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FISHERY MANAGEMENT INVESTIGATIONS

FEDERAL AID IN FISH RESTORATION
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Steven M. Huffaker, Director

REGIONAL FISHERIES MANAGEMENT INVESTIGATIONS
MAGIC VALLEY REGION (Subprojects I-E, II-E, III-E, IV-E)

PROJECT I. SURVEYS and INVENTORIES
- Job a. Magic Valley Region Mountain Lakes Investigations
- Job b. Magic Valley Region Lowland Lakes Investigations
- Job c. Magic Valley Region Rivers and Streams Investigations

PROJECT II. TECHNICAL GUIDANCE
PROJECT III: HABITAT MANAGEMENT
PROJECT IV. POPULATION MANAGEMENT

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1998 ANNUAL PERFORMANCE REPORT

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Project I: Surveys and Inventories

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ABSTRACT

Three lakes within the South Fork Boise River drainage were surveyed for fish and fish habitat in 1998. Green Creek Lake had no fish present although conditions are suitable for supporting stocked fish in most years. Goat Lake had rainbow trout *Oncorhynchus mykiss* that were probably of hatchery origin since spawning habitat is of marginal quality for maintaining a fishery. Perkons Lake had one cutthroat trout *O. clarki* and good numbers of rainbow trout in the sample, most of which were probably of hatchery origin since spawning habitat is of marginal quality for maintaining a fishery.

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OBJECTIVES

1. 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.
2. Develop appropriate management recommendations.

METHODS

Information gathered for mountain lake surveys included biological, physical, chemical, and descriptive data. Fish populations were sampled with Swedish-made Lundgrens Type A lightweight, multi-filament gill nets that were 1.5 m deep with six 7.6 m wide panels of bar mesh sizes 46, 38, 33, 30, 25, and 19 mm. A small inflatable rubber raft was used for setting and retrieving gill nets. Fish data analysis included identification to species, total length and weight measurements of fish sampled, and growth estimated by back calculating total length at annuli on scales.

Limnological data including pH, total hardness, alkalinity as $CaCO_3$ and conductivity were measured from the raft for some lakes by collecting surface samples in plastic bottles. Within two days of collection the samples were taken to the regional office for analysis using a HACH Water Chemistry kit, a Solu bridge conductivity meter, and an Oakton pH meter. Ambient surface water temperatures were recorded at all lakes with a mercury thermometer. Bathymetric maps were made at several locations by using a nylon rope marked in 1 m increments for depth measurements then plotting on a surface map. Lake locations were determined from USGS topographic maps and recorded in Universal Transverse Mercator (UTM) coordinates.

RESULTS AND DISCUSSIONS

Goat Lake

Goat Lake is a 3.5 ha alpine cirque lake located in the Bear Creek drainage of the South Fork Boise River at UTM Z11, 660,500 m E, 4,843,600 m N. Surface elevation of the lake is 2,665 m. It is accessed by a 1.4 km foot trail from the primitive road along Bear Creek. The lake has been stocked with 800 to 2,000 rainbow trout *Oncorhynchus mykiss* fry about every three years since at least 1969. It was most recently stocked with 2,000 rainbow trout 50 mm long in September 1994 and on September 11, 1998.

The Goat Lake fishery was surveyed with a single sinking gill net set at 1530 hours on September 23, 1998 then pulled at 0945 hours on September 24, 1998. Fish sampled included 12 rainbow trout (Table 1). Scale samples indicate that some may be of hatchery origin from the 1994 stocking and others of wild origin. Based on growth rates, rainbow trout reach 250 mm in length at four years of age. An inspection of four small tributaries and the outlet indicate that there is about 50 m of marginal quality habitat available for trout spawning, making it inadequate

Table 1. Fish sampled with a sinking gill net set overnight at Goat Lake, September 23,1998.

Total length		Rainbow trout
140	Number	1
	Avg wt (g)	39
170	Number	1
	Avg wt (g)	58
220	Number	3
	Avg wt (g)	128
260	Number	1
	Avg wt (g)	199
270	Number	1
	Avg wt (g)	240
300	Number	2
	Avg wt (g)	322
310	Number	1
	Avg wt (g)	260
320	Number	2
	Avg wt (g)	315
Total number sampled:		12
Average length:		258

for maintaining a fishery. Maximum lake depth is 6 m (Figure 1). There were some unidentified gilled salamanders in a small shallow pond 175 m west of Goat Lake. There were no amphibians observed in Goat Lake.

Surface water temperature was 12°C at 1600 hours on September 23, 1998. Secchi visibility depth was greater than lake depth. Other water quality measurements taken from a surface sample are as follows:

Total alkalinity as $CaCO_3$:	14 mg/l
Total hardness:	13 mg/l
Conductivity:	20 µsiemens/cm @ 20°C
pH:	7.3

There is evidence that the lake receives moderate use by hikers, anglers and campers with a foot trail that completely encircles the lake. The stocking program should continue as it has in the past to maintain the fishery.

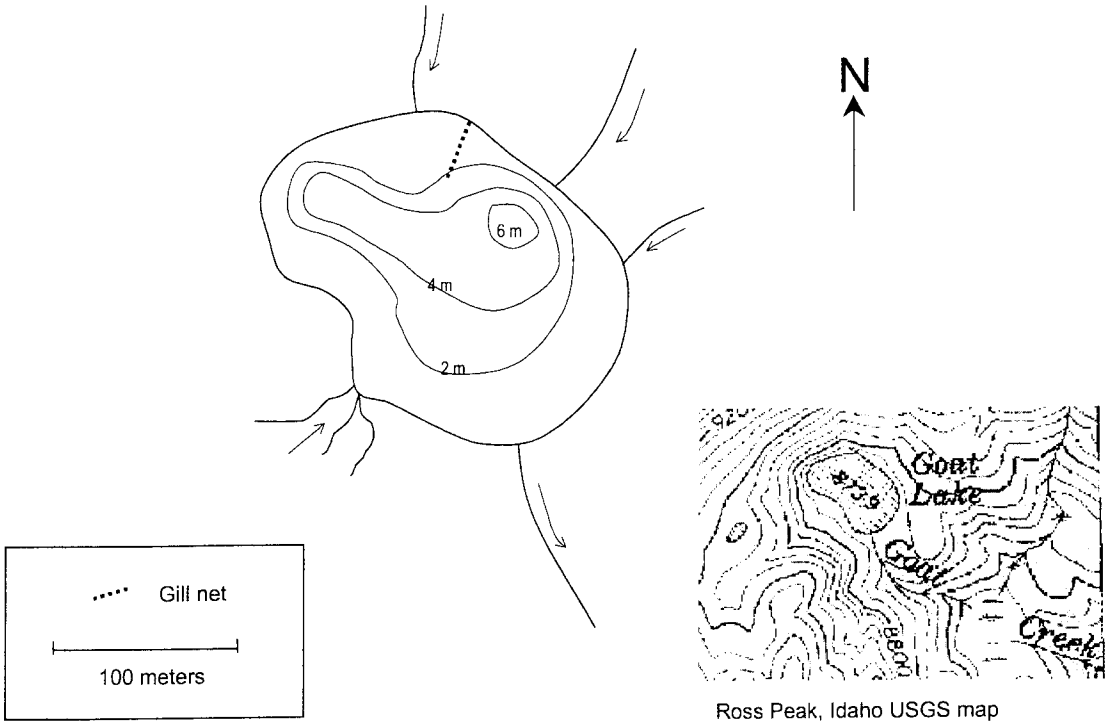


Figure 1. Map of Goat Lake with bathymetric contours and location of gill net set, September 23, 1998.

Green Creek Lake

Green Creek Lake is a 1.0 ha lake located at the headwaters of Green Creek, a tributary to the South Fork Boise River at UTM Z11, 631,300 m E, 4,826,400 m N. Surface elevation of the lake is 2,425 m. It is accessed from the trailhead off a logging road crossing Parks Creek. After taking the Parks Creek foot trail for approximately 2.5 km an unmarked trail through dense timber is followed for approximately 1.5 km. The lake has been intermittently stocked with 500 cutthroat trout *Oncorhynchus clarki* fry, most recently in September 1994.

The Green Creek Lake fishery was surveyed with a single sinking gill net set at 1715 hours on August 11, 1998 then pulled at 1615 hours on August 12, 1998. No fish were sampled with the net and none were observed during the survey. There is no visible surface inlet, and the outlet is subterranean, reappearing several meters downstream of the high water spillway. There is no habitat available for trout spawning. Maximum lake depth is 6 m (Figure 2). There were larval salamanders observed in Green Creek Lake and in some nearby ponds along the Parks Creek trail.

Secchi visibility depth was greater than lake depth. Other water quality measurements taken from a surface sample are as follows:

Total alkalinity as $CaCO_3$:	40 mg/l
Total hardness:	1 mg/l
Conductivity:	25 µsiemens/cm @ 20°C
pH:	7.5

The conservation officer has reported that anglers have caught trout from Green Creek Lake in the past. This indicates that stocked fish have survived, over wintered and have grown large enough to be recruited into the fishery from previous fish plantings. It is suggested that Green Creek Lake be stocked every three years with either cutthroat trout or Arctic grayling *Thymallus arcticus* and then resurveyed at least three years later to determine fish survival.

Perkons Lake

Perkons Lake is a 3.1 ha lake located in the Ross Fork drainage of the South Fork Boise River at UTM Z11, 663,200 m E, 4,846,400 m N. Surface elevation of the lake is 2,656 m. It is accessed by hiking south approximately 5.0 km along a trail from the trailhead on the Ross Fork Creek road. The trail is well marked, but portions are steep. There is evidence of moderate use by campers and anglers with the presence of two primitive campsites with fire pits and a footpath around part of the lake. The lake has been stocked every two to four years with about 800 rainbow trout fry, most recently in September 1994.

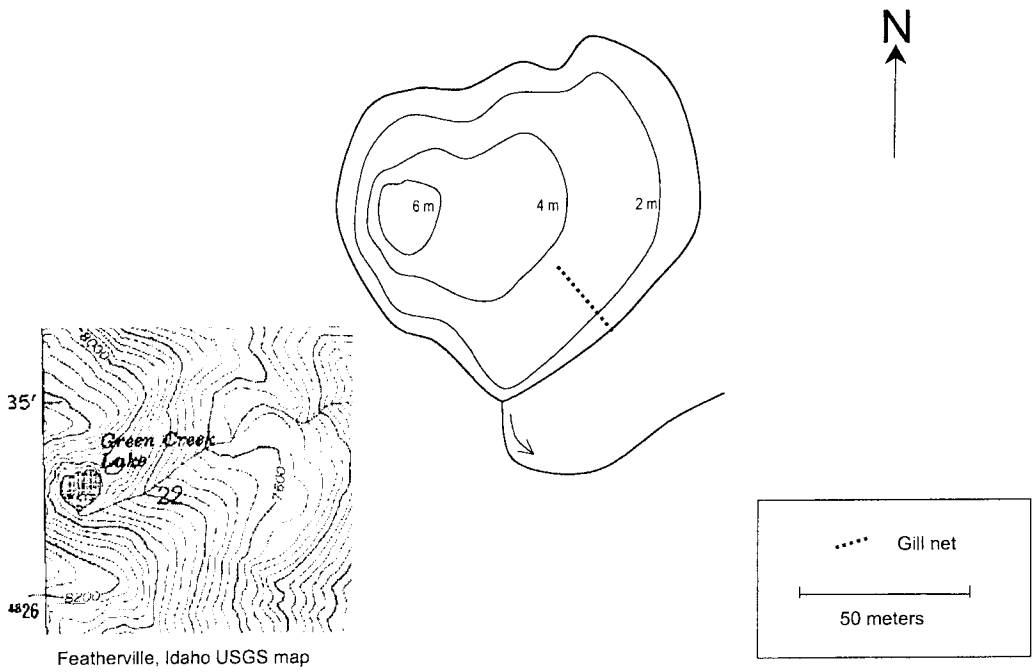


Figure 2. Map of Green Creek Lake with bathymetric contours and location of gill net set, August 11, 1998.

The Perkons Lake fishery was surveyed with a single sinking gill net set at 1900 hours on October 1, 1998 then pulled at 0835 hours on October 2, 1998. Fish sampled include 24 rainbow trout and 1 cutthroat trout (Table 2). Scale samples indicate that some may be of hatchery origin from the 1994 stocking and others of wild origin. Based on growth rates, rainbow trout reach 250 mm in length at four years of age. The presence of fish with two scale annuli confirms successful natural recruitment. There is approximately 80 m of fair spawning habitat in the outlet but none in the inlet. Maximum lake depth is 14 m and averages about 10 m. The lake has a north facing aspect (Figure 3).

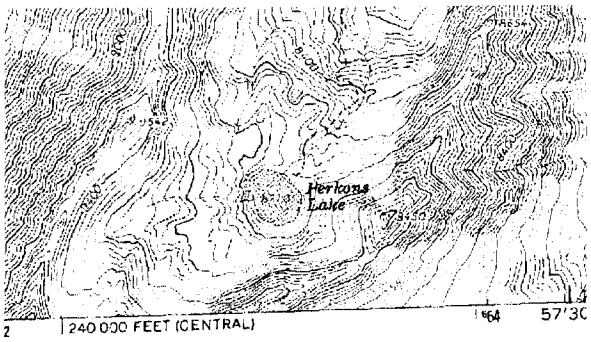
Secchi visibility depth was 12 m, and surface water temperature was 6°C at 1000 hours on October 2, 1998. Other water quality measurements taken from a surface sample are as follows:

Total alkalinity as $CaCO_3$:	15 mg/l
Total hardness:	6 mg/l
Conductivity:	25 µsiemens/cm @ 20°C
pH:	7.5

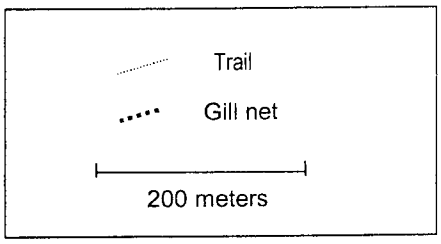
It is suggested that Perkons Lake continue to be stocked with 800 to 1,000 rainbow trout fry every three years.

Table 2. Fish sampled with a sinking gill net set overnight at Perkons Lake, October 1, 1998.

Total length		Rainbow trout	Cutthroat trout
170	Number	1	
	Avg wt (g)	58	
190	Number	1	
	Avg wt (g)	53	
200	Number	2	
	Avg wt (g)	84	
210	Number	1	
	Avg wt (g)	87	
220	Number	5	
	Avg wt (g)	93	
230	Number	2	
	Avg wt (g)	79	
240	Number	5	
	Avg wt (g)	105	
250	Number		1
	Avg wt (g)		190
260	Number	3	
	Avg wt (g)	138	
270	Number	3	
	Avg wt (g)	158	
280	Number	1	
	Avg wt (g)	198	
Total number sampled:		24	1
Average length:		236	250



Marshall Peak, Idaho USGS map



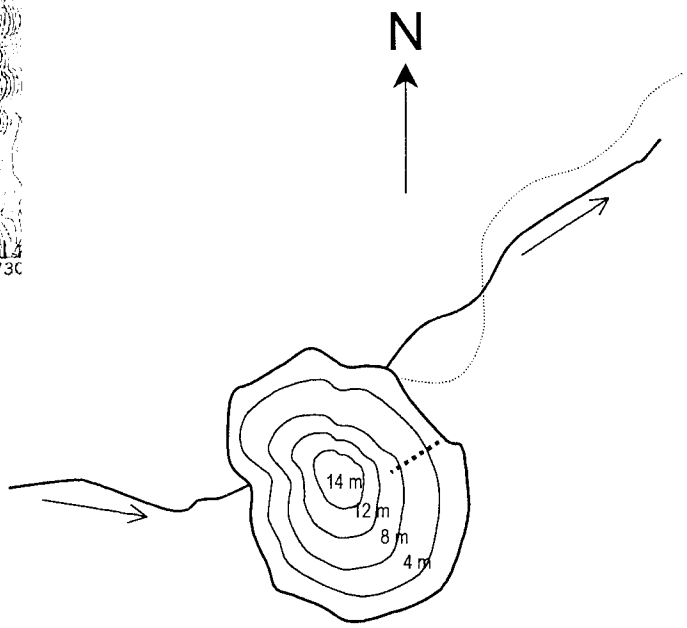


Figure 3. Map of Perkons Lake with Lake with bathymetric contours and location of gill net Set, October 1, 1998.

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We acknowledge biological aide Mike Hillesland for his assistance in surveying Goat and Perkons lakes and Senior Conservation Officer Bob Sellers for his reports on Green Creek Lake.

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Contract Period: July 1, 1998 to June 30, 1999

ABSTRACT

Midwater trawling for kokanee *Oncorhynchus nerka* at Anderson Ranch Reservoir and spawning kokanee trend counts on the South Fork Boise River indicate strong year classes of all ages of fish present in the reservoir. The trend count totaled more than 50,000 fish including those at the Pine trap, and there were 8,000 fish upstream of the trap. Both numbers are greater than any previous year's spawner count. A total of 71 bull trout *Salvelinus confluentus* were sampled and released, 28 of which were radio-tagged at Anderson Ranch Reservoir during spring sampling. Radio-tagged fish were tracked throughout the summer with several moving up the South Fork Boise River to spawning grounds. Downstream migrant trapping efforts during the fall at Pine sampled 293 migrating bull trout between October 9 and November 30, 1998.

Five rainbow trout *O. mykiss* were radio-tagged at the mouth of the Big Wood River in Magic Reservoir to monitor their spawning movements. The greatest distance traveled by one fish was in excess of 20 river km up the Big Wood River from where it was released at Sheep Bridge. The other four fish moved shorter distances upstream or stayed in the reservoir.

An intensive creel survey was completed on Mormon Reservoir, duplicating a 1987 survey. Results indicate approximately one-third of the 1987 angling effort was expended in 1998, possibly due to lower catch rates for yellow perch *Perca flavescens* and an encroachment of smartweed *Polygonum spp.* restricting bank fishing access. A 1996 survey had the same results as the 1998 survey, indicating that the switch to a two-trout limit in 1998 was not the reason for the decline in effort from 1987.

Forage fish trend surveys on Oakley and Salmon Falls Creek reservoirs indicate good levels of forage at Oakley Reservoir but poor levels of forage at Salmon Falls Creek Reservoir. A midwater trawl kokanee survey at Salmon Falls Creek Reservoir sampled only five fish, insufficient for a density or population estimate.

A standardized lowland lakes fishery sample was done on Sublett Reservoir. Over 95% of the fish biomass sampled was composed of brown trout *Salmo trutta*, cutthroat trout *O. clarki*, rainbow trout, and kokanee.

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OBJECTIVES

1. 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, and limnology.
2. To develop appropriate management recommendations.

METHODS

Kokanee *Oncorhynchus nerka* abundance and age structure were estimated in Anderson Ranch and Salmon Falls Creek reservoirs using a nighttime midwater trawl. Methods used for the trawling and data analysis followed those described by Rieman (1992).

General fishery data for lakes and reservoirs were collected and analyzed utilizing standardized fish sampling gear and methodologies. Sampling gear included a Smith-Root Model SR-18 electrofishing boat with a Model 5.0 pulsator, variable (19 to 64 mm) bar mesh 38 x 1.8 m gill nets and a 2 cm bar mesh size trap (frame) net with a 1.8 x 0.9 m box and five 76 cm diameter hoops. Other sampling gear included a 15.2 x 1.4 m with 6.2 mm bar mesh beach seine. Beach seine samples were taken by holding one end of the seine stationary at the shoreline while the other end was placed 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. Data analysis included total length frequencies, estimated length at annulus back calculated from scale measurements, and trend data used to compare with similarly acquired data from previous years. A single unit of standardized lowland lake sampling protocol included one sinking variable mesh gill net, one floating variable mesh gill net, and one trap net set overnight along with one hour of night time electrofishing. Data analysis included total length frequencies of all fish sampled and an estimate of total biomass of all fish sampled by species. Growth was estimated by back calculating total length at annuli on scales.

Limnological samples were taken by sampling surface waters for conductivity, pH, total hardness, and alkalinity. A Hach kit was used for the total hardness and alkalinity measurements, a Solu Bridge conductivity meter was used for measuring conductivity, and an Oakton PhTestr2 was used for measuring pH. Temperature and dissolved oxygen profiles were measured in-situ using a Y.S.I. model 57 temperature/dissolved oxygen meter from a boat. A Secchi disk was used from a boat.

Radio tags were surgically implanted into fish through a ventral incision of the body cavity proximally anterior to the pelvic girdle. The antennae was extruded through a small hole made with a hypodermic needle proximally posterior to the pelvic girdle then cut to a length equal to the caudal peduncle.

Intensive creel census and angler survey methodologies followed those given by McArthur (1993).

RESULTS AND DISCUSSION

Anderson Ranch Reservoir

Anderson Ranch Reservoir kokanee were sampled with a midwater trawl using methods described by Rieman (1992). The reservoir was partitioned into three strata and trawled on the nights of July 22 and 23, 1998. A total of 14 transects ranging in depth from 7 to 26 m were trawled in three or four steps in the three strata. All kokanee sampled were classified into three age class groups: up to 99 mm in total length were classified as age 0+; from 100 to 259 mm long were classified as age 1+; and at least 260 mm long were classified as age 2+. An estimated 160,000 kokanee with an average density of 146 fish/ha were found in 1998 (Table 1). Total length frequencies for each age class of fish sampled are given in Table 2.

Daytime temperature and dissolved oxygen profiles taken at three locations during the kokanee sampling indicated a strong temperature stratification with the thermocline beginning at about 5 m deep and the top of the hypolimnion at about 18 m deep (Figure 1). Additional temperature and dissolved oxygen profiles were sampled at three to four locations in the reservoir during March, May and October (Figures 2-4).

Kokanee spawning was monitored between August 14 and October 2, 1998 with counts of adult fish at 13 sites on the South Fork Boise River and Trinity Creek. These are the same sites at which counts have been made since 1989 for spawner trend information except for the trap site just downstream of the Pine Bridge, which was added to the survey in 1990 (Partridge and Corsi 1993). In 1998 the trap site was modified to accommodate a downstream migrant trap for a bull trout *Salvelinus confluentus* study that was in place during the kokanee spawning run. The modification entailed placing a temporary log and gravel cofferdam upstream of an undercut section of the concrete weir to prevent fish and most of the river current from flowing through the washout under the structure. This blocked upstream migrating fish from traveling through the washout. Kokanee were forced instead to jump over the concrete weir to gain access to upstream spawning areas. Due to erosion immediately downstream of the weir over the last several years the plunge pool has dropped in elevation, creating a barrier too high for some of the kokanee to cross. This meant that some of the fish were probably counted more than once at the trap site thus inflating the total annual count. Despite the presence of the barrier, 8,000 fish were counted at the 12 upstream trend monitoring sites (excluding the trap site), which exceeds any previous year's total kokanee counts (Table 3). The total count for all sites combined including the trap site was 50,065 fish (Figure 5).

Bull trout are known to be present in Anderson Ranch Reservoir during the winter. They move upstream into the South Fork Boise River drainage during the spring to spawn in late summer or early fall much like an adfluvial population would do in a large natural lake system. To learn more about the bull trout population in Anderson Ranch Reservoir and in the South Fork Boise River, the Bureau of Reclamation provided primary funding for temporary personnel to sample fish in the reservoir from March 9 through April 13, 1998 with gill and trap nets. Gill nets were set for 30 to 45 minute intervals during daylight hours to reduce bull trout mortality and trap nets were set overnight at various locations throughout the reservoir. Radios were surgically implanted in 28 bull trout weighing over 350 g to monitor movement patterns into headwater tributaries.

Table 1. Anderson Ranch Reservoir kokanee population and density estimates based on nighttime midwater trawling results in July 1998 and several previous years' total population estimates for comparison.

		Age 0+	Age 1+	Age 2+	Age 3+
Strata 1 (5 trawls)					
	Population estimate	45,394	9,432	3,548	0
	Density estimate (fish/ha)	93	19	7	0
	Variance of density estimate	1,401.8	115.0	23.7	-
Strata 2 (5 trawls)					
	Population estimate	37,138	17,003	5,216	0
	Density estimate (fish/ha)	84	39	12	0
	Variance of density estimate	1,543.2	367.6	28.4	-
Strata 3 (4 trawls)		35,087	6,380	1,276	0
	Population estimate	159	2	6	0
	Density estimate (fish/ha)	3,237.3	33.6	33.6	-
	Variance of density estimate				
Entire Reservoir					
	Population estimate	117,620	32,815	10,039	0
	Variance of population density estimate	5.0×10^8	8.0×10^8	8.9×10^6	-
	Average density estimate	109	29	8	0
Previous years' population and density estimates					
1997	Population estimate	853,932	34,582	5,831	0
	Variance of population estimate	7.0×10^8	5.0×10^7	2.1×10^6	-
	Density estimate (fish/ha)	497	23	4	0
1996	Population estimate	109,400[a]	7,733	3,551	0
	Variance of population estimate	2×10^8	4×10^7	7×10^6	0
	Density estimate (fish/ha)	64	6	2	0
1995	Population estimate	3,134[a]	15,995	38,364	0
	Variance of population estimate	3×10^6	3×10^7	5×10^7	-
	Density estimate (fish/ha)	2	11	25	0
1994	Population estimate	230,411[a]	444,791[b]	33,709[b]	0
	Variance of population estimate	2×10^{10}	1×10^{11}	5×10^8	-
	Density estimate (fish/ha)	191	368	28	0
	Population estimate	126,916c			
	Variance of population estimate	6×10^8			
	Density estimate (fish/ha)	106			
1993	Population estimate	212,788[a]	2,380	1,427	660
	Variance of population estimate	5×10^9	6×10^6	2×10^6	4×10^5
	Density estimate (fish/ha)	212	2	1	1
	Population estimate	33,564[c]			
	Variance of population estimate	4×10^8			
	Density estimate (fish/ha)	26			

[a] Wild
[b] Estimate of wild and hatchery fish combined for year
[c] Hatchery

Table 2. Total length frequencies of kokanee salmon sampled by midwater trawling at Anderson Ranch Reservoir, July 22-23, 1998.

	Number within age class		
Total length (mm)	Age 0+	Age 1+	Age 2+
0-9			
10-19			
20-29			
30-39			
40-49	14		
50-59	71		
60-69	44		
70-79	1		
80-89			
90-99			
100-109			
110-119			
120-129			
130-139			
140-149			
150-159		1	
160-169		1	
170-179			
180-189		2	
190-199		3	
200-209		3	
210-219		14	
220-229		7	
230-239		1	
240-249		1	
250-259		1	
260-269			
270-279			
280-289			
290-299			
300-309			3
310-319			5
320-329			1
330-339			
340-349			
350-359			
360-369			
370-379			
380-389			
390-399			1
Total sampled	130	34	10
Average length	57	212	321

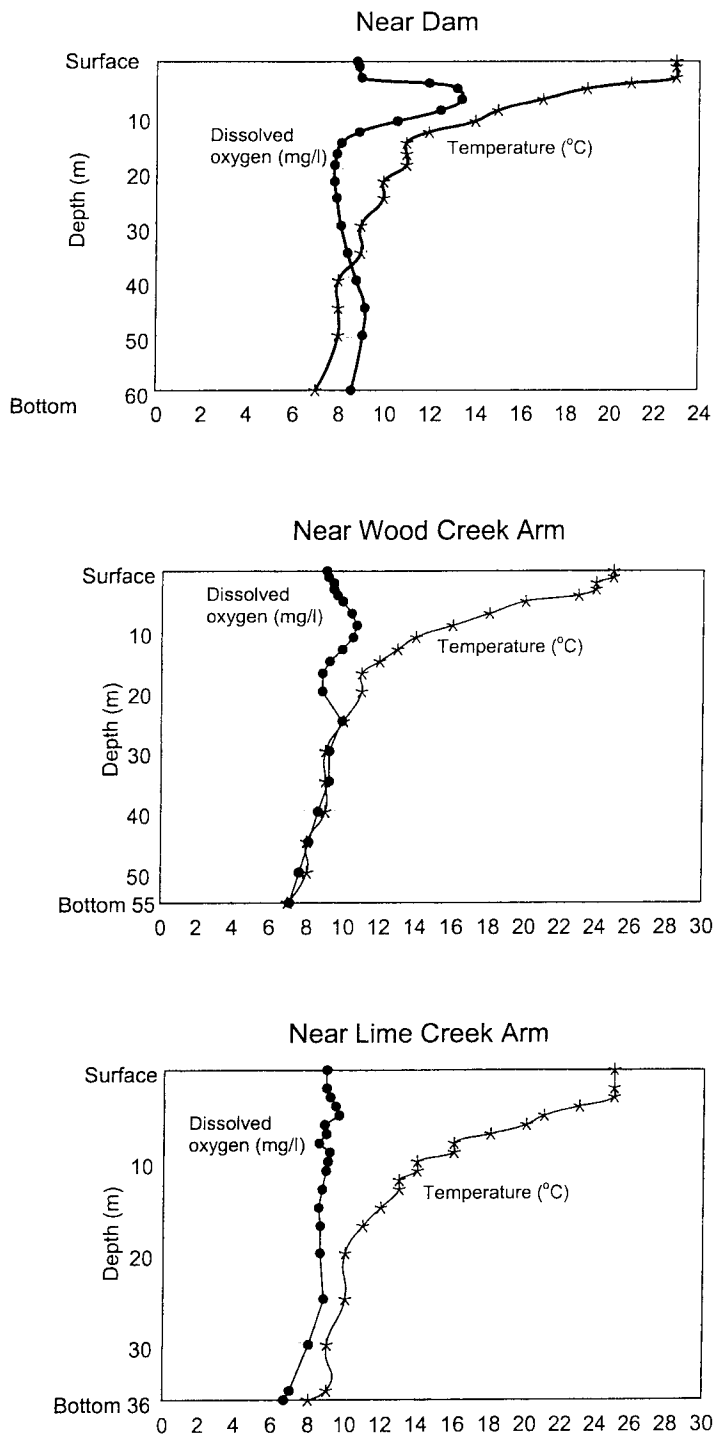


Figure 1. Daytime temperature and dissolved oxygen profiles at Anderson Ranch Reservoir at three locations, July 22, 1998.

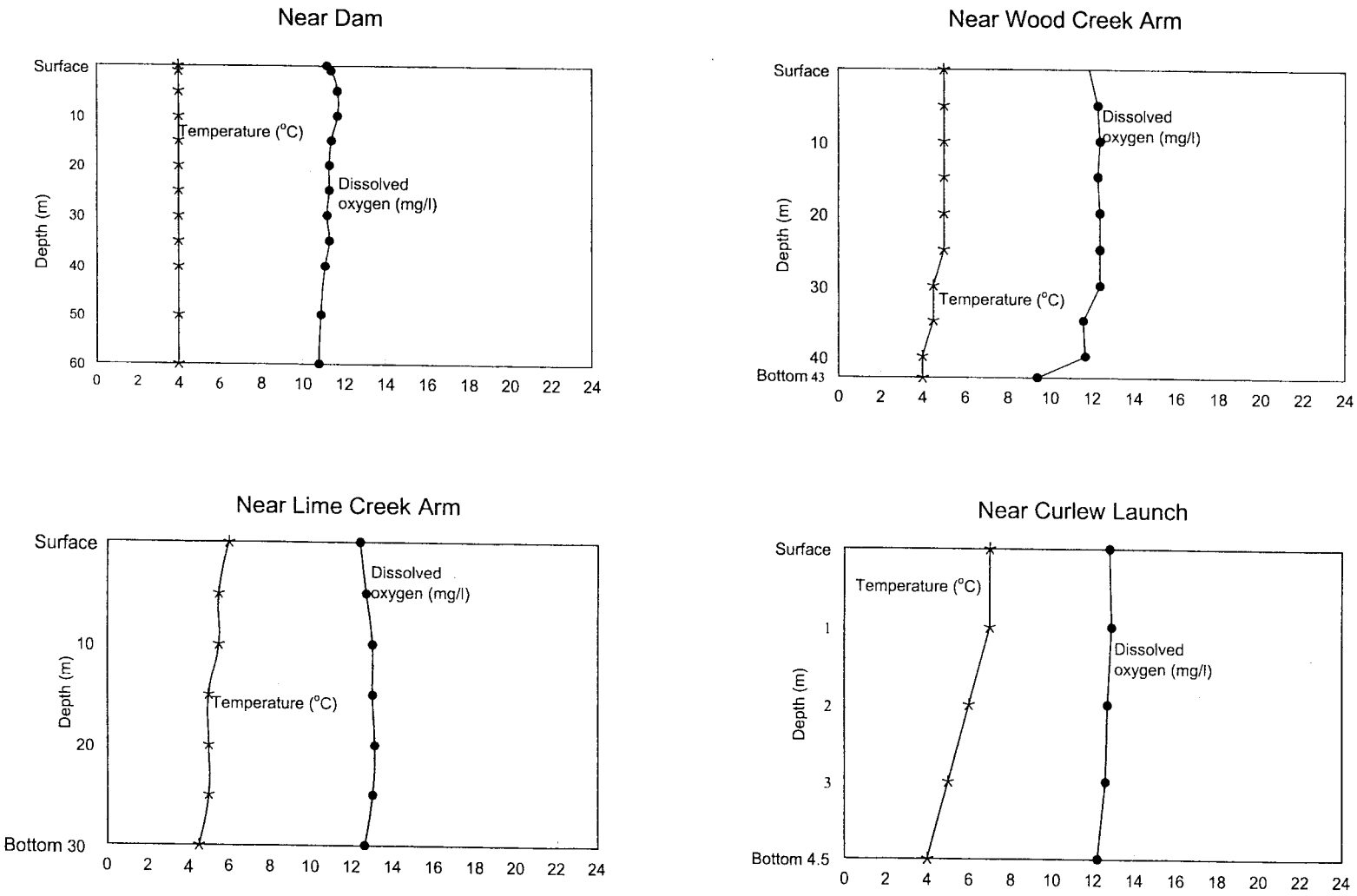


Figure 2. Daytime temperature and dissolved oxygen profiles for Anderson Ranch Reservoir at specified locations, March 31, 1998.

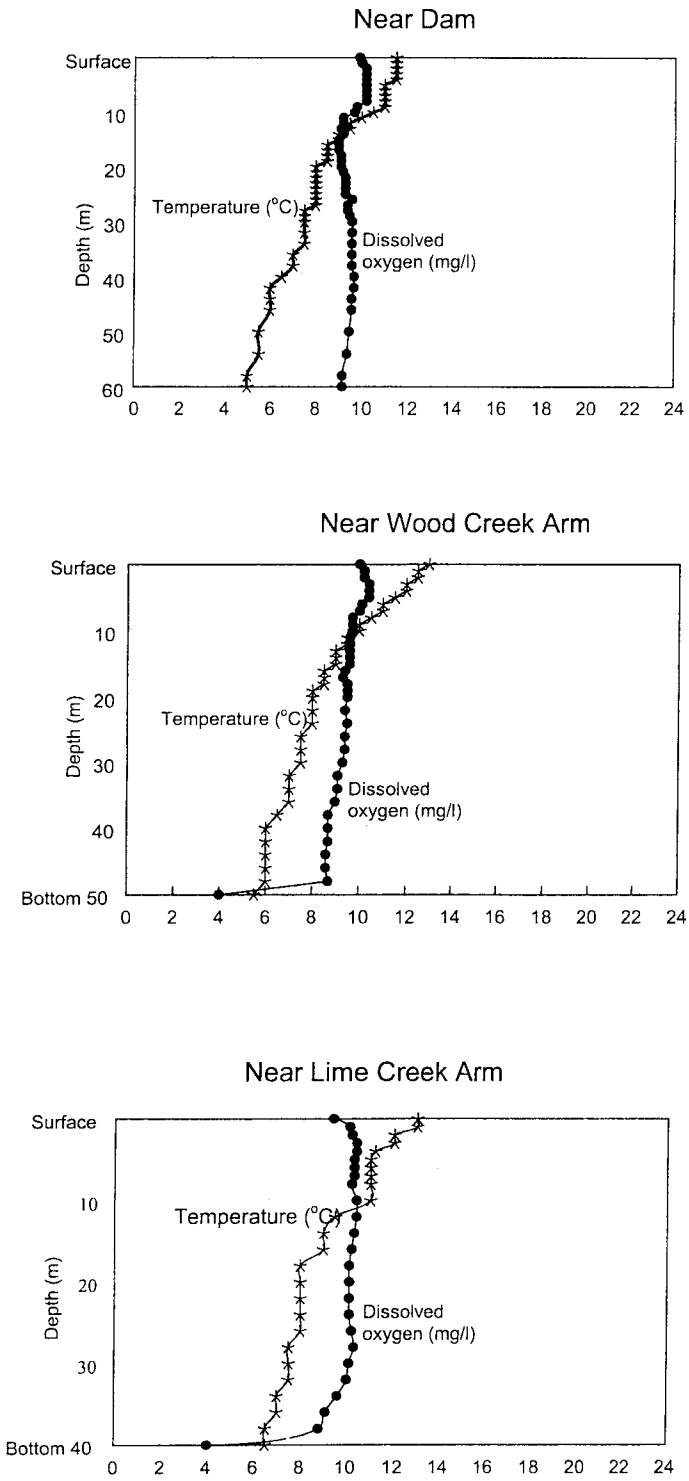


Figure 3. Daytime temperature and dissolved oxygen profiles for Anderson Ranch Reservoir at specified locations, May 28, 1998.

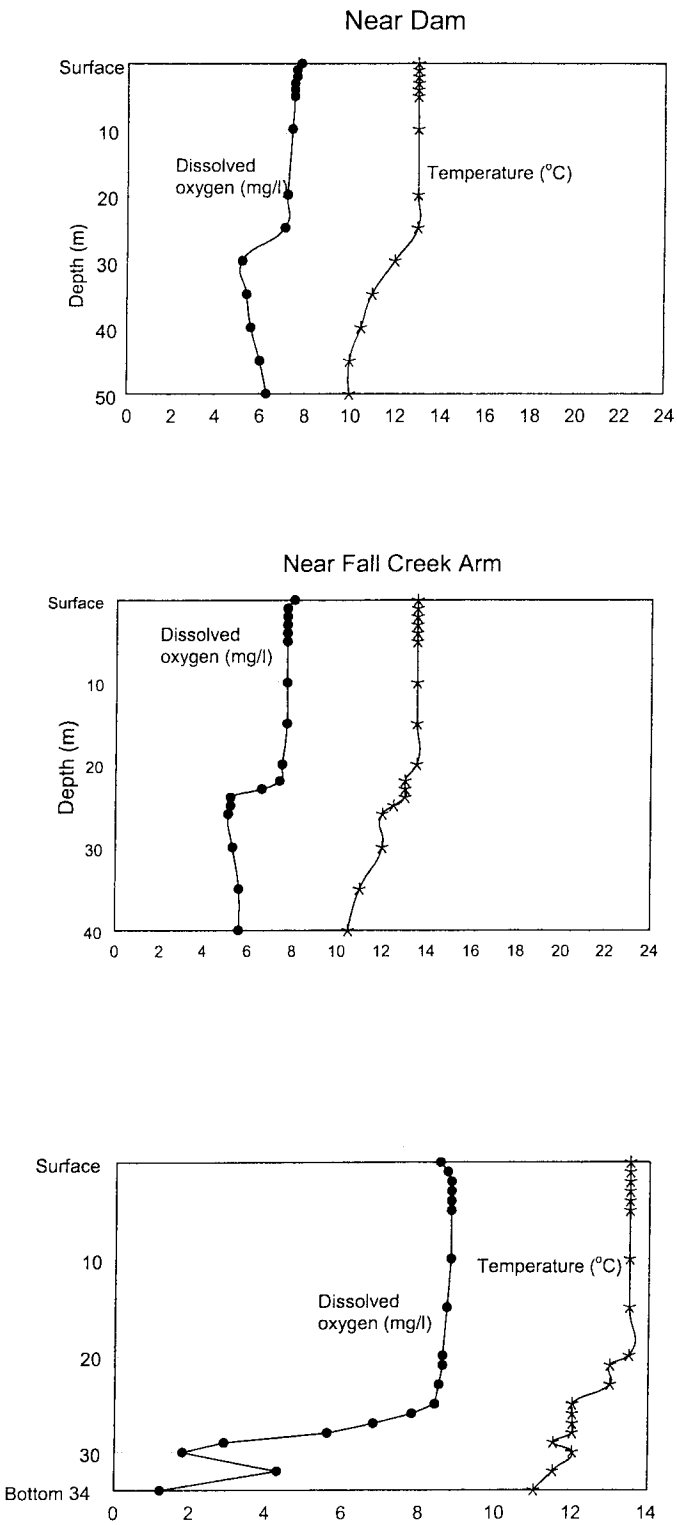


Figure 4. Daytime temperature and dissolved oxygen profiles for Anderson Ranch Reservoir at specified locations, October 22, 1998.

Table 3. Number of kokanee observed at selected sites on the South Fork Boise River during spawning ground surveys, 1998.

Location[a]	8/14	8/21	8/28	9/5	9/12	9/17	9/25	10/2
1	30	35	4,000	10,000	10,000	10,000	5,000	3,000
2	25	35	4	45	2	0	2	0
3	0	35	6	6	40	30	20	4
4	10	40	12	130	-	200	110	50
5	0	0	1	13	13	6	0	0
6	0	35	60	90	550	350	300	45
7	0	25	6	50	45	80	5	12
8	0	25	14	100	100	65	75	10
9	4	85	250	250	300	100	35	6
10	2	120	350	600	500	300	50	5
11	0	15	14	100	500	400	350	100
12	0	22	25	300	5	4	6	0
13	0	11	45	100	75	40	15	35
Total:	71	483	4,787	11,784	12,130	11,575	5,968	3,267

[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 - Smokey Creek confluence: SE1/4, SW1/4, Sec 9, T3N, R13E

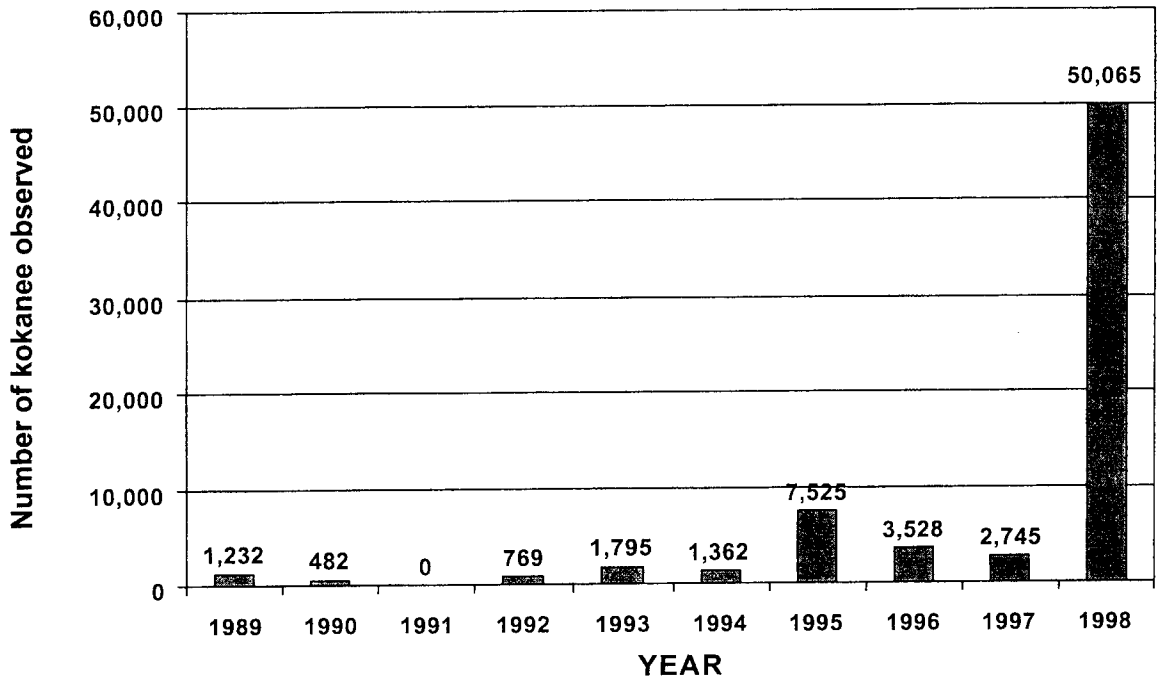


Figure 5. Total numbers of spawning kokanee observed at 13 trend monitoring sites on the South Fork Boise River on a weekly basis during the spawning season, 1989 through 1998.

A total of 488 gill net and 687 trap net hours captured 70 individual bull trout plus 2 recaptures (Table 4). Additional species sampled included rainbow trout *Oncorhynchus mykiss*, rainbow x cutthroat trout *O. clarki* hybrids, kokanee, mountain whitefish *Prosopium williamsoni*, smallmouth bass *Micropterus dolomieu*, yellow perch *Perca flavescens*, largescale sucker *Catostomus macrocheilus*, bridgelip sucker *C. columbianus*, northern pikeminnow *Ptychocheilus oregonensis*, and chiselmouth *Acrocheilus alutaceus*.

In addition to the spring sampling, bull trout migrating downstream into the reservoir in the fall were trapped with a picket weir and box trap in the river immediately above the reservoir. The trap was set at the Pine kokanee weir between October 9 and November 30, 1998. A total of 293 bull trout were sampled at the weir ranging in length from 225 to 740 mm (Figure 6). Additional details on the sampling in the reservoir and river are available in the final report being prepared for the Bureau of Reclamation.

Little Camas Reservoir

Daytime temperature and dissolved oxygen profiles were measured at Little Camas Reservoir on July 24, 1998. Dissolved oxygen was found to be less than 5 mg/l below 4 m and temperatures in excess of 20°C above 4 m depth (Figure 7).

Magic Reservoir

The rainbow trout fishery in Magic Reservoir is composed of both hatchery and wild origin fish with most of the wild fish probably recruited from the Big Wood River. It is suspected that the wild component is the progeny of fish that move upstream into the Big Wood River from the reservoir during the spring to spawn. In an attempt to determine when and where these fish spawn, five rainbow trout which appeared to be of wild origin and in prespawning condition were implanted with radio tags at the mouth of the Big Wood River on April 28, 1998. The fish were first sampled with approximately 600 seconds of electrofishing effort using the Smith-Root electrofishing boat at night. They were then sorted to determine which appeared to be of wild origin (straight fin rays and all fins intact) and large enough to accommodate a radio tag. Radio-tagged fish were subsequently released at Sheep Bridge where the Big Wood River enters Magic Reservoir. Total length frequencies of all fish sampled including brown trout *Salmo trutta*, redside shiner *Richardsonius balteatus* and bridgelip sucker are given in Table 5.

Radio-tagged fish were monitored with a receiver mounted on a fixed-wing aircraft on May 8, May 28 and July 22, 1998. Movements of these fish are illustrated in Figure 8. It appeared the 400 mm female might have died soon after the tag was implanted since her signal never left the Sheep Bridge area and the tag was found near the water's edge at the bridge on August 28, 1998. A 435 mm female appeared never to have moved upstream to spawn as her radio signal was always found in the south end of Magic Reservoir until her tag was found on the shoreline below the high water line near Myrtle Point. The other three tagged fish appeared to have moved upstream anywhere from 4 km to at least 20 km from where they were released at Sheep Bridge by May 28, 1998. The only radio-tagged male was detected at least 20 km upstream on May 28, 1998.

Table 4. Gill and trap net sampling efforts for bull trout at Anderson Ranch Reservoir, 1998.

		March		April		May		Total	
		Trap net	Gill net	Trap net	Gill net	Trap net	Gill net	Trap net	Gill net
Gear type hours		0	89	687	241	0	158	687	488
Bull trout	Captured then released	-	3	1	44	-	15	1	62
	Captured but escaped	-	0	0	1	-	2	0	3
	Captured then died	-	0	0	3	-	2	0	5
	Recaptured then released	-	0	0	0	-	1	0	1
	Recaptured then died	-	0	0	1	-	0	0	1
Rainbow trout (probably of wild origin)		-	17	3	23	-	17	3	57
Rainbow trout (hatchery origin)		-	3	0	26	-	20	0	49
Rainbow trout x cutthroat trout hybrids		-	0	0	1	-	0	0	1
Kokanee		-	1	0	5	-	48	0	54
Mountain whitefish		-	41	0	307	-	29	0	377
Smallmouth bass		-	11	0	74	-	36	0	121
Yellow perch		-	1	124	20	-	66	124	87
Largescale sucker		-	46	0	687	-	529	0	1,262
Bridgelip sucker		-	19	4	101	-	98	4	218
Northern pikeminnow		-	3	6	56	-	201	6	260
Chiselmouth		-	0	3	3	-	15	3	18

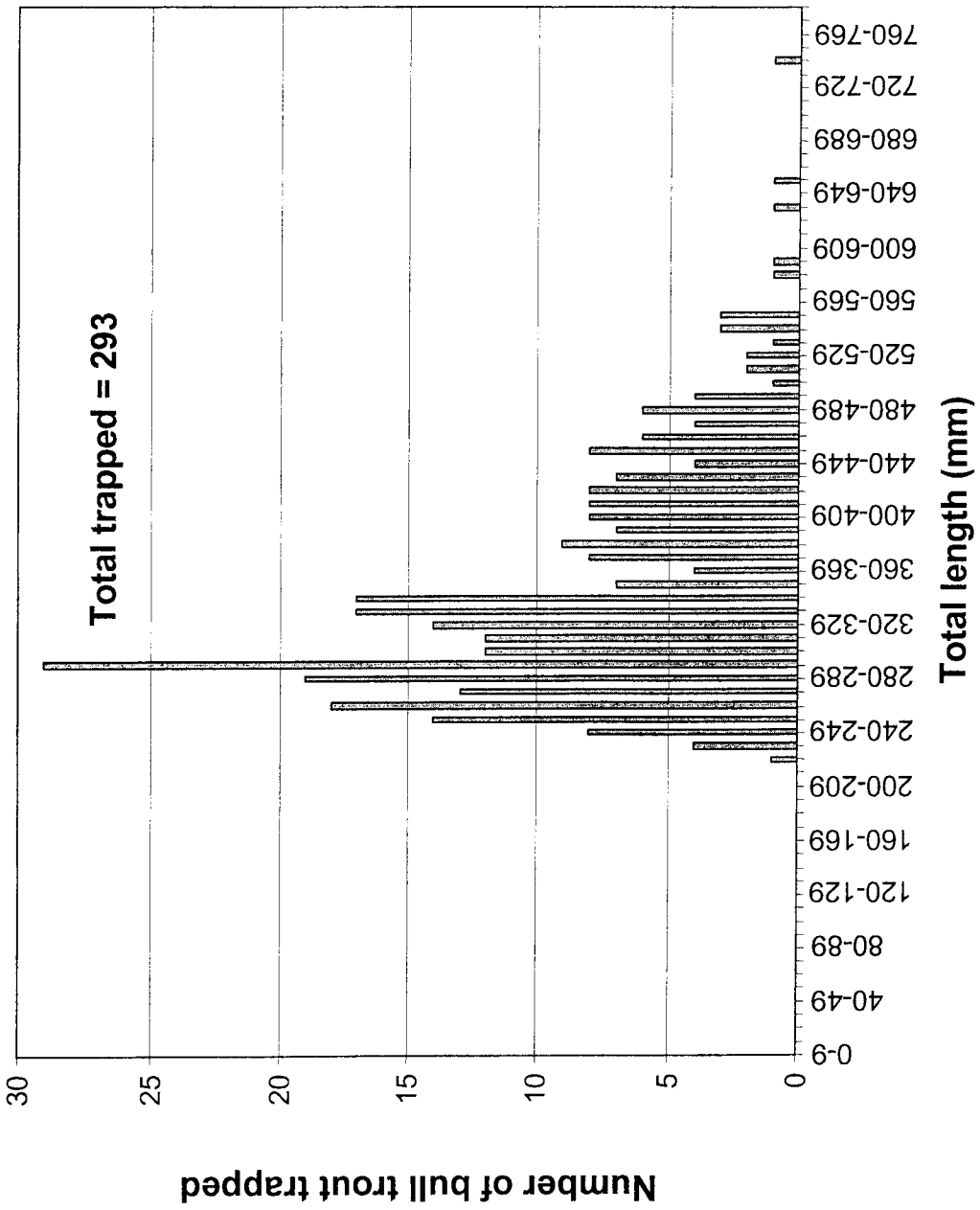


Figure 6. Length frequency of bull trout trapped in the South Fork Boise River above Anderson Ranch Reservoir, fall 1998.

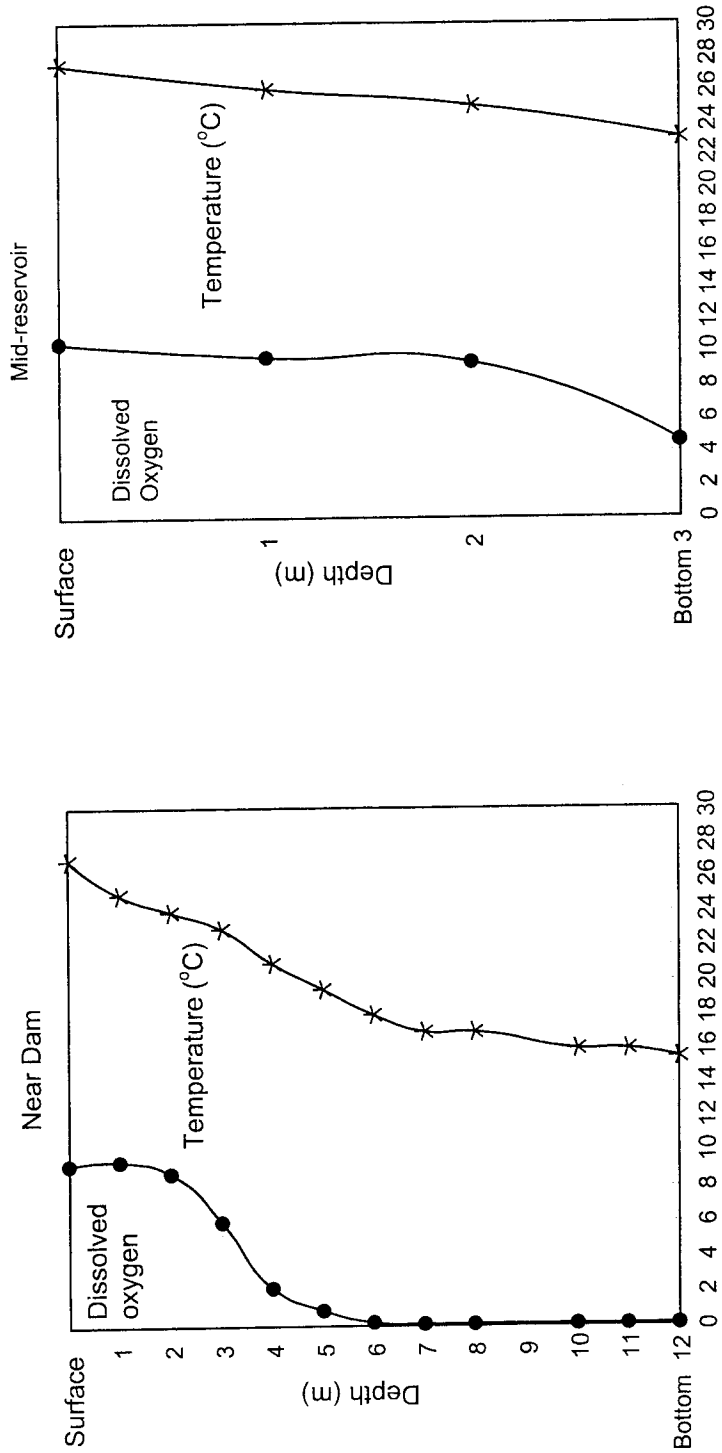


Figure 7. Daytime temperature and dissolved oxygen profiles on Little Camas Reservoir, July 24, 1998.

Table 5. Fish sampled by nighttime electrofishing Magic Reservoir at the mouth of the Big Wood River, April 28, 1998.

Total length (mm)		Bridgelip sucker	Brown trout	Rainbow trout	Redside shiner
80	Number			1	
	Avg wt (g)				
100	Number			1	2
	Avg wt (g)				
110	Number				1
	Avg wt (g)				
120	Number			1	
	Avg wt (g)				
140	Number		1		
	Avg wt (g)				
160	Number			1	
	Avg wt (g)				
170	Number			1	
	Avg wt (g)			40	
200	Number			1	
	Avg wt (g)				
210	Number			2	
	Avg wt (g)				
220	Number			3	
	Avg wt (g)			110	
230	Number			3	
	Avg wt (g)				
240	Number			4	
	Avg wt (g)			140	
250	Number			3	
	Avg wt (g)				
260	Number			2	
	Avg wt (g)				
270	Number			2	
	Avg wt (g)				
280	Number	1		1	
	Avg wt (g)			220	
290	Number			1	
	Avg wt (g)			320	
300	Number			1	
	Avg wt (g)				
320	Number		2	1	
	Avg wt (g)				
330	Number		1	2	
	Avg wt (g)		350	430	
340	Number		1	1	
	Avg wt (g)		360		
360	Number		1	2	
	Avg wt (g)			500	

Table 5. Continued.

Total length (mm)		Bridgelip sucker	Brown trout	Rainbow trout	Redside shiner
370	Number		1		
	Avg wt (g)				
380	Number		1		
	Avg wt (g)				
390	Number			1	
	Avg wt (g)				
400	Number			3	
	Avg wt (g)			670	
410	Number		3	1	
	Avg wt (g)			730	
420	Number		1	2	
	Avg wt (g)		650	680	
430	Number			3	
	Avg wt (g)			830	
470	Number		1	1	
	Avg wt (g)			1,050	
Total number measured:		1	13	45	3
Total number not measured:		0	0	0	0
Total number sampled:		1	13	45	3
Average length:		280	362	288	105

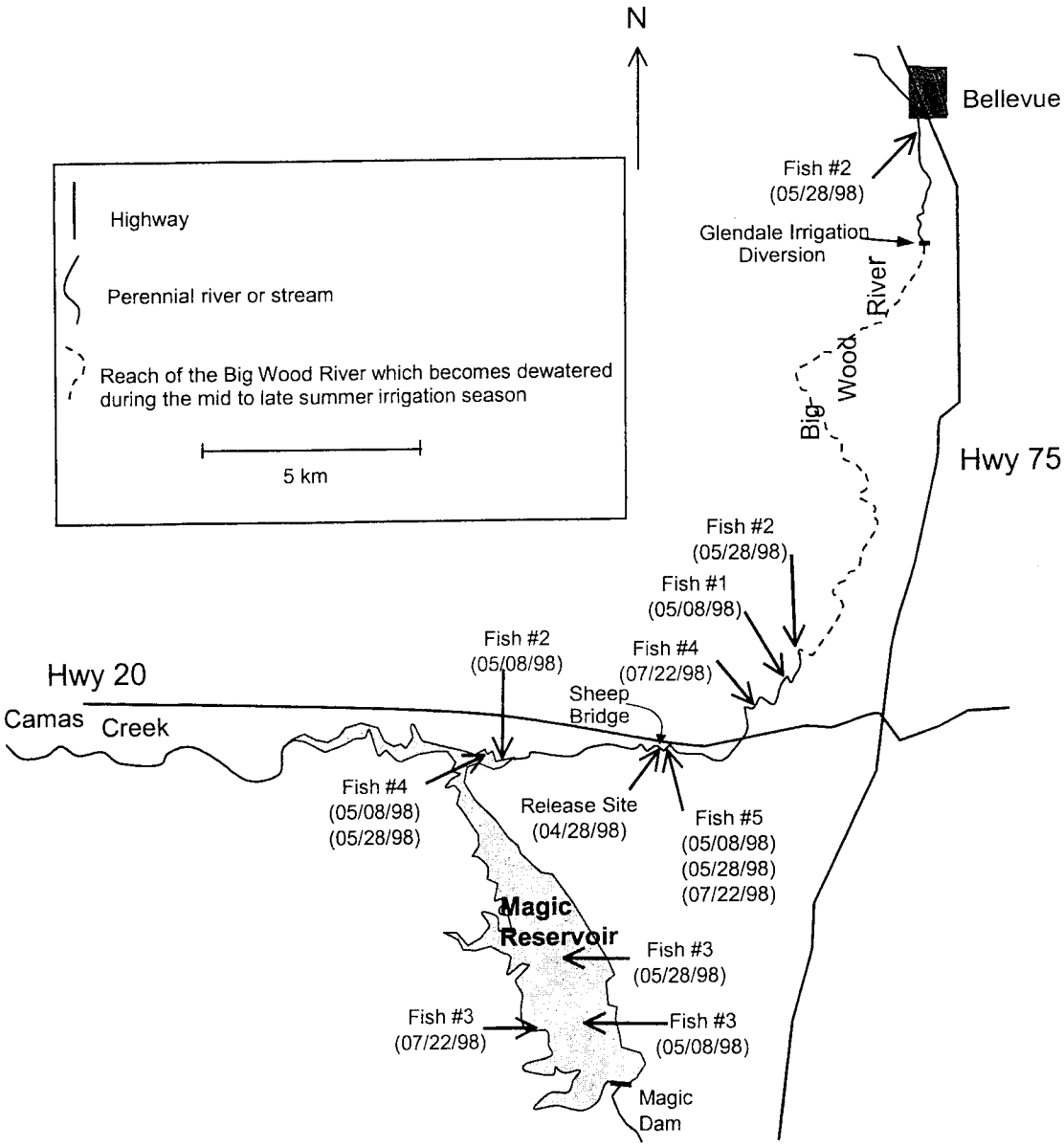


Figure 8. Locations of radio tagged wild rainbow trout after their release at the Sheep Bridge, April 28, 1998.

A spawning ground survey was performed on the Big Wood River upstream of Magic Reservoir to monitor spawning activities of brown trout that had moved upstream from the reservoir to spawn. The survey was done on November 23, 1998 by walking upstream looking for redds from Sheep Bridge 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. A total of 255 redds were counted (Table 6), which is more than double the 1997 count (120 redds), and is the highest number ever recorded since counts began 1986.

Mormon Reservoir

Mormon Reservoir is a 1,095 ha impoundment located in Camas County 7 km south of Fairfield, Idaho. Until 1998 the fishery has been managed as a put-grow-and-take rainbow trout fishery with a year-round six trout daily bag limit and general rules for methods of take. With no suitable trout spawning habitat available within the reservoir or any of its tributaries, essentially all trout are of hatchery origin. The yellow perch fishery has provided anglers with fish over 250 mm long in intermittent years. The reservoir is very productive with growth rates averaging 228 mm per year for trout stocked as catchables or as fingerlings. It is not unusual for anglers to catch 380 mm trout that were stocked as 250 mm fish early the previous year.

In 1998, the daily possession limit at Mormon Reservoir was reduced from six to two trout with no other exceptions made to the general rules. This was done to reduce the harvest rate of fish to allow a larger number of trout to carry over into larger size classes. A creel survey was conducted from April through October of 1998 to estimate fishing pressure and to compare with estimates made with studies done in 1987 by Partridge (1988) and in 1996 and 1997 by Alexander (unpublished Department data). The 1998 creel survey closely simulates the survey performed at Mormon Reservoir in 1987, which estimated angler use and fish harvested during five two-week periods out of every six-week interval between April and November. Estimates for the 1996, 1997 and 1998 surveys were based on methods described by McArthur (1993).

Between April 18 and November 11, 1998, angler effort was estimated to be nearly 22,000 hours on Mormon Reservoir (Table 7). Effort was similar to that of 1996 but considerably less than in 1987 and 1997. The decline of total angler effort since 1987 is possibly a result of the decline in catch rates for yellow perch estimated to be 0.45 fish kept per hour in 1987 and 0.14 fish kept per hour in 1998 (Table 8). There were also low water conditions in the reservoir from the late 1980s until 1995 when the reservoir nearly dried up and the entire trout population was lost several times. Without an established population of larger trout carried over from previous years many anglers chose to fish elsewhere. Water levels have remained high enough to carry over fish since 1995 which has resulted in good fishing since 1996 for rainbow trout measuring 400 mm or longer. Over 75% of rainbow trout kept by anglers in 1998 were over 450 mm (Figure 9).

Table 6. Brown trout redd counts monitored since 1986 on the Big Wood River and Rock Creek upstream of Magic Reservoir.

Date	Big Wood River[a]					Rock Creek
	Reach 1	Reach 2	Reach 3	Reach 4	Total	
Nov. 19, 1986	--[d]	26	--[b]	96	122	--[d]
Nov. 19, 1987	104	62[c]	--[b]	30	196	--[d]
Nov. 15, 1988	13	75	31	39	158	--[d]
Nov. 18, 1989	6	20	33	8	67	1
Nov. 20, 1990	1	25	30	14	70	0
Nov. 15, 1991	3	30	38	15	86	0
Nov. 19, 1992	5	14	9	15	43	0
Nov. 24, 1993	1	28	--[b]	15	43	0
Nov. 16, 1994	9	27	56	5	97	0
Nov. 16, 1995	2	29	54	32	117	0
Nov. 11, 1996	--[d]	8	37	51	96	--[d]
Nov. 25, 1997	--[d]	44	53	23	120	--[d]
Nov. 23, 1998	--[d]	45	139	71	255	--[d]

[a] Reach 1 - Rock Creek to Sheep Bridge.
Reach 2 - Sheep Bridge to fence at U.S.G.S. station.
Reach 3 - Fence to Stanton Crossing.
Reach 4 - Stanton Crossing to Davis Pond.
Rock Creek - Highway 20 to mouth.

[b] Combined with previous reach.

[c] A total of 42 female brown trout were trapped and spawned from this reach by Hayspur Hatchery in 1987.

[d] Not surveyed.

Table 7. Estimated angler effort with 95% confidence intervals during selected time intervals in 1998 compared with estimates from previous studies at Mormon Reservoir.

	Angler hours			
Census interval	Boat	Bank	Float tube	Total
April 18 – May 1, 1998	529 ± 251	158 ± 87	69 ± 138	757 ± 299
May 30 – June 12, 1998	2,423 ± 1,066	521 ± 236	181 ± 304	3,126 ± 1,133
July 11 – July 24, 1998	938 ± 454	60 ± 120	855 ± 289	1,853 ± 552
Aug 22 – Sept 4, 1998	1,036 ± 674	140 ± 198	266 ± 267	1,442 ± 752
Oct 3 – Oct 16, 1998	236 ± 295	46 ± 53	0 ± 0	282 ± 300
April 18 – Nov 11, 1998 (expanded)	15,094 ± 4,021	2,746 ± 997	3,986 ± 1,483	21,824 ± 4,400
Previous years' estimates				
April – Oct, 1987	32,133	36,428	--[a]	68,561
May – Nov, 1996	10,123 ± 2,171	5,722 ± 1,335	6,114 ± 1,134	21,959 ± 2,790
May – Nov, 1997	22,622 ± 3,030	9,798 ± 1,870	7,245 ± 1,786	39,663 ± 3,983

[a] Included with boat anglers.

Table 8. Estimated catch rates (fish per hour) and total numbers of fish harvested with 95% confidence intervals during selected time intervals at Mormon Reservoir in 1998 and season estimates from previous surveys.

	Rainbow trout			Yellow perch		
	Catch rates			Catch rates		
Census interval	Kept	Released	Total harvested	Kept	Released	Total harvested
April 18–May 1, 1998	0.00	0.10	0 ± 0	0.00	0.00	0 ± 0
May 30–June 12, 1998	0.20	0.01	593 ± 344	0.00	0.00	0 ± 0
July 11–July 24, 1998	0.19	0.67	347 ± 344	0.00	0.00	0 ± 0
Aug 22–Sept 4, 1998	0.08	0.07	109 ± 104	0.52	0.20	947 ± 1,112
Oct 3–Oct 16, 1998	0.00	0.00	0 ± 0	0.18	0.00	85 ± 88
April 18–Nov 11, 1998 (expanded)	0.09	0.17	3,090 ± 1,479	0.14	0.04	2,813 ± 3,018
Previous years' estimates						
April – Oct, 1987	0.15	- [a]	13,083	0.45	- [a]	30,954
May – Nov, 1996	0.29	0.31	8,947 ± 2,386	- [b]	- [b]	- [b]
May – Nov, 1997	0.21	0.07	10,860 ± 2,492	- [b]	- [b]	- [b]

[a] No estimates of numbers of fish released were made in the 1987 survey.
[b] Very limited number of yellow perch caught in 1996 and 1997.

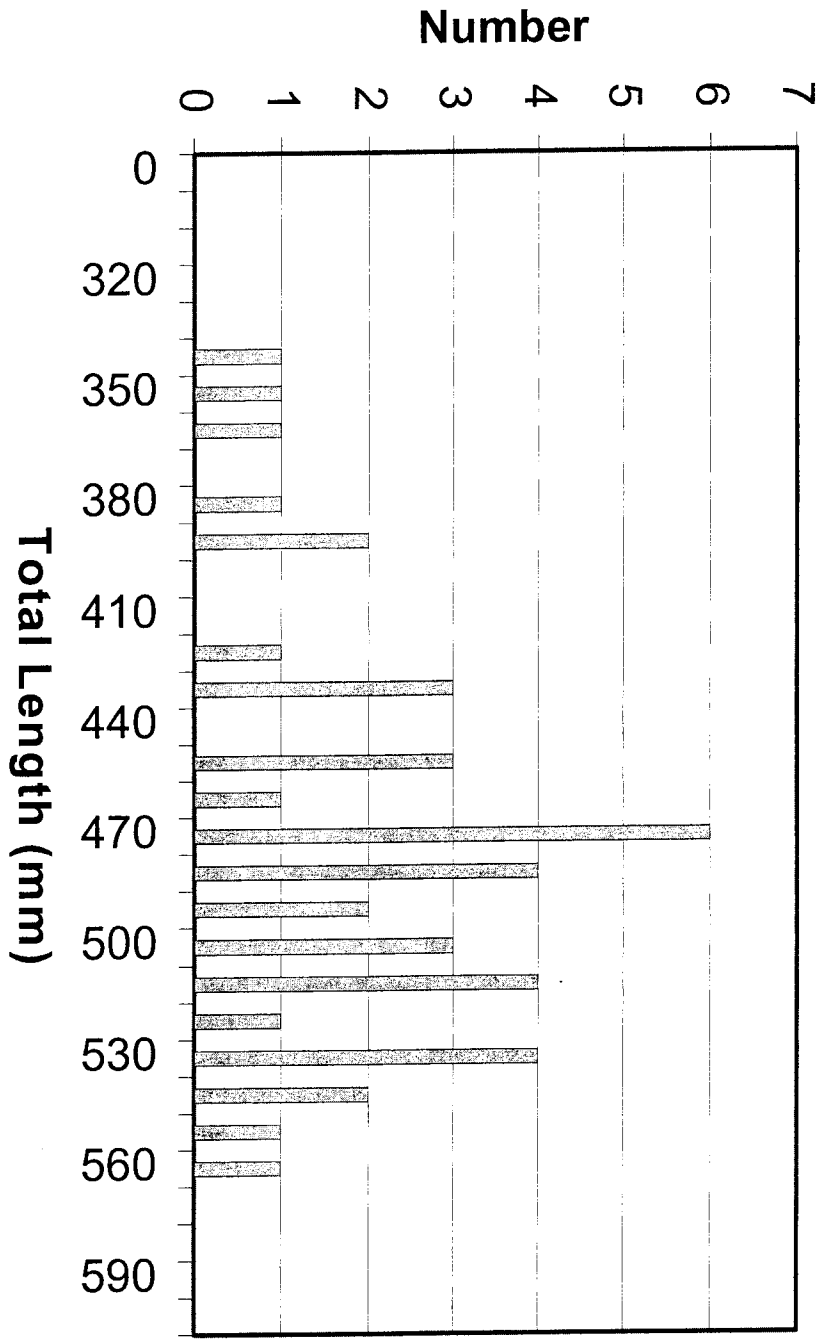


Figure 9. Total length frequency of 42 rainbow trout measured during the angler survey at Mormon Reservoir, 1998.

Since the return of good water years and subsequent annual reservoir filling there has been a serious encroachment of smartweed *Polygonum* sp. which has spread to virtually every part of the reservoir except for the south arm. The smartweed completely eliminates bank fishing from several access areas by early summer. There is also some concern that there may be an annual depletion of oxygen under the ice because of high biological oxygen demand from decaying smartweed and other aquatic vegetation. This smartweed infestation may be another reason for the decline in angler effort since 1987.

Temperature and dissolved oxygen profiles were taken on July 14 and December 12, 1998 (Figures 10 and 11). The December sample was taken through open water just prior to the reservoir freezing one day after a reported fish kill. The fish kill appeared to be minor with only young-of-the-year (YOY) yellow perch being affected. The cause of the fish kill was not determined.

Oakley Reservoir

Annual trend sampling for forage fish was conducted by beach seining five sites at Oakley Reservoir on September 2, 1998. Surface water temperature at time of sampling was 20°C. Sites sampled include two near the Goose Creek inlet, one in the Trapper Creek arm, one near the boat ramp, and one near the dam. Numbers of each species sampled include 62 YOY yellow perch, 261 spottail shiner *Notropis hudsonius*, and 1 longnose dace *Rhinichthys cataractae*. Results indicate good numbers of forage fish are present in Oakley Reservoir for walleye *Stizostedion vitreum.*

Salmon Falls Creek Reservoir

Annual trend sampling for forage fish was conducted by beach seining five sites at Salmon Falls Creek Reservoir on August 17, 1998. Surface water temperature at time of sampling was 23°C. Sites sampled include Grey's Landing, Norton Bay, a bay south of Goose Island on the east side of the reservoir, Walt's Bay and the Gravel Pit area. Numbers of each species sampled include 1 walleye measuring 200 mm long (near Goose Island), 33 smallmouth bass (most YOY), 20 crappie *Pomoxis sp.* (YOY), 1 yellow perch and 4 spottail shiner. Results indicate the reservoir is possibly becoming forage limited for larger piscivorous species such as walleye and smallmouth bass, although crayfish *Pacifastacus sp.* are abundant in the reservoir and may provide forage for smallmouth bass.

A midwater trawl sample for kokanee abundance and densities was taken on the evening of July 9, 1998. Four trawls were made at depths ranging from 11 m to 22 m throughout the reservoir north of Grey's Landing. Only five kokanee were sampled, which is insufficient for a density or population estimate. Although yellow perch were not targeted for sampling with the midwater trawl, there were 186 YOY yellow perch incidentally sampled. In 1997 there were approximately 7,600 YOY yellow perch sampled.

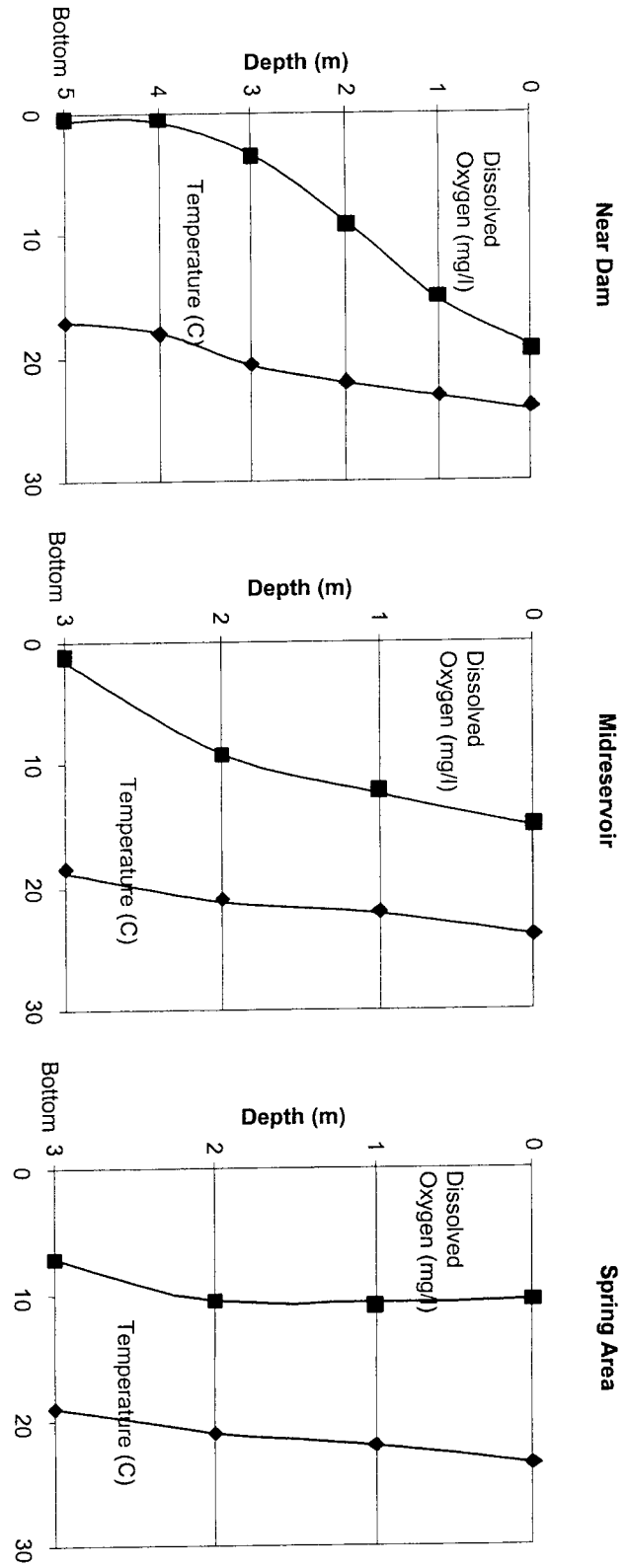


Figure 10. Daytime temperature and dissolved oxygen profiles at three sites on Mormon Reservoir, July 14, 1998.

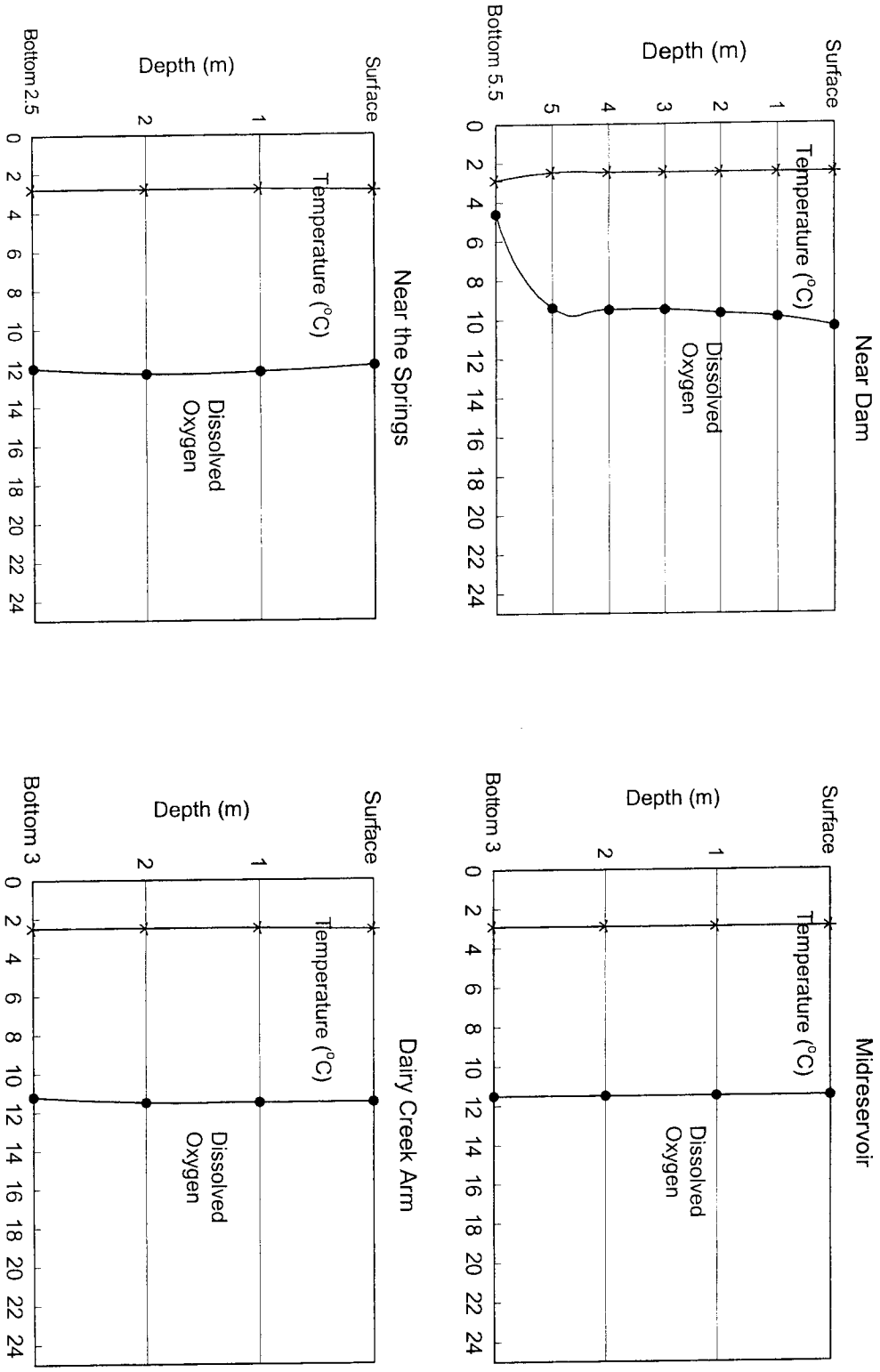


Figure 11. Daytime temperature and dissolved oxygen profiles at four sites measured on Mormon Reservoir, December 2, 1998.

A daytime temperature and dissolved oxygen profile taken near Whiskey Slough on July 21, 1998 showed good conditions for salmonids between 5 m and 20 m depth (Figure 12).

Sublett Reservoir

Sublett Reservoir is a 46 ha irrigation impoundment on a tributary to Raft River in the Sublett Mountains. Total area for the reservoir drainage basin is approximately 117 km^2. The Sublett Reservoir fishery is managed under general fishing rules except that the season is open from Saturday of Memorial Day weekend through November 30 rather than year-round. Fish stocked into the reservoir throughout the 1990's included unspecified strains of cutthroat trout, Henrys Lake cutthroat trout, Kamloops strain of rainbow trout, Hayspur rainbow trout, early spawning kokanee, October spawning kokanee and brown trout. Coho salmon *Oncorhynchus kisutch* were stocked intermittently until 1988.

Standardized lowland lakes fish sampling protocols were followed in sampling Sublett Reservoir on June 23 and 24, 1998. Total sampling effort included overnight sets of two sinking gill nets, two floating gill nets, two trap nets and 70 minutes of nighttime electrofishing. Species sampled include cutthroat trout, rainbow trout of hatchery and of unknown origin, brown trout, kokanee, speckled dace *Rhinichthys osculus*, and mottled sculpin *Cottus bairdi*. Length frequencies and weights of fish sampled are given in Appendix A. Rainbow trout made up nearly 80% of the total fish biomass and nearly 70% of total numbers of fish handled by sampling effort (Table 9). Since Kamloops strain rainbow trout have been stocked as fingerlings in recent years, it could not be determined if fish with good fin formation were of hatchery or wild origin from Sublett or Lake Fork creeks, both perennial tributaries to the reservoir (see Rivers and Streams Investigations, this report).

Scale samples were taken and analyzed for length-at-age estimates for rainbow trout with good fin formation and for brown trout. Results are given in Tables 10 and 11.

A daytime temperature and dissolved oxygen profile was taken near the dam on June 24, 1998 (Figure 13). Secchi disk visibility was 6.9 m deep. Other water quality measurements from a surface sample near the dam are as follows:

Conductivity:	425 μSiemens/cm
Total alkalinity:	205 mg/l as $CaCO_3$
Total hardness:	205 mg/l
pH:	8.4

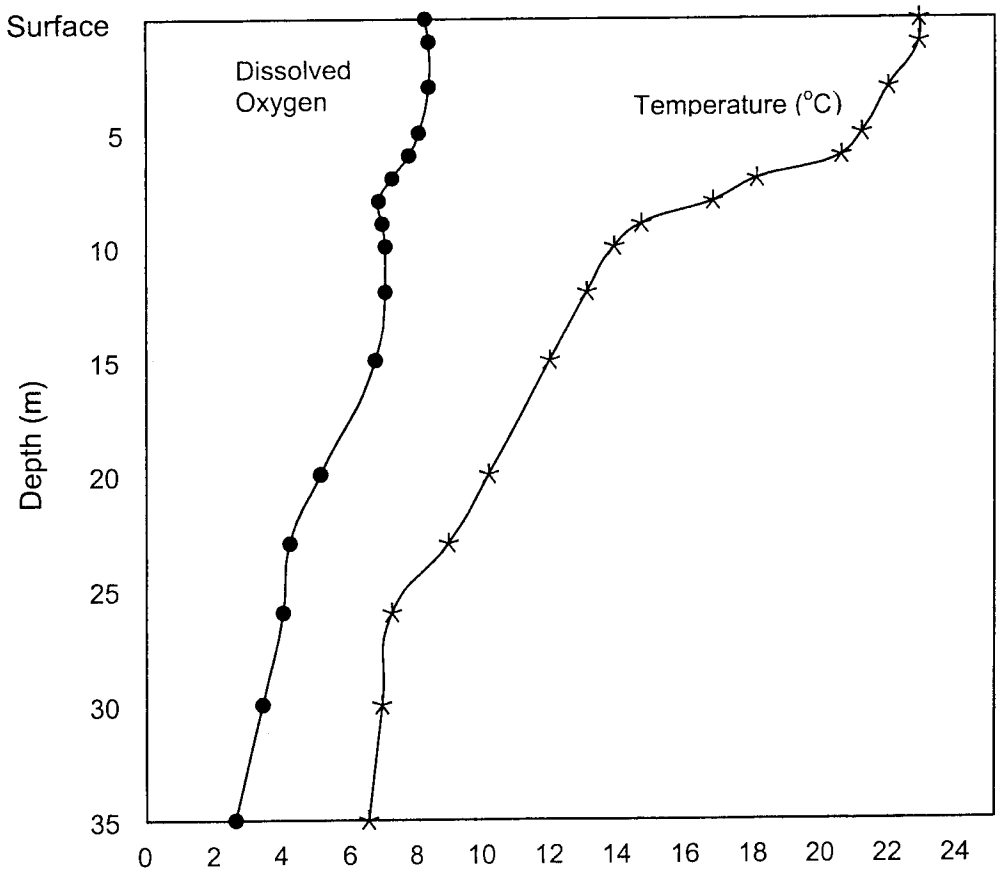


Figure 12. Daytime temperature and dissolved oxygen profiles in the main channel of Salmon Falls Creek Reservoir near Whiskey Slough, July 21, 1998.

Table 9. Standardized lowland lake sampling results for Sublett Reservoir, June 1998.

Species	Catch per unit of standardized lowland lakes sampling effort[a]				
	Total length range	Number per unit of effort	Percent by number	Weight (kg) per unit of effort	Percent by weight
Brown trout	195-600	11	1.4	13.95	13.8
Cutthroat trout	110-380	11	1.5	3.58	3.6
Rainbow trout[b]	80-430	358	48.5	4.99	49.5
Hatchery rainbow trout	100-380	134	18.1	29.38	29.1
Kokanee	245-450	4	0.5	2.24	2.2
Speckled dace	45-90	218	29.5	0.29	0.3
Mottled sculpin	95-110	3	0.3	<.01	<0.1
All species total	-	739	-	54.4	-

[a] One unit of sampling effort is equal to one floating gillnet, one sinking gillnet, and one trap net set overnight and one hour of night time electrofishing.
[b] Rainbow trout not identifiable as fish of hatchery origin.

Table 10. Back-calculated length at annulus for wild rainbow trout sampled at Sublett Reservoir, June 25, 1998. Standard deviation is in parentheses.

Year class	Number of fish	Mean length at annulus (mm)		
		I	II	III
1997	5	96 (13.3)		
1996	9	113 (20.6)	263 (25.5)	
1995	3	110 (45.3)	230 (12.2)	317 (2.7)
Weighted avg. length:		107	255	317

Table 11. Back-calculated length at annulus for brown trout sampled at Sublett Reservoir, June 25, 1998. Standard deviation is in parentheses.

Year class	Number of fish	Mean length at annulus (mm)					
		I	II	III	IV	V	VI
1996	5	97	159				
		(14.1)	(17.7)				
1995	1	134	250	435			
		-	-	-			
1994	2	94	170	344	474		
		(14.8)	(30.8)	(8.9)	(5.4)		
1993	1	92	169	344	432	504	
		-	-	-	-	-	
1992	1	110	152	370	451	493	536
		-	-	-	-	-	-
Weighted avg. length:		101	171	367	458	498	536

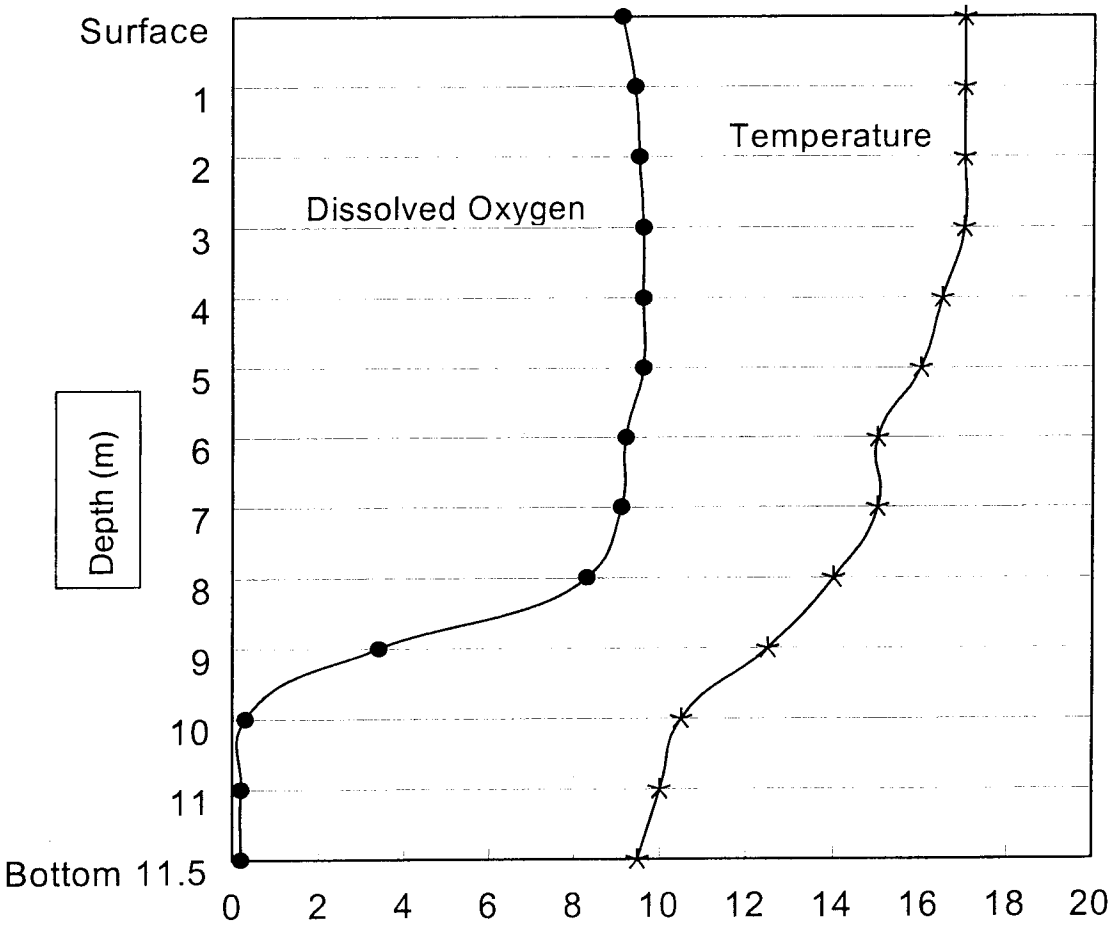


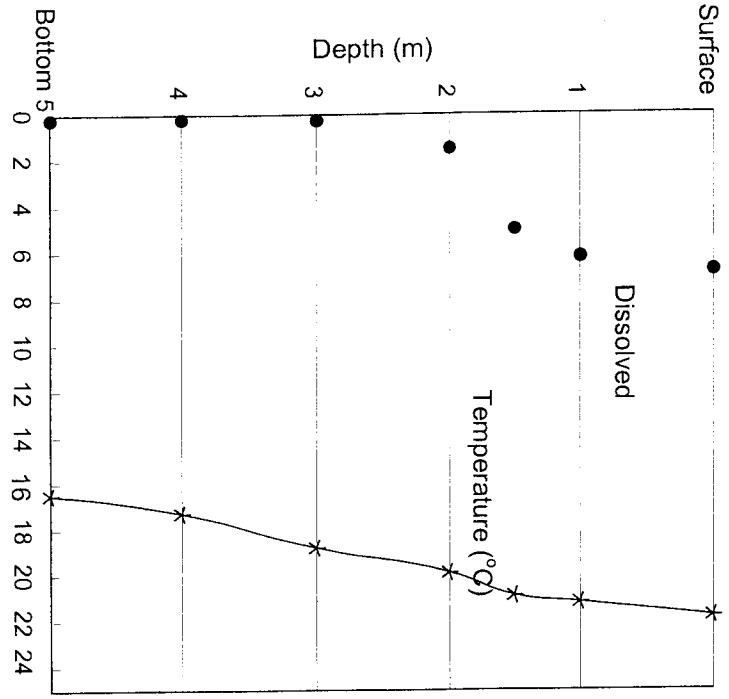
Figure 13. Daytime temperature and dissolved oxygen profiles for Sublett Reservoir near the dam on June 24, 1998.

Thorn Creek Reservoir

Daytime temperature and dissolved oxygen profiles measured at Thorn Creek Reservoir on July 14, 1998 showed super saturated oxygen levels in mid-reservoir due to an algae bloom (Figure 14). It is likely that night time dissolved oxygen levels would drop to dangerously low levels for salmonids.

Regional Creel Surveys

Regional conservation officers and fishery staff contacted anglers to gather general creel information on waters throughout the region. Contacts made on lakes and reservoirs on Memorial Day weekend fall under the general season opener category including waters that are open year round (Table 12). Contacts made at other times of the year fall under the spot-creel category (Table 13).



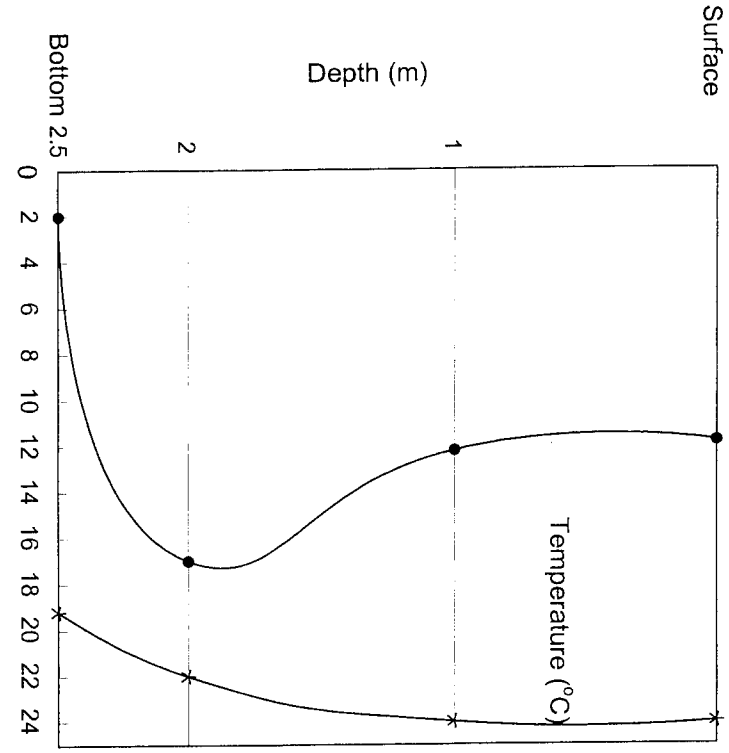


Figure 14. Daytime temperature and dissolved oxygen profiles at specified sites for Thorn Creek Reservoir, July 14, 1998.

Table 12. Angler surveys for Magic Valley Region waters on opening weekend of the general fishing season (May 23, 1998) including waters that are open year-round.

Water	Number of anglers	Hours fished	Species[a] caught	Number kept	Number released[b]	Total catch
Billingsley Creek	22	48	All	49	47	96
			RBH	40	47	87
			BRN	9		9
Fish Creek	5	15	All	8		8
			RBH	8		8
Fish Creek Reservoir	28	62	All	57		57
			RBH	49		49
			EB	8		8
Hagerman WMA (Riley Creek Imp & Oster Ponds open March 1)	98	235.5	All	137	85	222
			RBH	125	62	187
			LMB	12	23	35
Hagerman WMA (open July 1)	26	96	All	131	75	206
			RBH	0	20	20
			LMB	11	9	20
			YP	10	1	11
			BG	110	45	155
Little Camas Reservoir	70	138	All	63	13	76
			RBH	63	13	76
Little Wood Reservoir	25	37.5	All	46	41	87
			RBH	44	41	85
			EB	2		2
Little Wood River	10	10.5	All	5	1	6
			RBH	5	1	6
Magic Reservoir	105	250	All	152	5	157
			RBH	20		20
			RB	81	5	86
			YP	50		50
			BRN	1		1
Malad River	2	1		No fish		
Mormon Reservoir	9	15	All	1		1
			RBH	1		1
Oakley Reservoir	36	109	All	36	2	38
			RBH		1	1
			YP		1	1
Salmon Falls Creek Reservoir	40	186	All	37	3	40
			WE	18	3	21
			YP	1		1
			RBH	17		17
			KOK	1		1
Silver Creek	54	194	All	41	341	382
			RBT	27	299	326
			BRN	14	42	56
Sublett Creek	8	5.5	All		7	7
			BRN		2	2
			RB		3	3
			CT		2	2
Sublett Reservoir	37	92	All	10	8	18
			RBH	3		3
			RB	2	7	9
			CT	2	1	3
			BRN	3		3
Thorn Creek Reservoir	15	30	All	2		2

[a] BG = Bluegill, BRN = Brown trout, CT = Cutthroat trout, EB = Brook trout, KOK = Kokanee, LMB = Largemouth bass, RB = Rainbow trout, RBH = Rainbow trout – Hatchery, WE = Walleye, YP = Yellow perch.

[b] Fish species as identified by anglers.

Table 13. Results of spot angler surveys performed on Magic Valley Region waters throughout the fishing season, 1998.

Water	Number of anglers	Hours fished	Species[a] caught	Total catch (including released fish)
Anderson Ranch Reservoir	6	29	RBH	3
Big Wood River	156	562	RBH	185
			RB	158
			BRN	2
			MWF	6
Carey Lake	20	106	BG	84
			LMB	22
			YP	90
			BH	2
Crystal Lake	10	26	RBH	7
			RB	2
Fish Creek Reservoir	50	294	RBH	196
			EB	22
Hagerman Wildlife Mgt. Area	6	8	RBH	8
Jarbidge River	6	24	RB	12
Lava Lake	1	8	RBH	9
Little Camas Reservoir	2	18	RBH	4
Little Wood Reservoir	26	202	RBH	83
			EB	2
Little Wood River	1	1	No fish	
Magic Reservoir	81	481	RBH	53
			YP	481
			RB	34
			BRN	8
Malad River	27	38	RBH	3
			RB	140
Mormon Reservoir	22	151	RBH	35
Oakley Reservoir	96	384	RBH	130
			YP	26
			WE	2
			RB	8
Rock Creek	22	47	RBH	25
			YP	7
			RB	1
Roseworth Reservoir	20	137	RBH	3
			RB	52

Table 13. Continued.

Water	Number of anglers	Hours fished	Species[a] caught	Total catch (including released fish)
Salmon Falls Creek Reservoir	76	512	RBH	144
			YP	48
			WE	144
			RB	48
			SMB	1
Snake River	20	82	RBH	11
			RB	2
			SQF	5
			SU	4
			WS	7
South Fork Boise River	2	1	No fish	
Stone Reservoir	1	8	RBH	2
Thorn Creek Reservoir	3	5	No fish	

[a] BG = Bluegill, BH = Bullhead, BRN = Brown trout, CT = Cutthroat trout, EB = Brook trout, LMB = Largemouth bass, MWF = Mountain whitefish, RB = Rainbow trout, RBH = Rainbow trout – Hatchery, S = Sucker, SMB = Smallmouth bass, SQF = Northern pikeminnow, WE = Walleye, WS = White sturgeon, YP = Yellow perch.

ACKNOWLEDGMENTS

We acknowledge biological aide Mike Hillesland for his assistance in surveying regional waters and regional conservation officers their assistance in collecting angler information.

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APPENDIX

Appendix A. Standardized lowland lakes fish sampling results for Sublett Reservoir, June 23-24, 1998.

Total length (mm)		Brown trout				
		Electrofishing	Floating gill net	Sinking gill net	Trap net	Total sampled
190	Number	1				1
	Avg wt (g)	92				92
200	Number	1				1
	Avg wt (g)	95				95
230	Number	1		1		2
	Avg wt (g)	144		135		140
240	Number	1				1
	Avg wt (g)					
250	Number	1				1
	Avg wt (g)	175				175
390	Number			1		1
	Avg wt (g)			675		675
410	Number	1				1
	Avg wt (g)	700				700
470	Number	1				1
	Avg wt (g)					
500	Number	1				1
	Avg wt (g)	1,250				1,250
540	Number	1		3		4
	Avg wt (g)	1,850		1,683		1,725
600	Number			1		1
	Avg wt (g)			2,450		2,450
Total number measured:		9	0	6	0	15
Total number not measured:		0	0	0	0	0
Total number sampled:		9	0	6	0	15
Average length:						393

Appendix A. Continued.

Total length (mm)		Cutthroat trout				
		Electrofishing	Floating gill net	Sinking gill net	Trap net	Total sampled
110	Number	1				1
	Avg wt (g)	13				13
130	Number	1				1
	Avg wt (g)	27				27
150	Number	2				2
	Avg wt (g)	37				37
160	Number	1				1
	Avg wt (g)	40				40
170	Number			1		1
	Avg wt (g)			45		45
280	Number			2		2
	Avg wt (g)			202		202
290	Number	1	1	1		3
	Avg wt (g)	232	235			234
300	Number			1		1
	Avg wt (g)					
320	Number			2		2
	Avg wt (g)			320		320
330	Number		1			1
	Avg wt (g)					
340	Number	1				1
	Avg wt (g)	410				410
380	Number	1				1
	Avg wt (g)	570				570
Total number measured:		8	2	7	0	17
Total number not measured:		0	0	0	0	0
Total number sampled:		8	2	7	0	17
Average length:						254

Appendix A. Continued.

Total length		Rainbow trout				
		Electrofishing	Floating gill net	Sinking gill net	Trap net	Total sampled
80	Number	8				8
	Avg wt (g)					
90	Number	31				31
	Avg wt (g)	8				8
100	Number	55				55
	Avg wt (g)	14				14
110	Number	39				39
	Avg wt (g)	17				17
120	Number	52				52
	Avg wt (g)	21				21
130	Number	44				44
	Avg wt (g)	25				25
140	Number	38				38
	Avg wt (g)	34				34
150	Number	16	1			17
	Avg wt (g)	40				40
160	Number	10		2		12
	Avg wt (g)	47				47
170	Number	9		3		12
	Avg wt (g)	56				56
180	Number	3			1	4
	Avg wt (g)					
190	Number	2				2
	Avg wt (g)					
200	Number	4				4
	Avg wt (g)	80				80
210	Number	4		1		5
	Avg wt (g)					
220	Number	3		1		4
	Avg wt (g)	106				106
230	Number	2		2		4
	Avg wt (g)	135				135
240	Number	2		7		9
	Avg wt (g)			210		210
250	Number	1	1	8		10
	Avg wt (g)		175			175
260	Number			6		6
	Avg wt (g)					
270	Number	3		5		8
	Avg wt (g)					
280	Number	2	1	5		8
	Avg wt (g)	238				238

Appendix A. Continued.

Total length (mm)		Rainbow trout (continued)				
		Electrofishing	Floating gill net	Sinking gill net	Trap net	Total sampled
290	Number	1	7	10		18
	Avg wt (g)		260	270		265
300	Number	4	2	9		15
	Avg wt (g)		300	310		305
310	Number	2	4	3		9
	Avg wt (g)	310	315			313
320	Number	2	4	2		8
	Avg wt (g)	340	318			325
330	Number	4	1	9		14
	Avg wt (g)	390	360			375
340	Number	2	2	5		9
	Avg wt (g)	360	405	330		375
350	Number	1	2	5		8
	Avg wt (g)	380	400			390
360	Number		1	3		4
	Avg wt (g)		460	460		460
370	Number	3		1		4
	Avg wt (g)	420				420
380	Number	1	1			2
	Avg wt (g)		530			530
390	Number			1		1
	Avg wt (g)					
400	Number	1				1
	Avg wt (g)					
430	Number	1				1
	Avg wt (g)	670				670
Total number measured:		350	27	88	1	466
Total number not measured:		0	0	0	0	0
Total number sampled:		350	27	88	1	466
Average length:						180

Appendix A. Continued.

Total length (mm)		Hatchery rainbow trout				
		Electrofishing	Floating gill net	Sinking gill net	Trap net	Total sampled
100	Number	1				1
	Avg wt (g)					
120	Number	2				2
	Avg wt (g)					
130	Number	1				1
	Avg wt (g)					
150	Number	1				1
	Avg wt (g)					
170	Number	2				2
	Avg wt (g)					
180	Number	3				3
	Avg wt (g)	58				58
190	Number	2				2
	Avg wt (g)					
200	Number	5				5
	Avg wt (g)					
210	Number	11		1		12
	Avg wt (g)	117				117
220	Number	24		2		26
	Avg wt (g)	118				118
230	Number	15	1	8		24
	Avg wt (g)	135				135
240	Number	19	2	11		32
	Avg wt (g)	134	145			140
250	Number	17	1	11		29
	Avg wt (g)		182			182
260	Number	3		8		11
	Avg wt (g)					
270	Number	4	5	7	1	17
	Avg wt (g)		220			220
280	Number	2	2	2		6
	Avg wt (g)					
300	Number		1			1
	Avg wt (g)					
310	Number	2				2
	Avg wt (g)					
320	Number	2				2
	Avg wt (g)	365				365
330	Number			1		1
	Avg wt (g)					
350	Number	1				1
	Avg wt (g)					

Appendix A. Continued.

Total length (mm)		Hatchery rainbow trout (continued)				
		Electrofishing	Floating gill net	Sinking gill net	Trap net	Total sampled
360	Number		1			1
	Avg wt (g)					
380	Number	1				1
	Avg wt (g)					
Total number measured:		118	13	51	1	183
Total number not measured:		0	0	0	0	0
Total number sampled:		118	13	51	1	183
Average length:						241

Total length (mm)		Kokanee				
		Electrofishing	Floating gill net	Sinking gill net	Trap net	Total sampled
240	Number			1		1
	Avg wt (g)			170		170
250	Number			2		2
	Avg wt (g)			180		180
290	Number		1			1
	Avg wt (g)					
300	Number		1			1
	Avg wt (g)					
330	Number		1			1
	Avg wt (g)		395			395
370	Number			1		1
	Avg wt (g)			585		585
450	Number			1		1
	Avg wt (g)			710		710
Total number measured:		0	3	5	0	8
Total number not measured:		0	0	0	0	0
Total number sampled:		0	3	5	0	8
Average length:						312

Appendix A. Continued.

Total length (mm)		Dace species				
		Electrofishing	Floating gill net	Sinking gill net	Trap net	Total sampled
40	Number	2				2
	Avg wt (g)					
50	Number	2			2	4
	Avg wt (g)					
60	Number	10			9	19
	Avg wt (g)					
70	Number	11			13	24
	Avg wt (g)					
80	Number	5			8	13
	Avg wt (g)					
90	Number				3	3
	Avg wt (g)					
Total number measured:		30	0	0	35	65
Total number not measured:		204	0	0	0	204
Total number sampled:		234	0	0	35	269
Average length:						70

Total length (mm)		Mottled sculpin				
		Electrofishing	Floating gill net	Sinking gill net	Trap net	Total sampled
90	Number	1				1
	Avg wt (g)					
110	Number	2				2
	Avg wt (g)					
Total number measured:		3	0	0	0	3
Total number not measured:		0	0	0	0	0
Total number sampled:		3	0	0	0	3
Average length:						105

1998 ANNUAL PERFORMANCE REPORT

State of: Idaho

Program: Fisheries Management F-71-R-23

Project I: Surveys and Inventories

Subproject I-E: Magic Valley Region

Job: c

Title: Rivers and Streams Investigations

Contract Period: July 1, 1998 to June 30, 1999

ABSTRACT

Several tributaries to the South Fork Boise River were surveyed to determine bull trout *Salvelinus confluentus* and brook trout *S. fontinalis* presence and to determine the presence of natural or man-made barriers to upstream migrating fish. No new bull trout locations were found although brook trout were found in Lick Creek, a lower drainage tributary to Little Smoky Creek, which is a new location for that species. Rainbow trout *Onchorhynchus mykiss* of wild origin were found in almost every location sampled.

The South Fork Boise River at the Deadwood Creek confluence was sampled by electrofishing for a population estimate of rainbow trout, mountain whitefish *Prosopium williamsoni* and bull trout. Results indicate a higher percentage of the rainbow trout population structure has shifted to at least 200 mm long since more restrictive fishing rules were implemented in 1992.

Big Cottonwood Creek at the wildlife management area was sampled by electrofishing downstream of the irrigation diversion. Results indicate that fish move downstream into the reach, which becomes dewatered during the irrigation season, and that the fishery could benefit from a fish ladder and some water being bypassed over the diversion dam into the natural stream channel to allow fish to move upstream.

Willow Creek, a tributary to Camas Creek, was sampled by electrofishing downstream of the Cherry Creek confluence. Good numbers of rainbow trout of various size classes were sampled indicating an increase in the population since previous low water year's surveys.

The Snake River at Centennial Park and near Buhl was electrofished for species composition trend data. Approximately 90% of the fish biomass at Centennial Park was composed of common carp *Cyprinus carpio* and largescale sucker *Catostomus macrocheilus*. Near Buhl approximately 95% of the fish biomass was largescale sucker, redside shiner *Richardsonius balteatus* and northern pikeminnow *Ptychocheilus oregonensis*.

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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 to develop appropriate management recommendations.

METHODS

Stream habitat data was collected using ocular and measurement techniques described by IDFG (1992). Fish were sampled by electrofishing with either a Smith-Root Model 15-A backpack shocker or a Coffelt VVP-15 Electrofisher with a 5,000 watt Honda generator mounted in an aluminum drift boat. Both setups were used with one shocker operator and one or two people netting. Sampled fish were identified and total lengths recorded in 10 mm length groups; subsamples were weighed in grams. Length frequency records for samples with more than one pass include recaptured fish.

Fish population estimates were made with either an adjusted Petersen mark-recapture method (Ricker 1975), a two-step removal method (Seber and LeCren 1967) or a multiple-step removal method using a maximum-likelihood estimate with a computer program developed by Van Deventner and Platts (1989). Length at age was estimated by back calculating to length at scale annulus.

Redd counts for brown trout *Salmo trutta* were made by walking upstream through the prescribed reach a week or two after the end of the spawning season.

White sturgeon *Acipenser transmontanus* were sampled by angling utilizing heavy duty rods and reels equipped with a minimum of 22.7 kg test line, barbless hooks, and small hatchery trout or nongame fish for bait. Fish at least 150 cm in total length were considered mature and were surgically checked for sex and gonadal development.

RESULTS AND DISCUSSION

Big Cottonwood Creek

Big Cottonwood Creek is a perennial stream that flows northeast through the South Hills in Cassia County. The stream originates at Jarvis Spring near the Bostetter Forest Service guard station and gains flow until it reaches the irrigation diversion on the Big Cottonwood Wildlife Management Area. By midsummer in most water years the stream is dewatered at the diversion for irrigation. Two fish and stream habitat surveys were completed downstream of the diversion prior to complete dewatering to determine the status of the fish populations. The lower site was at the lower end of the wildlife management area at the corrals upstream of the county road and the upper site was in the thick grove of cottonwood trees approximately 300 m downstream of the diversion. On July 7, 1998 two passes were made at both sites with a Coffelt backpack electroshocker for a population estimate. Cutthroat trout *Oncorhynchus clarki* and

mottled sculpin *Cottus bairdi* were sampled at both sites (Table 1). Cutthroat trout density was estimated to be 6/100 m^2 at the lower site and 17/100 m^2 at the upper site (Table 2). Habitat survey results are given in Table 3. These results indicate that when flow permits, some fish move downstream through the irrigation diversion dam into the natural stream channel. Since the dam creates a barrier to upstream migrating fish, these fish are ultimately lost from the system when the stream is dewatered downstream of the dam. The fishery could therefore benefit from maintaining some flow into the downstream channel during the irrigation season and a fish ladder to allow passage back upstream.

Lake Fork Creek

Lake Fork Creek is one of two main tributaries that flow into Sublett Reservoir, an irrigation storage reservoir on the west side of the Sublett Mountain range. During the spring Lake Fork Creek receives most of its flow from snow melt, although there is still a perennial flow at other times of the year. Lake Fork and Sublett creeks were surveyed in late June 1998 as part of a basin-wide fishery survey that included a lowland lakes survey on Sublett Reservoir (see Lowland Lakes Investigations, this report). Lake Fork Creek is not stocked with fish but has been known to have a population of game fish, which may include resident fish and fish that migrate upstream from Sublett Reservoir to spawn. Fishing rules in Lake Fork Creek allow the harvest of two trout, with no exceptions to restrictions on fishing gear or the general seasons on rivers and streams.

The backpack electrofishing and habitat surveys were done at one site 2 km upstream of the high water level of Sublett Reservoir on June 24, 1998. The fishery survey consisted of a population estimate using a two-step removal method (Seber and LeCren 1967). Habitat survey results are given in Table 4. Water temperature at time of sampling was 12°C. Rainbow trout *Oncorhynchus mykiss* and mottled sculpin were the only two species of fish sampled with rainbow trout ranging in size from 60 mm to 310 mm (Table 5). The density of rainbow trout $\geq$100 mm was estimated to be 43/100 m^2 (Table 6).

Silver Creek

Fish were sampled from The Nature Conservancy's Silver Creek Preserve as part of a genetics study by the University of Idaho Center for Salmonid and Freshwater Species at Risk. Fish were sampled between the Stalker Creek Bridge and the Kilpatrick Bridge on May 18, 1998 by daytime electrofishing with the drift boat and Coffelt VVP-15 electrofishing unit. A total of 46 rainbow trout, 7 brown trout, and 1 brook trout *Salvilinus fontinalis* were captured for a fin tissue sample for the genetic analysis. A fin tissue sample was also taken from one bridgelip sucker *Catostomus columbianus*. All fish were released into the same reach of stream from which they were sampled. Tissue samples were also collected from rainbow trout from the Hayspur Hatchery located on a tributary to Silver Creek. Results of the mitochondrial DNA analysis indicated no evidence of interior redband (rainbow) trout *O. mykiss gairdneri* in either sample, but did reveal differences in diversity between the two samples (Williams et al. 2000). It appears that the rainbow trout in Silver Creek have developed from several historical releases of hatchery trout.

Table 1. Fish sampled with two passes of electrofishing at two sites on Big Cottonwood Creek at the Big Cottonwood Wildlife Management Area, July 7, 1998.

Total length (mm)		Corral site		Cottonwood grove site	
		Cutthroat trout	Mottled sculpin	Cutthroat trout	Mottled sculpin
50	Number				1
	Average weight (g)				
60	Number				7
	Average weight (g)				
70	Number				6
	Average weight (g)				
80	Number		1	1	2
	Average weight (g)				
90	Number		1	1	1
	Average weight (g)			7	
100	Number	1	2	5	4
	Average weight (g)			10	
110	Number	1	2	5	2
	Average weight (g)			14	
120	Number	2	3	3	
	Average weight (g)			18	
130	Number			2	
	Average weight (g)			22	
140	Number	3	1		
	Average weight (g)				
160	Number	3			
	Average weight (g)				
170	Number	2		1	
	Average weight (g)			58	
180	Number	2			
	Average weight (g)				
210	Number	1			
	Average weight (g)				
220	Number			4	
	Average weight (g)			119	
230	Number	2		1	
	Average weight (g)			130	
240	Number	2		3	
	Average weight (g)			192	
250	Number			2	
	Average weight (g)			162	
270	Number	1		1	
	Average weight (g)			212	
290	Number			2	
	Average weight (g)			290	
300	Number	2			
	Average weight (g)				
Total count of number measured:		22	10	31	23
Total count of number not		0	0	0	33
Total count of number sampled:		22	10	31	56
Average length:		187	112	169	79

Table 2. Population and density estimates of cutthroat trout sampled from Big Cottonwood Creek, July 7, 1998.

	Corral site	Cottonwood Grove site
Number sampled in first pass	21	21
Number sampled in second pass	1	10
Population est. +/-95% CI	22 +/-1	40 +/-19
Number per 100 m^2	6 +/-<1	17 +/-8

Table 3. Stream habitat survey summaries for two sites on Big Cottonwood Creek.

Site: Cottonwood Grove (Upper) (All measurements are in meters)
Date: July 7, 1998

Channel type:	Entrenched meandering riffle/pool channel in low gradient valley	
Avg. width:	3.2	
Transect interval:	10	
No. transects:	7	
Distance electrofished:	73.5	
Total surface area:	236.3 m^2	
Gradient (%):	1	
Habitat		Average depth
%pool:	47.6	0.3
%riffle:	14.3	0.1
%run:	33.3	0.2
%pocket:	4.8	0.2
%backwater:	0.0	
Substrate		
%silt/sand:	49.3	
%gravel:	21.2	
%rubble:	29.5	
%boulder:	0.0	
%bedrock:	0.0	

Substrate by habitat type

	%silt/sand	%gravel	%rubble	%boulder	%bedrock
Pool:	62.0	12.0	26.0	0.0	0.0
Riffle:	28.3	48.3	23.3	0.0	0.0
Run:	34.3	24.3	41.4	0.0	0.0
Pocket:	90.0	10.0	0.0	0.0	0.0
Backwater:	-	-	-	-	-

Table 3. Continued.

Site:	Corral (lower)	(All measurements are in meters)				
Date:	July 7, 1998					
Channel type:		Entrenched meandering riffle/pool channel in low gradient valley				
Avg. width:		2.7				
Transect interval:		15				
No. transects:		8				
Distance electrofished:		124				
Total surface area:		339.5 m^2				
Gradient (%):		1				
Habitat			Average depth			
	%pool:	29.2	0.3			
	%riffle:	25.0	0.1			
	%run:	37.5	0.2			
	%pocket:	8.3	0.2			
	%backwater:	0.0				
Substrate						
	%silt/sand:	32.3				
	%gravel:	26.5				
	%rubble:	41.3				
	%boulder:	0.0				
	%bedrock:	0.0				
Substrate by habitat type						
		%silt/sand	%gravel	%rubble	%boulder	%bedrock
	Pool:	32.9	21.4	45.7	0.0	0.0
	Riffle:	25.8	40.8	33.3	0.0	0.0
	Run:	27.8	25.6	46.7	0.0	0.0
	Pocket:	70.0	5.0	25.0	0.0	0.0
	Backwater:	-	-	-	-	-

Table 4. Stream habitat survey summary for Lake Fork Creek.

Site:	Z 12 331,850 E., 4,690,400 N.			(All measurements are in meters)	
Date:	June 24, 1998				
Channel type:	B - C, Moderately entrenched, Low gradient				
Avg. width:	2.3				
Transect interval:	15				
No. transects:	6				
Distance electrofished:	101				
Total surface area:	232 m^2				
Gradient (%):	1				
Habitat			Average depth		
%pool:	5.6		0.4		
%riffle:	27.8		0.2		
%run:	44.4		0.2		
%pocket:	22.2		0.1		
%backwater:	0.0		-		
Substrate					
%silt/sand:	47.2				
%gravel:	48.1				
%rubble:	4.7				
%boulder:	0.0				
%bedrock:	0.0				
Substrate by habitat type					
	%silt/sand	%gravel	%rubble	%boulder	%bedrock
Pool:	20.0	80.0	0.0	0.0	0.0
Riffle:	27.0	56.0	17.0	0.0	0.0
Run:	53.1	46.9	0.0	0.0	0.0
Pocket:	67.5	32.5	0.0	0.0	0.0
Backwater:	-	-	-	-	-

Table 5. Fish sampled with two passes of electrofishing in Lake Fork Creek, June 24, 1998.

Total length (mm)		Rainbow trout	Mottled sculpin
50	Number		11
	Average weight (g)		
60	Number	3	30
	Average weight (g)		
70	Number	10	13
	Average weight (g)		
80	Number	26	6
	Average weight (g)		
90	Number	20	
	Average weight (g)		
100	Number	22	1
	Average weight (g)	12	
110	Number	11	
	Average weight (g)	18	
120	Number	7	
	Average weight (g)	12	
130	Number	7	1
	Average weight (g)	24	
140	Number	8	
	Average weight (g)	38	
150	Number	4	
	Average weight (g)	40	
160	Number	3	
	Average weight (g)	59	
170	Number	1	
	Average weight (g)		
180	Number	4	
	Average weight (g)	68	
190	Number	4	
	Average weight (g)	83	
200	Number	2	
	Average weight (g)	89	
210	Number	1	
	Average weight (g)		
220	Number	2	
	Average weight (g)		
250	Number	1	
	Average weight (g)		
310	Number	1	
	Average weight (g)		
Total count of number measured:		137	62
Total count of number not measured:		0	27
Total count of number sampled:		137	89
Average length:		114	66

Table 6. Population and density estimates of rainbow trout sampled from Lake Fork Creek, June 24, 1998.

	Rainbow trout ≥100 mm
Number sampled in first pass	53
Number sampled in second pass	25
Population est. +/-95% CI	100 +/-29
Number per 100 m^2	43 +/-12.5

Snake River

The Snake River was sampled by daytime electrofishing at the U.S. Geological Survey (USGS) gauging station near Buhl and at Centennial Park near Twin Falls for trend monitoring information on fish assemblages. The Buhl site was sampled on September 3, 1998 and the Twin Falls site was sampled on August 31 and September 1, 1998. U.S. Geological Survey has sampled the Buhl site similarly in the past for its North American Water Quality Assessment Program surveys (Maret 1997). Approximately 600 meters of this site were electrofished using the Smith-Root electrofishing boat with power on for 1,400 seconds using about 200 volts of direct current electricity set at 60 pulses per second. Water temperature was 18°C, conductivity was 540 μSiemen/cm, and depth of visibility was 70-80 cm as measured with a Secchi disk. Equal effort was made to net all fish stunned regardless of size or species. Species sampled include chiselmouth *Acrocheilus alutaceus*, common carp *Cyprinus carpio*, largescale sucker *Catostomus macrocheilus*, rainbow trout, redside shiner *Richardsonius balteatus*, and northern pikeminnow *Ptychocheilus oregonensis* (Appendix A). Redside shiner accounted for over 50% of the fish sampled with largescale sucker accounting for over 60% of the biomass (Table 7).

The site at Centennial Park included the reach from the suspended aqueduct on the west side of the Blue Lakes Country Club golf course upstream to and including the backwater slough on the east end of the golf course. Using the Smith-Root electrofishing boat, approximately 3,000 m of river were sampled which included about 1,800 m along the north bank and about 1,200 m along the south bank. Total time electrofished with power on was 3,939 seconds using about 200 volts of direct current electricity set at 60 pulses per second. Water temperature was 20°C, conductivity was 420 μSiemen/cm, and depth of visibility was 100-105 cm as measured with a Secchi disk. Equal effort was made to net all fish stunned regardless of size or species. Species sampled include bridgelip sucker, chiselmouth, common carp, largemouth bass *Micropterus salmoides*, smallmouth bass *M. dolomieui*, largescale sucker, redside shiner, northern pikeminnow, yellow perch *Perca flavescens*, and *Tilapia* spp. (Appendix B). Tilapia have been present in this reach previously and most likely originated from local commercial hatchery sources. Game fish consisting of large and smallmouth bass accounted for 12% of the fish sampled with common carp accounting for nearly 50% of the biomass (Table 8).

The Idaho Department of Fish and Game (IDFG) has an agreement with the College of Southern Idaho to assist with acquiring wild white sturgeon brood stock from the Snake River for artificial propagation. In 1998 we spent 11 days with two or more anglers fishing for a total of 167 hours for white sturgeon. Six white sturgeon were landed (Table 9). None of the fish landed was either large enough to be checked or appeared to have sufficient gonadal development suitable for brood stock; these fish were released into the river.

Table 7. Fish assemblage and biomass from the electrofishing sample from the Snake River near Buhl, Idaho, September 3, 1998.

Species	Number sampled	Percent of sample by number	Total weight (kg)	Percent of sample by weight
Chiselmouth	7	2.5	1.0	1.9
Common carp	3	1.1	1.2	2.3
Largescale sucker	71	25.3	31.9	61.0
Rainbow trout	1	0.3	<0.1	<0.1
Redside shiner	161	57.3	8.0	15.3
Northern pikeminnow	38	13.5	10.2	19.4

Table 8. Fish assemblage and biomass from the electrofishing sample on the Snake River near Twin Falls, August 31 and September 1, 1998.

Species	Number sampled	Percent of sample by number	Total weight (kg)	Percent of sample by weight
Bridgelip sucker	3	1.0	2.2	1.0
Chiselmouth	2	0.6	<0.1	0.01
Common carp	62	18.2	109.6	48.9
Largemouth bass	22	6.4	4.2	1.9
Largescale sucker	123	36.1	93.6	41.7
Northern pikeminnow	65	19.1	11.4	5.1
Redside shiner	38	11.1	0.2	<0.1
Smallmouth bass	21	6.2	2.4	1.1
Tilapia	4	1.2	0.5	0.2
Yellow perch	1	<0.1	0.2	0.1

Table 9. Sturgeon fishing effort by Magic Valley regional personnel in 1998 between C.J. Strike Reservoir and Bliss Dam.

Date	Rod hours	Fish caught
April 4, 1998	6	None
April 8, 1998	14	177cm fork length, 198cm total length, 71cm girth behind pectorals, immature male, no tags detected.
April 10, 1998	18	Lost 1 large fish.
April 17, 1998	10	None
May 5, 1998	14	155cm fork length, 171cm total length, sex not determined, detected P.I.T. tag # 7F7F441434.
		68cm fork length, 78cm total length, not sexed, a hatchery fish.
May 14, 1998	15	68cm fork length, 78cm total length, sex not determined, no tags detected, a hatchery fish.
		78cm fork length, 92cm total length, sex not determined, no tags detected, a possible hatchery fish.
May 27, 1998	12	None
June 2, 1998	15	None
June 3, 1998	18	Lost 1 large fish.
June 4, 1998	21	Lost 1 large fish.
June 12, 1998	24	79cm fork length, 83cm total length, sex not determined, no tags detected.
Total rod hours	167	

South Fork Boise River

The South Fork Boise River upstream of Anderson Ranch Reservoir flows mostly through U.S. Forest Service lands in Elmore and Camas counties. Access between Pine and Big Smoky Creek is by a good paved and graded gravel road which follows the river most of its length. The fishery in the reach from the bridge at Pine upstream 39 km to the Beaver Creek confluence is managed with no exceptions to the general fishing rules for rivers and streams. The 16 km reach from Beaver Creek upstream to the Big Smoky Creek confluence has been managed since 1992 with a two trout limit, none less than 14 inches long (356 mm) and fishing gear restricted to artificial flies and lures with a single barbless hook. The reach upstream from Big Smoky Creek including all tributaries is managed with no exceptions to the general rules. Both reaches that are managed with no exceptions to the general rules are stocked with catchable-sized rainbow trout for a put-and-take fishery. Since January 1, 1996 there has been no open season for bull trout *Salvelinus confluentus*, which are known to be present in the South Fork Boise River. Kokanee *Oncorhynchus nerka* are also known to migrate upstream from Anderson Ranch Reservoir to spawn in the river from late August into early October.

Fish populations were estimated on a 1.5 km reach of the river from Deadwood Creek upstream using two passes of electrofishing for adjusted Petersen mark-recapture population estimate (Ricker 1975). Previous estimates were conducted in August 1991 (Partridge and Warren 1994) and in 1994 (Warren and Partridge 1996). A habitat survey was included in the 1991 fisheries survey. Fish were surveyed again within the same reach on August 18 and August 25, 1998. Total river discharge measured at the USGS gauge near Featherville at the time of sampling was 9.5 m^2 per second (cms) on August 18 and 8.1 cms on August 25. Water temperature at time of sampling averaged 10°C on both days. In 1998 rainbow trout, bull trout and mountain whitefish *Prosopium williamsoni* $\geq$100 mm were marked with a hole punch on the dorsal lobe of the caudal fin during the initial marking run. Game fish sampled included bull trout, kokanee, mountain whitefish and wild and hatchery rainbow trout (Table 10). Nongame fish included bridgelip sucker, largescale sucker, mountain sucker *Catostomus platyrhynchus*, longnose dace *Rhinichthys cataractae*, mottled sculpin and northern pikeminnow (Table 11). The length frequency histogram illustrates a gradual shift to an increasingly higher percentage of the fish in the larger size classes over 200 mm since 1991 (Figure 1). Back calculation to length at annulus from scales for the rainbow trout show growth rates of about 40 mm a year after age 1 (Table 12). An estimated 858 rainbow trout were found in 1998 compared to less than 600 in 1994 and 1991 (Table 13). Bull trout, due to their migratory nature, numbered too low to make population estimates for the reach.

A sample of 20 rainbow trout of wild origin was shipped to the IDFG Fish Health Laboratory to test for bacterial kidney disease (BKD) *Renibacterium salmoninarum* and whirling disease *Myxosoma cerebralis*. The whirling disease pathogen was not found in any of the samples; BKD was found to be present in samples although the fish did not show evidence of clinical disease.

Table 10. Game fish sampled with two passes of electrofishing (with replacement) the South Fork Boise River upstream of Deadwood Creek, August 1998.

Total length (mm)		Bull trout	Kokanee	Mountain whitefish	Rainbow trout (hatchery)	Rainbow trout (wild)
70	Number			9		
	Avg wt (g)					
80	Number			8		1
	Avg wt (g)					
90	Number			1		2
	Avg wt (g)					
100	Number					5
	Avg wt (g)					
110	Number					22
	Avg wt (g)					15
120	Number					27
	Avg wt (g)					16
130	Number					26
	Avg wt (g)					31
140	Number					21
	Avg wt (g)					26
150	Number			4		10
	Avg wt (g)					33
160	Number			9		9
	Avg wt (g)					40
170	Number			6		9
	Avg wt (g)					46
180	Number			15		9
	Avg wt (g)					56
190	Number			10		11
	Avg wt (g)					69
200	Number			15		16
	Avg wt (g)					76
210	Number			11		13
	Avg wt (g)					89
220	Number			4		10
	Avg wt (g)					105
230	Number	1		3	7	11
	Avg wt (g)	100				123
240	Number	2		3	5	13
	Avg wt (g)	114				174
250	Number	1		12	4	12
	Avg wt (g)	155				157
260	Number		1	12	6	11
	Avg wt (g)					176

Table 10. Continued.

Total length (mm)		Bull trout	Kokanee	Mountain whitefish	Rainbow trout (hatchery)	Rainbow trout (wild)
270	Number	2		5	4	8
	Avg wt (g)	177				188
280	Number	2		13	4	8
	Avg wt (g)	209				239
290	Number	1		15	3	4
	Avg wt (g)	212				247
300	Number		2	16		1
	Avg wt (g)					
310	Number	1		17		
	Avg wt (g)	240				
320	Number		6	16		
	Avg wt (g)					
330	Number		5	14		1
	Avg wt (g)					
340	Number		1	7		3
	Avg wt (g)					380
350	Number		1	10		
	Avg wt (g)					
360	Number			3		
	Avg wt (g)					
370	Number			6		
	Avg wt (g)					
380	Number			3		
	Avg wt (g)					
390	Number			1		
	Avg wt (g)					
400	Number			1		
	Avg wt (g)					
Total number measured:		10	16	249	33	263
Total number not measured:		0	125	6	0	0
Total number sampled:		10	141	255	33	263
Average length:		270	321	256	257	184

Table 11. Nongame fish sampled with two passes of electrofishing (with replacement) the South Fork Boise River upstream of Deadwood Creek, August 1998.

Total length (mm)		Bridgelip sucker	Longnose dace	Largescale sucker	Mountain sucker	Mottled sculpin	Northern pikeminnow
40	Number					5	
	Avg wt (g)						
50	Number					10	
	Avg wt (g)						
60	Number		1			13	
	Avg wt (g)						
70	Number		1			13	
	Avg wt (g)						
80	Number		5			9	
	Avg wt (g)						
90	Number	1	3			4	
	Avg wt (g)						
100	Number	4	2			2	
	Avg wt (g)						
110	Number		1			1	
	Avg wt (g)						
120	Number		2			2	
	Avg wt (g)						
130	Number	1	1			2	
	Avg wt (g)						
140	Number	1					
	Avg wt (g)						
150	Number				1		
	Avg wt (g)						
190	Number				1	1	
	Avg wt (g)						
280	Number						1
	Avg wt (g)						
310	Number						1
	Avg wt (g)						
320	Number						
	Avg wt (g)						
330	Number						3
	Avg wt (g)						
340	Number						2
	Avg wt (g)						
350	Number						1
	Avg wt (g)						
360	Number	1					1
	Avg wt (g)						
380	Number	1					
	Avg wt (g)						

Table 11. Continued.

Total length (mm)		Bridgelip sucker	Longnose dace	Largescale sucker	Mountain sucker	Mottled sculpin	Northern pikeminnow
390	Number	1					
	Avg wt (g)						
400	Number			1			
	Avg wt (g)						
420	Number	1					1
	Avg wt (g)						
430	Number			1			
	Avg wt (g)						
440	Number	1					
	Avg wt (g)						
450	Number						1
	Avg wt (g)						
Total number measured:		12	16	2	2	62	11
Total number not measured:		0	3	0	0	10	0
Total number sampled:		12	19	2	2	72	11
Average length:		232	95	415	175	74	353

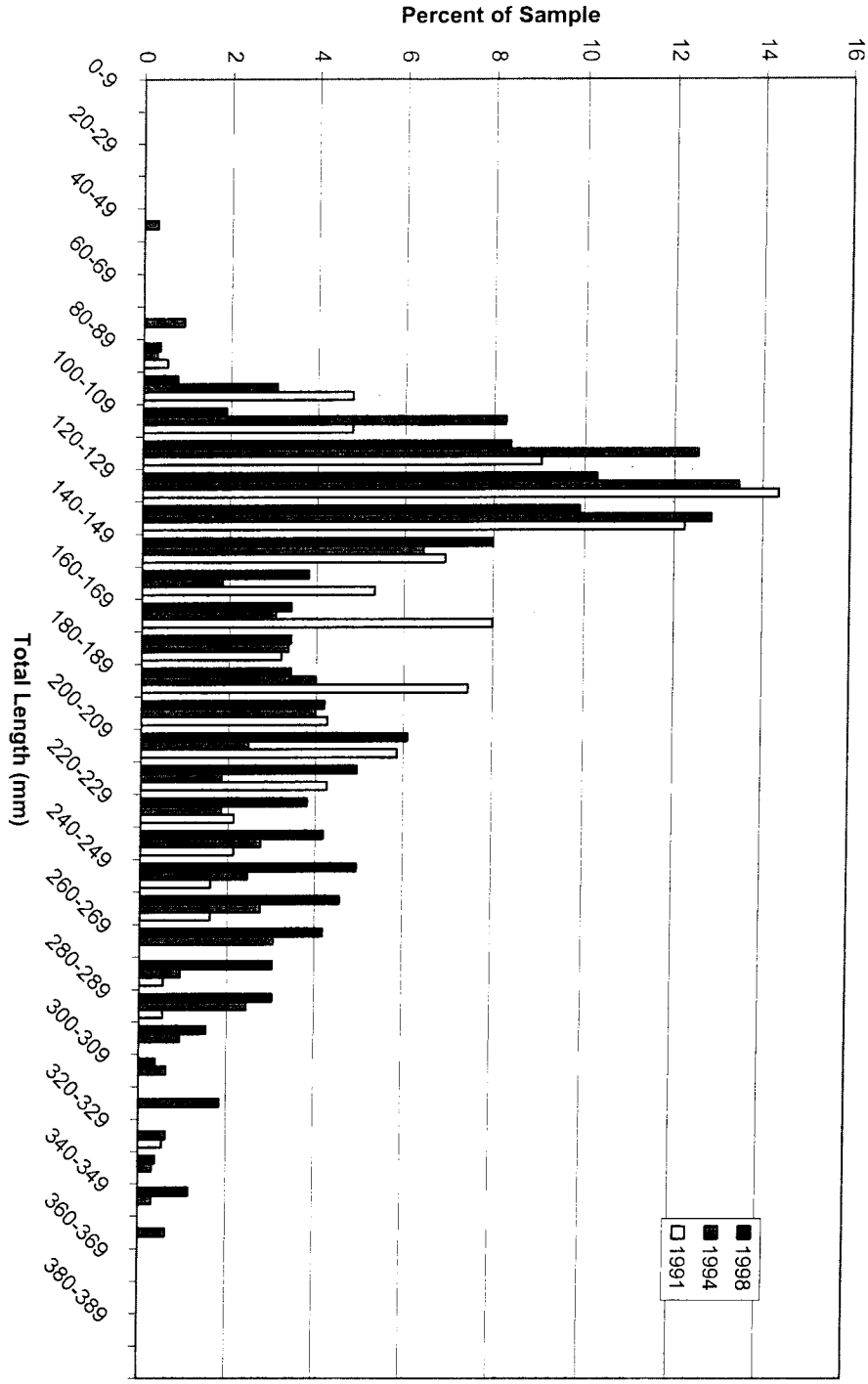

Figure 1. Total length frequency histogram of wild rainbow trout sampled from the South Fork Boise River in three separate years.

Table 12. Back-calculated length at annulus for wild rainbow trout sampled from the South Fork Boise River, August 25, 1998. Standard deviation is in parentheses.

Year Class	Number of fish	Mean length at annulus (mm)				
		I	II	III	IV	V
1997	6	85 (9.5)				
1996	9	-[a]	137 (5.4)			
1995	8	-[a]	113 (19.3)	171 (22.8)		
1994	5	-[a]	101 (18.6)	146 (13.6)	203 (14.7)	
1993	1	-[a]	128 (-)	202 (-)	241 (-)	281 (-)
Weighted avg. length:		85	120	164	209	281

[a] First annulus not detected in most fish age II and older.

Table 13. Fish population estimates in the South Fork Boise River upstream of Deadwood Creek, August 1998, and from previous surveys.

Year surveyed Species Size/age class	No. marked	No. caught	No. recaptured	Pop. est. +/- 95 % CI	Density estimates	
					No. per 100 m	No. per 100 m^2
1998						
Rainbow Trout of wild origin						
100-199 mm	66	81	9	549 +/- 304	36.4	1.63
200-299 mm	38	67	8	295 +/- 170	19.6	0.88
300-399 mm	3	2	1	--[a]	--	--
All ≥ 100 mm	107	150	18	858 +/- 352	56.9	2.55
Rainbow Trout of hatchery origin						
100-199 mm	0	0	0	0	0.0	0.00
200-299 mm	13	19	3	--	--	--
300-399 mm	0	0	0	0	0.0	0.00
Bull Trout						
All ≥100 mm	7	3	1	--	--	--
Mountain whitefish						
100-199 mm	24	20	2	--	--	--
200-299 mm	42	50	9	219 +/- 116	14.5	0.65
300-399 mm	55	38	7	273 +/- 159	18.1	0.81
All ≥100 mm	118	108	18	683 +/- 272	45.2	2.03
1994						
Rainbow trout of wild origin						
100-199 mm	108	121	26	492 +/- 161	32.6	1.46
200-299 mm	33	37	14	86 +/- 33	5.7	0.26
300-399 mm	10	4	2	--	--	--
All ≥100 mm	151	162	42	576 +/- 146	38.1	1.71
Rainbow trout of hatchery origin						
100-199 mm	0	0	0	0	0.0	0.00
200-299 mm	20	23	8	56 +/- 27	3.7	0.17
>300 mm	0	0	0	0	0.0	0.00
All ≥100 mm	20	23	8	56 +/- 27	3.7	0.17
Bull Trout						
All ≥100 mm	2	1	1	3--	--	--

Table 13. Continued.

Year surveyed Species Size/age class	No. marked	No. caught	No. recaptured	Pop. est. +/- 95 % CI	Density estimates	
					No. per 100 m	No. per 100 m^2
Mountain whitefish						
100-199 mm	17	33	6	87 +/- 54	5.8	0.26
200-299 mm	45	71	18	174 +/- 66	11.5	0.52
300-399 mm	32	33	10	105 +/- 49	7.0	0.30
400-499 mm	0	1	0	--	--	--
All ≥100 mm	94	138	34	377 +/- 107	25.0	1.12
1991						
Rainbow trout of wild origin						
100-199 mm	53	87	9	475 +/- 264	31.5	1.41
200-299 mm	13	22	4	64 +/- 46	4.2	0.19
300-399 mm	1	0	0	2	0.1	0.01
All ≥100 mm	67	109	13	534 +/- 252	35.4	1.59
Bull Trout						
All ≥100 mm	2	8	2	9 +/- 14	0.6	0.03
Mountain whitefish						
100-199 mm	53	65	4	713 +/- 548	47.3	2.12
200-299 mm	21	19	4	88 +/- 61	5.8	0.26
300-399 mm	70	62	20	213 +/- 73	14.1	0.63
400-499 mm	3	2	1	6 +/- 4	0.4	0.02
All ≥100 mm	147	148	29	735 +/- 231	48.7	2.19

South Fork Boise River Tributaries

Several tributaries to the South Fork Boise River were surveyed by electrofishing with a backpack shocker to determine the presence of bull trout and brook trout and to look for any potential barriers to upstream migrating fish. A single upstream pass was made with the shocker through the stream reach. All fish sampled were identified and enumerated with measurements and weights taken on subsamples. A habitat survey was completed on some streams. Stream site locations were determined either from USGS Topographic maps or with hand-held GPS units, however locations made with GPS units are not precise with errors of up to 250 m. Locations are recorded in Universal Transverse Mercator (UTM) coordinates (Letham 1998).

Barlow Creek

Barlow Creek enters Big Smoky Creek approximately 1.5 stream km upstream of the trailhead at the end of the road on Big Smoky Creek. It was sampled near its confluence with Big Smoky Creek with a single upstream pass of electrofishing in UTM Zone 11, 673,900 m E, 4,833,800 m N, on August 26, 1998. Total length of stream sampled was 47 m and average stream width was 0.8 m. The gradient from the USGS map was 12% and the water temperature while electrofishing was 10°C at 1300 hours. Rainbow trout of wild origin were the only species of fish sampled along with tailed frog *Ascaphus truei* tadpoles (Table 14). There were no barriers to upstream migrating fish in the lower reaches of the stream.

Bear Creek

Bear Creek enters the South Fork Boise River upstream of the Methodist Camp at River Mile 97. A fish survey was done on September 24, 1998 in UTM Z 11, 667,200 m E., 4,844,000 m N, which is approximately 2.3 km upstream of its confluence with the South Fork Boise River. Water temperature while electrofishing was 7°C at 1400 hours. Fish sampled in 165 m of stream include rainbow trout of wild origin, bull trout and mottled sculpin (Table 15). All of the bull trout sampled were juvenile fish. A habitat survey was done since bull trout were sampled at this site (Table 16). The U.S. Forest Service has documented bull trout to be present in this stream in previous surveys. There were no apparent barriers to upstream migrating fish from the South Fork Boise River.

Table 14. Species sampled with a single pass of electrofishing Barlow Creek, August 26, 1998.

Total length (mm)		Rainbow trout	Tailed frog tadpoles
10	Number		
	Avg wg (g)		
20	Number	1	
	Avg wt (g)		
30	Number	3	
	Avg wg (g)		
40	Number	22	
	Avg wt (g)		
110	Number	2	
	Avg wg (g)		
Total number measured:		28	0
Total number not measured:		0	2
Total number sampled:		28	2
Average length:		46	

Table 15. Fish sampled with a single pass of electrofishing Bear Creek, September 24, 1998.

Total length (mm)		Bull trout	Rainbow trout	Mottled sculpin
50	Number			3
	Avg wg (g)			
60	Number			6
	Avg wt (g)			
70	Number			9
	Avg wg (g)			
80	Number			6
	Avg wt (g)			
90	Number			4
	Avg wg (g)			
100	Number			1
	Avg wt (g)			
110	Number			1
	Avg wt (g)			
130	Number	1		
	Avg wt (g)	18		
140	Number	2		
	Avg wt (g)	24		
150	Number	4		
	Avg wt (g)	31		
160	Number	1	1	
	Avg wt (g)	33	42	
180	Number		1	
	Avg wt (g)		58	
190	Number		1	
	Avg wt (g)		84	
200	Number		1	
	Avg wt (g)		79	
210	Number		1	
	Avg wt (g)		85	
220	Number	1		
	Avg wt (g)	108		
270	Number		1	
	Avg wt (g)		244	
Total number measured:		9	6	30
Total number not measured:		0	0	0
Total number sampled:		9	6	30
Average length:		160	204	76

Table 16. Stream habitat survey summary for Bear Creek.

Site:	Z 11, 667,200 E., 4,844,000 N.		(All measurements are in meters)		
Date:	Sept. 24, 1998				
Channel type:	A - Moderately Entrenched, Stable Bank				
Avg. width:	4.47				
Transect interval:	15				
No. transects:	10				
Distance electrofished:	165				
Total surface area:	737.55 Sq. m				
Gradient (%):	6				
Habitat			Average depth		
%pool:	20.00		0.4		
%riffle:	46.67		0.2		
%run:	23.33		0.3		
%pocket:	10.00		0.2		
%backwater:	0.00		-		
Substrate					
%silt/sand:	13.12				
%gravel:	23.42				
%rubble:	42.52				
%boulder:	20.93				
%bedrock:	0.00				
Substrate by habitat type					
	%silt/sand	%gravel	%rubble	%boulder	%bedrock
Pool:	24.17	19.17	40.00	16.67	0.00
Riffle:	7.14	22.86	53.57	16.43	0.00
Run:	15.71	25.71	27.14	31.43	0.00
Pocket:	12.90	29.03	32.26	25.81	0.00
Backwater:	-	-	-	-	-
Comments					
Some bank undercuts up to 0.3 m deep are present. Large woody debris prevalent.					

Bowns Creek

Bowns Creek enters Big Smoky Creek approximately 2 stream km downstream of the U.S. Forest Service Big Smoky Guard Station. Fish were sampled with a single upstream pass of electrofishing at a site in UTM Z 11, 671,300 m E., 4,830,000 m N. Total length of stream sampled was 59 m, stream width averaged 1 m, and the stream bank was heavily vegetated with willows. Water temperature at time of sampling was 10°C at 1745 hours. There were seven rainbow trout of wild origin sampled ranging from 70 to 95 mm. The culvert immediately upstream of the Bowns Creek confluence with Big Smoky Creek is not a barrier to upstream migrating fish.

Calf Creek

Calf Creek enters Big Smoky Creek at the trailhead at the end of the Big Smoky Creek road. It was sampled on August 26, 1998 near its confluence with a single upstream pass of electrofishing in UTM Z11, 672,800 m E, 4,833,000 m N. The stream bank was heavily vegetated with willows overhanging the stream, thus we were able to electrofish only a few pools. Average stream width was 0.8 m and the map gradient was 10%. Sampling results were 6 rainbow trout of wild origin ranging from 30 to 100 mm and one tailed frog tadpole. There were no noted barriers to upstream migrating fish in lower Calf Creek.

Carrie Creek

Carrie Creek is a tributary to Little Smoky Creek and was sampled at two sites with a single upstream pass of electrofishing on August 19,1998. The lower site was in UTM Z 11, 681,000 m E, 4,824,800 m N. Total length of stream electrofished was 50 m, average stream width was 2.4 m, gradient was less than 1% and the substrate was composed primarily of silt and sand. Species sampled included rainbow trout of wild origin and mottled sculpin (Table 17).

The upper site was located in UTM Z 11, 683,000 m E, 4,830,300 m N. Water temperature at time of electrofishing was 12°C at 1500 hours. Total length of stream electrofished was 65 m, average width was 2.3 m, the gradient was 4% and the substrate was composed of boulder, rubble and gravel with a significant amount of silt and sand. Species sampled included rainbow trout of wild origin, one tailed frog and one tailed frog tadpole (Table 17).

Cayuse Creek

Cayuse Creek is a tributary to the Feather River, which enters the South Fork Boise River near Featherville at river mile 63. Cayuse Creek was sampled with a single upstream pass of electrofishing on September 16, 1998 in UTM Z 11, 645,500 m E, 4,836,000 m N, which is approximately 6.3 km upstream of its confluence with the Feather River. Total length of stream electrofished was 60 m, average stream width was 3.5 m, stream gradient was approximately 18%, the substrate was dominated by boulders and rubble and the water column was carrying a high suspended sediment load. Water temperature while electrofishing was 14°C at 1500 hours. A total of 33 rainbow trout of wild origin, 14 tailed frog tadpoles and 1 adult tailed frog were sampled (Table 18). A tributary entering Cayuse Creek approximately 1 km downstream of the sample reach passed through a culvert, which did not appear to be a barrier to upstream migrating fish. Another culvert approximately 2.5 km downstream of the sample reach on Cayuse Creek had a 0.3 m drop and a low gradient but did not appear to be a barrier to upstream migrating fish.

Table 17. Species sampled with a single pass of electrofishing two sites on Carrie Creek, August 19, 1998.

		Lower site		Upper site		
		Rainbow	Mottled	Rainbow	Tailed frog	
Total length (mm)		trout	sculpin	trout	Tadpole	Adult
90	Number			1		
100	Number			2		
130	Number	1		1		
140	Number	2		4		
150	Number			1		
160	Number	1		2		
190	Number	2				
Total number measured:		6	0	11	0	0
Total number not measured:		0	11	0	1	1
Total number sampled:		6	11	11	1	1
Average length:		161		135		

Table 18. Species sampled with a single pass of electrofishing Cayuse Creek, September 16, 1998.

			Tailed frog	
Total length (mm)		Rainbow trout	Tadpole	Adult
40	Number	4		
	Avg wt (g)			
60	Number	2		
	Avg wt (g)			
70	Number	2		
	Avg wt (g)			
80	Number	5		
	Avg wt (g)			
90	Number	6		
	Avg wt (g)			
100	Number	2		
	Avg wt (g)	11		
110	Number	2		
	Avg wt (g)	14		
120	Number	2		
	Avg wt (g)	18		
130	Number	1		
	Avg wt (g)	21		
140	Number	1		
	Avg wt (g)	25		
150	Number	2		
	Avg wt (g)	32		
160	Number	2		
	Avg wt (g)	47		
170	Number	2		
	Avg wt (g)	47		
Total number measured:		33	0	0
Total number not measured:		0	14	1
Total number sampled:		33	14	1
Average length:		101		

Five Points Creek

Five Points Creek enters Little Smoky Creek at the junction of the Couch Summit Road and the Dollar Hide Summit Road. It was sampled with a single upstream pass of electrofishing on August 20, 1998 in UTM Z 11, 676,300 m E, 4,823,300 m N, which is near its confluence with Little Smoky Creek. Total length of stream electrofished was 57 m. A complete habitat survey was conducted at the sample site (Table 19). Water temperature at time of electrofishing was 14°C at 1320 hours. Species sampled included 16 rainbow trout of wild origin, 8 mottled sculpin and 15 tailed frog tadpoles (Table 20). The culvert at the upstream boundary of the site did not appear to be a barrier to upstream migrating fish. Electrofishing 10 m of stream approximately 5 m upstream of the culvert revealed the presence of age 0 rainbow trout.

Table 19. Stream habitat survey summary for Five Points Creek.

Stream: Five Points Creek
Site: Z 11, 676,300 E., 4,823,300 N. (All measurements are in meters)
Date: August 20, 1998

Channel type:	A - Confined	
Avg. width:	2.26	
Transect interval:	10	
No. transects:	5	
Distance electrofished:	57 m	
Total surface area:	128.82 m^2	
Gradient (%):	5	
Habitat		Average depth
%pool:	13.33	0.3
%riffle:	46.67	0.1
%run:	33.33	0.2
%pocket:	6.67	0.1
%backwater:	0.00	-
Substrate		
%silt/sand:	27.67	
%gravel:	12.33	
%rubble:	48.67	
%boulder:	11.33	
%bedrock:	0.00	

Substrate by habitat type

	%silt/sand	%gravel	%rubble	%boulder	%bedrock
Pool:	90.00	0.00	10.00	0.00	0.00
Riffle:	7.86	12.86	67.86	11.43	0.00
Run:	36.00	18.00	46.00	0.00	0.00
Pocket:	0.00	5.00	5.00	90.00	0.00
Backwater:	-	-	-	-	-

Comments
Stream bank vegetation dense with a lot of overhead cover.

Table 20. Species sampled with a single pass of electrofishing Five Points Creek, August 20, 1998.

Total length (mm)		Rainbow trout	Mottled sculpin	Tailed frog tadpoles
30	Number	1		
50	Number		1	
60	Number	2	1	
70	Number	1	2	
80	Number	2	1	
90	Number	5	1	
100	Number		2	
110	Number	1		
120	Number	2		
140	Number	1		
180	Number	1		
Total number measured:		16	8	0
Total number not measured:		0	0	15
Total number sampled:		16	8	15
Average length:		96	80	

Grindstone Creek

Grindstone Creek enters Little Smoky Creek between Five Points Creek and Carrie Creek. It was sampled with a single upstream pass of electrofishing at three sites on August 19, 1998. Site 1 was in UTM Z 11, 680,100 m E, 4,825,600 m N. Total length of stream electrofished was 123 m. Water temperature at time of sampling was 10°C at 1030 hours. A complete habitat survey was completed at this site (Table 21). Species sampled included 17 rainbow trout of wild origin and 21 mottled sculpin (Table 22). A culvert at the lower end of the creek is not a barrier to upstream migrating fish, nor are there any apparent natural barriers upstream.

Site 2 was in UTM Z 11, 680,100 m E, 4,827,100 m N. Total length of stream electrofished was 50 m and average stream width was 2.75 m. Habitat at this site is similar to habitat at site 1 (Table 21). Species sampled included 8 rainbow trout of wild origin, 20 mottled sculpin and 1 tailed frog tadpole (Table 22).

Site 3 was on the West Fork of Grindstone Creek in UTM Z 11, 680,300 m E, 4,827,600 m N. Total stream length electrofished was 45 m, average stream width was 0.9 m and discharge was approximately 0.01 cms. Species sampled included 8 rainbow trout of wild origin, 31 mottled sculpin and 1 tailed frog tadpole (Table 22).

Table 21. Stream habitat survey summary for Site 1 on Grindstone Creek.

Stream:	Grindstone Creek					
Site:	Z 11, 680,100 E., 4,827,100 N.				(All measurements are in meters)	
Date:	August 19, 1998					
	Channel type:	B – Moderately Entrenched				
	Avg. width:	2.68				
	Transect interval:	25				
	No. transects:	5				
	Distance electrofished:	123				
	Total surface area:	329.64 m^2				
	Gradient (%):	2				
	Habitat			Average depth		
	%pool:	46.67		0.2		
	%riffle:	6.67		0.1		
	%run:	33.33		0.2		
	%pocket:	13.33		0.1		
	%backwater:	0.00		-		
	Substrate					
	%silt/sand:	51.67				
	%gravel:	28.67				
	%rubble:	12.00				
	%boulder:	7.67				
	%bedrock:	0.00				
	Substrate by habitat type					
		%silt/sand	%gravel	%rubble	%boulder	%bedrock
	Pool:	50.71	30.71	2.14	16.43	0.00
	Riffle:	5.00	80.00	15.00	0.00	0.00
	Run:	71.00	13.00	16.00	0.00	0.00
	Pocket:	30.00	35.00	35.00	0.00	0.00
	Backwater:	-	-	-	-	-
	Comments					
	Some bank damage from livestock.					

Table 22. Species sampled with a single pass of electrofishing three sites on Grindstone Creek, August 19, 1998.

		Site 1		Site 2			Site 3		
Total length (mm)		Rainbow trout	Mottled sculpin	Rainbow trout	Mottled sculpin	Tailed frog tadpole	Rainbow trout	Mottled sculpin	Tailed frog tadpole
0	Number				1	1		1	1
40	Number		7					1	
50	Number		4		2			2	
60	Number		3		1			2	
70	Number	1	4	1	1		2	3	
80	Number	1		1	2		1		
90	Number	3	2				1	1	
100	Number	4	1	2					
110	Number	2		1					
120	Number	1		1			1		
130	Number			1					
140	Number	2					1		
150	Number	1		1			1		
160	Number						1		
170	Number	1							
190	Number	1							
Total number measured:		17	21	8	7	0	8	10	0
Total number not measured:		0	0	0	13	1	0	21	1
Total number sampled:		17	21	8	20	1	8	31	1
Average length:		117	60	110	66		112	65	

Grouse Creek

Grouse Creek enters the South Fork Boise River at River Mile 59. Fish were sampled at one site each on the mainstem of Grouse Creek and on the Middle Fork of Grouse Creek. The mainstem site was located in UTM Z 11, 643,260 m E, 4,822,650 m N. It was sampled with a single pass of electrofishing on October 1, 1998 for the purpose of obtaining fin tissue samples for DNA analysis. The Middle Fork site was located in UTM Z 11, 646,780 m E, 4,823,350 m N. It was sampled on September 16, 1998 with a single upstream pass of electrofishing. The same site on the Middle Fork of Grouse Creek was sampled again on October 1, 1998 for the purpose of obtaining fin tissue samples for DNA analysis from 10 fish because the fish previously sampled appeared to be cutthroat trout or at least cutthroat trout and rainbow trout hybrids. DNA analysis run the University of Idaho's Hagerman Laboratory indicate that the fish are not cutthroat trout but are redband (rainbow) trout (M. Powell, University of Idaho, personal communication). Although the fish were classified as redband, they appear to be distinct from samples taken from streams in Owyhee County. Trout sampled ranged from 60 to 210 mm (Table 23). Water temperature was 12°C at time of sampling on September 16. Total length of stream sampled at the Middle Fork site was 82 m and average stream width was 1.7 m. Stream gradient was 3%. There is a barrier to upstream migrating fish at the mouth of Grouse Creek where the stream is diverted through a long culvert under a hot spring that has been developed into a swimming pool.

Lick Creek

Lick Creek is a tributary to Little Smoky Creek, entering approximately 1 km upstream of its confluence with Big Smoky Creek. Fish were sampled with a single upstream pass of electrofishing on a 78 m reach of stream in UTM Z 11, 674,000 m E, 4,831,000 m N. Average stream width at this site was 1.8 m. Species sampled included 8 brook trout, 21 rainbow trout of wild origin, and 28 mottled sculpin (Table 24). Brook trout have never been previously documented in Lick Creek. They may have migrated into the drainage from nearby Paradise Creek where they are known to have been present for several years. There are no known barriers to upstream migrating fish from Little Smoky Creek into Lick Creek.

Little Smoky Creek

Four sites on Little Smoky Creek were sampled with a single pass of electrofishing on August 19 and 20, 1998. The lowermost site (Site 1) was located in UTM Z 11, 672,400 m E, 4,830,300 m N, which is a few hundred meters downstream of the Lick Creek confluence. Total length of stream electrofished was 173 m, average stream width was 10 m and water temperature at time of sampling was 14°C at 1015 hours. This site was within a meandering low gradient reach (less than 1%) with the substrate composed mostly of gravel, sand and silt. Willows and grasses dominated the riparian zone. Species sampled included 12 wild rainbow trout, 2 hatchery rainbow trout, 2 mountain whitefish, 7 bridgelip sucker, 5 mottled sculpin and 8 longnose dace (Appendix C).

Table 23. Rainbow trout sampled with a single pass of electrofishing two sites in the Grouse Creek drainage.

		Grouse Creek	Middle Fork Grouse Creek	
Total length (mm)		Oct. 1, 1998[a]	Sept. 16, 1998	Oct. 1, 1998[a]
60	Number		3	
	Avg wt (g)			
70	Number		5	
	Avg wt (g)			
80	Number		4	
	Avg wt (g)			
90	Number		8	
	Avg wt (g)			
100	Number		5	
	Avg wt (g)		9	
110	Number	1	4	2
	Avg wt (g)	10	13	10
120	Number	2	6	1
	Avg wt (g)	10	13	12
130	Number	1	4	
	Avg wt (g)	50	19	
140	Number	1	5	2
	Avg wt (g)	18	22	22
150	Number	2	8	2
	Avg wt (g)	25	28	25
160	Number		3	1
	Avg wt (g)		34	34
170	Number	2	1	1
	Avg wt (g)	40	37	38
180	Number	1	1	1
	Avg wt (g)	50	47	43
190	Number		1	
	Avg wt (g)		65	
210	Number		1	
	Avg wt (g)		74	
Total number measured:		10	59	10
Total number not measured:		0	0	0
Total number sampled:		10	59	10
Average length:		145	119	145

[a] Samples taken for DNA analysis.

Table 24. Fish sampled with a single pass of electrofishing Lick Creek, August 26, 1998.

Total length (mm)		Brook trout	Rainbow trout	Mottled sculpin
30	Number		1	
40	Number		4	3
50	Number			12
60	Number	1	1	
70	Number	3	1	3
80	Number	1	1	4
90	Number		1	4
100	Number		3	2
110	Number		1	
120	Number		1	
130	Number		1	
140	Number		1	
150	Number		1	
190	Number	1		
210	Number	1	3	
240	Number		1	
260	Number	1		
Total number measured:		8	21	28
Total number not measured:		0	0	0
Total number sampled:		8	21	28
Average length:		129	112	66

Site 2 was located in UTM Z 11, 675,500 m E, 4,826,300 m N. Total length of stream electrofished was 74 m. Average stream width was 9.3 m and habitat was similar to Site 1. Species sampled included 17 wild rainbow trout, 3 hatchery rainbow trout, 5 mountain whitefish, 7 bridgelip sucker, 8 mottled sculpin and 3 longnose dace (Appendix C).

Site 3 was located in UTM Z 11, 678,600 m E, 4,825,300 m N. Total length of stream electrofished was 96 m. Water temperature at time of electrofishing was 21°C at 1800 hours. Average stream width was 6.2 m and habitat was similar to Site 1. Species sampled included 11 wild rainbow, 6 hatchery rainbow trout, 9 bridgelip sucker, 4 longnose dace, 1 redside shiner and 1 speckled dace *Rhinichthys osculus* (Appendix C).

Site 4 was located in UTM Z 11, 687,600 m E, 4,823,700 m N. Total length of stream electrofished was 96 m. Average stream width was 3.0 m and instream habitat was composed mostly of runs with sand and gravel substrate and willows dominated streamside vegetation. Species sampled included 8 wild rainbow trout and 21 mottled sculpin (Appendix C).

Miller Creek

Miller Creek is a small stream entering Big Smoky Creek near its confluence with the South Fork Boise River approximately at river mile 87. The Miller Creek confluence is a low gradient marsh with no defined stream channel. A 35 m section of Miller Creek was sampled

with a single upstream pass of electrofishing on August 26, 1998 in UTM Z 11, 670,463 m E, 4,829,177 m N. The water temperature was 10°C when sampled at 1530 hours, the average stream width was 1.5 m, and the stream bank vegetation was dense and composed mostly of willows. Species sampled include four young-of-the-year rainbow trout and one tailed frog tadpole.

Parks Creek

Parks Creek is a high gradient tributary to Trinity Creek, neither of which has had bull trout presence documented in recent surveys. Three sites on Parks Creek were sampled by electrofishing. Site 1 was 100 m long and located near its confluence with Trinity Creek in UTM Z 11, 634,200 m E, 4,831,800 m N. It was sampled on September 17, 1998 with a single upstream pass of electrofishing. The stream is in a deeply incised canyon with large boulders and woody debris. The average stream width was 3.25 m with a gradient of 15%. Water temperature at time of sampling was 11°C at 1245 hours. The only species sampled were 23 wild rainbow trout (Table 25).

Site 2 was 85 m long and located in UTM Z 11, 633,800 m E., 4,831,400 m N. It was sampled on September 17, 1998 with a single upstream pass of electrofishing. Habitat was similar to that of Site 1. Average stream width was 3.25 m. Water temperature at time of sampling was 10°C at 1030 hours. The only species sampled were 24 wild rainbow trout (Table 25).

Site 3 was 32 m long and located in UTM Z 11, 633,900 m E, 4,826,500 m N. It was sampled on August 27, 1998 with a single upstream pass of electrofishing. Average stream width was 2.5 m, streamside vegetation was dense and there was an abundance of large woody debris and in the stream channel. Water temperature at time of sampling was 8°C at 1220 hours. Species sampled included three wild rainbow trout and one tailed frog tadpole (Table 25).

Stream gradient is highly variable with the lowermost reaches of Parks Creek exceeding 5%. There are numerous natural log drop structures throughout the stream, some of them possibly creating upstream migration barriers.

Sublett Creek

Sublett Creek is one of two main tributaries flowing into Sublett Reservoir, an irrigation storage reservoir on the west side of the Sublett Mountain range. Most of Sublett Creek flow is spring water with some spring snow melt. Sublett Creek was surveyed in late June 1998 as part of a basin-wide fishery survey that included a lowland lakes survey on Sublett Reservoir (see Lowland Lakes Investigations, this report). Sublett Creek is not stocked but is known to have a game fish population that may include resident fish and fish that migrate upstream from Sublett Reservoir to spawn. Fishing rules in Sublett Creek allow the harvest of two trout with no exceptions to restrictions on fishing gear or the general seasons on rivers and streams.

Table 25. Species sampled with a single pass of electrofishing Parks Creek at sites 1 and 2 on September 17, 1998 and Site 3, August 27, 1998.

		Site 1	Site 2	Site 3	
Total length (mm)		Rainbow trout	Rainbow trout	Rainbow trout	Tailed frog tadpoles
50	Number		1		
	Avg wt (g)				
70	Number		3		
	Avg wt (g)				
80	Number	3	1		
	Avg wt (g)		7		
90	Number	1			
	Avg wt (g)				
100	Number		1		
	Avg wt (g)	12	12		
110	Number	2	5		
	Avg wt (g)	15	15		
120	Number	1	2		
	Avg wt (g)	18	20		
130	Number	2	1		
	Avg wt (g)	24	25		
140	Number		2		
	Avg wt (g)		29		
150	Number	1	1		
	Avg wt (g)	31	38		
160	Number	5	3		
	Avg wt (g)	42	44		
170	Number	2	2	1	
	Avg wt (g)	49	47		
180	Number	3	2		
	Avg wt (g)	66	61		
190	Number	1		1	
	Avg wt (g)	73			
200	Number			1	
	Avg wt (g)				
Total number measured:		23	24	3	0
Total number not measured:		0	0	0	1
Total number sampled:		23	24	3	1
Average length:		139	127	187	

Four sites on Sublett Creek were surveyed, which included sampling fish with a backpack electroshocker and habitat surveys on June 23 and 25, 1998. The survey included population estimates with a removal depletion method where enough fish were sampled in the first pass of electrofishing to warrant making a second pass. Site 1 (the lowermost) was located within the Sawtooth National Forest boundary approximately 2 stream km upstream of the maximum reservoir level of Sublett Reservoir. Site 2 was located at the campground approximately 3 stream km upstream of the reservoir. Site 3 was on the North Fork of Sublett Creek approximately 1.25 km upstream of the South Fork confluence. Site 4 was on the Station Fork tributary to the North Fork of Sublett Creek approximately 220 m upstream of the U.S. Forest Service guard station. Habitat survey results for all four sites are given in Appendix D. Brown trout were sampled at sites 1 and 2 and rainbow trout and mottled sculpin were sampled at sites 1, 2 and 3 (Table 26). No fish were sampled at Site 4. Two passes were made only at Site 1 for a population and density estimate for brown and rainbow trout $\geq$100 mm. Total trout density was estimated to be 14 fish/100 m^2 (Table 27).

Survey results indicate that brown trout successfully move upstream at least 3 km from Sublett Reservoir for spawning and early rearing. Rainbow trout are present in smaller numbers in Sublett Creek but it is unknown if most of them are resident fish or offspring from migratory reservoir fish. The presence of wild brown trout and rainbow trout indicate suitable spawning and early rearing habitat although much of the stream is silt-laden and the riparian zone has been heavily grazed in some areas with very little overhead cover. The absence of riparian overhead cover appears to have resulted in an abundance of aquatic vegetation dominated by watercress *Rorippa nasturtium* which grows particularly well in this spring-fed system.

Willow Creek

Willow Creek flows southward from the Smoky Mountains entering Camas Creek approximately 8 km upstream of Magic Reservoir. The upper one-third of Willow Creek flows through the Sawtooth National Forest, and the reach downstream from the Cherry Creek confluence flows through private property. Hal McNee, the property owner immediately downstream from the Cherry Creek confluence, has been attempting to reestablish a riparian community after extensive grazing several years ago caused extensive stream bank erosion. He has allowed various state and federal conservation agencies and schools to monitor the riparian vegetation and fishery there. On November 17, 1998 Fish and Game personnel and students from Fairfield High School conducted a fish and stream habitat survey on McNee's property.

Fish were sampled at a single 50 m section with two upstream passes with the backpack shocker for a two-pass removal population estimate (Seber and LeCren, 1967). Approximately two-thirds of the section was compcsed of a pool-riffle complex and the remaining one-third was a beaver pond. The average width of the pool-riffle complex was 6.8 m and the average width of the beaver pond was 13.8 m. Water temperature at the time of sampling was 5°C at 1430 hours. A total of 89 rainbow trout and 1 Wood River sculpin *Cottus leiopomus* were sampled (Table 28). Rainbow trout density was estimated to be 20/100 m^2. The wild trout population appears to be increasing with the return of higher stream flows in the mid- to late-1990s. The riparian zone also appears to be rejuvenating due to fencing and an apparent change in land management practices.

Table 26. Fish sampled by electrofishing three sites at Sublett Creek, June 23–26, 1998.

		Site 1		
Total length (mm)		Brown trout	Rainbow trout	Mottled sculpin
40	Number	2		
	Avg. wt (g)			
50	Number	12		
	Avg. wt (g)			
60	Number	11		9
	Avg. wt (g)			
70	Number			7
	Avg. wt (g)			
80	Number			3
	Avg. wt (g)			
90	Number			7
	Avg. wt (g)			
110	Number		2	
	Avg. wt (g)			
120	Number		2	1
	Avg. wt (g)		24	
130	Number		3	
	Avg. wt (g)		24	
140	Number	1	1	
	Avg. wt (g)			
150	Number		1	
	Avg. wt (g)			
160	Number	6		
	Avg. wt (g)			
170	Number	2		
	Avg. wt (g)	53		
180	Number	2	2	
	Avg. wt (g)			
190	Number	4	1	
	Avg. wt (g)	75	86	
200	Number	1		
	Avg. wt (g)	84		
210	Number	2	1	
	Avg. wt (g)	100		
230	Number		1	
	Avg. wt (g)			
Total number measured:		43	14	27
Total number not measured:		0	0	33
Total number sampled:		43	14	60
Average length:		108	154	77

Table 26. Continued.

Total length (mm)		Site 2 Brown trout	Site 2 Rainbow trout	Site 2 Mottled sculpin
60	Number	1		6
	Avg. wt (g)			
70	Number	1		2
	Avg. wt (g)			
80	Number			3
	Avg. wt (g)			
90	Number			1
	Avg. wt (g)			
130	Number		1	
	Avg. wt (g)		20	
140	Number		3	
	Avg. wt (g)		27	
180	Number	1		
	Avg. wt (g)	60		
190	Number	1		
	Avg. wt (g)	90		
200	Number	2		
	Avg. wt (g)	91		
210	Number	1		
	Avg. wt (g)	102		
320	Number	1		
	Avg. wt (g)	395		
370	Number	1		
	Avg. wt (g)	585		
Total number measured:		9	4	12
Total number not measured:		0	0	0
Total number sampled:		9	4	12
Average length:		202	138	71

Total Length (mm)		Site 3 Rainbow trout	Site 3 Mottled sculpin
60	Number		1
	Avg. wt (g)		
70	Number		2
	Avg. wt (g)		
150	Number	1	
	Avg. wt (g)	40	
Total number measured:		1	3
Total number not measured:		0	0
Total number sampled:		1	3
Average length:		155	70

Table 27. Population and density estimates of fish sampled from Site 1 at Sublett Creek, June 25, 1998.

	Brown trout ≥100 mm	Rainbow trout ≥100 mm
Number sampled in first pass	15	14
Number sampled in second pass	3	0
Population est. +/- 95% CI	19 +/- 2.6	14 +/- 0.0
Number per 100 m^2	8 +/- 1.1	6 +/- 0.0

Table 28. Fish sampled, population and density estimates made with two passes of electrofishing Willow Creek, November 17, 1998.

Total length (mm)		Rainbow trout (Age 0)	Rainbow trout (Age 1+)	Sculpin Species
50	Number	5		
60	Number	19		
70	Number	8		
80	Number	1		
90	Number		1	
100	Number		6	1
110	Number		4	
120	Number		5	
130	Number		4	
140	Number		3	
160	Number		1	
180	Number		1	
190	Number		1	
210	Number		1	
220	Number		1	
Total number measured:		33	28	1
Total number not measured:		28	0	0
Total number sampled:		61	28	1
Average length:		64	134	100

Population estimate	Rainbow trout age 0	Rainbow trout age 1+	Rainbow trout All ages
Number sampled in first pass	34	22	55
Number sampled in second pass	20	5	25
Population est. +/- 95% CI	82 +/- 50	28 +/- 4	101 +/- 27
Number per 100 m^2	16.6	5.7	20.5

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APPENDICES

Appendix A. Fish sampled with a single electrofishing pass in the Snake River near Buhl, Idaho during daytime, September 3, 1998.

Total length (mm)		Chiselmouth	Common carp	Largescale sucker	Rainbow trout	Redside shiner	Northern pikeminnow
30	Number					4	
	Avg wt (g)						
40	Number			1		7	1
	Avg wt (g)					1	
50	Number			1		82	1
	Avg wt (g)					2	
60	Number					25	
	Avg wt (g)					2	
70	Number	1		1		2	
	Avg wt (g)	4					
80	Number					5	
	Avg wt (g)						
90	Number	1				10	4
	Avg wt (g)					5	6
100	Number					14	
	Avg wt (g)					6	
110	Number		1			6	2
	Avg wt (g)		24			11	12
120	Number				1	3	
	Avg wt (g)				20	14	
130	Number					2	
	Avg wt (g)					22	
140	Number	2				1	
	Avg wt (g)	25				38	
150	Number						4
	Avg wt (g)						34

Appendix A. Continued.

Total length (mm)		Chiselmouth	Common carp	Largescale sucker	Rainbow trout	Redside shiner	Northern pikeminnow
160	Number	1					2
	Avg wt (g)	40					36
170	Number						1
	Avg wt (g)						42
180	Number	1					1
	Avg wt (g)	60					43
210	Number	1					1
	Avg wt (g)	85					
220	Number			1			
	Avg wt (g)						
240	Number						1
	Avg wt (g)						
250	Number						1
	Avg wt (g)						136
270	Number						1
	Avg wt (g)						
280	Number						1
	Avg wt (g)						
300	Number						2
	Avg wt (g)						243
320	Number			1			
	Avg wt (g)						
330	Number			1			
	Avg wt (g)						
360	Number			1			2

Appendix A. Continued.

Total length (mm)		Chiselmouth	Common carp	Largescale sucker	Rainbow trout	Redside shiner	Northern pikeminnow
	Avg wt (g)						460
370	Number			3			3
	Avg wt (g)			525			480
380	Number						1
	Avg wt (g)						
390	Number			3			2
	Avg wt (g)			700			
400	Number			1			
	Avg wt (g)						
410	Number						1
	Avg wt (g)						
420	Number			3			1
	Avg wt (g)			850			680
430	Number			3			
	Avg wt (g)			768			
440	Number			2			1
	Avg wt (g)						780
450	Number			5			
	Avg wt (g)			950			
460	Number			5			
	Avg wt (g)			1,000			
470	Number			6			1
	Avg wt (g)			1,100			
480	Number			4			1
	Avg wt (g)			1,125			
490	Number			4			

Appendix A. Continued.

Total length (mm)		Chiselmouth	Common carp	Largescale sucker	Rainbow trout	Redside shiner	Northern pikeminnow
	Avg wt (g)						
500	Number			6			
	Avg wt (g)			1,250			
510	Number			5			
	Avg wt (g)			1,200			
520	Number		1	5			1
	Avg wt (g)		2,380	1,600			
530	Number			4			
	Avg wt (g)			1,250			
540	Number			1			
	Avg wt (g)			1,800			
550	Number			2			
	Avg wt (g)						
560	Number			1			
	Avg wt (g)						
570	Number		1	1			1
	Avg wt (g)		3,500	1,700			1,800
Total number measured:		7	3	71	1	161	38
Total number not measured:		0	0	0	0	0	0
Total number sampled:		7	3	71	1	161	38
Average length:		144	400	449	125	67	268

Appendix B. Fish sampled with a single pass electrofishing the Snake River near Twin Falls, Idaho during daytime, August 31 and September 1, 1998.

Total length (mm)		Bridgelip sucker	Chiselmouth	Common carp	Largemouth bass	Largescale sucker	Redside shiner	Smallmouth bass	Northern pikeminnow	Tilapia sp.	Yellow perch
40	Number			1			3				
	Avg wt (g)										
50	Number			1	12	1	17	2			
	Avg wt (g)							4			
60	Number			2	3			6	1		
	Avg wt (g)										
70	Number			1	1			3			
	Avg wt (g)			4				4			
80	Number						5	2			
	Avg wt (g)						7				
90	Number		1	1			9	1	1		
	Avg wt (g)		5	11			6	10			
100	Number		1				2		2		
	Avg wt (g)		7				6		9		
110	Number								2		
	Avg wt (g)										
120	Number							1			
	Avg wt (g)							24			
130	Number						1		2		
	Avg wt (g)						22				
140	Number						1				
	Avg wt (g)						19				
150	Number								1		
	Avg wt (g)								22		
170	Number					1				1	
	Avg wt (g)					49				108	
180	Number							1	1		
	Avg wt (g)							80			

Appendix B. Continued.

Total length (mm)		Bridgelip sucker	Chiselmouth	Common carp	Largemouth bass	Largescale sucker	Redside shiner	Smallmouth bass	Northern pikeminnow	Tilapia sp.	Yellow perch
190	Number					1			2	2	
	Avg wt (g)								50		
200	Number								2		
	Avg wt (g)										
210	Number								5	1	
	Avg wt (g)								65	170	
220	Number								2		
	Avg wt (g)										
230	Number				1	1			3		
	Avg wt (g)				200				101		
240	Number				1				4		1
	Avg wt (g)				200				120		200
250	Number								5		
	Avg wt (g)								117		
260	Number								4		
	Avg wt (g)								143		
270	Number					1			4		
	Avg wt (g)										
280	Number								4		
	Avg wt (g)								175		
290	Number					1		3			
	Avg wt (g)					270		357			
300	Number					2			4		
	Avg wt (g)					285			225		
310	Number								2		
	Avg wt (g)								260		

Appendix B. Continued.

Total length (mm)		Bridgelip sucker	Chiselmouth	Common carp	Largemouth bass	Largescale sucker	Redside shiner	Smallmouth bass	Northern pikeminnow	Tilapia sp.	Yellow perch
320	Number	1			1	4		1	3		
	Avg wt (g)	320			505	337		410			
330	Number				1	2					
	Avg wt (g)				565	430					
340	Number					4		1	3		
	Avg wt (g)					413		710	315		
350	Number					4			2		
	Avg wt (g)								370		
360	Number	1			1	6			2		
	Avg wt (g)	510			800	540			350		
370	Number					8			1		
	Avg wt (g)					500					
380	Number					4					
	Avg wt (g)					542					
390	Number					2			1		
	Avg wt (g)								470		
400	Number					7					
	Avg wt (g)					755					
410	Number					5					
	Avg wt (g)					738					
420	Number					10					
	Avg wt (g)					765					
430	Number			1		12			1		
	Avg wt (g)					775			750		
440	Number			2		16					
	Avg wt (g)			1,110		870					

Appendix B. Continued.

Total length (mm)		Bridgelip sucker	Chiselmouth	Common carp	Largemouth bass	Largescale sucker	Redside shiner	Smallmouth bass	Northern pikeminnow	Tilapia sp.	Yellow perch
450	Number			2		8					
	Avg wt (g)					943					
460	Number			4		8					
	Avg wt (g)			1,400							
470	Number			2		2					
	Avg wt (g)			1,700							
480	Number			10		1					
	Avg wt (g)			1,775							
490	Number			5		2					
	Avg wt (g)					1,500					
500	Number			1	1	2			1		
	Avg wt (g)								1,100		
510	Number	1		6		1					
	Avg wt (g)					1,425					
520	Number			4		4					
	Avg wt (g)					1,200					
530	Number			5							
	Avg wt (g)			2,100							
540	Number			3		3					
	Avg wt (g)					1,420					
560	Number			5							
	Avg wt (g)			2,633							
570	Number			1							
	Avg wt (g)										
580	Number			1							
	Avg wt (g)										

Appendix B. Continued.

Total length (mm)		Bridgelip sucker	Chiselmouth	Common carp	Largemouth bass	Largescale sucker	Redside shiner	Smallmouth bass	Northern pikeminnow	Tilapia sp.	Yellow perch
590	Number			1							
	Avg wt (g)										
600	Number			1							
	Avg wt (g)										
640	Number			1							
	Avg wt (g)			3,600							
680	Number			1							
	Avg wt (g)			4,000							
Total number measured:		3	2	62	22	123	38	21	65	4	1
Total number not measured:		0	0	0	0	0	0	0	0	0	0
Total number sampled:		3	2	62	22	123	38	21	65	4	1
Average length:		397	95	469	131	409	73	133	255	191	245

Appendix C. Fish sampled with a single pass of electrofishing four sites on Little Smoky Creek, August 19 and 20, 1998.

	Site 1					
Total length (mm)	Rainbow trout (wild)	Rainbow trout (hatchery)	Mountain whitefish	Bridgelip sucker	Mottled sculpin	Longnose dace
40						1
50					1	1
60				1		2
70				1		2
80			1	2	2	2
90	2		1	2		
100	2			1	2	
110	1					
140	2					
150	1					
160	1					
180	2					
240	1	1				
260		1				
Total number measured:	12	2	2	7	5	8
Total number not measured:	0	0	0	0	0	0
Total number sampled:	12	2	2	7	5	8
Average length:	142	252	88	84	85	68

Appendix C. Continued.

	Site 2					
Total length (mm)	Rainbow trout (wild)	Rainbow trout (hatchery)	Mountain whitefish	Bridgelip sucker	Mottled sculpin	Longnose dace
60					1	
70					2	2
80				1	3	
90				1	1	1
100	1			1	1	
110	4			2		
120	2			1		
130	1			1		
140	2					
190	1					
200	2					
210	2					
220		1	1			
230	2					
240		1	1			
250			2			
300			1			
Total number measured:	17	2	5	7	8	3
Total number not measured:	0	1	0	0	0	0
Total number sampled:	17	3	5	7	8	3
Average length:	159	232	255	108	81	80

Appendix C. Continued.

	Site 3					
Total length (mm)	Rainbow trout (wild)	Rainbow trout (hatchery)	Bridgelip sucker	Longnose dace	Redside shiner	Speckled dace
40	1					
50				1		
60				3		1
70			2			
80	1		2			
90			3			
100	1		2		1	
110	1					
120	1					
130	2					
150	1					
180	1					
190	1					
200		1				
230		2				
240	1	1				
250		1				
Total number measured:	11	6	9	4	1	1
Total number not measured:	0	0	0	0	0	0
Total number sampled:	11	6	9	4	1	1
Average length:	136	238	88	60	105	60

Appendix C. Continued.

	Site 4	
Total length (mm)	Rainbow trout (wild)	Mottled sculpin
60		3
70	1	1
80	1	2
90	1	2
100	1	
110		2
140	1	
160	2	
220	1	
Total number measured:	8	10
Total number not measured:	0	11
Total number sampled:	8	21
Average length:	131	84

Appendix D. Stream habitat survey summaries for four sites on Sublett Creek.

Site: Z 11 334,450 E, 4,687,775 N (Site 1) (All measurements are in meters)

Date: June 25, 1998

Channel type:	E, Low gradient, Meandering	
Avg. width:	2.9	
Transect interval:	15	
No. transects:	5	
Distance electrofished:	80	
Total surface area:	232 m^2	
Gradient (%):	2	
Habitat		Average depth
%pool:	6.7	0.4
%riffle:	13.3	0.2
%run:	33.3	0.3
%pocket:	40.0	0.2
%backwater:	6.7	0.3
Substrate		
%silt/sand:	52.0	
%gravel:	32.3	
%rubble:	15.7	
%boulder:	0.0	
%bedrock:	0.0	

Substrate by habitat type

	%silt/sand	%gravel	%rubble	%boulder	%bedrock
Pool:	50.0	30.0	20.0	0.0	0.0
Riffle:	0.0	75.0	25.0	0.0	0.0
Run:	18.0	49.0	33.0	0.0	0.0
Pocket:	90.0	10.0	0.0	0.0	0.0
Backwater:	100.0	0.0	0.0	0.0	0.0

Comments: Dense willow growth in riparian zone.

Appendix D. Continued.

Site: Z 11 335,025 E, 4,687,850 N (Site 2) (All measurements are in meters)

Date: June 23, 1998

Channel type:	E, Low gradient, Meandering	
Avg. width:	4.6	
Transect interval:	5	
No. transects:	10	
Distance electrofished:	68	
Total surface area:	312.8 m^2	
Gradient (%):	1	
Habitat		Average depth
%pool:	10	0.4
%riffle:	0	-
%run:	40	0.4
%pocket:	0	-
%backwater:	50	0.3
Substrate		
%silt/sand:	95.2	
%gravel:	4.8	
%rubble:	0.0	
%boulder:	0.0	
%bedrock:	0.0	

Substrate by habitat type

	%silt/sand	%gravel	%rubble	%boulder	%bedrock
Pool:	98.3	1.7	0.0	0.0	0.0
Riffle:	-	-	-	-	-
Run:	88.3	11.7	0.0	0.0	0.0
Pocket:	-	-	-	-	-
Backwater:	100.0	0.0	0.0	0.0	0.0

Comments: Dense willow growth in riparian zone.

Appendix D. Continued.

Site: 11 336,000 E, 4,688,700 N (Site 3) (All measurements are in meters)

Date: June 25, 1998

Channel type:	B, Moderately entrenched, Low gradient	
Avg. width:	2.03	
Transect interval:	10	
No. transects:	10	
Distance electrofished:	103	
Total surface area:	209.09 m^2	
Gradient (%):	3	
Habitat		Average depth
%pool:	10.0	0.1
%riffle:	13.3	0.2
%run:	40.0	0.2
%pocket:	6.7	0.2
%backwater:	30.0	0.1
Substrate		
%silt/sand:	59.8	
%gravel:	34.3	
%rubble:	1.7	
%boulder:	4.2	
%bedrock:	0.0	

Substrate by habitat type

	%silt/sand	%gravel	%rubble	%boulder	%bedrock
Pool:	78.3	21.7	0.0	0.0	0.0
Riffle:	45.0	55.0	0.0	0.0	0.0
Run:	47.8	37.6	4.2	10.5	0.0
Pocket:	70.0	30.0	0.0	0.0	0.0
Backwater:	74.4	25.6	0.0	0.0	0.0

Comments: Dense watercress-like aquatic vegetation in approximately 25% of wetted stream channel.

Appendix D. Continued.

Site: Z 11 337,900 E, 4,690,775 N (Site 4) (All measurements are in meters)

Date: June 24, 1998

Channel type:	B, Moderately entrenched, Low gradient	
Avg. width:	0.9	
Transect interval:	10	
No. transects:	10	
Distance electrofished:	135	
Total surface area:	121.5 m^2	
Gradient (%):	2	
Habitat		Average depth
%pool:	0.0	-
%riffle:	63.3	0.1
%run:	16.7	0.1
%pocket:	3.3	0.1
%backwater:	16.7	0.1
Substrate		
%silt/sand:	26.0	
%gravel:	67.7	
%rubble:	6.3	
%boulder:	0.0	
%bedrock:	0.0	

Substrate by habitat type

	%silt/sand	%gravel	%rubble	%boulder	%bedrock
Pool:	-	-	-	-	-
Riffle:	17.6	76.1	6.3	0.0	0.0
Run:	35.0	55.0	10.0	0.0	0.0
Pocket:	10.0	90.0	0.0	0.0	0.0
Backwater:	52.0	44.0	4.0	0.0	0.0

Comments: No riparian overhead cover present, only grasses.

1998 ANNUAL PERFORMANCE REPORT

State of: Idaho

Program: Fisheries Management F-71-R-23

Project II: Technical Guidance

Subproject: II-E-Magic Valley Region

Contract Period: July 1, 1998 to June 30, 1999

ABSTRACT

Magic Valley Region fishery management personnel furnished verbal and written comments of technical guidance to other agencies, consultants, and private individuals and organizations. Fishing information was provided to anglers in the forms of brochures, angler guides, public meetings, news releases, telephone and in person.

Many miscellaneous activities were commented on, participated in, or otherwise addressed, and numerous meetings regarding fisheries were attended.

Regional fishery personnel investigated five different fish kills in 1998, which included one mid-summer and two winter low oxygen events. An electrical water pump short killed 45 brook trout *Salvelinus fontinalis* in Antelope Springs. A deliberate dump of ammonia into an irrigation drain flowing into the Little Wood River resulted in the loss of more than 65,000 fish, primarily native nongame species.

Author:

Fred E. Partridge
Regional Fishery Manager

OBJECTIVES

To provide current fisheries and habitat information and recommendations as needed to Department habitat specialists or to state, federal, and private parties contemplating projects with the potential to affect fish.

To provide technical fish and habitat management advice to public and private landowners and other agencies in order to sustain or enhance fish resources.

METHODS

Reviews, field inspections, comments, expertise, and recommendations were furnished to all governmental agencies, private organizations, consultants and individuals upon request. We participated in meetings, tours, and gave presentations where requested or necessary. Expertise on regional fisheries was provided to the regional environmental coordinator to assist in commenting on the numerous habitat-related projects in the region.

FINDINGS

Magic Valley regional fishery management personnel collected data, inspected, commented on and\or provided advice regarding the following major projects in 1998:

Public information - Prepared and provided input on regional fishing, recreation and public access in various forms including 1-800-ASKFISH service and as requested by public, students, media and organized fishing clubs. Provided information to local fishing clubs and elementary school classes on regional fisheries and basic habitat needs of fish in the Magic Valley Region.

Threatened and species of concern – Collected data, summarized collecting permit reports and provided information to the U.S. Forest Service, Bureau of Land Management, Bureau of Reclamation, U.S. Fish and Wildlife Service, Idaho Division of Environmental Quality, and Nevada Department of Wildlife on bull trout *Salvelinus confluentus* in the South Fork Boise and Jarbidge river drainages. Also provided information on native rainbow (redband) trout *Oncorhynchus mykiss gairdneri* and Yellowstone cutthroat trout *O. clarki bouvieri*.

Agency assistance - Regional fishery personnel provided equipment and assistance to U.S. Geological Service, Idaho Division of Environmental Quality, U.S. Forest Service and Bureau of Land Management in the collection of fish to provide long term monitoring of water quality conditions in rivers and streams and to document the presence or absence of fish species.

Fish kills – Regional personnel responded to five reports of dead fish during the year. Two partial die offs were winter mortality related resulting in numbers of dead fish being observed after ice melted at Mormon Reservoir and Carey Lake. Both systems are fairly

shallow and heavily vegetated, and dissolved oxygen levels are normally quite low during most winters. A report of dead fish in Magic Reservoir turned out to be the remains of a large number of filleted yellow perch *Perca flavescens*. In September, approximately 45 brook trout *Salvelinus fontinalis* valued at $48 were killed from an electrical short on a pump in Antelope Springs near Salmon Falls Creek Dam. The most significant fish kill occurred in the Little Wood River on September 2, 1998. This fish kill was the result of a deliberate release of refrigerant ammonia from the Avonmore cheese plant at Richfield into an irrigation drain. The ammonia impacted fish populations from the point the drain entered the Little Wood River downstream for up to 19 km. The minimum estimated loss was 65,000 fish, primarily nongame species. Game species lost were estimated at 370 brown trout *Salmo trutta* and 180 rainbow trout. Total value of lost fish based on the American Fisheries Society's Investigation and Valuation of Fish Kills handbook was $22,400. Recreational lost was estimated at $22,500.

1998 ANNUAL PERFORMANCE REPORT

State of: Idaho

Program: Fisheries Management F-71-R-23

Project III: Habitat Management

Subproject: III-E - Magic Valley Region

Contract Period: July 1, 1998 to June 30, 1999

ABSTRACT

Approximately 15 m^3 of 2.5 to 5 cm washed river gravel was placed in two sites on Butte Creek below Hayspur Fish Hatchery for instream spawning of wild trout.

Design suggestions were provided to the Idaho Department of Transportation on pond and wetland developments at their Clear Lakes Grade project adjacent to the Snake River. Ponds, when completed, will provide an additional site for a put-and-take fishery along with waterfowl habitat.

A good water year resulted in some spill from Mormon Reservoir. Loss of fish from the reservoir was reduced with the installation of a temporary fish weir in the spillway.

Scheduling problems delayed installation of a culvert passage structure on the Feather River, tributary to the South Fork Boise River, for bull trout *Salvelinus confluentus* passage.

Author:

Fred E. Partridge
Regional Fishery Manager

OBJECTIVES

Construct riparian or improved pasture fencing on degraded streams on private property with good potential to enhance wild trout recruitment.

Provide upstream and downstream fish passage in key wild trout spawning and recruitment streams.

Create improved and additional small pond fishing opportunities in areas of easy access.

METHODS

Work with federal, state and private land management groups to select sites and acquire funds to improve fish habitat and provide additional fishing opportunity.

RESULTS AND DISCUSSION

Butte Creek

Butte Creek channel restoration has been an ongoing project to reestablish flow in the Butte Creek stream channel below Hayspur Fish Hatchery. The 580 m of stream channel replaced 400 m of a straight canal on Department property providing additional and more natural stream habitat. To complete the project on February 7, 1998 approximately 15 m^3 of 2.5 to 5 cm washed river gravel was placed in Butte Creek at two sites to provide spawning substrate for rainbow trout *Oncorhynchus mykiss*.

Feather River

The Feather River is a perennial stream flowing southward towards its confluence with South Fork Boise River at Featherville, Idaho. It is within the range of bull trout *Salvelinus confluentus,* which migrate throughout the South Fork Boise River basin from Anderson Ranch Reservoir to upstream tributaries where they are known to spawn. The main South Fork Boise River road crosses over the Feather River 0.5 km upstream of its confluence with the South Fork Boise River. The road crossing has been considered a potential barrier to the upstream migration of bull trout and other species because of the drop of water from the culvert onto a concrete apron and because of the velocity of water flowing through the three culverts under the road. This barrier reduces access to more than 32 km of streams above 1,500 m elevation.

In 1998, Section Six funds were acquired from the U.S. Fish and Wildlife Service to improve passage at the Feather River/South Fork Boise River road. Project design includes rock drop structures to stabilize the stream below the culvert and to reduce the jump into the

culvert and an in-culvert structure to reduce velocity. The project is scheduled for completion in late summer 1999.

Additional Activities

Design suggestions were provided to the Idaho Department of Transportation on pond and wetland developments at its Clear Lakes Grade project adjacent to the Snake River. When completed, ponds will provide an additional site for a put-and-take fishery along with waterfowl habitat. Additionally, comments and design suggestions were provided to the Natural Resources Conservation Service and a landowner for a stream and riparian habitat improvement project on Billingsley Creek.

A good water year resulted in some spill from Mormon Reservoir. Loss of fish from the reservoir was reduced with the installation of a temporary fish weir in the spillway.

The Anderson Ponds at the Hagerman Wildlife Management Area were surveyed to calculate water volumes. This was necessary to provide beneficial use information to maintain water rights for the ponds.

Regional personnel provided boats and assistance with two community-organized trash clean up projects along the Snake River in the Pillar Falls area and between the town of Burley and Minidoka Dam.

1998 ANNUAL PERFORMANCE REPORT

State of: Idaho

Program: Fisheries Management F-71-R-23

Project IV: Population Management

Subproject: IV-E-Magic Valley Region

Contract Period: July 1, 1998 to June 30, 1999

ABSTRACT

Fish populations and fishing in the Magic Valley Region were enhanced by stocking approximately 2.98 million put-and-grow and 0.61 million put-and-take size rainbow trout *Oncorhynchus mykiss*, brown trout *Salmo trutta*, and kokanee *O. nerka*, into lakes, reservoirs, rivers and streams accessible by vehicle. High mountain lakes were stocked with Henrys Lake cutthroat trout *O. clarki*, rainbow trout, and Arctic grayling *Thymallus arcticus* fingerlings.

Other species released in the region for angler enjoyment and population enhancement included 1.7 million walleye *Stizostedion vitreum* fry in Salmon Falls Creek and Oakley reservoirs; 20,000 channel catfish *Ictalurus punctatus* in ponds and reservoirs; 300 tiger muskie *Esox lucius x masquinongy* in Dog Creek Reservoir; and 240 white sturgeon *Acipenser transmontanus* in the Snake River.

A goldfish *Carassius auratus* population was eradicated by electroshocking from Easley Hot Springs in the Big Wood River drainage.

Author:

Fred E. Partridge
Regional Fishery Manager

OBJECTIVES

To maintain and restore fisheries in streams, lakes and reservoirs as appropriate.

METHODS

Regional fisheries with low natural recruitment are maintained with recommended stocking levels of trout and warmwater fish. Illegally introduced and overabundant, undesirable species are controlled or eradicated using standard physical and chemical methods (Horton 1991).

RESULTS AND DISCUSSION

Fish populations and fishing in the Magic Valley Region were enhanced by stocking approximately 2.98 million put-and-grow and 0.61 million put-and-take size rainbow trout *Oncorhynchus mykiss*, brown trout *Salmo trutta*, and kokanee *O. nerka*, into lakes, reservoirs, rivers and streams (IDFG 1999). Hatchery or regional personnel stocked waters accessible by road from fish transport trucks.

High mountain lakes were stocked with Henrys Lake cutthroat trout *O. clarki*, rainbow trout and Arctic grayling *Thymallus arcticus* fingerlings. Inaccessible waters were stocked by Department personnel, reservists and volunteers by backpacking or using livestock to carry fingerling fish. Up to 0.5 kg of fingerlings were transported in plastic milk bags filled with one gallon of water and pure oxygen.

Other species released in the region for angler enjoyment and population enhancement included 1.7 million walleye *Stizostedion vitreum* fry in Salmon Falls Creek and Oakley reservoirs; 20,000 channel catfish *Ictalurus punctatus* in ponds and reservoirs; 300 tiger muskie *Esox lucius x masquinongy* in Dog Creek Reservoir; and 240 white sturgeon *Acipenser transmontanus* in the Snake River.

A goldfish *Carassius auratus* population was eradicated from Easley Hot Springs in the Big Wood River drainage by electroshocking with a backpack shocker.

LITERATURE CITED

Horton, W.D. 1991. Lakes renovation procedures manual. Idaho Department of Fish and Game, Boise.

IDFG (Idaho Department of Fish and Game). 1999. 1998 statewide fish stocking records, Boise.

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