the seine stationary at the shoreline while the other end was taken straight out into the water perpendicular to the shoreline. With the shore end remaining stationary, the other end was swept shoreward with the lead line held near the bottom.

Several water quality parameters were measured at numerous waters, depending on the objective. Temperature and dissolved oxygen profiles were measured at various depths with a Yellow Springs Instruments Model 57 meter. Surface water conductivity and salinity was measured with a Yellow Springs Instruments Model 30 meter, and temperature monitored with a continuously recording Tidbit (Onset Computer Corp.) thermograph. Total alkalinity and total hardness were measured with a HACH titratable series kit.

Intensive angler surveys performed to estimate total angler effort, fish harvested and catch rates were done following methods described by McArthur (1993). Regional fishery personnel and conservations officers also performed spot creel surveys throughout the region. Most of these were nonrandom surveys to determine angler effort for specific days and estimate catch rates.

Age and growth of fish were estimated by counting annuli on scales sampled from an area of the fish between the lateral line and the dorsal fin. Age of fish was validated by correlating with annuli counts from a cross section of the second dorsal fin-ray (Mackay et al. 1990) and by length frequency analysis.

Growth of fish was analyzed using a Walford line (Ricker 1975). This plots the length of a stock of fish at a given age against the length of that same stock one year later to derive the maximum or asymptotic length they can grow. This is useful for determining what the maximum length and age the current stock is capable of reaching and if growth limitations (such as stunting) are keeping the stock from reaching size objectives.

Proportional stock densities of bluegill, largemouth bass and smallmouth bass were calculated from the size distribution of the sample following methods described by Anderson and Gutreuter (1983).

A zooplankton quality index was used as a measurement of a lake's or reservoir's suitability for stocking and growing rainbow trout (Teuscher 1999). Larger bodies of water were stratified into two or more sections for sampling.

ANDERSON RANCH RESERVOIR

Introduction

Anderson Ranch Reservoir is a Bureau of Reclamation (BOR) impoundment on the South Fork Boise River 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 mostly kokanee, rainbow trout, smallmouth bass and yellow perch. Several other nongame fish species and bull trout *Salvelinus confluentus* are also present. The kokanee are managed as a consumptive fishery with a daily bag limit of 25 fish and a possession limit of 50 fish. Kokanee populations were monitored in Anderson Ranch Reservoir and the South Fork Boise River upstream of the reservoir as part of an annual monitoring program to forecast future recruitment of fish. Zooplankton was measured to acquire an overall measurement of forage availability and to provide a guideline for stocking fingerling rainbow trout.

Study Site

Anderson Ranch Reservoir is a 1,923 ha impoundment on the South Fork Boise River with a 502,700 acre feet capacity when full. The dam is located at UTM 625,766M E, 4,801,496M N, Z 11 and has a crest elevation of 1,282 m. The reservoir receives most of its water from the upper South Fork Boise River drainage with a total drainage area of approximately 2,490 km^2.

Methods

Anderson Ranch Reservoir was partitioned into three strata for a mid-water kokanee trawl on the nights of July 29 and 30, 2003 (Rieman 1992). Strata 1 had five trawls that included the area from the dam up-reservoir to, and including, the Fall Creek arm. Strata 2 had five trawls from the Fall Creek Arm to, and included the Lime Creek arm. Strata 3 had four trawls from the Lime Creek arm to the Curlew boat ramp. All kokanee sampled were classified into 4 age groups; fish up to 109 mm in total length were classified as age 0+ fish, fish from 110 to 199 mm long were classified as age 1+ fish, fish from 200 to 299 mm long were classified as age 2+ fish, and fish larger than 299 mm long were classified as age 3+ fish. Zooplankton was sampled from within the three strata defined in the mid-water trawl in the afternoon of July 29, 2003 following methods described by Teuscher (1999).

Results

A total of 132 kokanee were sampled with the nighttime mid-water trawl. The total population estimate of young of the year kokanee for the entire reservoir was 166,214 fish +/- 108,094, which is an increase from the two previous year's estimates but significantly lower than the high of 1.5 million estimated in 1999 (Table 2).

There were 1,261 adult kokanee counted at the thirteen trend count sites on the South Fork Boise River in August, September and October (Table 3). This is less than the long-term average of 6,200 kokanee counted in the fourteen previous years since 1989 (Figure 1).

Zooplankton was monitored with samples taken from within each of the three strata delineated by the mid-water kokanee trawl samples in July, 2003 following methods described by Teuscher (1999). The resulting zooplankton quality index was 0.08 in the lower strata, 0.15 in the middle strata and 1.04 in the upper strata. Stocking recommendations based on the zooplankton quality index provided below (Teuscher 1999):

ZQI > 0.60:	Competition for food unlikely; stock fingerlings from 150 to 300 Per acre.
0.60 > ZQI > 0.10:	Competition for food may be occurring; stock fingerlings from 75 to 150 per acre.
ZQI < 0.10:	Forage resources are limiting; stock less than 75 fingerlings per acre or catchables.

Table 1. Anderson Ranch Reservoir kokanee population (± 95% CI) and density (fish/ha) estimates based on night time midwater trawling results in July 2003 with total population estimates from 1993-2002.

	Age-0	Age-1	Age-2	Age-3
2003				
Strata 1 (5 Trawls)				
Population estimate	152,333 +/- 143,093	0	0	0
Density Estimate	254	0	0	0
SD	192	-	-	-
Strata 2 (5 Trawls)				
Population estimate	10,532 +/ 13,669	7,899 +/ 10,651	2,627 +/ 4,464	0
Density Estimate	18.81	14.10	4.690	0
SD	19.67	15.33	6.42	-
Strata 3 (5 Trawls)				
Population estimate	3,350 +/ 3,559	1,163 +/ 3,699	1,163 +/ 3,699	1,091 +/- 3,469
Density Estimate	10.15	3.52	3.52	-
SD	11.43	7.05	7.05	-
Whole Reservoir				
Population estimate	166,214 +/ 108,094	9,062 +/ 8,475	3,790 +/ 4,377	1,091 +/- 2,641
Density Estimate	111.55	6.08	2.54	-
Previous year's whole reservoir population and density estimates				
2002				
Population estimate	18,744 +/ 14,339	3,775 +/- 7,775	1,965 +/- 3,103	0
Density Estimate	13	3	1	0
2001				
Population estimate	33,702 +/- 23,245	64,570 +/- 61,034	28,736 +/- 18,606	0
Density Estimate	41	78	35	0
2000				
Population estimate	819,828 +/- 1,076,117	54,455 +/- 40,645	4,189 +/- 6,488	0
Density Estimate	565	38	3	0
1999				
Population estimate	1,446,945 +/- 521,699	12,549 +/- 5,578	15,210 +/- 8,980	0
Density Estimate	1,201	10	13	0
1998				
Population estimate	117,620	32,815	10,039	0
Variance	5.0×10^{8}	8.0×10^{8}	8.9×10^{6}	
Density estimate	109	29	8	0

Table 1. Continued

1997				
Population estimate	853,932	34,582	5,831	0
Variance	$7.0x10^8$	$5.0x10^8$	$2.1x10^6$	
Density estimate	497	23	4	0
1996				
Population estimate	109,400	7,733	3,551	0
Variance	$2.0x10^8$	$4.0x10^8$	$7.0x10^6$	
Density estimate	64	6	2	0
1995				
Population estimate	3,134	15,995	38,364	0
Variance	$3.0x10^6$	$3.0x10^7$	$5.0x10^7$	
Density estimate	2	11	25	0
1994				
Population estimate	230,411(wild)	444,791	38,364	0
Variance	$3.0x10^6$	$3.0x10^7$	$5.0x10^7$	
Density estimate	2	11	25	0

Table 2. Number of spawning kokanee observed at selected sites on the South Fork Boise River during spawning ground surveys in 2003.

Location[a]	8/15	8/22	8/29	9/5	9/12	9/19	9/26	10/3
1	0	1	25	17	3	2	0	0
2	14	20	55	20	0	4	0	0
3	0	18	30	12	0	0	0	0
4	50	35	55	40	20	15	0	0
5	0	0	0	0	0	0	0	0
6	25	50	65	80	60	52	30	12
7	0	0	1	30	4	0	0	0
8	6	1	2	2	0	1	0	0
9	1	2	12	12	0	0	0	0
10	1	10	3	12	0	2	0	0
11	0	4	10	40	85	80	60	20
12	6	4	2	6	0	2	0	0
13	0	0	14	6	10	0	0	0
Total:	103	145	274	277	182	158	90	32

[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

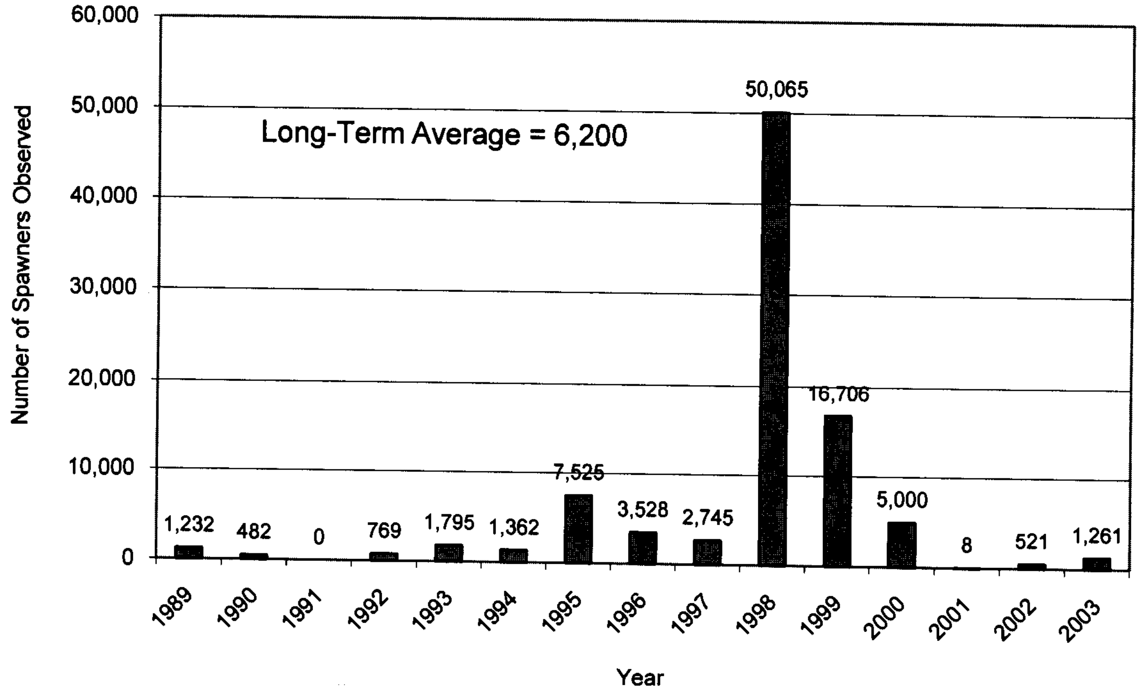

Figure 2. Total numbers of spawning kokanee observed at thirteen trend monitoring sites on the South Fork Boise River on a weekly basis during the spawning season since 1989.

BLUEGILL LAKE (Twin Falls City)

Introduction

Bluegill Lake is a shallow pond approximately one-half ha in surface area located within the Snake River canyon south of Auger Falls. The City of Twin Falls recently purchased the pond and property surrounding it and is in the process of determining how to manage it. The objective of the Idaho Department of Fish and Game's involvement in the process was to determine the feasibility of using the pond as an urban fishery.

Study Area

The dimensions of Bluegill Lake were not measured but it appears to be approximately one-half to one hectare in surface area located within the Snake River canyon approximately 500 m south of the Snake River. The UTM location is 703,113 m E, 4,722,277 m N in Zone 11. Maximum depth of the pond was measured to be 1.5 m. Water flows into the pond from a small spring-fed stream and from irrigation return flows that drain into the canyon over the rim to the south of the pond. The earthen dam was originally built to be approximately two meters high, which now leaks water that is eroding a gap in it.

Methods

Fish were sampled with 12.2 minutes of daytime electrofishing effort on April 24, 2003. We used the Coffelt VVP-15 electrofishing array mounted on the aluminum drift boat with two netters working off the bow. Water quality measurements taken include surface water salinity, specific and ambient conductivity, total alkalinity, total hardness, and pH. A daytime temperature and dissolved oxygen profile was also measured from the middle of the pond. A continuously recording thermograph was placed in the pond in front of the outflow at the dam.

Results

The only fish sampled by electrofishing was one brown bullhead 185 mm long. A sample of the surface water had the following water quality measurements: salinity = 0.4 ppt, specific conductivity = 880 μS/cm, pH = 8.9, total alkalinity as CaCO = 187 mg/l, and total hardness = 238 mg/l.

Water temperatures ranged from 14°C at the surface to 13°C near the bottom (1.5 m deep) and dissolved oxygen ranged from 11.4 mg/l at the surface to 12.8 mg/l at the bottom on April 24, 2003. Results of the continuously recording thermograph indicate that temperatures ranged from 11°C to 27°C (Figure 3) from April 25 to October 22, 2003.

The bottom of the pond is completely covered with filamentous algae and other aquatic macrophytes. It is suspected that there has been significant filling of the pond with decaying vegetation.

Discussion

Without knowing the history behind the management of Bluegill Lake it is difficult to discern why only one fish was sampled with the electrofishing efforts. Water quality measurements indicate that conditions are suitable for supporting more warm water tolerant fish species and the design of the dam and outflow structure indicate that water levels have not fluctuated significantly for at least the past several years. There may be low nighttime dissolved oxygen levels or possibly a high biological oxygen demand reducing dissolved oxygen during the winter under the ice.

Due to the poor condition of the earthen dam, we recommend a complete reconstruction of the pond that includes draining, dredging, and reinforcing of the existing dam. We also recommend the replacement and installation of a bottom draw outflow gate. The source of water to the pond should continue to be spring flow and include only filtered irrigation return flow to reduce sedimentation and prevent the introduction of undesirable fish species. Once this is completed the pond could be managed for largemouth bass and bluegill and as a seasonal put-and-take trout fishery.

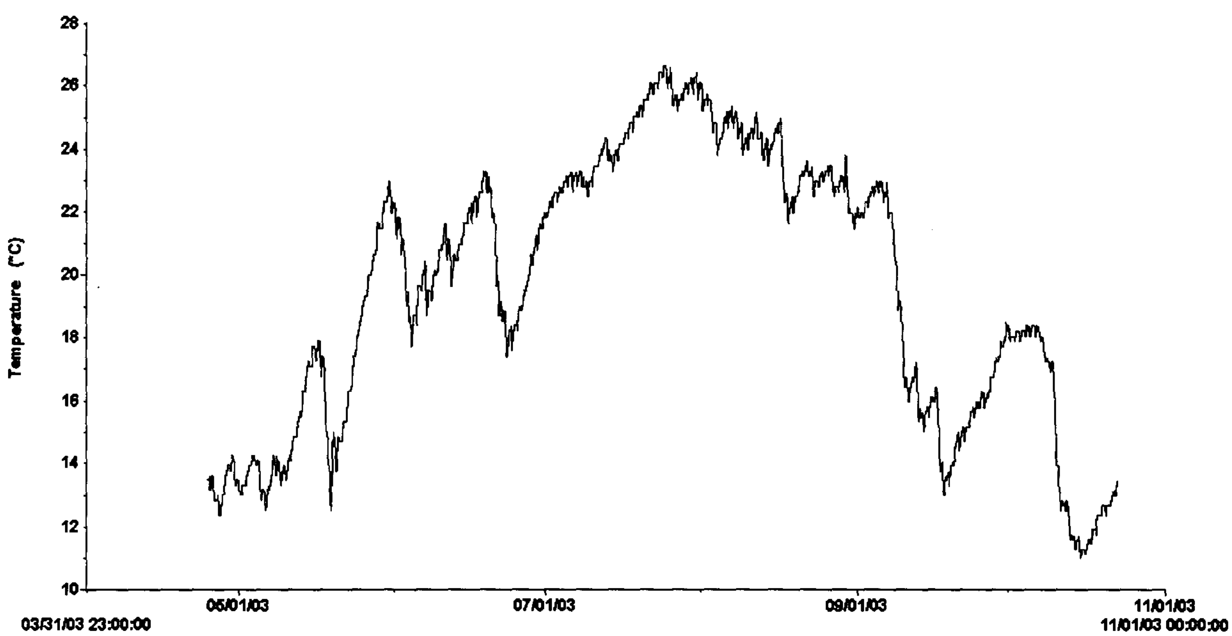

Figure 3. Continuously recorded water temperatures of Bluegill Lake in front of the dam from April 25 through October 22, 2003.

BRUNEAU DUNES STATE PARK PONDS

Introduction

Water is pumped annually from the Snake River into two large ponds within the Bruneau Sand Dunes State Park providing a warmwater fishery. Pumped water flows from the north pond through a culvert when full into the larger south pond. The pump is shut off during the summer causing the two ponds to drop in volume from water losses to seepage and evaporation.

The fishery is managed for largemouth bass and bluegill with fishing rules that allow for the harvest of two bass, none less than 20 inches long. Fish were previously sampled with electrofishing in June, 2001 (Warren et al. in press) and with one unit of lowland lakes sampling protocols in July, 1994 (Warren et al. 1996). Results of both surveys indicate the presence of common carp in the larger south pond. Angler comments and observations concerning carp in the last few years indicate that they may be adversely impacting the game fish population.

Objectives of this year's sampling were to determine the species composition, relative abundance, and size structure of the fish population in the south pond.

Study Site

There are two ponds within the Bruneau Dunes State Park that support warm water fisheries. The north pond, which is the first to receive water pumped from the Snake River, is approximately 13 ha in surface area, and the south pond, which receives water from the north pond through a culvert after it fills, is approximately 29 ha in surface area. The inlet to the upper (north) pond is located at UTM 607,182M E, 4,750,683M N, Z 11 and the inlet to the lower pond is located at UTM 606,859M E, 4,750,122M N, Z 11.

Methods

Fish were sampled with one unit of standardized lowland lakes sampling effort on September 10 and 11, 2003. In addition to the standard gear, one extra trap net and two 38 m long sinking gill nets with a 10 cm bar mesh size were set overnight. Water quality measurements included temperature and dissolved oxygen profiles and surface water salinity, ambient and specific conductivity, total alkalinity, total hardness, pH and Secchi visibility. Measurements were made on May 2 and on September 11, 2003 to provide a comparison of water quality when the ponds are filling and after water levels have dropped due to seepage and evaporation.

Results

There were a total of 158 fish sampled with the one unit of lowland lakes sampling effort and an additional three common carp sampled with the large mesh gill nets (Table 3). Bluegill made up 40% of the fish sampled, common carp 10%, largemouth bass 23% and pumpkinseed 27% numerically (Table 4). Growth rate estimates based on scale and dorsal fin ray annuli counts indicate that it takes three years for a largemouth bass to reach 300 mm, two years for a bluegill to reach 150 mm and three years for a pumpkinseed to reach 150 mm.

Water quality measurement results are provided in Table 5.

Discussion

In comparing this year's data with the lowland lakes sampling data collected in 1994, there were only 33 largemouth bass at least 100 mm long sampled in 2003 whereas 232 were sampled in 1994 with about the same amount of effort (Warren et al. 1996). In 1994 there were only 18 bluegill and pumpkinseed combined whereas there were 63 bluegill and 43 pumpkinseed sampled in 2003 and 18 common carp sampled in 2003 and 54 sampled in 1994. The high specific conductivity of the water (≅ 1,880 μS/cm) appeared to have affected electrofishing efficiency. In 1994 specific conductivity measured 1,150 μS/cm, which may account for a difference in electrofishing efficiencies between the two samples. Assuming that electrofishing efforts were efficient enough to provide a true representation of the bluegill and pumpkinseed size structure, there was a 10% proportional stock density of the two species combined. There were not enough common carp sampled to recommend an eradication project at this time.

Table 3. Fish sampled with one floating experimental gill net, one sinking experimental gill net, two large mesh sinking gill nets, two trap nets, and sixty minutes of nighttime electrofishing effort on South Pond in the Bruneau Dunes State Park in September 2003.

		Gill net						
Species	TL (mm)	Floating	Sinking	Large mesh	Trap net	E-fish	Avg. Wt. (g)	Rel. Wt.
Bluegill	30	1	--	--	--	--	--	--
	40	4	--	--	--	--	2	1.7
	60	1	--	--	--	--	5	1.5
	70	6	--	--	--	--	7	1.2
	75	1	--	--	--	--	8	1.1
	80	13	--	--	--	--	9	1.1
	90	9	1	--	--	--	13	1.0
	100	3	--	--	1	--	18	1.0
	110	2	--	--	1	--	22	0.9
	120	5	--	--	1	--	35	1.0
	130	6	--	--	--	--	45	1.0
	140	--	--	--	1	--	57	1.0
	150	2	--	--	--	--	67	1.0
	160	1	--	--	--	--	91	1.1
	170	1	--	--	1	--	112	1.1
	180	1	--	--	--	--	120	0.9
	210	1	--	--	--	--	275	1.3
	Total	57	1	--	5	--	--	--
		--	--	--	--	--	--	--
Common carp	250	--	--	--	1	--	218	--
	310	1	2	--	1	--	357	--
	320	1	--	--	1	--	418	--
	340	--	--	--	1	--	515	--
	350	--	--	--	1	--	565	--
	530	--	1	--	--	--	1800	--
	560	--	1	--	--	--	2200	--
	590	1	--	1	--	--	2950	--
	630	1	--	--	--	--	3150	--
	640	1	--	--	--	--	3100	--
	660	--	--	1	--	--	4100	--
	690	--	--	1	--	--	4000	--
	740	1	--	--	--	--	4800	--
	Total	6	4	3	5	--	--	--
						--	--	--
Largemouth bass	40	1	--	--	--	--	--	--
	50	2	--	--	--	--	--	--
	90	1	--	--	--	--	--	--
	110	4	--	--	--	--	15	1.0
	120	5	--	--	--	--	20	1.0
	130	1	--	--	--	--	22	0.8
	140	2	1	--	--	--	37	1.1

Table 3. Continued.

Species	TL (mm)	Gill net Floating	Gill net Sinking	Gill net Large mesh	Trap net	E-fish	Avg. Wt. (g)	Rel. Wt.
	150	1	3	--	--	--	43	1.0
	170	1		--	--	--	60	0.9
	180	--	--	--	1	1	79	1.0
	190	--	1	--	--	--	89	1.0
	220	--	--	--	1	--	155	1.1
	320	2	--	--	--	--	450	0.9
	340	--	1	--	--	--	405	0.7
	350	3	--	--	--	--	600	0.9
	360	2	--	--	--	--	675	1.0
	390	--	--	--	1	--	833	0.9
	400	1	--	--	--	--	960	1.0
	410	--	--	--	1	--	1030	1.0
	Total	26	6	--	4	1	--	--
		--	--	--	--	--	--	--
Pumpkinseed	70	8	--	--	--	2	8	--
	80	16	--	--	--	1	10	--
	90	4	--	--	--	--	14	--
	100	4	1	--	--	1	20	--
	110	4	--	--	--	--	26	--
	130	1	--	--	--	--	45	--
	150	1	--	--	--	--	60	--
	Total	38	1	--	--	4	--	--

Table 4. Bruneau Dunes State Park South Pond lowland lake sampling results from 2003, standardized to one unit of sampling effort.

Spp.	TL range (mm)	N	% Catch	WT (kg)	% WT
Bluegill	40-210	63	39.9	1.84	5.7
Common carp	250-740	15	9.5	21.51	66.8
Largemouth bass	40-410	37	23.4	8.22	25.5
Pumpkinseed	70-150	43	27.2	0.63	2.0
Total		158		32.20	

Table 5. Daytime water quality measurements at the North and South Ponds at Bruneau Dunes State Park.

Depth (m)	DO (mg/l)	Temp (C)	Salinity (PPT)	Ambient conductivity (µS/cm)	Specific conductivity (µS/cm @ 25°C)	Total alkalinity (mg/l as $CaCO^3$)	Total hardness (mg/l)	pH	Secchi (m)
				South Pond - May 2, 2003					
0	9.8	14	0.7	1158	1466	--	--	--	5.0
1	10	14	0.7	1158	1466	--	--	--	--
2	10	14	0.7	1156	1466	--	--	--	--
3	10.2	14	0.7	1157	1466	--	--	--	--
4	10.1	14	0.7	1157	1466	--	--	--	--
5	10.4	14				--	--	--	--
				South Pond - September 11, 2003					
0	7.4	19	0.9	1653	1888	307	385	9.0	4.0
1	7.6	18	1.0	1641	1874	--	--	--	--
2	7.7	18	1.0	1640	1873	--	--	--	--
				North Pond - May 2, 2003					
0	9.8	15	0.2	395	488	--	--	--	1.4
1	10.0	15	0.2	395	488	--	--	--	--
2	10.2	14	0.2	395	488	--	--	--	--

DIERKES LAKE

Introduction

Dierkes Lake in Twin Falls County is managed as an urban fishery for both warm and coldwater fish species. It is stocked in the spring and fall with catchable sized rainbow trout and supports a population of largemouth bass and bluegill and has also been stocked with channel catfish fingerlings for the last few years. Fishing rules at Dierke's Lake went from a five bass limit with none under 305 mm long (12 inches) to a two bass limit with none under 508 mm long (20 inches) in 1994. This rule was implemented after surveys in 1991 and 1993 indicated that there was a dense population of stunted bluegill (Partridge et al. 1994, Partridge et al. 1995). Fish have since been sampled by electrofishing in 1997 (Partridge et al. 2001) and were sampled again this year to determine if the rule change has accomplished the intended objective.

Study Site

Dierkes Lake is about 10 ha in surface area located in a depression on a canyon bench at UTM 714,233M E, 4,718,958M N, Z 11. It is a naturally formed lake supplied by spring water with a perennially flowing outlet. It is accessed by the public through the Shoshone Falls City Park (City of Twin Falls).

Methods

Fish were sampled with one unit of lowland lakes sampling effort at Dierkes Lake in 2003. The floating and sinking Gill nets and trap net were set on March 29 and electrofishing was done for a total of 50 minutes of effort on the evening of July 14, 2003. Other information gathered includes a daytime temperature and dissolved oxygen profile and surface conductivity and salinity.

Results

Species sampled by all gear types combined include bluegill, largemouth bass and rainbow trout (Table 6). The proportional stock density (PSD) was 13% for bluegill and 33% for largemouth bass. All rainbow trout sampled appeared to be fish of hatchery origin. There were 492 bluegill ranging in total length from 30 to 160 mm and there were 98 largemouth bass ranging in total length from 30 to 390 mm (Table 7). Cross sections of dorsal fin rays taken from a sample of largemouth bass indicate that it takes approximately five years for a fish to reach 300 mm.

The temperature and dissolved oxygen data showed the beginning of thermal stratification by the end of May with surface water temperatures reaching 20°C (Table 8). Specific conductivity measured 821 μS/cm on March 19.

Discussion

On April 29, 1997 the PSD of largemouth bass was 55% and for bluegill was 24%, which was based on fish sampled with 60 minutes of electrofishing effort (Partridge et al. 2001). On May 27 and June 10, 1993 the PSD of largemouth bass was 33% and was 5% for bluegill, which was based on 63 minutes of nighttime electrofishing effort (Partridge et al. 1995). Results of the fish sampling efforts in 2003 indicate a slight increase in the PSD of bluegill but no change in the largemouth bass PSD since fishing rules were changed in 1994 from a five bass limit with none less than 12 inches long to a two largemouth bass limit with none less than 20 inches long (Figures 4 and 5). Although a numerical goal of an increase in bluegill PSD was not established, it does not appear that the change in fishing rules created the fishery it was intended to. However, discussions with local anglers who have provided input on fishing rules during scoping periods have indicated to regional personnel that they want IDFG to maintain the 20-inch minimum bass limit because they believe that it creates better catch rates for larger largemouth bass. Recommendations at this time are to consider the possibility of rescinding the bass limit exceptions.

Table 6. Fish sampled with one gill net, one trap net, and 50.0 minutes of electrofishing at Dierkes Lake in March, 2003.

Species	TL (mm)	Floating gill net	Sinking gill net	Trap net	E-fish	Avg. Wt. (g)	Rel. Wt
Bluegill	30	--	--	--	16	--	--
	40	--	--	--	51	--	--
	50	--	--	--	106	--	--
	60	--	--	--	135	--	--
	70	--	--	--	53	--	--
	80	--	--	--	28	9	1.0
	90	--	--	--	27	12	0.9
	100	--	--	--	12	16	0.9
	110	--	--	--	5		0.0
	120	--	--	--	8	40	1.2
	130	--	1	--	9	40	0.9
	140	--	--	--	24	55	1.0
	150	--	--	--	14	71	1.0
	160	--	--	--	3	89	1.0
	Total	--	1	--	491		
Largemouth bass	20	--	--	--	1	--	--
	70	--	--	--	5	--	--
	80	--	--	--	1	--	--
	110	--	--	--	3	20	1.3
	120	--	--	--	3	20	1.0
	130	--	--	--	2	40	1.5
	140	--	--	--	2	--	--
	150	--	--	--	7	42	1.0
	160	--	--	--	5	--	--
	170	--	--	--	4	70	1.1
	180	--	--	--	5	87	1.1
	190	--	--	--	3	90	1.0
	200	--	--	--	2	115	1.1
	210	--	--	--	2	--	--
	220	--	--	--	4	--	--
	230	--	--	--	5	160	1.0
	240	--	1	--	2	220	1.1
	250	--	--	--	2	220	1.0
	260	--	--	--	9	248	1.0
	270	--	--	--	4	287	1.0
	280	--	--	--	4	290	0.9
	290	--	--	--	4	335	1.0
	300	--	--	--	1	--	--
	310	--	--	--	3	420	1.0
	330	--	--	--	3	490	0.9
	340	--	--	--	4	525	0.9
	360	1	--	--	1	--	0.9
	370	--	--	--	2	760	1.0
	380	--	--	--	1	840	1.0
	390	--	--	--	2	910	1.0
	Total	1	1	0	96		

Table 6. Continued.

Species	TL (mm)	Floating gill net	Sinking gill net	Trap net	E-fish	Avg. Wt. (g)	Rel. Wt
Rainbow Trout	200	1	--	--	--	--	--
	210	1	2	--	--	175	--
	240	--	1	--	--	150	--
	250	4	3	--	--	152	--
	260	10	3	--	--	170	--
	270	5	10	1	--	--	--
	280	8	11	--	--	223	--
	290	8	12	--	--	233	--
	300	8	14	--	--	307	--
	310	5	2	--	--	265	--
	320	7	4	--	--	350	--
	330		1	--	--	--	--
	340	1		--	--	--	--
	Total	58	63	1	0		

Table 7. Dierkes Lake lowland lake sampling results for one unit of sampling effort.

	TL range (mm)	N	% Catch	WT (kg)	% WT
Bluegill	30-160	492	69	5.2	9
Largemouth bass	30-360	98	14	21.5	38
Rainbow trout[a]	200-340	122	17	29.3	52
Total		712		56.0	

[a] Equal effort was not expended to sample rainbow trout

Table 8. Temperature (C) and dissolved oxygen (DO – mg/l) profiles measured on Dierkes Lake in 2003.

	March 19, 2003		May 26, 2003	
Depth (m)	Temp	DO	Temp	DO
0.0	8	11.4	20	12.3
1.0	7	11.2	19	12.6
2.0	7	11.4	19	13.0
3.0	7	11.5	17	16.4
4.0	7	11.5	16	14.4
5.0	7	11.5	15	13.4
6.0	7	11.5	14	11.5
7.0	7	11.5	14	10.0
8.0	7	11.4	14	10.2
9.0	7	11.6	13	8.0
10.0	7	11.6	--	--
11.0	7	11.6	--	--
11.5 (B)	7	11.7	--	--

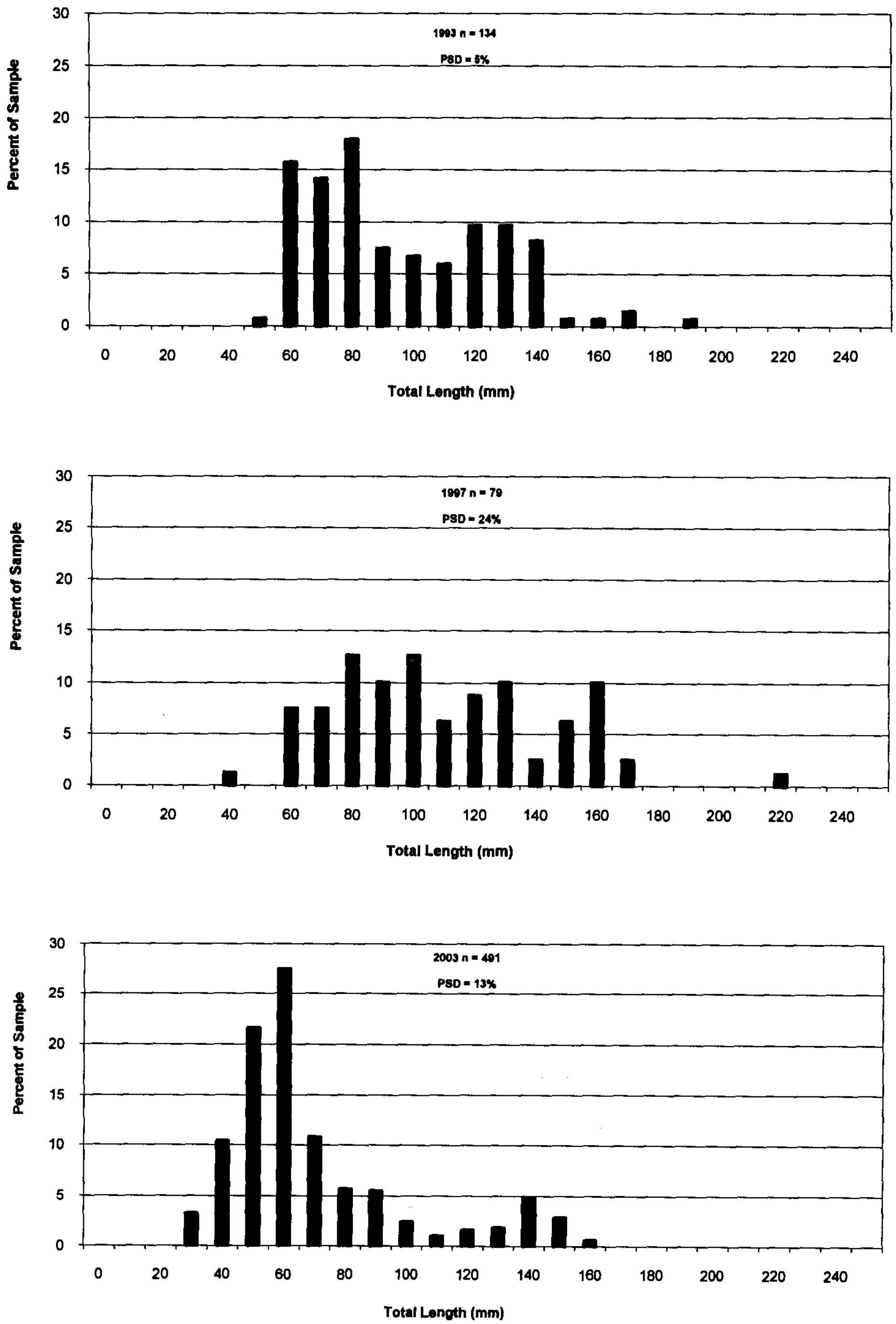

Figure 4. Length frequency distribution of bluegill sampled from Dierkes Lake in 1993 (Partridge et al. 1995), 1997 (Partridge et al. 2001) and 2003.

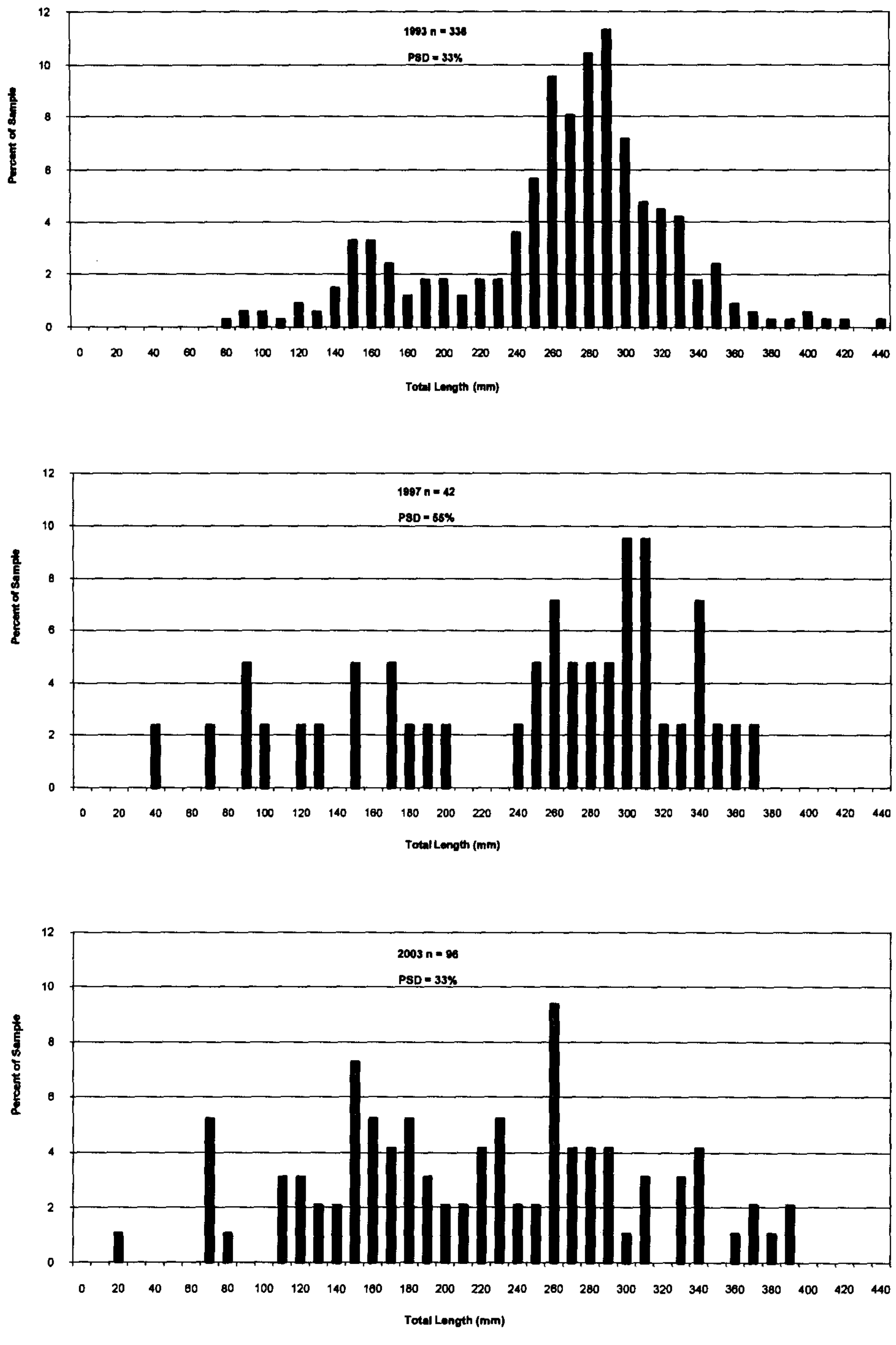

Figure 5. Length frequency distribution of largemouth bass sampled from Dierkes Lake in 1993 (Partridge et al. 1995), 1997 (Partridge et al. 2001) and 2003.

MAGIC RESERVOIR

Magic Reservoir is a Big Wood River impoundment that provides a year-round fishery for rainbow trout, brown trout, yellow perch and occasionally smallmouth bass. Most of the rainbow trout are of hatchery origin, some are of wild origin and all of the brown trout are of wild origin. Most of the trout of wild origin are probably recruited from the Big Wood River where spawning occurs.

Brown trout redds were counted on November 17, 2003 as part of an annual trend monitoring effort from Sheep Bridge upstream to the outflow of a private pond on the east side of the Big Wood River approximately 1.5 km upstream of the Stanton Crossing Bridge. Results of the survey estimate that there were 76 redds within the reach, which is 103 redds less than the previous ten-year's average (Table 9).

Table 9. Brown trout redd counts and spawning activity on the Big Wood River and Rock Creek upstream of Magic Reservoir monitored since 1986.

	Big Wood River[a]				
Date	Reach 1	Reach 2	Reach 3	Reach 4	Total
Nov. 19, 1986	--[c]	26	--[b]	96	122
Nov. 19, 1987	104	62	--[b]	30	196
Nov. 15, 1988	13	75	31	39	158
Nov. 18, 1989	6	20	33	8	67
Nov. 20, 1990	1	25	30	14	70
Nov. 15, 1991	3	30	38	15	86
Nov. 19, 1992	5	14	9	15	43
Nov. 24, 1993	1	28	--[b]	15	43
Nov. 16, 1994	9	27	56	5	97
Nov. 16, 1995	2	29	54	32	117
Nov. 11, 1996	--[c]	8	37	51	96
Nov. 25, 1997	--[c]	44	53	23	120
Nov. 23, 1998	--[c]	45	139	71	255
Nov. 23, 1999	--[c]	104	209	130	443
Nov. 17, 2000	--[c]	79	211	153	443
Nov. 16, 2001	21	30	36	24	111
Nov. 14, 2002	6	26	13	17	62
Previous 10 Yr. Avg.					179
Nov. 17, 2003	--[c]	16	30	30	76

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

[b] Combined with previous reach.

[c] Not surveyed.

MILNER RESERVOIR

Introduction

Milner Reservoir is a 760 ha impoundment on the Snake River inundating approximately 40 km of river near the town of Burley, Idaho. It is managed primarily as an irrigation diversion providing water to the Milner-Gooding Canal system, the Twin Falls Canal system and the North Side Canal system. The reservoir has been operated with almost no water surface elevation fluctuations since the early 1990's when the dam was reconstructed.

There are several publicly and privately owned boat launch facilities and access points on Milner Reservoir providing ample access to boats and shore anglers. Gamefish known to be present include smallmouth bass, rainbow trout, yellow perch and channel catfish of hatchery origin. Twenty to thirty thousand fingerling channel catfish have been stocked into Milner annually by Idaho Power Company since at least 1995 and rainbow trout were last stocked as fingerlings in 1994. Unpublished data provided by Idaho Power Company indicates that 475 channel catfish were sampled with nine hoop nets set for 40 hours and four gill nets set for 16 hours in September 2002 (Rick Wilkison, personal communication). It is not likely that Milner Reservoir gains sufficient thermal units to stimulate channel catfish spawning for natural production and recruitment. It is therefore assumed that all channel catfish sampled are of hatchery origin. Hatchery contributions to the rainbow trout fishery was estimated with a jaw tag return study from 1987 through February 1989 (Partridge et al. 1990). Results estimate that 194 rainbow trout (9%) of the 2,000 jaw-tagged fish were caught in either the reservoir or in the downstream canal systems leaving the reservoir by February 1989. The discontinuation of the hatchery trout stocking program may be due to the low return rate of stocked fish.

Reservoir water elevation fluctuations have been minimal since reconstruction of the dam was completed in the early 1990's. The increase in interest in the smallmouth bass fishery at Milner Reservoir indicates that this water management strategy has resulted in an increase in the smallmouth bass and forage fish population dependent a stable littoral zone. We performed an angler and lowland lake survey in 2003 in an effort to measure the level of angler effort and status of the smallmouth bass fishery.

Methods

Fish were sampled with four units of gill netting and electrofishing effort by IDFG personnel in June, 2003 and with nine trap nets set by Idaho Power biologists in August, 2003 (Table 10). Continuously recording thermographs were submerged in the reservoir in front of the dam at one meter deep and at six meters deep from May 15, 2003 until October 27, 2003.

Anglers were surveyed from April through October 2003 following methods described by McArthur (1993). The survey was stratified into seven sampling periods, each 28 days long, with three weekend and three weekday days randomly selected out of each period with a randomly selected time to count anglers out of each day. Anglers were interviewed on the days that counts were made to determine the length of time each had been fishing, how many fish had been caught, kept and released, and if the anglers were currently participating in a tournament. Only daylight hours were used in the survey. A subsample was taken of total lengths and weights of fish in the creel.

Results

Lowland Lakes Survey

Species sampled with all gear types combined include bluegill, brown bullhead, common carp, channel catfish, mountain whitefish, redside shiner, smallmouth bass, Utah chub, Utah sucker and yellow perch (Table 11). Utah sucker made up 41.2% of the sample numerically and 53.1% of the sample by weight whereas smallmouth bass made up 22.8% of the sample numerically and 10.5% of the sample by weight (Table 12). Utah chub made up 29.8% of the sample numerically and 13.0% by weight.

Back calculations of total length to scale annuli indicate that it takes five growing seasons to produce a 305 mm (12 inch) smallmouth bass, the minimum length limit for harvest (Table 13). A Walford plot of length at year t plotted against length at year t+1 indicates that the growth of smallmouth bass in Milner Reservoir do not reach their maximum growth potential until they reach 620 mm (Figure 6). The proportional stock density of smallmouth bass was 39.5.

Continuously recording thermograph measurements show no differences in temperatures between one and six meters deep in front of the dam between May 12 and October 26, 2003 (Figure 7). A temperature and dissolved oxygen profile measured with the Y.S.I. temp/D.O. meter on June 4, 2003 also indicates little stratification throughout the water column in front of the dam (Table 14). Total alkalinity was 123 mg/l, total hardness 189 mg/l and the pH was 8.6 as measured from a surface water sampled taken in June, 2003.

Angler Survey

The angler survey results estimate total angler effort from April through October, 2003 to be 34,939 ± 7,218 (95% C.I.) hours (Table 15). Approximately 65% of the effort was from boat anglers with the balance made up of shore anglers. Total effort includes anglers participating in the 24 fishing tournaments, which had a total of 1,325 angler trips registered for participation. All of the bass tournaments were catch-and-release. The estimated number of smallmouth bass harvested for the entire season was 2,612 ± 1,418 (95% C.I.) out of a total of 56,586 ± 19,809 (95% C.I.) fish of all species caught (Table 16). The composition of the total catch was 89% smallmouth bass, 5% channel catfish, 3% yellow perch and 2% rainbow trout. It is therefore estimated that only about 5% of the smallmouth bass caught were harvested. Of all smallmouth bass caught, anglers reported that 64% were less than 12 inches (305 mm) long and 36% were at least 12 inches long. This equates to approximately 18,130 legally harvestable sized smallmouth bass being caught, of which 2,612 ± 1,418 (95% C.I.) were kept. The average length of forty-seven smallmouth retained in the creel measured during the survey was 337 mm.

Discussion

Results of the lowland lakes survey indicate that Milner Reservoir has an abundant population of smallmouth bass with growth rates that equal or surpass other populations of smallmouth bass found in Idaho (Dillon 1992). With a proportional stock density of 39% there are no indications that there is significant cropping of the legally harvestable component of the smallmouth bass population. The results of the angler survey support this statement with only 6% to 21% (95% C.I.) of the approximately 18,130 legal sized bass caught actually being harvested.

It is noteworthy that other warm and cool water gamefish species have not become established as another targeted species in the reservoir, even though channel catfish have been stocked as fingerlings by Idaho Power Company for the past several years. The current levels of harvest do not appear to warrant changing fishing rules or shifting current management strategies.

Table 10. Locations and amount of effort expended sampling fish at Milner Reservoir in 2003.

Gear type		Zone	Location (UTM) Easting (m)	Northing (m)	Effort (hrs:min)
Floating gill net		12	253,983	4,712,874	12:45
Floating gill net		12	260,428	4,713,932	15:37
Floating gill net		12	265,011	4,714,083	13:25
Floating gill net		12	269,297	4,714,429	13:20
Sinking gill net		12	254,436	4,713,121	14:05
Sinking gill net		12	260,922	4,713,979	14:10
Sinking gill net		12	264,748	4,714,245	13:02
Sinking gill net		12	269,026	4,714,090	12:05
Trapnet		12	272,698	4,714,529	23:13
Trapnet		12	271,245	4,715,443	23:20
Trapnet		12	269,419	4,714,738	23:20
Trapnet		12	268,559	4,714,063	23:30
Trapnet		12	267,168	4,713,121	23:30
Trapnet		12	265,162	4,713,928	23:30
Trapnet		12	261,830	4,714,518	23:30
Trapnet		12	258,506	4,713,073	22:50
Trapnet		12	256,898	4,713,333	22:50
Electrofishing	Begin	12	253,982	4,712,550	0:30
	End	12	253,673	4,712,491	
Electrofishing	Begin	12	253,682	4,712,275	0:30
	End	12	746,189	4,712,270	
Electrofishing	Begin	12	260,988	4,713,741	0:30
	End	12	260,515	4,713,742	
Electrofishing	Begin	12	259,435	4,713,356	0:30
	End	12	258,789	4,713,312	
Electrofishing	Begin	12	264,837	4,714,236	1:00
	End	12	266,126	4,713,434	
Electrofishing	Begin	12	269,466	4,714,714	0:30
	End	12	268,462	4,714,024	
Electrofishing	Begin	12	268,462	4,714,024	0:30
	End	12	268,396	4,713,935	

Table 11. Fish sampled with four floating gill nets, four sinking gill nets, nine trap nets and 240 minutes of electrofishing effort at Milner Reservoir in 2003.

Species	TL (mm)	Floating gill nets	Sinking gill nets	Trap net	Electro-Fish	Avg. Wt. (g)	Relative Wt.
Bluegill	50	--	--	--	1		
	Total	0	0	0	1		
Brown bullhead	210	--	--	--	1		
	Not meas.			2			
	Total	0	0	2	1		
Common carp	330	--	1	--	--		
	360	1	--	--	--		
	380	--	--	--	1		
	400	--	1	--	--		
	520	--	1	--	--		
	530	1	--	--	1		
	550	--	--	--	1		
	560	--	--	--	2		
	570	--	--	--	2		
	580	--	--	--	4		
	590	1	--	--	1		
	600	1	--	--	--		
	610	--	1	--	3		
	620	--	--	--	3		
	630	--	--	--	3		
	640	--	1	--	2		
	650	1	--	--	2		
	660	--	--	--	1		
	670	--	--	--	2		
	700	--	--	--	1		
	710	--	--	--	1		
	740	--	--	--	1		
	760	--	--	--	1		
	Not meas.	--	--	1	--		
	Total	5	5	1	32		
Channel catfish	230	--	--	1	--	136	
	280	--	--	2	--	236	
	340	--	1	--	--	300	
	350	--	--	1	--	485	
	360	--	--	1	--	600	
	370	--	1	--	1	540	
	390	--	1	--	--	600	
	400	--	--	1	--	747	
	420	--	--	1	--	875	
	510	--	--	1	--	1950	
	570	--	1	--	--	2900	
	Total	0	4	8	1		

Table 11. Continued.

Species	TL (mm)	Floating gill nets	Sinking gill nets	Trap net	Electro-fish	Avg. Wt. (g)	Relative Wt.
Mountain whitefish	230	--	1	--	--	145	
	360	--	1	--	--	650	
	390	--	1	--	--	1000	
	Total	0	3	0	0		
Redside shiner	50	1	--	--	--		
	60	3	--	--	--		
	80	1	--	--	--		
	Total	5	0	0	0		
Smallmouth bass	60	--	--	--	1		
	70	--	--	--	2		
	80	--	--	--	6		
	90	--	--	--	11	15	1.6
	100	--	--	--	4	28	2.1
	110	--	--	--	3	16	0.9
	120	--	--	--	4	22	0.9
	130	--	--	--	16	30	1.0
	140	--	--	--	10	38	1.0
	150	--	--	--	26	51	1.1
	160	--	--	--	22	65	1.2
	170	--	--	--	13	93	1.4
	180	--	--	--	11	85	1.1
	190	--	--	--	8	88	0.9
	200	--	--	2	11	113	1.0
	210	--	--	--	21	130	1.0
	220	--	--	--	18	147	1.0
	230	--	--	--	8	174	1.0
	240	--	--	--	9	195	1.0
	250	--	--	--	13	213	1.0
	260	--	--	--	9	239	1.0
	270	--	--	--	14	271	1.0
	280	--	--	1	9	327	1.1
	290	--	--	--	9	322	0.9
	300	--	--	--	8	367	1.0
	310	--	--	--	5	405	1.0
	320	1	1	--	8	456	1.0
	330	--	--	--	6	425	0.8
	340	--	1	--	6	559	1.0
	350	--	--	--	3	592	1.0
	360	--	1	--	3	709	1.1
	370	--	1	--	3	624	0.9
	380	--	--	--	2	805	1.0
	390	--	1	--	2	850	1.0
	400	--	2	--	2	1025	1.1
	410	--	--	--	2	758	0.8
	420	--	--	--	1	1050	1.0
	430	--	1	--	--	1250	1.1
	440	--	--	--	1	1300	1.1
	550	--	--	--	1		
	Total	1	8	3	311		

Table 11. Continued.

Species	TL (mm)	Floating gill nets	Sinking gill nets	Trap net	Electro-fish	Avg. Wt. (g)	Relative Wt.
Utah chub	30	--	--	--	2		
	40	--	--	--	3		
	50	--	--	--	13		
	60	--	--	--	7		
	70	--	--	--	12		
	80	--	--	--	16	3	
	90	--	--	--	8		
	100	--	--	--	6		
	110	--	--	--	3		
	120	--	--	--	3		
	130	--	--	--	8		
	140	1	1	--	15		
	150	4	3	--	19	45	
	160	3	2	--	15	53	
	170	2	1	--	7		
	180	--	--	--	5		
	190	1	--	--	5		
	200	2	3	--	1	110	
	210	2	2	--	4		
	220	1	--	--	4		
	230	1	2	--	2	160	
	240	1	3	--	1	188	
	250	2	1	--	2		
	260	3	9	--	2		
	270	2	9	--	--	295	
	280	7	20	--	--	265	
	290	10	29	--	2	324	
	300	18	22	--	2	366	
	310	8	21	--	1	478	
	320	6	10	--	--	450	
	330	4	11	--	--	515	
	340	2	1	--	--		
	350	--	2	--	--	550	
	360	--	1	--	--	700	
	370	1	--	--	--		
	Not meas.	--	--	20	--		
	Total	81	153	20	168		
Utah sucker	60	--	--	--	1		
	70	--	--	--	4		
	80	--	--	--	15		
	90	--	--	--	37		
	100	--	--	--	30	18	
	110	--	--	--	27	23	
	120	--	--	--	11	25	
	150	--	--	--	1		
	160	--	--	--	2		
	170	--	--	--	5		
	180	--	--	--	16	65	
	190	--	--	--	12	88	
	200	--	2	--	21	97	
	210	1	--	--	11		

Table 11. Continued.

Species	TL (mm)	Floating gill nets	Sinking gill nets	Trap net	Electro-fish	Avg. Wt. (g)	Relative Wt.
	220	--	--	--	8	100	
	230	--	--	--	5	125	
	250	--	--	--	3		
	260	1	--	--	7	200	
	270	1	3	--	4	226	
	280	--	2	--	9	250	
	290	--	4	--	11	250	
	300	--	3	--	12	246	
	310	--	3	--	7	323	
	320	1	--	--	1		
	340	--	1	--	2	450	
	350	1	2	--	2	500	
	360	--	1	--	3		
	370	1	--	--	3		
	380	--	1	--	5	550	
	390	--	1	--	2	800	
	400	--	1	--	5	913	
	410	1	2	--	6	850	
	420	1	1	--	9	900	
	430	--	3	--	3	1033	
	440	--	1	--	9	1100	
	450	1	5	--	11	1090	
	460	4	5	--	12	1125	
	470	4	9	--	19	1238	
	480	6	7	--	21	1277	
	490	8	2	--	7	1367	
	500	7	6	--	12	1450	
	510	1	3	--	10	1450	
	520	2	2	--	6	1700	
	530	4	2	--	9	1683	
	540	2	--	--	4		
	550	2	--	--	--		
	560	1	3	--	1	1883	
	580	--	1	--	--	2000	
	600	--	1	--	--	2250	
	Not meas.	--	--	36	--		
	Total	50	77	36	421		
Yellow perch	40	--	--	--	1	38	
	80	--	--	--	1		
	90	--	--	--	7	12	
	100	--	--	--	4	15	
	110	--	--	--	2	16	
	180	--	--	--	1	85	
	190	1	--	--	1	90	
	290	--	1	1		190	
	Total	1	1	1	17		

Table 12. Milner Reservoir lowland lake sampling results from 2003, standardized to one unit of sampling effort.

Species	TL range (mm)	Catch (#)	Relative catch (%)	Mass (kg)	Relative mass (%)
Bluegill	50	0.3	0.1	0.0	0.0
Brown bullhead	210	0.8	0.2	0.1	0.1
Common carp	380-760	10.8	3.0	36.0	21.4
Channel catfish	230-570	3.3	0.9	2.5	1.5
Mountain whitefish	230-390	0.8	0.2	0.4	0.3
Redside shiner	50-80	1.3	0.4	0.0	0.0
Smallmouth bass	60-550	80.8	22.8	17.8	10.5
Utah chub	30-370	105.5	29.8	22.0	13.0
Utah sucker	60-600	146.0	41.2	89.5	53.1
Yellow perch	40-290	5.0	1.4	0.2	0.1
Total:		354.3		168.5	

Table 13. Back-calculated total length at age (mm) of smallmouth bass sampled from Milner Reservoir in June, 2003. Data based on measurements of scale annuli.

Year class	n	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8
2002	3	72.0							
		(4.1)							
2001	12	76.0	138.0						
		(7.9)	(17.7)						
2000	11	78.0	147.0	216.0					
		(12.1)	(24.1)	(25.1)					
1999	4	82.0	152.0	218.0	270.0				
		(22.9)	(32.5)	(43.5)	(32.8)				
1998	18	74.0	124.0	187.0	255.0	300.0			
		(13.8)	(19.9)	(27.5)	(27.6)	(24.2)			
1997	4	75.0	156.0	220.0	277.0	328.0	365.0		
		(13.9)	(38.1)	(48.2)	(37.0)	(18.9)	(15.0)		
1996	4	84.0	142.0	197.0	260.0	310.0	354.0	388.0	
		(13.6)	(33.5)	(50.8)	(30.3)	(19.5)	(8.6)	(11.0)	
1995	2	73.0	140.0	205.0	262.0	305.0	345.0	372.0	398.0
		(6.1)	(34.6)	(33.7)	(15.2)	(3.2)	(5.4)	(9.9)	(0.7)
Weighted avg. length:		76.0	138.0	202.0	260.0	306.0	357.0	383.0	398.0

Table 14. Daytime temperature (C), dissolved oxygen (mg/l) profiles measured in front of the dam at Milner Reservoir on June 4, 2003.

Depth (meters)	DO	Temp
0	8.1	18
1	8.0	18
2	8.0	18
3	7.9	18
4	7.9	18
5	7.9	18
10	7.8	18
12	7.7	17
13	7.7	17

Table 15. Estimated total angler effort on Milner Reservoir for April 14 through October 26, 2003. Confidence intervals are 95%.

	Angler Hours			
Interval	Boat	Bank	Float tube	Total
April 14 – May11	2,011 ± 386	953 ± 815	0	2,964 ± 902
May 12 – June 8	4,510 ± 1,574	2,990 ± 2,533	95 ± 190	7,595 ± 2,988
June 9 – July 6	4,449 ± 1,770	3,229 ± 2,350	0	7,678 ± 2,942
July 7 – Aug. 3	4,420 ± 1,324	1,860 ± 1,202	0	6,280 ± 3,535
Aug. 4 – Aug. 31	4,442 ± 4,134	2,371 ± 979	0	6,813 ± 4,249
Sept. 1 – Sept. 28	1,152 ± 1,608	252 ± 401	0	1,404 ± 1,658
Sept. 29 – Oct. 26	1,305 ± 444	895 ± 455	0	2,200 ± 636
Season totals	22,289 ± 6,057	12,550 ± 3,921	95 ± 190	34,939 ± 7,218

Table 16. Estimated numbers of fish caught and harvested (95% CI) by anglers at Milner Reservoir from April 14 through October 26, 2003.

Interval	Smallmouth bass	Rainbow trout	Yellow perch	Channel catfish	Total harvested	Total caught, kept and released
April 14 – May 11	35 (51)	18 (51)	0	0	53 (52)	2,393 (1,694)
May 12 – June 8	1,284 (1,131)	0	22 (10)	0	1,301 (1,131)	19,272 (15,454)
June 9 – July 6	202 (249)	0	0	0	202 (249)	12,048 (6,119)
July 7 – Aug 3	488 (659)	0	40 (69)	86 (155)	619 (723)	9,608 (6,514)
Aug 4 – Aug 31	469 (442)	0	37 (85)	0	507 (478)	9,880 (7,848)
Sept 1 – Sept 28	34 (63)	0	0	0	34 (63)	1,752 (2,313)
Sept 29 – Oct 26	100 (186)	25 (58)	0	0	125 (192)	1,633 (1,968)
Season Totals	2,612 (1,418)	43 (77)	99 (110)	86 (155)	2,841 (1,462)	56,586 (19,809)

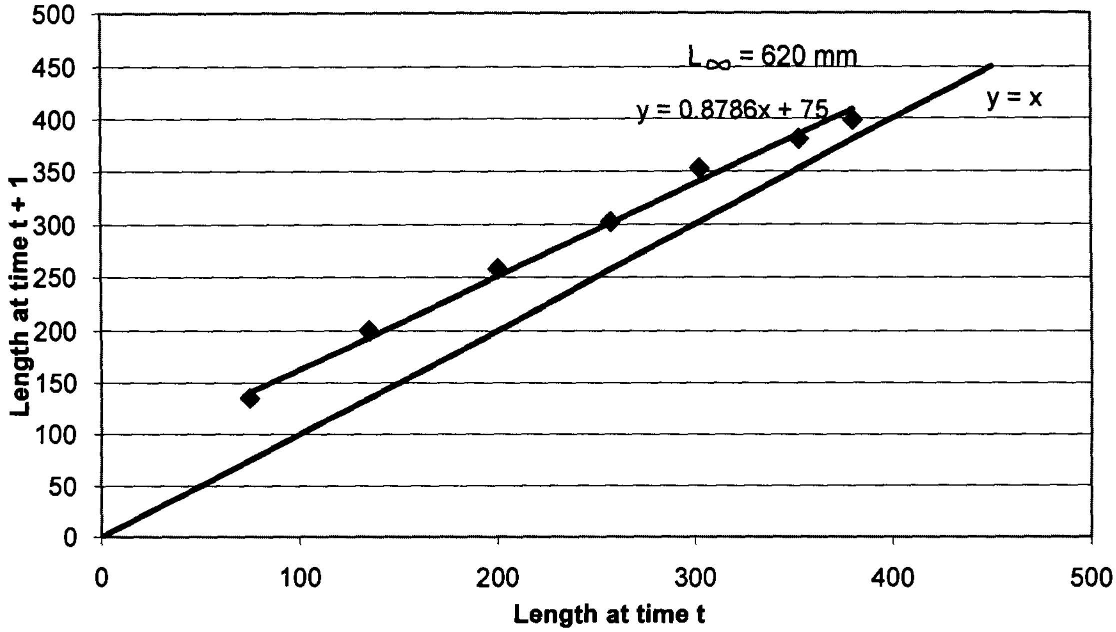

Figure 6. Walford plot of smallmouth bass sampled from Milner Reservoir in June, 2003 indicating a theoretical asymptotic total length of 620 mm.

Figure 7. Continuously recorded water temperatures of Milner Reservoir in front of the dam at one meter deep and at six meters deep from May 12 through October 25, 2003.

MORMON RESERVOIR

Mormon Reservoir is an irrigation impoundment located approximately eight kilometers south of Fairfield, Idaho and has a surface area of 1,200 ha when full with a 21,400 acre-foot capacity. The eutrophic status of Mormon Reservoir is attributed to its shallow characteristics and its propensity to retain nutrients. This has resulted in a dense stand of water smartweed *Polygonum sp.* and other macrophytes over a significant proportion of its surface area. Demands for water have approached total reservoir storage capacity several times over the past decade leaving only a small shallow pool to carry fish over through the winter.

Concerns about the survivability of the fish through the winter were the impetus for taking water temperature and dissolved oxygen profiles through the ice on January 15, 2003 and sampling the fishery with three sinking experimental gill nets set overnight on April 3, 2003. Results of the water quality measurements indicate that there was adequate dissolved oxygen present at the three locations sampled (Table 17). Results of the gill netting support this with a total of 12 rainbow trout, 18 yellow perch and 3 bridgelip sucker being sampled (Table 18).

Table 17. Temperature (C) and dissolved oxygen (mg/l) profiles measured at three locations [a] on Mormon Reservoir on January 15, 2003.

	Near the Boat Ramp		South of the Dam		Across from Lookout Point	
Depth (m)	Temp	DO	Temp	DO	Temp	DO
0.0	2	12.0	1	11.2	0.5	5.2
0.5					2.0	2.7
1.0	2	6.2	2	4.8		
1.5(B)	4	0.5				

[a] Boat ramp: Zone 11, 678,565m E, 4,794,119m N
Dam: Zone 11, 678,525m E, 4,793,612m N
Lookout point: Zone 11, 677,922m E, 4,792,768m N

Table 18. Total length frequencies of fish sampled with three experimental mesh gill nets set overnight at Mormon Reservoir on April 3, 2003.

TL (mm)	Bridgelip sucker	Rainbow trout	Yellow perch
150	--	--	1
170	--	--	1
180	--	--	2
190	--	--	1
200	--	--	1
210	--	--	3
220	1	--	3
230	1	--	4
240	--	--	1
260	1	--	--
270	--	--	1
410	--	1	--
430	--	1	--
440	--	3	--
450	--	1	--
480	--	1	--
490	--	1	--
510	--	2	--
520	--	1	--
530	--	1	--
Total	3	12	18

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. Forage fish are sampled with a beach seine every August as part of an annual trend monitoring program. A total of four sites were sampled throughout the reservoir in 2003. Fish species sampled include mottled sculpin, spottail shiner, speckled dace *Rhinichthys osculus*, walleye and yellow perch (Table 19).

Table 19. Fish sampled by beach seining four sites [a] at Oakley Reservoir on August 7, 2003.

Site	Crayfish	Spottail shiner	Speckled dace	Walleye (< 100 mm)	Yellow perch (< 100 mm)	Mottled Sculpin
Trapper Creek arm	15	2			435	
Goose Creek arm	12	4	1	2	214	2
Mid Res.	3				56	
Dam	No fish sampled					
Total	30	6	1	2	705	2

[a] Trapper Creek arm: UTM 257,847E, 4,673,885N, Z12
Goose Creek arm: (UTM 257,467E, 4,673,334, Z12)
Mid Res. : (UTM 258,236E, 4,674,464N, Z12)
Dam : (UTM 259,204E, 4,675,388N, Z12)

PONDEROSA POND

Introduction

Ponderosa Pond is an 11 ha gravel pit pond located on the northwest corner of the Interstate 84 and Highway 27 intersection. Historically the pond received irrigation return water from the Northside Canal system originating at Minidoka Dam but those inflow channels have been blocked thus most of its water is now from groundwater seepage into the pit. Water is intermittently pumped out for irrigation purposes, although the level remains relatively stable. It is currently managed for warm-water fish and as a seasonal put-and-take trout fishery.

The pond was previously surveyed with one unit of lowland lakes sampling protocols in June, 1995 (Partridge et al. 2003). In an effort to determine the pond's suitability for reclaiming with a rotenone project, we again sampled the fishery in the spring of 2003.

Methods

Fish in Ponderosa Pond were sampled with approximately 60 minutes of nighttime electrofishing effort on May 7, 2003. The Smith-Root 18 ft electrofishing boat was used to sample the entire perimeter of the pond as well as a transect across the center. An effort was made to net all fish stunned regardless of size or species. All fish sampled were identified and counted with most measured to total length. A Y.S.I. conductivity and temperature meter was used to measure ambient conductivity and temperature at the surface.

Results

Fish species sampled include 25 common carp, 37 pumpkinseed, 11 rainbow trout, one redside shiner *Richardsonius balteatus*, 235 smallmouth bass, 12 Utah sucker and one yellow perch (Table 20). Although smallmouth bass dominated the sample numerically (73%), only one was greater than 100 mm long. Ambient conductivity measured 567 μS/cm at 13^{o}C.

Discussion

In comparing 2003 data with 1995 data (Partridge et al. 2003) largemouth bass and black crappie were sampled in 1995 but none were sampled in 2003. Conversely, smallmouth bass were sampled in 2003 but not in 1995. Nongame fish sampled in both years include common carp and Utah sucker. Based on these findings it is evident that gamefish may be negatively influenced by the numbers of nongame fish present. It is recommended that we proceed with a rotenone project to kill all fish present in the pond then restock with largemouth bass and bluegill. Rainbow trout may also continue to be stocked on a put-and-take basis.

It is further recommended that Ponderosa Pond be enhanced with a project to provide submerged aquatic habitat suitable for providing cover against avian predators. In a study done on nearby Emerald Lake in the spring of 1997, numbers of piscivorous birds were counted on a daily basis prior to and after the stocking of rainbow trout (Warren et al. 2001). Results of that study indicated that the number of double crested cormorants *Phalacrocorax auritus* in the daily counts jumped from two or three birds to over 100 birds within two days of being stocked. Although it is not confirmed that double-crested cormorants are feeding on hatchery rainbow trout, another study done on Springfield Reservoir near American Falls Reservoir came to the same conclusion that large numbers of hatchery rainbow trout are possibly being consumed by avian predators. The addition of overhead cover in the pond may reduce the amount of predation on fish and should be included in the future management of the Ponderosa Pond fishery.

Table 20. Total length (mm) frequencies and numbers of fish sampled by nighttime electrofishing Ponderosa Pond on May 7, 2003.

TL	Common carp	Pumpkinseed	Rainbow trout	Redside shiner	Smallmouth bass	Utah sucker	Yellow perch
20	--	--	--	--	8	--	--
30	--	--	--	--	16	--	--
40	--	--	--	--	6	--	--
70	--	1	--	--	--	--	--
80	--	2	--	--	--	--	--
90	--	1	--	--	--	--	--
100	--	2	--	--	1	--	--
110	--	3	--	1	--	--	--
210	--	--	--	--	--	--	1
290	--	--	1	--	--	--	--
310	1	--	--	--	--	--	--
320	1	--	--	--	--	--	--
340	--	--	2	--	--	--	--
360	--	--	5	--	--	--	--
370	1	--	1	--	--	--	--
390	--	--	1	--	--	--	--
420	--	--	--	--	--	1	--
450	--	--	--	--	1	--	--
460	--	--	--	--	--	--	--
510	1	--	--	--	--	3	--
520	2	--	--	--	--	1	--
530	1	--	--	--	--	--	--
540	--	--	--	--	--	1	--
550	1	--	--	--	--	2	--
560	2	--	--	--	--	1	--
570	2	--	--	--	--	2	--
580	2	--	--	--	--	1	--
590	3	--	--	--	--	--	--
600	1	--	--	--	--	1	--
640	1	--	--	--	--	--	--
650	1	--	--	--	--	--	--
680	1	--	--	--	--	--	--
690	1	--	--	--	--	--	--
700	1	--	--	--	--	--	--
760	1	--	--	--	--	--	--
790	1	--	--	--	--	--	--
Not meas.	0	28	0	0	203[a]	0	0
Total	25	37	11	1	235	12	1

[a] 203 young-of-year smallmouth bass 20-50 mm long.

SALMON FALLS CREEK RESERVOIR

Introduction

Salmon Falls Creek Reservoir is a 1,400 ha irrigation impoundment with a capacity for 234,650 acre-feet of water when full. The fishery is managed for walleye, rainbow trout, kokanee, yellow perch, smallmouth bass and crappie (IDFG 2001). The reservoir is stocked annually with fingerling and catchable sized rainbow trout, fingerling late spawning kokanee and on intermittent years it is stocked with walleye fry. In 2002 it was stocked with 500,000 walleye fry that had been submerged in a 700 mg/l solution of oxytetracycline (OTC) for marking bony structures.

Forage fish abundance is an important component of maintaining a good walleye fishery, forage fish have therefore been sampled with a beach seine every August as part of an annual trend monitoring program. Other fish sampling done this year includes gill netting and electrofishing shallow areas of the reservoir to collect age one walleye with the objective of determining what percentage of the stocked walleye fry are being recruited into the fishery and to determine the significance of natural recruitment. Temperature and dissolved oxygen profiles were monitored to determine reservoir habitat available for salmonid species.

Normal and below normal snowpack and high irrigation demands has kept the reservoir low over the past few years, reducing spawning habitat and submerged vegetative cover for forage fish. To ameliorate this problem the Idaho Department of Fish and Game has been involved in a joint project with the Idaho chapter of the Walleye Unlimited club to create woody aquatic habitat for forage fish spawning and cover since 2001.

Methods

Annual trend sampling for forage fish was conducted by beach seining five sites at Salmon Falls Creek Reservoir on August 5, 2002. Each site was sampled with a single pull of the seine. Age one walleye were targeted for sampling with two sinking gill nets set for a combined time of 11.5 daylight hours on August 28, 2003 and September 4, 2003. Both nets used were 45.7 m long, 1.8 m wide, with three mesh sizes measuring 25.4 mm, 19.05 mm, and 12.7 mm. Age-1 walleye were also targeted for sampling by electrofishing with the Smith-Root SR-18 electrofishing boat with thirty minutes of shock time during daylight hours on August 28, 2003. All walleye sampling effort was within the littoral zone across from, or up-reservoir from Gray's Landing. Otoliths of all walleye sampled less than 300 mm long were removed and sent to Ron Brooks at the Southern Illinois University in Murphysboro for estimation of age and inspection for OTC marks. Temperature and dissolved oxygen profiles were measured at three locations on July 29, 2003. Measurements were made in-situ from a boat with a Yellow Springs Instruments model 57 temperature/dissolved oxygen meter.

Results

Species sampled by beach seining include smallmouth bass, spottail shiner, white crappie, yellow perch and crayfish (Table 21). Although not targeted for sampling, three rainbow trout, two yellow perch, twenty three rainbow trout, forty five smallmouth bass, fourteen yellow perch, four spottail shiner, twenty largescale sucker, and one northern pikeminnow were sampled by gill netting and electrofishing for age one walleye. Additionally, two walleye over 400 mm long were sampled. A total of eighteen age one walleye, ranging in length from 220 to 300 mm, were sampled for otoliths. Three of these were identified as fish marked with OTC.

Results of the temperature and dissolved oxygen profile measurements are provided in Table 22.

Discussion

The overall results of the sampling indicate that forage fish numbers may be somewhat low for the number of walleye present in the reservoir. If the lack of young-of-the-year walleye in the efforts to sample age one walleye are an indication that natural walleye recruitment is low, then forage abundance may increase in the next year or two. It is also noteworthy that 17% of the age one walleye were of hatchery origin. The results of stocking OTC marked fish have the appearance to date of becoming a valuable tool for tracking walleye recruitment, growth and ageing techniques. It is recommended that only marked walleye be stocked as a means of tracking.

REGIONAL CREEL SURVEYS

Anglers were contacted by conservation officers and regional fishery staff to gather general creel information on waters throughout the region. Results of these angler interviews are given in Table 23.

Table 21. Number of fish sampled by beach seining five locations on Salmon Falls Creek Reservoir on August 5, 2003.

Beach seining site [a]	Crayfish	White crappie (<100 mm)	Smallmouth bass	Spottail shiner	Yellow perch < 100 mm	Yellow perch ≥ 100 mm
Near Dam	1		1		19	2
Whiskey slough	127	1	1	6	115	
Marble Cliff			3			
Grey's Landing			2			
Lud's Point			1	3	1	24
Total Sampled:	128	1	8	9	135	26

[a] Near Dam: UTM 687,412M E, 4,674,979M N, Z 11
Whiskey Slough: UTM 685,838M E, 4,673,455M N, Z 11
Marble Cliff: UTM 687,587M E, 4,667,801M N, Z 11
Grey's Landing: UTM 687,923M E, 4,666,597M N, Z 11
Ludds Point: UTM 686,116M E, 4,665,246M N, Z 11

Table 22. Temperature (C) and dissolved oxygen (mg/l) profiles measured at three locations [a] on Salmon Falls Creek Reservoir on July 29, 2003.

	Near the Dam		Near Grey's Landing		Near Luds Point	
Depth (m)	Temp	DO	Temp	DO	Temp	DO
S	22	7.6	25	7.8	25	9.7
1			25	7.8	25	8.8
2	21	7.8	23	7.4	24	7.6
3			22	6.0	23	6.6
4	21	7.6	22	4.8		
5			17	0.2		
6	20	6.1	15	0.2		
7	17	2.5				
8	13	0.4				
9	11	0.2				
10	11	0.2				
12	10	0.4				
14	9	0.4				
16	8	0.4				
18	8	0.2				
20	8	0.2				
21(B)	8	0.2				

[a] Near the Dam: UTM 686,976m E, 4,674,465m N, Z11
Near Grey's Landing: UTM 687,000m E, 4,666,709m N, Z11
Near Luds Point: UTM 686,473m E, 4,665,299m N, Z11

Table 23. Results of spot creel checks performed on Magic Valley Region fisheries in 2003.

Fishery	Angler (n)	Effort (h)	Species caught	Catch [a]
Big Smoky Creek	23	28.0	Hatchery rainbow trout	26
Big Wood River	92	143.0	Hatchery rainbow trout	144
			Mountain whitefish	7
Billingsly Creek	8	23.5	Hatchery rainbow trout	49
			Utah chub	2
Blair Trail Res.	15	9.0	Hatchery rainbow trout	13
			Brown bullhead	2
Bruneau Ponds	17	31.0	Bluegill	226
			Largemouth bass	28
Featherville Dredge P.	226	350.5	Hatchery rainbow trout	422
Dierkes Lake	125	219.0	Hatchery rainbow trout	430
			Largemouth bass	11
Hagerman WMA (July 1 Opener)	42	110.0	White sturgeon	2
			Yellow perch	72
			Hatchery rainbow trout	40
			Bluegill	132
			Largemouth bass	103
Hagerman WMA (March 1 Opener)	129	487.5	Hatchery rainbow trout	254
			Bluegill	2
			Largemouth bass	2
Lake Walcott	153	452.0	Hatchery rainbow trout	48
			Smallmouth bass	2
Little Smoky River	10	18.0	Hatchery rainbow trout	9
Magic Res.	765	3124.0	Hatchery rainbow trout	1112
			Yellow perch	2044
			Brown trout	19
Malad River	2	4.0	NO FISH	
Mormon Reservoir	8	14.0	Hatchery rainbow trout	3
Oakley Res	44	190.5	Hatchery rainbow trout	17
			Walleye	50
Rock Creek	13	8.0	Hatchery rainbow trout	13
Roseworth Res.	10	15.0	Hatchery rainbow trout	5
Salmon Falls Creek Res.	105	306.0	Hatchery rainbow trout	139
			Yellow perch	9
			Walleye	23
			Smallmouth bass	2
South Fork Boise R.	12	10.5	Hatchery rainbow trout	2
South Fork Boise R. (Special Regulations)	22	27.5	Rainbow trout	16

[a] Combined total of fish harvested and/or released

2003 ANNUAL PERFORMANCE REPORT

State of: Idaho

Program: Fisheries Management F-71-R-28

Project I: Surveys and Inventories

Subproject I-E: Magic Valley Region

Job: c

Title: Rivers and stream surveys and studies

Contract Period: July 1, 2003 to June 30, 2004

ABSTRACT

The Big Wood River was sampled at three previously monitored trend sites and one new site that has been modified with in-stream drop structures in the last two years. Results of the sampling indicates only slight changes in the overall size structure of the trout population in the past few years but a significant change since fishing rules were modified in 1990. The Little Wood River was sampled in May of 2003 to determine if fishery management plan objectives are being met. Results indicate a low population of brown and rainbow trout. This may be the result of drought conditions, low survival of stocked rainbow trout or the cessation of the brown trout stocking program. It is recommended that the brown trout stocking program be resumed. Trend monitoring of the fishery in the Snake River was continued with the U.S.G.S. and their North American Water Quality Assessment program. Most of the fish sampled from two sites on the Snake River are tolerant to warm water and capable of surviving eutrophic conditions. The fish assemblages sampled are indicative of poor water quality associated with reduced flows in the Snake River. Upstream irrigation diversions and high nutrient loading are likely contributors to limited water quality and elevated temperatures.

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GRANT OBJECTIVES

To obtain current information for fishery management decisions on rivers and streams, including angler use, success, harvest and opinions, fish population characteristics, spawning success, habitat characteristics, return-to-the-creel for hatchery trout, and develop appropriate management recommendations.

GENERAL METHODS

Fish were sampled with pulsed direct current (DC) electricity provided by a generator-powered array. Two different arrays were used, depending on the size of river or stream sampled. For smaller wadeable streams a 5,000 watt Honda generator providing AC current to a Coffelt Model 15 variable voltage pulsator (VVP), which routed DC power to two hand-held anodes was used to stun fish. The cathode was the hull of the aluminum canoe that the array was transported in. For some larger rivers and streams the same array was used in an aluminum drift-boat with two dangling cable anodes mounted on the bow of the boat. For rivers navigable by a jet-powered boat, fish were sampled with an eighteen-foot Smith-Root Model GPP 5.0 electrofishing boat.

Population estimates were made with either an adjusted Petersen mark-recapture model (Ricker 1975) or with a maximum-likelihood calculation run on MicroFish 3.0, a computer software system for generating population estimates from electrofishing data (Van Deventer et al. 1989).

Age structure and growth rates were estimated for some fish populations sampled. Scale samples taken from an area between the dorsal fin and lateral line were processed by creating an imprint on an acetate slide then viewed with a microfiche reader. Imprints were subsequently viewed with a microfiche reader to estimate age of the fish following methods described by Mackay et al. (1990).

Relative weights of fish were calculated for 1-cm length groups. Average weights of rainbow trout within each length group were divided by an expected standard weight calculated from an equation developed for lotic populations of rainbow trout that were at least 130 mm long (Simpkins et al. 1996).

BIG WOOD RIVER

Introduction

The Big Wood River from the Glendale Diversion upstream to its headwaters is managed with a variety of fishing rules that were first implemented in 1977 to provide a trophy wild rainbow trout fishery. More restrictive rules were implemented and expanded in 1990 listing more stream miles under more restrictive rules to expand the trophy quality of the Big Wood River fishery. These changes were based on public input and data provided by Thurow (1990). Data collected on intermittent years from the 1980's has provided information on how the fishery has evolved since before and after the fishing rules were changed (Partridge et al. 1994, Thurow 1990 and Warren et al. in press). The fishery was sampled at two sites within the slot-limit segment (two trout limit with none between 305 mm and 406 mm allowed) and two sites within the catch-and-release segment in an effort to document how the fishery has evolved since the rule changes were implemented and to determine how environmental factors are affecting it. There are no rainbow trout of hatchery origin stocked within this segment of river, there are however, rainbow trout stocked in the North Fork of the Big Wood River and in the Big Wood River upstream of the North Fork confluence.

Methods

Fish were sampled by electrofishing with the Honda generator-powered array transported through each reach in an aluminum canoe. A minimum crew of six people worked their way downstream through the reach netting as many trout and mountain whitefish *Prosopium williamsoni* as possible in a marking and a recapture run. All salmonids were measured and subsamples weighed. Salmonid species at least 100 mm long were marked with a hole punch on a caudal fin lobe during the marking run. A recapture run was made one week later for a ratio of marked to unmarked fish. An estimate of the population of fish within each reach was based on the adjusted Petersen population estimate model (Ricker 1975). Population estimates were made on one hundred millimeter length groups when enough fish were sampled and on combined length groups. Scale samples were taken from mountain whitefish from just below the dorsal fin for age and growth analysis.

Study Site

Four sites selected for fish sampling were Hailey-lower (Site 2), Hailey-upper (Site 2A), Gimlet (Site 4) and the Highway Diversion Channel (Site 6A) (Figure 8, Table 24). Sites 2, 4 and 6A have been sampled in previous years but site 2A was sampled for the first time in 2003 to monitor possible effects of several man-made in-stream drop structures that were constructed there in 2001. It is delineated by the uppermost and lowermost artificial drop structures put into place immediately downstream of the Croy Creek bridge in 2001. The two lowermost (Sites 2 and 2A) are within the reach of river where fishing is regulated with a slot-limit. Sites 4 and 6A are within the segment of river regulated with catch-and-release fishing rules.

Results

Fish species sampled at the four sites combined include bridgelip sucker, brook trout *S. fontinalis*, brown trout, fathead minnow *Pimephales promelas,* mountain whitefish, rainbow trout of hatchery origin, rainbow trout of wild origin, and Wood River sculpin *Cottus leiopomus* (Tables 25-28). Rainbow trout, mountain whitefish and brook trout population and density estimates were made for most size classes at all sites (Table 29). The only brown trout *Salmo trutta* sampled were two from site 2. A fathead minnow was also sampled was from site 2, which is the first confirmed documentation of the species in the Big Wood River. A comparison of population estimates for sites sampled in previous years is provided in Tables 30 and 31. Average weights of fish calculated for each 10 mm length group indicates that there is a slightly negative correlation between total lengths and relative weights of rainbow trout (Table 32, Figure 9).

Discussion

Results of the 2003 fishery survey indicate that catch-and-release rules set in 1990 shifted the size structure of the rainbow trout population to a greater number of fish in the larger ($\geq$ 300 mm) size classes in the Gimlet reach (Site 4) (Tables 30 and 31). There has also been a similar but less profound shift within the slot limit reach (Figure 10). There is also some evidence that stream discharge levels are influencing population numbers. Surveys conducted at sites 2 (Lower Hailey), 4 (Gimlet) and 6 (Lake Creek) since 1990 show an upward spike in the population in year 2000 at all three sites (Table 30). This spike follows a series of river flows that peaked in June averaging more than 1,800 cfs for five consecutive years from 1995 until 1999 (Table 33, Figure 11). In the three following years the monthly mean streamflow reached a maximum of 1,042 cfs in May of 2000 and never reached 1,000 cfs again through 2002 (Table 33, Figure 11). Population estimates in 2003 dropped at all sites sampled to a level below the long term averages since 1990, when fishing rules were last changed. These long-term results support IDFG's position on protesting additional surface water right applications in the Wood River Valley.

The presence of the whirling disease pathogen *Myxosoma cerebralis* in the watershed has created concern that it may be negatively affecting the fisheries population. The presence of all year classes of rainbow trout in all segments of the Big Wood River indicates that the pathogen is not having a measurable impact on the population.

Table 24. Descriptions of Big Wood River sites sampled by electrofishing in 2003.

	Sample sites			
Reach	Site 2 (Hailey-lower)	Site 2A (Hailey-upper)	Site 4 (Gimlet)	Site 6A (Highway channel)
Upper boundary	716,797 E 4,821,125 N Zone 11	716,590 E 4,821,445 N Zone 11	713,884 E 4,833,622 N Zone 11	710,499 E 4,845,559 N Zone 11
Lower boundary	716,873 E 4,820,797 N Zone 11	716,590 E 4,821,233 N Zone 11	714,017 E 4,833,622 N Zone 11	710,818 E 4,844,906 N Zone 11
Length (m)	908	280	863	882
Area (ha)	2.1	0.6	1.9	1.3

Table 25. Total length frequency of fish sampled from site 2 on the Big Wood River with a mark and recapture run of electrofishing on September 25 and October 2, 2003. Does not include fish marked as recaptured on the October 2 run.

TL (mm)	Bridgelip sucker	Brook trout	Brown trout	Fathead minnow	Rainbow trout (hatchery)	Mountain whitefish	Rainbow trout (wild)	Wood River sculpin
40	--	--	--	--	--	--	--	2
60	1	--	--	--	--	--	4	2
70	1	--	--	--	--	--	7	5
80	2	1	--	--	--	1	4	6
90	2	3	--	--	--	14	2	2
100	11	3	--	--	--	18	1	1
110	5	4	--	--	--	16	15	--
120	9	1	--	--	--	12	34	--
130	3	1	--	--	--	5	61	--
140	7	--	--	--	--	2	47	--
150	4	1	--	--	--	--	82	--
160	6	1	--	--	--	--	90	--
170	2	1	--	--	--	--	60	--
180	--	6	--	--	--	1	50	--
190	--	2	--	--	--	3	46	--
200	--	1	--	--	--	3	43	--
210	--	--	--	--	--	7	24	--
220	--	6	1	--	--	12	22	--
230	--	1	--	--	--	4	26	--
240	--	--	--	--	--	2	15	--
250	--	--	--	--	1	4	21	--
260	--	--	--	--	--	--	9	--
270	--	--	--	--	--	--	9	--
280	--	--	--	--	--	--	6	--
290	--	--	--	--	--	--	6	--
300	--	--	--	--	--	--	2	--
310	--	--	--	--	--	--	2	--
320	--	--	--	--	--	--	1	--
340	--	--	--	--	--	--	4	--
350	--	--	--	--	--	--	2	--
360	--	--	--	--	--	--	3	--
370	--	--	--	--	--	--	3	--
380	--	--	--	--	--	--	6	--
390	--	--	--	--	--	--	7	--
400	--	--	--	--	--	--	2	--
410	--	--	--	--	--	--	3	--
420	--	--	--	--	--	--	1	--
430	--	--	--	--	--	--	1	--
440	--	--	--	--	--	--	2	--
450	--	--	--	--	--	--	1	--
490	--	--	1	--	--	--	--	--
Not meas.	1	--	--	1	--	--	--	20
Total:	54	32	2	1	1	125	724	38

Table 26. Total length frequency of fish sampled from site 2A on the Big Wood River with a mark and recapture run of electrofishing on September 25 and October 2, 2003. Does not include fish marked as recaptured on the October 2 run.

TL (mm)	Bridgelip sucker	Brook trout	Mountain whitefish	Rainbow trout (wild)	Wood River sculpin
0	--	--	--	--	3
50	--	--	--	4	--
60	--	--	--	5	1
70	--	--	--	2	1
80	--	--	2	2	2
90	--	--	1	1	1
100	--	--	1	2	1
110	--	1	--	5	--
120	1	--	--	10	--
130	--	--	--	12	--
140	--	--	--	17	--
150	--	--	--	18	--
160	--	--	--	14	--
170	--	--	--	16	--
180	--	--	--	30	--
190	--	--	--	27	--
200	--	1	--	22	--
210	--	--	--	14	--
220	--	--	--	18	--
230	--	--	2	10	--
240	--	--	--	12	--
250	--	--	--	9	--
260	--	--	--	4	--
270	--	--	--	5	--
280	--	--	--	6	--
290	--	--	--	3	--
310	--	--	--	1	--
330	--	--	--	1	--
350	--	--	--	2	--
360	--	--	--	1	--
370	--	--	--	3	--
380	--	--	--	2	--
390	--	--	--	4	--
400	--	--	--	1	--
410	--	--	1	1	--
420	--	--	1	--	--
430	--	--	--	1	--
440	--	--	1	--	--
480	--	--	--	1	--
Grand Total	1	2	9	286	15

Table 27. Total length frequency of fish sampled from site 4 on the Big Wood River with a mark and recapture run of electrofishing on September 24 and October 1, 2003. Does not include fish marked as recaptured on the October 1 run.

TL (mm)	Bridgelip sucker	Brook trout	Mountain whitefish	Rainbow trout (wild)	Wood River sculpin
50	--	--	--	6	--
60	--	--	--	9	--
70	--	--	--	5	--
75	--	--	--	1	--
80	--	--	--	1	--
90	--	--	1	--	--
100	--	--	--	2	1
110	--	--	--	12	--
115	--	--	--	1	--
120	1	--	--	11	--
130	1	--	1	10	--
140	--	--	--	21	--
150	--	--	--	23	--
160	--	--	--	14	--
170	--	--	--	13	--
175	--	--	--	1	--
180	--	1	--	11	--
190	--	--	--	9	--
200	--	--	--	9	--
210	--	--	1	15	--
220	--	--	1	13	--
230	--	--	2	13	--
235	--	--	--	1	--
240	--	--	--	14	--
250	--	--	--	13	--
260	--	--	--	8	--
270	--	--	1	12	--
280	--	--	--	18	--
290	--	--	--	10	--
300	--	--	--	8	--
310	--	--	--	2	--
320	--	--	--	3	--
330	--	--	--	11	--
340	--	--	1	15	--
350	--	--	--	31	--
360	--	--	3	22	--
370	--	--	3	28	--
380	--	--	3	21	--
390	--	--	10	21	--
400	--	--	9	11	--
410	--	--	9	5	--
420	--	--	1	4	--
430	--	--	1	--	--
440	--	--	--	1	--
450	--	--	1	--	--
Not meas.	--	--	--	--	46
Grand total	2	1	48	459	47

Table 28. Total length frequency of fish sampled from site 6A on the Big Wood River with a mark and recapture run of electrofishing on September 23 and September 30, 2003. Does not include fish marked as recaptured on the September 30 run.

TL (mm)	Brook trout	Rainbow trout (hatchery)	Mountain whitefish	Rainbow trout (wild)	Wood River sculpin	Rainbow trout YOY (< 100 mm)
40	--	--	--	2	--	--
50	--	--	--	4	--	--
60	--	--	--	11	--	--
70	--	--	1	10	--	--
80	1	--	2	2	--	--
90	2	--	5	5	--	--
100	1	--	1	16	--	--
105	--	--	--	2	--	--
110	1	--	--	35	--	--
115	--	--	--	1	--	--
120	--	--	1	29	--	--
125	--	--	--	1	--	--
130	--	--	--	36	--	--
140	1	--	--	15	--	--
145	--	--	--	1	--	--
150	--	--	--	19	--	--
160	--	--	--	13	--	--
170	1	--	--	16	--	--
180	--	--	--	9	--	--
190	--	--	--	9	--	--
200	--	--	--	3	--	--
210	--	--	1	8	--	--
220	--	--	--	3	--	--
230	--	--	--	3	--	--
240	--	2	--	3	--	--
250	--	2	--	4	--	--
260	--	5	--	2	--	--
270	--	--	--	4	--	--
280	--	2	--	2	--	--
290	--	--	--	2	--	--
300	--	1	--	1	--	--
310	--	1	--	1	--	--
330	--	--	2	1	--	--
340	--	--	--	2	--	--
350	--	--	--	1	--	--
360	--	--	1	--	--	--
370	--	--	--	1	--	--
380	--	--	--	2	--	--
390	--	--	2	6	--	--
400	--	--	2	2	--	--
405	--	--	1	--	--	--
410	--	--	2	2	--	--
420	--	--	--	1	--	--
455	--	--	1	--	--	--
460	--	--	--	1	--	--
Not meas	--	--	--	--	57	69
Grand Total	7	13	22	291	57	69

Table 29. Population estimates of brook trout, rainbow trout of wild origin, and mountain whitefish from electrofishing samples taken from four sites on the Big Wood River in 2003.

	Species	Size Class	M	C	R	Pop. Est. ± 95% CI	No./ha
Site 2	Brook trout	≥ 100 mm	18	13	3	66 ± 49 [a]	31
(Hailey-Lower)	Mountain whitefish	≥ 100 mm	42	76	8	367 ± 214 [a]	175
	Rainbow trout	100-199 mm	252	262	28	2293 ± 774	1092
	Rainbow trout	200-299 mm	69	125	13	629 ± 301	300
	Rainbow trout	≥ 200 mm	85	154	18	701 ± 288	334
	Rainbow trout	≥ 300 mm	16	29	5	84 ± 56 [a]	40
	Rainbow trout	≥ 400 mm	3	9	2	12 ± 11 [a]	6
Site 2A	Brook Trout	≥ 100 mm	2	0	0	2 ± 0	3
(Hailey-Upper)	Mountain whitefish	≥ 100 mm	4	4	0	24 ± 31 [a]	40
	Rainbow trout	100-199 mm	72	92	14	452 ± 203	753
	Rainbow trout	200-299 mm	46	62	5	493 ± 348 [a]	822
	Rainbow trout	≥ 200 mm	50	78	7	503 ± 312	838
	Rainbow trout	≥ 300 mm	4	16	2	27 ± 25 [a]	45
	Rainbow trout	≥ 400 mm	1	3	0	7 ± 10	12
Site 4	Brook Trout	≥ 100 mm	1	0	0	1 ± 0	<1
(Gimlet)	Mountain whitefish	≥ 100 mm	28	32	13	67 ± 26	35
	Rainbow trout	100-199 mm	72	63	8	518 ± 298 [a]	272
	Rainbow trout	200-299 mm	64	70	9	461 ± 253 [a]	242
	Rainbow trout	≥ 200 mm	164	184	40	744 ± 199	392
	Rainbow trout	≥ 300 mm	100	114	31	362 ± 105	190
	Rainbow trout	≥ 400 mm	9	13	1	69 ± 73	36
Site 6A	Brook Trout	≥ 100 mm	4	1	1	4 ± 0	3
(Hwy diversion)	Mountain whitefish	≥ 100 mm	10	6	4	14 ± 7	11
	Rainbow trout	100-199 mm	139	65	11	769 ± 379	592
	Rainbow trout	200-299 mm	25	18	10	44 ± 16	34
	Rainbow trout	≥ 200 mm	41	32	19	68 ± 19	52
	Rainbow trout	≥ 300 mm	16	14	9	25 ± 9	19
	Rainbow trout	≥ 400 mm	5	4	3	6 ± 3	5

[a] 95% confidence intervals that exceed 50% of the population estimate.

Table 30. Population and density estimates of rainbow trout $\geq$ 200 mm long sampled from various sites on the Big Wood River since 1986.

Reach	Year	Season	Pop. est	95% CI	Trout/100m	Trout/ha
2 (Lower Hailey)	1986	Summer	352	218-598	17.6	97
	1987	Summer	544	292-1,113	27.2	177
	1987	Fall	583	338-1,093	29.2	189
	1988	Summer	1,038	749-1,483	51.9	353
	1992	Fall	974	834-1,114	48.7	331
	1995	Fall	979	789-1,170	52.7	263
	1996	Fall	1,351	1,168-1,534	73.1	386
	2000	Fall	1,237	1,082-1,392	114.3	488
	2003	Fall	701	413-989	31.7	334
2A (Upper Hailey)	2003	Fall	503	191-815	179.6	838
3 (Starweather)	1986	Summer	460	254-920	43.1	211
	1986	Fall	81	42-171	7.6	37
	1987	Summer	244	147-433	22.9	137
	1987	Fall	220	128-413	20.6	123
	1988	Summer	392	278-569	36.7	232
	1991	Summer	547	350-743	45.3	191
	1993	Fall	329	221-437	30.7	92
	1995	Fall	466	320-612	46.5	222
	1996	Fall	753	622-884	73.7	285
4 (Gimlet)	1986	Summer	675	431-1,898	34.1	197
	1986	Fall	455	258-878	23.0	133
	1987	Summer	955	609-1,577	48.3	318
	1987	Fall	301	187-512	15.2	100
	1988	Summer	808	601-1,111	40.8	276
	1992[a]	Fall	895	713-1,077	79.9	406
	1993	Fall	1,001	770-1,232	64.2	326
	1995	Fall	985	835-1,135	67.8	343
	1996	Fall	1,280	1,120-1,440	87.0	410
	2000	Fall	1,123	978-1,268	150.9	744
	2003	Fall	744	545-943	86.2	392
6 (Lake Creek)	1986	Summer	125	73-235	10.9	72
	1986	Fall	168	107-277	14.6	97
	1987	Summer	176	83-405	15.3	104
	1987	Fall	161	97-285	14.0	95
	1988	Summer	90	50-180	7.8	54
	1990[b]	Fall	199	141-289	12.1	86
	1991	Summer	132	94-171	11.4	81
	1992	Fall	209	171-243	18.2	129
	1993	Fall	213	141-285	17.3	118
	1995	Fall	188	106-268	15.5	100
	1996	Fall	207	158-256	17.2	104
	2000	Fall	266	211-321	20.9	125

Table 31. Estimated percentages and numbers of wild rainbow trout ($\geq$ 200 mm only) that exceeded 300, 400, and 500 mm in the Big Wood River. Estimates from 1986-88 adjusted for sampling efficiency. Data from 1986-88 is from Thurow (1990), data from 1991 is from Partridge et al. (1994), data from 1992 is from Warren et al. (1994), data from 1995 is from Partridge et al. (2003) and data from 2000 is from Warren et al. (in press).

		Percent			Trout/km		
Reach	Year	≥ 300	≥ 400	≥ 500	≥ 300	≥ 400	≥ 500
2,3,4[a]	1986-88[a]	21	5	<0.1	76	17	0.2
2	1992	10	1	0	51	4	0
	1995	12	2	0	66	13	0
	1996	20	4	0	252	27	0
	2000	34	4	0	391	44	0
	2003	12	2	0	92	13	0
2A	2003	5	1	0	45	12	0
3	1991	27	7	0	125	31	0
	1993	28	8	0	82	22	0
	1995	36	10	0	155	42	0
	1996	33	8	0	244	61	0
4	1992	50	12	0	226	57	0
	1993	40	15	0	258	97	0
	1995	52	10	0	352	69	0
	1996	35	10	0	418	94	0
	2000	44	4	0	660	63	0
	2003	49	9	0	419	80	0
6	1986-88[a]	27	4	0.4	30	5	0.4
	1990[b]	29	7	0	35	8	0
	1991	21	5	0	23	5	0
	1992	29	8	0	51	14	0
	1993	25	2	0	51	5	0
	1995	45	22	0	68	33	0
	1996	52	18	0	96	29	0
	2000	63	10	0	132	22	0
6A	1991	13	4	0	18	6	0
	1992	11	0	0	13	0	0
	1993	17	1	0	45	4	0
	1995	40	9	0	101	22	0
	1996	56	22	0	87	33	0
	2003	37	9	0	28	7	0
7	1986-88[a]	8	0	0	2	0	0
	1996	37	0	0	9	0	0

[a] Pooled data.
[b] Includes a portion of old highway river site, total sample length estimated to be 1.65 km.

Table 32. Average weights (g) of fish from subsamples taken from four sites electrofished on the Big Wood River in September and October, 2003.

	Brook trout		Mountain whitefish		Rainbow trout	
TL (mm)	Ave. Wt.	N	Ave. Wt.	N	Ave. Wt.	N
50	--	--	--	--	1	1
60	--	--	--	--	2	1
70	--	--	--	--	4	2
80	7	1	5	1	5	2
90	7	3	6	2	8	2
100	11	1	--	--	11	6
110	13	4	10	1	14	27
120	--	--	13	1	17	18
130	--	--	20	2	23	38
140	27	1	23	1	29	29
150	--	--	--	--	36	32
160	45	1	--	--	40	23
170	49	2	--	--	53	28
180	60	5	--	--	62	21
190	77	1	--	--	73	22
200	80	1	--	--	87	15
210	--	--	73	1	99	16
220	115	3	220	1	114	7
230	--	--	132	1	123	10
240	--	--	--	--	141	13
250	--	--	189	1	162	10
260	--	--	200	1	177	5
270	--	--	233	1	205	10
280	--	--	--	--	224	11
290	--	--	--	--	246	7
300	--	--	--	--	280	4
310	--	--	--	--	287	2
320	--	--	--	--	315	1
330	--	--	343	1	350	5
340	--	--	--	--	379	7
350	--	--	--	--	437	12
360	--	--	521	4	440	10
370	--	--	--	--	498	14
380	--	--	603	3	550	15
390	--	--	680	6	586	8
400	--	--	673	2	608	6
410	--	--	764	11	532	6
420	--	--	867	2	667	1
430	--	--	856	2	--	--
440	--	--	--	--	--	--
450	--	--	801	2	--	--
460	--	--	--	--	930	1

Table 33. Monthly mean streamflow, in cubic feet per second measured at the U.S.G.S. gauge on the Big Wood River in Hailey, Idaho (U.S.G.S. provisional website data).

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1986	189	194	475	1,178	1,815	2,410	694	344	290	278	226	167
1987	155	152	213	375	725	521	284	172	128	125	131	121
1988	119	119	153	343	621	715	217	133	116	120	125	115
1989	120	114	149	644	994	954	351	174	156	165	156	131
1990	126	121	157	439	464	831	359	185	152	150	146	122
1991	115	110	120	186	487	1,088	435	171	172	158	171	132
1992	125	121	227	350	616	356	188	92	95	113	109	96
1993	100	100	194	485	1,853	1,823	771	426	214	205	157	148
1994	143	128	164	259	517	448	136	79	63	103	93	98
1995	105	128	277	627	1,598	2,928	2,196	622	309	266	244	204
1996	175	187	270	602	1,509	2,089	831	297	206	199	235	196
1997	307	199	304	854	2,596	2,938	1,070	486	318	301	258	180
1998	204	187	219	480	1,691	1,862	1,312	410	287	262	245	181
1999	186	182	244	563	1,431	2,100	838	367	240	238	229	186
2000	188	193	214	594	1,042	884	281	158	181	224	208	169
2001	158	147	197	275	649	405	188	100	93	118	123	108
2002	114	116	133	434	716	895	266	119	102			

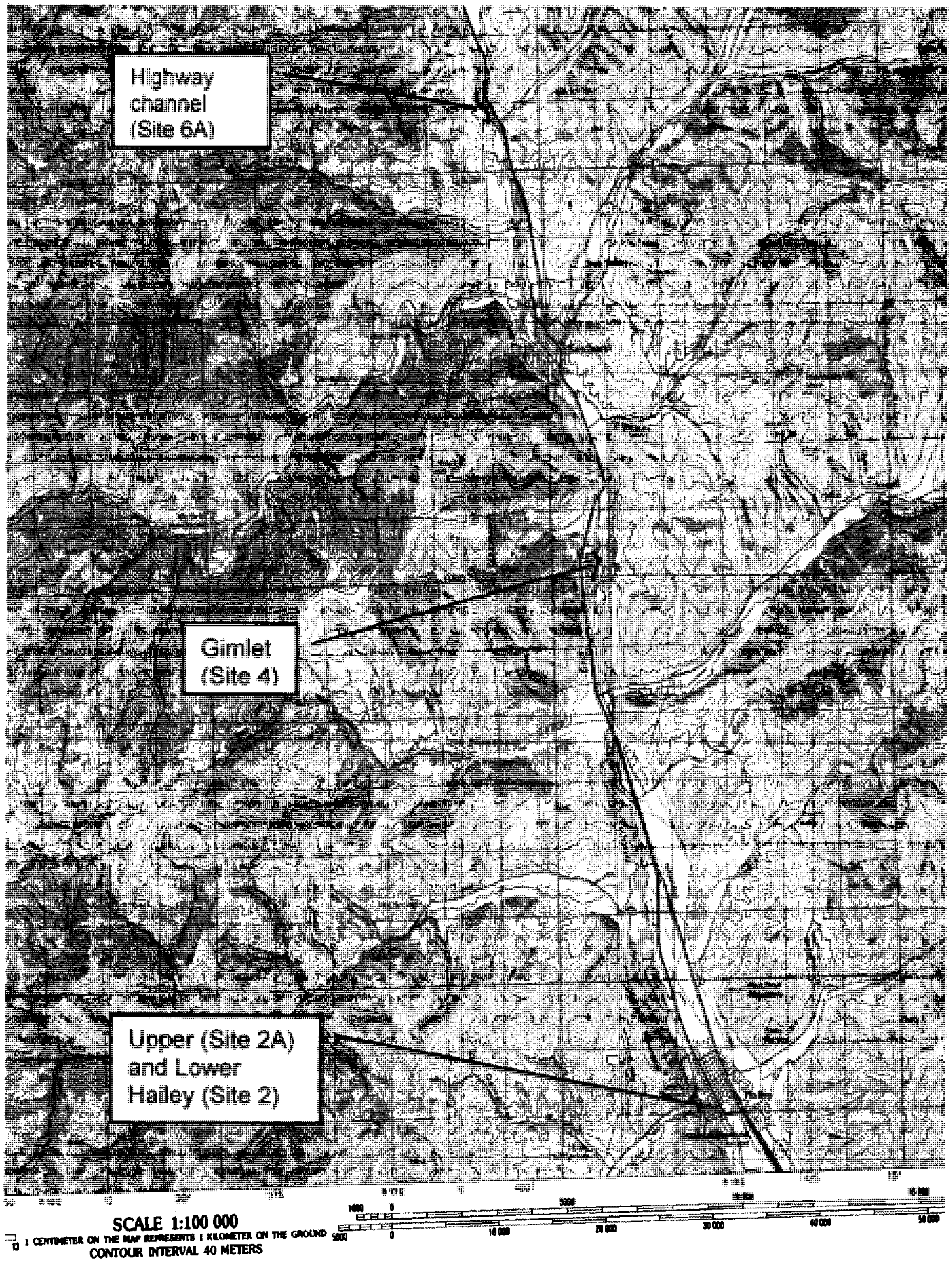


Figure 8. Map of the Big Wood River depicting reaches sampled for fish population estimates in September and October, 2003.

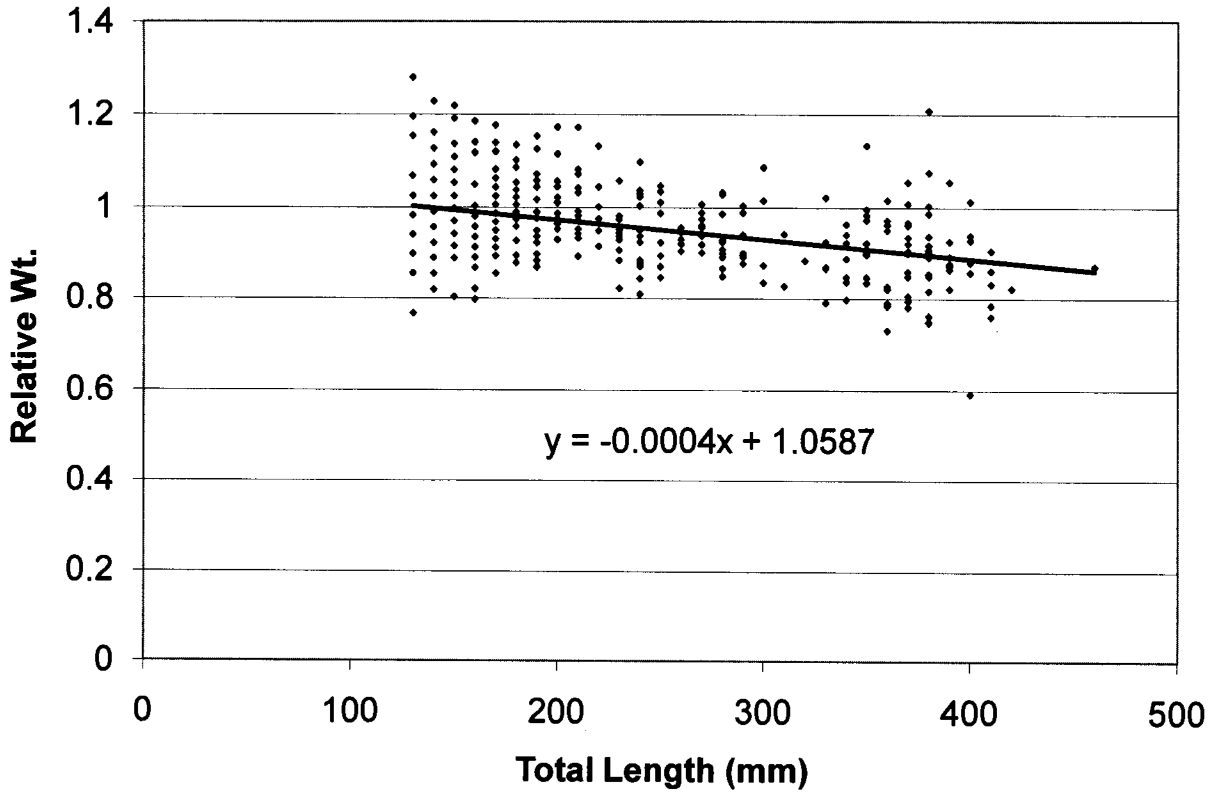


Figure 9. Distribution and linear regression of relative weights of rainbow trout sampled from four sites on the Big Wood River in September and October, 2003.

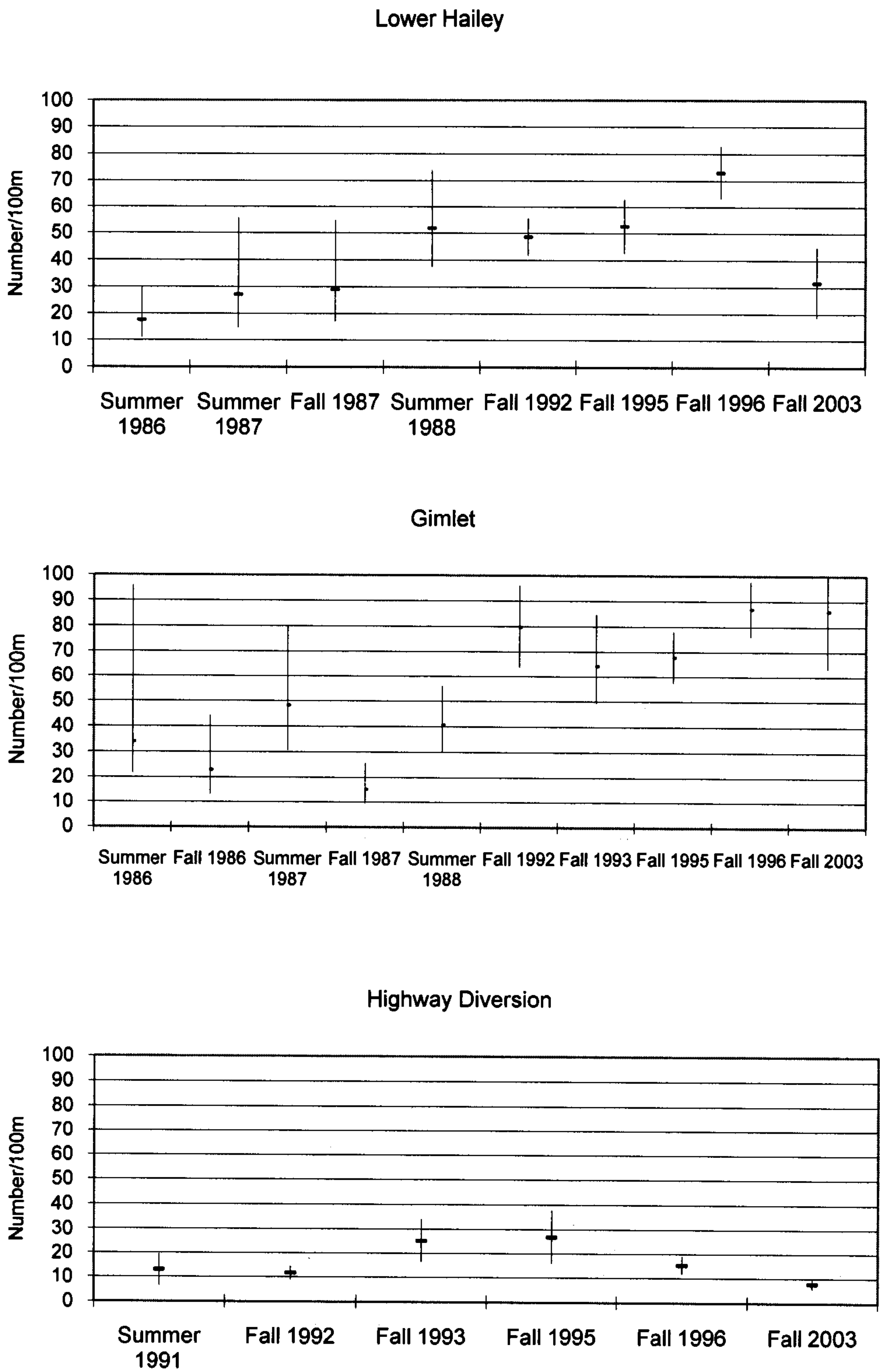
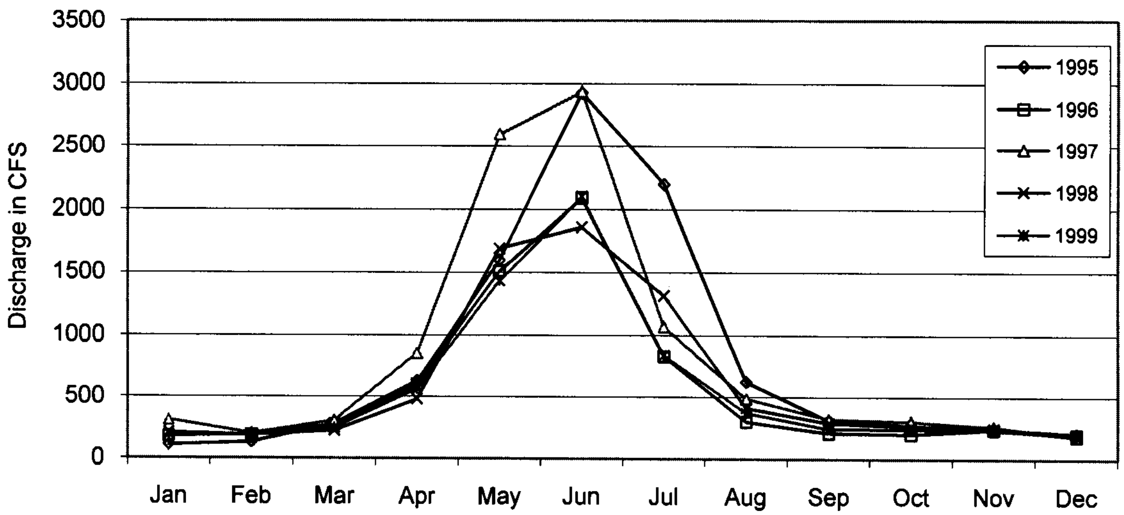


Figure 10. Density estimates (+/-95% C.I.) of rainbow trout at least 200 mm long sampled from three segments of the Big Wood River during various time periods since 1986.



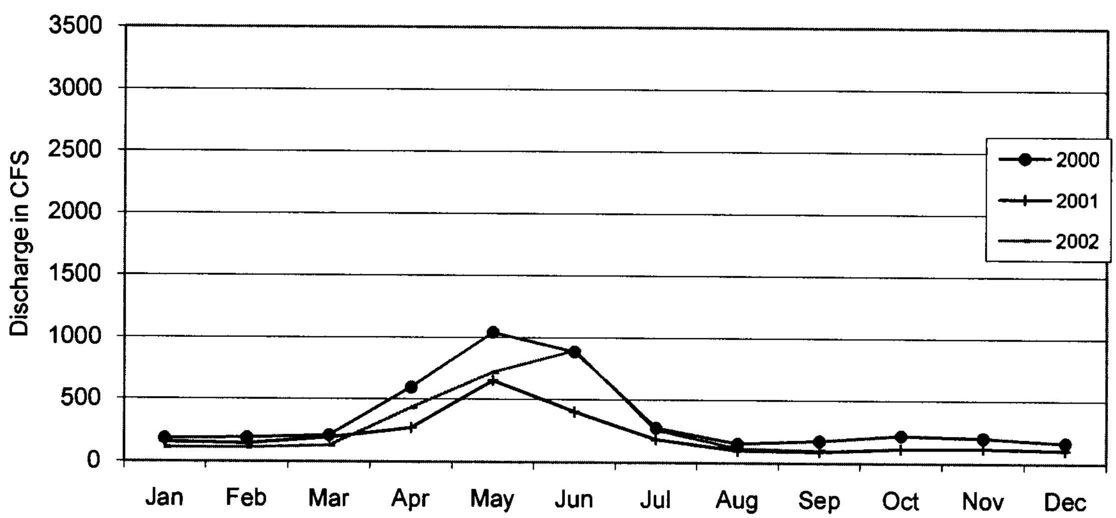


Figure11. Mean monthly discharge of the Big Wood River at the U.S.G.S. gauge 1995-1999 (top) and 2000-2002 (bottom) in Hailey(provisional data from U.S.G.S.).

CLOVER CREEK

Clover Creek is a tributary to the Bruneau River with elevations ranging from about 980 m in elevation at its confluence to about 2,600 m at its headwaters in Nevada. The total drainage for Clover Creek encompasses approximately 700 km^2, most of which is sagebrush steppe habitat sloping to the north from broad undulating plateaus northeast of the Jarbidge Mountains. Clover Creek flows through the steep basaltic East Fork Bruneau Canyon, which has very little human access.

The watershed is within the historic range of redband trout but little is known about the current fish community. A study was undertaken with the assistance of a Bureau of Land Management cost share grant to survey the fishery at various locations on Clover Creek in 2002 and 2003. Results of the study indicate that the cold water and salmonid fishery in Clover Creek upstream of Clover Crossing is limited by high thermal summertime conditions and sedimentation of spawning gravels. A full report of the study will be available in a later publication (Megargle et al. 2004).

LITTLE WOOD RIVER

Introduction

The Little Wood River between the town of Richfield and its confluence with Silver Creek is managed as a rainbow and brown trout fishery (IDFG 2001). Stocking records indicate that brown trout fry and fingerlings were annually stocked within this reach until 1998 and approximately 275,000 triploid rainbow trout fingerlings have been stocked since 2000. Over the last three years angler input to IDFG has indicated that catch rates for both species have declined since the late 1990s. Speculation points to either poor water quality associated with below average flow conditions reducing natural recruitment and the cessation of the brown trout stocking program or a combination of both. Fish were therefore sampled in May 2003 to determine the success of the current stocking program and to estimate presence and densities of other fish of wild origin.

Study Site

Fish were sampled from a segment of the Little Wood River within the Bear Tracks Williams State Recreation Area approximately seven kilometers downstream of the Silver Creek confluence. The point of beginning was at UTM Zone 11, 740,166 m E, 4,783,173 m N and the ending point was at UTM Zone 11, 739,714 m E, 4,781,918 m N, which is at an abandoned railroad trestle bridge. The total length of river sampled was approximately 2,009 m and the total area was 2.69 ha.

Methods

Fish were sampled with three passes of electrofishing in May 2003 with a drift boat and VVP-15 electrofishing array. The multiple mark-recapture Schnabel model was used to estimate the population of trout species at least 100 mm long (Ricker 1975). Water temperatures were monitored with a continuous recording Tidbit (Onset Computer Corp.) device from May 17, 2003 until October 28, 2003.

Results

Fish sampled in all three runs combined include 17 brown trout, 19 rainbow trout, 91 bridgelip sucker, 22 longnose dace *R. cataractae*, 62 speckled dace, and 209 redside shiner (Table 34). No population estimates were made with only six brown trout and three rainbow trout recaptured in the second and third passes combined. The minimum temperature recorded with the thermograph was 5° C on October 26 and the maximum was 28° C on July 18 and 23 (Figure 12).

Discussion

The overall objective of the sampling was to determine if the brown trout and rainbow trout populations are meeting the management goals of providing a quality fishery with a catch rate of 1.0 fish/hour (IDFG 2001). Although an angler survey was not made to determine if management objectives are being met, the small sample size would indicate that the population is low compared to surveys from previous years (Warren et al. in press, Partridge et al. 1995). For example, in 2002 there were 41 brown trout and 14 rainbow trout sampled with one marking run and one recapture run of electrofishing effort made at the same time of year with the same equipment within the same reach of river (Warren et al. in press). For further comparison, 137 brown trout and five rainbow trout were sampled with one marking run and one recapture run of electrofishing within the same reach in October of 1993 (Partridge et al. 1995). The results indicate the possibility that there has not been many rainbow trout sampled in any of the surveys in the last ten years and the brown trout may be declining in numbers. It is likely that fishery is not meeting objectives.

Thermograph records from May 16 through October 28, 2003 indicate that the maximum temperature recorded in this reach of the Little Wood River was 28°C on July 18 and July 23, 2003 (Figure 12). The question of thermal influences on the brown trout and rainbow trout fishery was investigated through a review of a study by Eaton et al. (1995). In that study over 1,000 fish and water temperature databases available on thirty fish species for the "Fish and Temperature Database Matching System" (FTDMS) was compiled to determine maximum temperature tolerances of several fish species in running water environments. Maximum temperature tolerance estimates were based on the 95th percentile of a minimum of 50 warmest weekly mean temperature values acquired. The FTDMS maximum for brown trout was 24.1°C and was 24.0°C for rainbow trout. The warmest weekly mean temperature measured on the Little Wood River was 24.1°C. These results indicate that water temperatures in the Little Wood River are reaching the maximum threshold of tolerance for these species and may be resulting in sublethal effects on growth and mortality or possibly causing a direct mortality at certain life stages.

Experimental stockings of fingerling triploid rainbow trout and subsequent surveys in 2000 (Warren et al. in press) and 2002 (Warren et al. in press) indicates a low retention of these fish. Alternatively, good numbers of brown trout but few rainbow trout were sampled in October of 1993 (Partridge et al. 1995), when brown trout fingerlings were being stocked annually. These results may indicate that brown trout of hatchery origin may be surviving the high thermal conditions better than rainbow trout. The overall results from the last ten years also indicate that natural recruitment of both species is low and the only way to meet the management objective of providing a catch rate of 1.0 fish per hour is through supplementation.

There needs to be greater recruitment of rainbow trout or brown trout into the Bear Track Williams Recreation Area reach to meet angler expectations. In the past management objectives were met by stocking brown trout fingerlings and possibly through natural recruitment. Based on evidence that brown trout survive better in the Little Wood River than do rainbow trout, it is recommended that brown trout stocking be resumed within the Bear Track Williams Recreation Area segment of the Little Wood River. This may be done by stocking fry or fingerlings from eggs acquired from out-of-state sources or by transfers of brown trout from Silver Creek, a likely source of naturally produced fish. With the concern from anglers that brown trout are significantly affecting the rainbow trout fishery in Silver Creek, an annual transfer of fish may fulfill the needs to meet the Little Wood River management objectives as well as reducing the brown trout population in Silver Creek.

Table 34. Fish sampled with three passes of electrofishing 2,009 m of the Bear Tracks Williams section of the Little Wood River in May, 2003. Does not include fish marked as recaptured in the second and third run.

	Bridgelip sucker	Brown trout		Longnose dace	Rainbow trout			Redside shiner	Speckled dace
TL (mm)	N	N	Ave. wgt. (g)	N	N	Ave. wgt. (g)	Rel. Wt.	N	N
50	--	--	--	1	--	--	--	1	2
60	--	--	--	--	--	--	--	4	8
70	--	--	--	1	--	--	--	9	5
80	--	--	--	4	--	--	--	4	1
90	1	--	--	4	--	--	--		2
100	--	--	--	--	1	--	--	--	--
110	1	--	--	--	--	--	--	--	--
120	2	1	18	--	--	--	--	--	--
130	3	1	20	--	1	20	0.9	--	--
140	4	--	--	--	--	--	--	--	--
150	8	--	--	--	3	32	0.9	--	--
160	4	--	--	--	2	30	0.7	--	--
170	1	--	--	--	1	50	0.9	--	--
180	3	--	--	--	2	60	1.0	--	--
190	3	--	--	--				--	--
200	1	--	--	--	1	67	0.8	--	--
210	1	--	--	--				--	--
230	1	--	--	--	3	115	0.9	--	--
240	--	1	130	--	--	--	--	--	--
250	1	1	170	--	1	170	1.0	--	--
260	--	--	--	--	1	165	0.9	--	--
280	--	--	--	--	1	170	0.7	--	--
290	--	2	260	--	--	--	--	--	--
300	--	1	330	--	--	--	--	--	--
320	--	4	345	--	--	--	--	--	--
330	--	3	382	--	--	--	--	--	--
340	--	2	425	--	--	--	--	--	--
350	--	--	--	--	1	480	1.0	--	--
360	--	1	450	--	1	520	1.0	--	--
Not meas.	57	--	--	12	--	--	--	191	43
Total	91	17		22	19			209	62

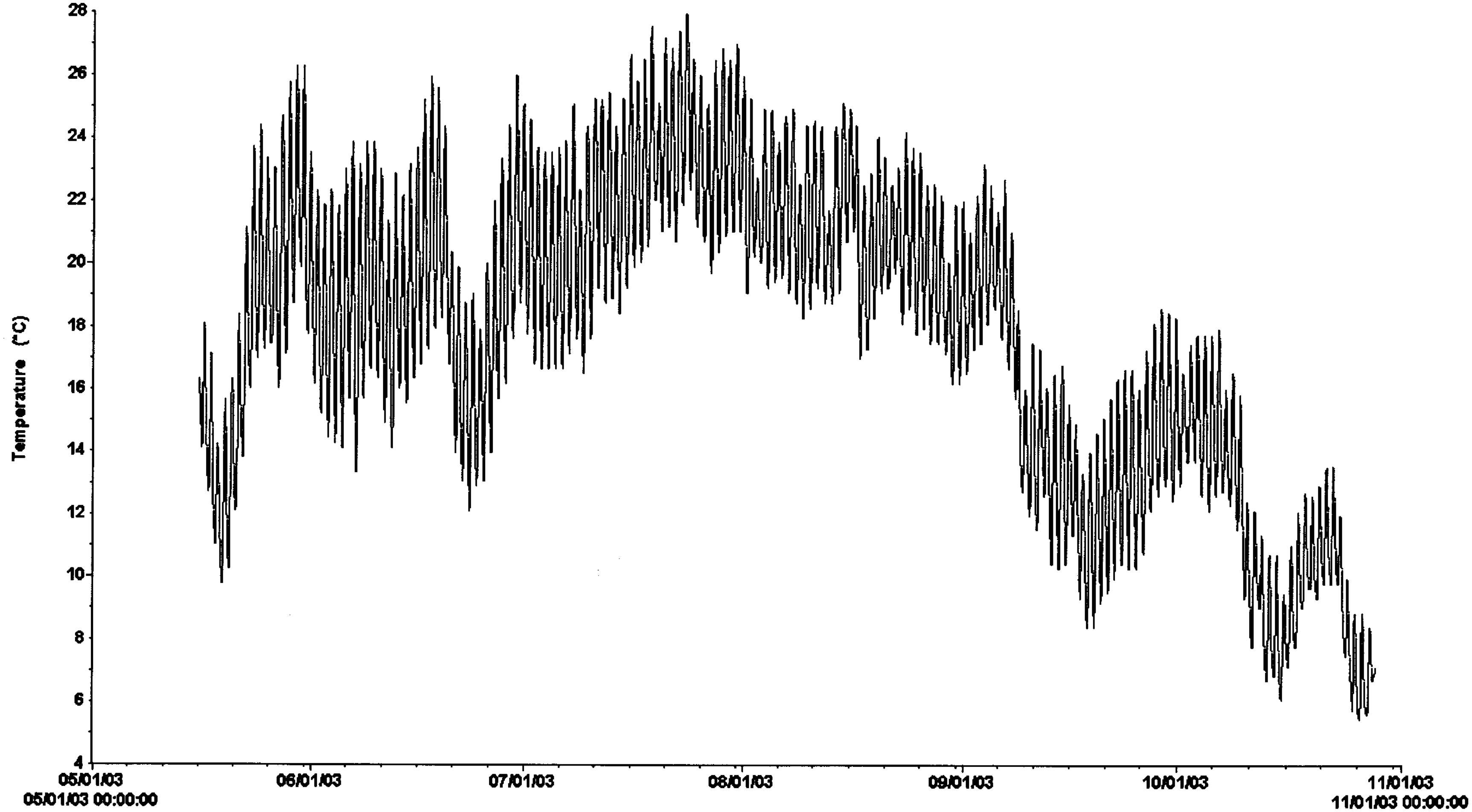


Figure 12. Continuously recorded water temperatures of the Little Wood River at Bear Tracks Williams Access from May 16 through October 27, 2003.

SNAKE RIVER (NAWQA SAMPLE)

Introduction

The U.S. Geological Survey (USGS) has been monitoring the fishery of the Snake River as part of the National Water Quality Assessment Program (NAWQA) on an annual basis since 1993 (Maret 1997). One of the goals of this program is to address the relation of physical and chemical characteristics of streams and associated fish assemblages in the upper Snake River Basin, which includes select sites within the watershed upstream of King Hill. IDFG has been assisting with the fish sampling component of this program since it was implemented. In 2003 IDFG continued their assistance with electrofishing at the King Hill site, which is located at the USGS gauging station at river mile 547, and at the Buhl site, which is located at the USGS gauging station at river mile 597. Fish were sampled for a distance of 1,065 m along the north shoreline at the King Hill site and for a distance of 1,285 m along the south shoreline at the Buhl site. The Smith-Root Model GPP 5.0 electrofishing boat was used for the daytime fish sampling efforts.

Results

Fish sampled at the Buhl site include chiselmouth chub, common carp, largescale sucker, mottled sculpin *C. bairdi*, northern pikeminnow *Ptychocheilus oregonensis*, rainbow trout, and redside shiner (Table 35). Fish sampled at the King Hill site include bridgelip sucker, chiselmouth chub, common carp, leopard dace, largescale sucker, mottled sculpin, northern pikeminnow, redside shiner, smallmouth bass, and speckled dace (Table 36).

Discussion

Most of the fish sampled from the Snake River at both sites are somewhat tolerant to warm water and capable of surviving eutrophic conditions. The fish assemblage sampled are indicative of the continuing poor water quality associated with reduced flows in the Snake River due to upstream irrigation diversions and high nutrient loadings. Monitoring should continue through the NAWQA program to measure any significant shifts in the fish community resulting from changes in water quality.

Table 35. Length frequencies and total numbers of fish species [a] sampled by electrofishing the Snake River near Buhl on July 10, 2003 for the NAWQA.

TL (mm)	CMC	CC	LSS	MSC	NPM	RBT	RSS
30	--	--	--	--	--	--	2
60	--	--	--	--	3	--	2
70	--	--	--	2		--	--
80	3	1	--	1	2	--	--
90	1	--	--	--	--	--	--
100	--	--	1	--	1	--	--
110	--	--	2	--	--	--	--
120	--	--	2	--	--	--	--
130	--	--	1	--	--	--	--
140	--	--	--	--	1	--	--
150	--	1	--	--	1	--	--
160	--	--	1	--	2	--	--
170	--	--	2	--	--	--	--
180	--	--	6	--	--	--	--
190	--	1	2	--	1	--	--
200	--	1	3	--	--	--	--
210	--	1	3	--	--	--	--
220	--	--	2	--	1	--	--
230	--	--	1	--	--	--	--
240	--	3	2	--	1	--	--
250	--	--	1	--	--	--	--
260	--	3	4	--	1	--	--
270	--	6	3	--	--	--	--
280	--	1	1	--	--	1	--
290	--	5	2	--	--	--	--
300	--	4	1	--	--	--	--
310	--	2	--	--	--	--	--
320	--	3	--	--	--	--	--
330	--	--	1	--	--	--	--
340	--	1	--	--	--	--	--
360	--	1	1	--	--	--	--
370	--	1	--	--	--	--	--
390	--	1	--	--	--	--	--
420	--	1	2	--	--	1	--
440	--	1	--	--	1	--	--
450	--	--	2	--	--	--	--
460	--	--	2	--	1	--	--
470	--	1	2	--	--	--	--
480	--	--	1	--	--	--	--
490	--	--	3	--	--	--	--
520	--	--	1	--	1	--	--
550	--	--	1	--	--	--	--
560	--	1	--	--	--	--	--
580	--	1	--	--	--	--	--
590	--	1	--	--	--	--	--
610	--	2	--	--	--	--	--
660	--	1	--	--	--	--	--

Table 35. Continued

TL (mm)	CMC	CC	LSS	MSC	NPM	RBT	Rss
670	--	1	--	--	--	--	--
680	--	1	--	--	--	--	--
700	--	1	--	--	--	--	--
720	--	1	--	--	--	--	--
750	--	1	--	--	--	--	--
Not meas.	--	12	--	--	--	--	--
Total	4	65	84	3	17	2	4

[a] CMC = Chiselmouth chub, CC = Common carp, LSS = largescale sucker, MSC = mottled sculpin, NPM = northern pikeminnow, RBT = rainbow trout, RSS = redside shiner

Table 36. Length frequencies and total numbers of fish species [a] sampled by electrofishing the Snake River near on King Hill July 10, 2003 for the NAWQA.

TL (mm)	BLS	CMC	CC	LSS	LD	MSC	NPM	RSS	SMB	SPD
20	--	--	--	--	--	--	--	1	--	--
30	--	--	--	--	--	--	--	1	--	1
40	--	--	--	--	1	--	--	--	--	1
50	--	--	--	4	--	--	--	--	--	--
60	1	--	--	--	1	1	--	2	--	--
70	--	1	--	--	--	5	3	1	--	--
80	--	1	--	--	--	2	6	3	--	--
90	--	4	--	--	--	2	2	1	--	--
100	1	--	--	--	1	--	3	2	--	--
110	1	1	--	--	--	--	--	4	--	--
120	1	1	--	--	--	--	2	--	--	--
130	--	3	--	4	--	--	--	--	--	--
140	--	2		1	--	--	2	1	--	--
150	--	--	--	--	--	--	3	--	--	--
170	--	--	--	--	--	--	1	--	--	--
190	--	--	--	--	--	--	1	--	--	--
200	1	--	--	--	--	--	1	--	--	--
240	--	--	--	--	--	--	1	--	--	--
270	--	--	--	--	--	--	--	--	1	--
300	--	--	1	--	--	--	--	--	--	--
310	--	--	--	1	--	--	--	--	--	--
330	--	--	1		--	--	--	--	--	--
350	--	--	1	1	--	--	--	--	1	--
370	--	--	2	--	--	--	--	--	--	--
380	--	--	2	--	--	--	--	--	--	--
400	--	--	1	--	--	--	--	--	--	--
420	1	--	--	--	--	--	--	--	--	--
430	--	--	1	1	--	--	--	--	--	--
440	--	--	2	3	--	--	--	--	--	--
450	--	--	--	4	--	--	--	--	--	--
460	--	--	1	3	--	--	2	--	--	--
470	--	--	--	8	--	--	--	--	--	--
480	--	--	--	3	--	--	--	--	--	--
490	--	--	--	1	--	--	--	--	--	--
500	--	--	--	3	--	--	--	--	--	--
510	--	--	--	1	--	--	--	--	--	--
520	--	--	--	1	--	--	--	--	--	--
540	--	--	--	1	--	--	--	--	--	--
560	--	--	--	1	--	--	--	--	--	--
600	--	--	1	--	--	--	--	--	--	--
630	--	--	1	--	--	--	--	--	--	--
640	--	--	1	--	--	--	--	--	--	--
660	--	--	1	--	--	--	--	--	--	--
680	--	--	1	--	--	--	--	--	--	--

Table 36. Continued

TL (mm)	BLS	CMC	CC	LSS	LD	MSC	NPM	RSS	SMB	SPD
700	--	--	2	--	--	--	--	--	--	--
710	--	--	3	--	--	--	--	--	--	--
750	--	--	1	--	--	--	--	--	--	--
760	--	--	1	--	--	--	--	--	--	--
Total	6	13	24	41	3	10	27	16	2	2

[a] BLS = bridgelip sucker, CMC = Chiselmouth chub, CC = Common carp, LSS = largescale sucker, LD = leopard dace, MSC = mottled sculpin, NPM = northern pikeminnow, RSS = redside shiner, SMB = smallmouth bass, SPD = speckled dace

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