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DEPARTMENT OF FISH AND GAME

FEDERAL AID IN FISH RESTORATION
1996 Job Performance Report
Program F-71-R-21

REGIONAL FISHERIES MANAGEMENT INVESTIGATIONS

MCCALL SUBREGION (Subprojects I-C, II-C, III-C, IV-C)

PROJECT I.	**SURVEYS AND INVENTORIES**
Job a.	**McCall Subregion Mountain Lakes Investigations**
Job b.	**McCall Subregion Lowland Lakes Investigations**
Job c.	**McCall Subregion Rivers and Streams Investigations**
Job d.	**McCall Subregion Salmon and Steelhead Investigations**
PROJECT II.	**TECHNICAL GUIDANCE**
PROJECT III.	**HABITAT MANAGEMENT**

By

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1996 ANNUAL PERFORMANCE REPORT

State of: Idaho

Program: Fisheries Management F-71-R-21

Project I: Surveys and Inventories

Subproject I-C: McCall Subregion

Job: a

Title: Mountain Lakes Investigations

Contract Period: July 1, 1996 to June 30, 1997

ABSTRACT

Fish population status, past stocking strategies, and/or physical habitat variables were assessed in 17 mountain lakes in 1996 in a cooperative project with the U.S. Forest Service (USFS). This report presents the status of fish populations in these lakes. We collected no fish in two lakes. We collected no rainbow trout *Oncorhynchus mykiss* in one lake, and no westslope cutthroat trout *Oncorhyncus clarki* in another lake that were previously stocked with these species. Four lakes contained large numbers of small brook trout *Salvelinus fontinalis* with low relative weights (< 80). Condition factors for stocked cutthroat trout, rainbow trout, or rainbow trout/cutthroat trout hybrids *O. mykiss* x *O. clarki* were generally greater than 0.80 for fish larger than 7 inches in the eight lakes without brook trout. One lake contained brown trout *Salmo trutta* and another contained only previously stocked arctic grayling *Thymallus arcticus*.

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OBJECTIVES

1. Evaluate current and past fisheries management practices in alpine lakes.

2. Identify problems and/or angling opportunities in lakes that currently are not being planted.

3. Contribute to an extensive alpine lakes database.

INTRODUCTION

The Idaho Department of Fish and Game (IDFG) entered into a cooperative project with the United States Forest Service (USFS), Payette National Forest (PNF) in 1989 to assess fish populations, physical habitat, and past stocking strategies in alpine lakes. This program was continued in 1996. IDFG and PNF personnel worked cooperatively to collect the data used in this report. A more detailed habitat survey report will be written by the USFS. Past data collected from this project was presented by Weaver (1992; 1994), Janssen and Anderson (1994), and Janssen et al. (1994).

METHODS

Fish populations in each lake were assessed by collecting fish with one experimental diving gill net (150 ft) set perpendicular to the shore. The nets were set in the afternoon or evening and were pulled the next morning. All fish collected were weighed to the nearest gram and total length measured to the nearest millimeter.

Physical habitat and chemical variables were measured on several lakes. Lake depth (mean & maximum), the number of inlets and/or outlets, pH, and alkalinity were determined by IDFG personnel. Also, the presence of suitable trout spawning habitat in each inlet and/or outlet (based on presence of gravel substrates) was noted and the length of the available habitat was estimated (m). The methods used by USFS personnel and results were described in Weaver (1992, 1994). IDFG personnel used the IDFG standard mountain lake survey form. Global positioning system (GPS) coordinates were recorded for the major outlet of each lake.

RESULTS

IDFG personnel collected fish population and habitat data for 17 mountain lakes in 1996. The Twin Lakes (07-193, 07-194) are treated as one lake in this report. The 17 lakes were located in the Payette National Forest (8), Boise National Forest (6), and a Bureau of Land Management mining district (3). Location of each lake and GPS coordinates for the major outlet are presented in Appendix A. In the PNF, six lakes: Lloyd=s (07-167), Corral (07-177), Duck (07-178), Twin Lakes, Horton (09-381), and Ellis (09-382) were located in areas burned in 1994. Three lakes were deepened by dams: Twin Lakes, Raft (09-276), and Willow Creek Reservoir (09-278).

Gill net collections revealed two lakes with no fish, two lakes dominated by large populations of

brook trout *Salvelinus fontinalis*, and two lakes devoid of stocked westslope cutthroat trout *Oncorhynchus clarki* and rainbow trout *O. mykiss* but dominated by brook trout (Table 1). No fish were collected in Kimberly Lake #1 (07-243) and Pete=s Lake #1 (07-492); both lakes were shallow (< 3 m) and had small, slow-flowing inlets. Brook trout were abundant in the following lakes: Lloyd=s, Corral, Duck, Twin, and Kimberly #2 (07-244). Abundant young-of-year brook trout were observed in the inlet to Lloyd=s Lake and no cutthroat trout were found from the 1992 and 1994 plantings. In Twins Lakes, no rainbow trout from the 1991 and 1994 plantings were found. Corral Lake was dominated by brook trout and only four rainbow trout from previous stockings were found. Duck Lake was also dominated by brook trout and only two westslope cutthroat trout from previous stockings were found. Two brown trout *Salmo trutta* were collected in Skein Lake (09-274). Fish found in all other lakes were only the species recently stocked (IDFG 1995). Three arctic grayling *Thymallus arcticus* from the 1995 plant in Meadow Creek Lake (07-462) were captured and in one year have attained lengths of 4 inches. One large (14 in) brook trout was found dead on the shore of Ellis Lake (09-382) but no brook trout were caught in the gill net.

Brook trout had relative weights (Wr) that varied from <80 to >100 while most westslope cutthroat trout had condition factors (Ktl) >0.89 (Table 1). All brook trout in Twins, Corral, and Duck Lakes had Wr <85. For 60% of the catch, Lloyd=s Lake brook trout Wrs were >92 for all fish 6 inches or longer. All 11 brook trout caught in Kimberly Lake #2 had Wrs >92 and had a total length of 13-15 inches. The presence of many small brook trout and a high mean depth (29 ft) in Twins Lake prompted stocking of 50 (9-11 inch) splake *S. fontinalis* x S. *namaycush*. Condition factors of cutthroat trout in Bear, Pete=s #2, Skein, Raft, and Ellis Lakes were generally >0.89 with most length groups condition near 1.00. Most length groups of rainbow trout, cutthroat trout hybrids *O. mykiss* x *O. clarki*) from Horton Lake (09-381) had condition factors greater than or equal to one.

IDFG personnel completed habitat surveys on 17 mountain lakes (Table 2). Bear Lake was unique and Abog-like≅ with deeply brown stained water, floating mats, roots and dead leaves of bulrush (sp.) and cattail *Typha sp*., and large amounts of organic debris resulting in a strong odor of methane (sewer or marsh gas). Twin Lake is listed (and numbered) as two lakes; however, on the survey date (07-09-96) both lakes were connected and depth of 12 ft at the connection was recorded.

Table 1. Total number and mean condition factors (Ktl) or relative weights (Wr) by length group of each species caught during mountain lake surveys in 1996.

Lake	Catalog No.	Species Ktl Wr	Total Length in Inches															
			4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	>19
Lloyd=s	07-167	BRK	3	9	11	4	0	0	2	1	0	0	0	0	0	0	0	0
		Wr	na	71.2	92	104	0	0	108	115	0	0	0	0	0	0	0	0
Corral	07-177	BRK	4	0	1	16	23	28	5	0	0	0	0	0	0	0	0	0
		Wr	77	0	82	0	82	81	66	0	0	0	0	0	0	0	0	0
		RBT	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0
		Kt1	0	0.72	1.05	0	0	0	0	0	0	0	0	0	0	0	0	0
Duck	07-178	BRK	0	0	1	4	5	9	9	18	0	0	0	0	0	0	0	0
		Wr	0	0	65	78	81	80	81	78	0	0	0	0	0	0	0	0
		CT	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
		Ktl	0	0	0	0	0	0.97	0	0	0	0	0	0	0	0	0	0
Twins Lakes	07-193 07-194	BRK	2	0	4	7	9	8	5	0	0	0	0	0	0	0	0	0
		Wr	40	0	85	78	81	76	70	0	0	0	0	0	0	0	0	0
Bear	07-245	CT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
		Ktl	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.16
Meadow Creek	07-462	GRY	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Ktl	na	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pete=s #1	07-492	None	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pete=s #2	07-493	CT	0	0	0	0	0	0	0	0	5	4	0	1	0	0	0	0
		Ktl	0	0	0	0	0	0	0	0	1.25	1.07	0	0.78	0	0	0	0
Lost	09-263	CT	3	1	0	3	0	0	1	4	0	0	0	0	0	0	0	0
		Ktl	0.3 0	0.33	0	0.69	0	0	1.03	1.05	0	0	0	0	0	0	0	0
Hidden	09-269	CT	2	0	13	6	0	0	0	0	0	0	0	0	1	0	0	0
		Ktl	0.3 2	0	0.71	0.78	0	0	0	0	0	0	0	0	0.87	0	0	0

Table 1. Continued

Lake	Catalog No.	Species Ktl Wr	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	>19
Skein	09-274	BRN	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0
		Ktl	0	0	0.97	0	0	0.98	0	0	0	0	0	0	0	0	0	0
		CT	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
		Ktl	0	0	0	0	0	1.01	0	0	0	0	0	0	0	0	0	0
Raft	09-276	RBT	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0
		Ktl	0	0	0	0	0	0	0	0	0	1.27	1.07	0	0	0	0	0
		RC	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
		Ktl	0	0	0	0	0	0	0	0	0	0	1.18	0	0	0	0	0
Willow Creek Reservoir	09-278	BRK	0	0	0	2	0	0	1	0	0	0	1	0	0	0	1	0
		Wr	0	0	0	78.2	0	0	83.6	0	0	0	84.4	0	0	0	1.0	0
									1.08	0	0	0	0	0	0	0	1	0
		CT	0	0	0	0	0	0	9	1	0	0	0	0	0	0	0	0
		Ktl	0	0	0	0	0	0	0	1.18	0	0	0	0	0	0	0	0
																	0	
Horton	09-381	RC	0	1	7	5	1	0	0	0	0	0	0	0	0	0	0	0
		Ktl	0	0.62	1.01	1.02	1.25	0	0	0	0	0	0	0	0	0	0	0
Ellis	09-382	CT	0	0	0	4	4	11	2	0	0	0	1	0	0	0	0	0
		Ktl	0	0	0	1.12	1.14	1.09	1.15	0	0	0	0.96	0	0	0	0	0
Kimberly #1	07-243	None	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kimberly #2	07-244	BRK	0	0	0	0	0	0	0	0	6	5	0	0	0	0	0	0
		WR	0	0	0	0	0	0	0	0	1.07	1.05	0	0	0	0	0	0

RBT = rainbow trout
CT = westslope cutthroat trout
BRK = brook trout
RC = rainbow/cutthroat hybrid
GRY = arctic grayling
BRN = brown trout

Table 2. Fish species present, depth (m), elevation (m), area (ha), number of inlets, number of outlets, inlet and outlet spawning habitat ranking[a] (1-4) and spawning habitat length in meters (in parentheses), pH, and alkalinity for 17 mountain lakes surveyed in 1996.

Lake	Catalog No.	Fish Species Present	Mean Depth (max)	Elevation (m)	Areas (Ha)	No. of inlets	Inlet[a] Spawning Habitat	No. of Outlets	Outlet[a] Spawning Habitat	pH	Alkalinity (mg/L)
Lloyd=s	07-167	BRK	6.4 (11.0)	2,087	2.9	2	4 (0)	1	1 (50)	7.2	0
Corral	07-177	BRK, RBT	4.3 (7.6)	2,073	2.3	1	2 (10)	1	4 (0)	7.2	0
Duck	07-178	BRK, CT	3.0 (4.9)	2,171	5.0	3	1 (100)	2	2 (50)	6.8	0
Twin Lake	7-194	BRK	8.8 (22.8)	2,184	40.5	8	3 (12)	2	2 (5)	6.4	0
Bear	07-245	CT	6.7 (8.8)	1,337	1.8	1	4 (0)	1	4 (0)	7.6	120
Meadow Creek	07-462	GRY	4.6 (6.0)	2,414	3.0	1	4 (0)	1	4 (0)	6.8	0
Pete=s #1	07-490	None	1.2 (2.1)	2,152	1.7	2	4 (1)	1	3 (1.5)	7.2	0
Pete=s 2	07-493	CT	4.5 (6.4)	2,117	2.5	3	1 (100)	1	4 (3)	6.8	0
Lost	09-263	CT	2.3 (5.5)	2,240	1.9	4	2 (20)	1	2 (10)	7.2	0
Hidden	09-269	CT	3.7 (5.2)	2,192	10.0	3	4 (0)	1	2 (20)	6.8	0
Raft	09-276	RBT, RC	6.4 (9.8)	2,121	2.5	1	4 (0)	1	4 (0)	7.2	0

Table 2. (Continued).

Lake	Catalog No.	Fish Species Present	Mean Depth (max)	Elevation (m)	Areas (Ha)	No. of inlets	Inlet[a] Spawning Habitat	No. of Outlets	Outlet[a] Spawning Habitat	pH	Alkalinity (mg/L)
Willow Creek Reservoir	09-278	BRK, CT	1.5 (1.8)	1,902	3.1	1	4 (0)	1	3 (1)	7.2	0
Skein	09-295	BRN, CT	5.5 (12)	2,121	3.4	1	4 (0)	1	3 (3)	7.2	0
Horton	09-381	RC	1.8 (2.7)	2,195	2.3	1	4 (0)	1	3 (30)	7.2	0
Ellis	09-382	CT BRK[b]	3.3 (5.5)	2,195	3.7	2	4 (0)	1	3 (40)	7.2	0
Kimberly #1	07-243	None	3.3 (10.6)	2,134	3.2	2	4 (0)	1	3 (10)	--	--
Kimberly #2	07-244	BRK	7.3 (11)	2,180	2.9	1	4 (0)	1	4 (0)	--	--

[a] Rankings for trout spawning habitat: 1 = excellent (abundant), 2 = adequate (enough habitat to maintain population, 3 = fair (not adequate to maintain population, and 4 = poor (not suitable for spawning.

[b] Found one dead EB on shore, none caught in gillnet.

RECOMMENDATIONS

1. Discontinue stocking the following lakes: Lloyd=s (07-167), Corral (07-177), Duck (07-178), Twins Lakes (07-193; 07-194) and Pete=s #1 (07-490).

2. Monitor stocked splake in Twins Lake.

3. Continue to monitor fish populations in high mountain lakes in the region.

4. Continue to work with Payette National Forest personnel to collect baseline fishery and habitat data in high mountain lakes.

5. Continue current management and planting strategies for the McCall area alpine lakes.

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APPENDIX

Appendix A. Location, county, outlet location in universal transverse mercator (UTM) coordinates and latitude-longitude, along with trail presence to and around the lake for 17 mountain lakes surveyed in 1996.

Lake	Cat. #	Location	County	UTM	Latitude/ longitude	Trail To Lake	Trail Around Lake
Lloyd=s	07-167	21N 2E Sec 1	Idaho	11T 0565661 UTM 5004729		Yes	Partial
Corral	07-177	21N 2E Sec 35	Idaho	11T 0565661 UTM 4946459	N 45° 07' 13.8" W 116° 10' 50.9"	No	Yes
Duck	07-178	21N 2E Sec 36	Idaho	11T 0566330 UTM 495926	N 45° 06' 59.3" W 116° 09' 28.7"	Yes	Yes
Twin Lakes	07-193 07-194	5S 2E Sec 2	Adams	11T 0564415 UTM 4994538	N 45° 06' 13.0" W 116° 10' 51.2"	Yes	Partial
Bear	07-245	24N 5E sec 9	Idaho	11T 0590377 UTM 5031840	N 45° 26' 09.2" W 115° 50' 39.6"	Yes	No
Meadow Creek	07-462	18N 9E 29	Valley	11T 0628543 UTM 4968864	N 44° 51' 48.4" W 115° 22' 23.9"	No	No
Pete=s #1	07-490	18N 5E Sec 33	Valley	11T 0590737 UTM 4967663	N 44° 51' 31.2" W 115° 51' 05.5"	No	Partial
Pete=s #2	07-492	18N 5E Sec 33	Valley	11T 059092 UTM 4967309	N 44° 51' 19.7" W 115° 50' 57.1"	No	Partial
Lost	09-263	13N 3E Sec 20	Valley	11T 0570263 UTM 4921663	N 44° 26' 49.8" W 116° 07' 01.8"	No	Partial
Hidden	09-269	13N 3E Sec 21	Valley	11T 0570750 UTM 4921444	--	No	Partial
Raft	09-276	13N 3E Sec 9	Valley	11T 0570334 UTM 4925536	N 44° 28' 54.0" W 116° 06' 56.0"	Yes	Yes
Willow Creek Reservoir	09-278	13N 3E Sec 9	Valley	--	N 44E 28' 16.1" W 116° 05' 56.8"	Yes	Partial
Skein	09-295	13N 3E Sec 9	Valley	--	N 44° 28' 41.8" W 116° 06' 29.9"	Yes	Yes
Horton	09-381	21N 3E Sec 28	Valley	11T 0571804 UTM 4997413	45° 07' 42.9" W 116° 05' 13.8"	Partial	Partial
Ellis	09-382	21N 3E Sec 28	Valley	11T 0571261 UTM 4997413	N 45° 07' 42.6" W 116° 05' 38.1"	No	Partial
Kimberly #1	07-243	24N 3E Sec 20	Idaho	--	--	Yes	Partial
Kimberly #2	07-244	24N 3E Sec 20	Idaho	--	--	Yes	Partial

1996 ANNUAL PERFORMANCE REPORT

State of: Idaho

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Project I: Surveys and Inventories

Subproject I-C: McCall Subregion

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Title: Lowland Lakes Investigations

Contract Period: July 1, 1996 to June 30, 1997

ABSTRACT

Payette Lake was sampled by midwater trawling and hydroacoustic techniques to estimate the population size of kokanee salmon *Oncorhynchus nerka kennerlyi*. The population estimates of age 1, and age 0 kokanee were 132,234 ± 62.6% and 194,070 ± 25%. A creel survey from May 1, 1995 through July 9, 1996 revealed total angling pressure and harvest estimates of 11,849 hours and 1,381 fish.

By weight and number, 83% of the fish sampled in Little Payette Lake with gill nets were largescale suckers *Catostomus macrocheilus* and squawfish *Ptychocheilus oregonensis*. Of the trout sampled, 25% were greater than 16 inches.

Largemouth bass *Micropterus salmoides* larger than 12 inches made up 27% of all bass electrofished in C. Ben Ross Reservoir in 1996. This compares with 6.5% in 1993. We collected seven age classes of bass in 1996 compared with five in 1993.

Splake *Salvelinus fontinalis x S. namaycush* sampled in 1996 in Granite Lake and Upper Payette Lake averaged 339 mm and 430 mm, respectively.

We compared angler counts on Cascade Reservoir on Memorial Day, Independence Day, and Labor Day in 1996 to angler counts done on the same holidays during intensive creel surveys in 1982, 1991, and 1992. We found that the average of the holiday counts of the number of boats and shore anglers, was a good indicator of total angling pressure.

Smallmouth bass *Micropterus dolomieu* greater than 12 inches made up 82% of the IDFG data collection tournament held on Oxbow Reservoir. Of all bass greater than 12 inches, 2% were greater than 16 inches.

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OBJECTIVES

To maintain information for fishery management activities and decisions for lowland lakes and reservoirs.

INTRODUCTION

Payette Lake

Payette Lake was previously described by Grunder et al. (1990). We conducted the annual kokanee *Oncorhynchus nerka kennerlyi* age class population estimate in 1996. We also made population estimates of kokanee and lake trout *Salvelinus namaycush* with hydro-acoustic techniques to help us better understand trawling data and help us get a perspective on lake trout numbers.

An intensive creel survey was begun in 1995 on Payette Lake that ran from May 1 through December to determine angler use and harvest (Janssen and Anderson (2000). Biologists continued this survey through July 4, 1996 to get an entire years estimate of angler use and harvest .

Little Payette Lake

Squawfish *Ptychocheilus oregonensis* and largescale sucker *Catostomus macrocheilus* biomass had increased significantly in recent years to threaten the quality rainbow trout fishery in the lake (Janssen and Anderson 1992, 1994, 1994). We surveyed the fish community again in 1996 to monitor trout growth, condition, and relative abundance.

C. Ben Ross Reservoir

The largemouth bass *micropterus salmoides* regulation in Ben Ross changed in 1994 from five fish with a 12 inch minimum size limit to a more restrictive regulation of two fish, none between 12 and 16 inches, and no harvest of bass before July 1. The intent of this new regulation was to develop a quality bass fishery as defined in the five year fish management plan. The bass population was sampled in 1996 to determine effects of the new regulation.

Splake Introduction Evaluations

Both Upper Payette Lake and Granite Lake were stocked in the fall of 1992 with 165 mm (6.5 inch) splake *S. fontanalis* x *S. namaycush*. Upper Payette Lake was also stocked on June 30, 1993 with 330 mm splake which were marked with an adipose fin clip. These lakes were gill netted in 1994 and again in 1996 to track growth and condition of these fish.

Cascade Reservoir Angler Counts

We examined past creel survey data to determine if angler counts on specific holidays was an effective way to monitor angler effort on Cascade Reservoir without major investments in time and effort. We then conducted angler counts on three holidays in 1996 on Cascade Reservoir.

Oxbow and Hell=s Canyon Reservoirs

The bass regulation in Oxbow Reservoir was changed in 1992 and its effect on the smallmouth bass *Micropterus dolomieu* population has been monitored annually (Janssen et al. in print). This effort was continued in 1996.

METHODS

Payette Lake

Biologists sampled kokanee in Payette Lake, for the ninth consecutive year, on August 14 and 15, 1996 with a midwater trawl (Janssen, et al. 1997). Methodology for the trawling technique was reported by Bowles, et al. (1986, 1987) and Grunder, et al. (1991).

Methods used for the hydroacoustic assessment of kokanee and lake trout are presented in Appendix A. The hydroacoustic assessment of kokanee and lake trout was completed on the night of June 17, 1996.

The creel survey began on January 19, 1996 and ran through July 4, 1996. The survey was structured to sample four weekdays and two weekend days each in consecutive 14 day periods. Days were stratified into two equal time periods between sunrise and sunset.

We made three angler counts per day, during the selected count period (am or pm), at three hour intervals. Angler counts included number of shore anglers and number of fishing boats. The number of anglers in each boat were not counted. The creel days and count period were selected randomly using the Idaho Department of Fish and Game=s (IDFG) standard creel survey computer program (McArthur et al. 1993). This program was also used to summarize the data and generate total use, harvest and catch rate estimates. Time before, between and after counts was used to make angler contacts and conduct interviews.

Ice fishing pressure on Payette Lake was known to be very limited and therefore a formally structured creel survey was not completed. Instead, we used angling data from selected fishing trips. The numbers of anglers on the ice, hours fished on each trip and angling success was recorded. These data were then expanded to determine ice angling pressure. Total pressure equaled the number of days the ice was good enough to walk out on, multiplied by number of day light hours per day, multiplied by the average number of anglers per count. Total harvest equaled total angling pressure multiplied by the average catch

rates (fish/hour).

This report summarizes creel data from both 1995 (Janssen and Anderson, 2000) and 1996.

Little Payette Lake

On October 17, 1996 we set four standard lake survey gill nets in Little Payette Lake (four diving nets). We connected two of the diving nets end to end to fish a longer, deeper section of the lake. We fished two locations with the four nets. The nets were set on the afternoon of 10/16/96, fished all night, and pulled the next morning. All collected fish were measured to the nearest mm and weighed to the nearest 5 grams. We checked all collected fish for fin clips.

C. Ben Ross Reservoir

We electrofished Ben Ross Reservoir on the night of June 12, 1996. Three areas of shoreline were sampled for a total of 47 minutes of electrofishing time. Each largemouth bass collected was weighed, measured and examined for hooking scars and abrasions. A scale sample was also collected for age determination from five fish in every 10 mm length group.

Splake Introduction Evaluations

We set two diving, experimental gill nets in Upper Payette Lake on June 18, and two diving, experimental gill nets in Granite Lake on July 3, 1996. The nets were set in the afternoon, allowed to fish overnight and then pulled the following morning. We weighed and measured total length of all splake collected. Fish were examined for an adipose fin clip and stomachs were examined for food contents.

Cascade Reservoir Angler Counts

Intensive creel surveys were conducted on Cascade Reservoir in 1982, 1991 and 1992. We compared angler counts made on holidays in each of these three years to determine which holidays had been sampled every year. We found three specific holidays: Memorial Day, July 4th and Labor Day that had been sampled during all three surveys. We then averaged all the counts of all three holidays by angler type (# boats and shore anglers) to get an average count for the three holidays in a given year. We then compared these numbers with the total pressure estimates.

We conducted angler counts on the reservoir on the Monday of each of those three holidays in 1996. A fixed wing aircraft was used to make total instantaneous counts of all fishing boats and shore anglers. We made counts on each day at 10:00 am, 2:00 pm and 6:00 pm.

Oxbow and Hell=s Canyon Reservoirs

We used a sanctioned bass fishing tournament on Hell=s Canyon reservoir. All fish brought to the weigh-in on Hell=s Canyon reservoir were measured and released. Catches had been culled so entrants could weigh in a limit of bass with the heaviest weight possible.

The Oxbow Reservoir tournament was conducted on May 4 specifically to help IDFG and Oregon Department of Fish and Wildlife (ODFW) fisheries personnel collect smallmouth bass. Tournament participants measured all bass caught and fish under 12 inches were released. Each participant also kept and/or culled bass over 12 inches for this tournament. Biologists weighed, measured and collected scales from all bass brought to the weigh-in.

Biologists also electrofished Oxbow Reservoir on May 4, 1996 to compare results of the bass tournament with those from electrofishing. We used three elecrofishing boats. Each boat electrofished for 1 hour of actual electrofishing time. All fish collected were measured to the nearest 1 mm.

RESULTS (AND DISCUSSION)

Payette Lake

Kokanee Population Status

From mid-water trawl data, we estimated the population of wild, age 0+ and age 1+ kokanee in Payette Lake to be 251,339 $\pm$ 51.3% (95% CI), and 132,234 $\pm$ 62.6% fish (Table 1). Estimated mean densities (fish/ha) of age 0+ and age 1+ were 146 and 77 fish/ha.

Population estimates of kokanee from the hydroacoustic sampling were: 423,450 $\pm$ 18% age 0+, 194,070 $\pm$ 25% age 1+, and 166,250 $\pm$ 22% age 2+ and 3+ fish. A full report of the hydroacoustic assessment on Payette Lake is presented in Appendix A.

Total kokanee biomass, not including adult fish (this year=s spawners) was estimated at 2.7 kg/ha using trawl data. Total biomass, including 1996 spawner escapement estimates (1996 Annual Performance Report: Rivers and Streams Investigations section) was 8.4 kg/ha. There was a shoreline spawning component of the kokanee population, in addition to this estimate, which was not estimated but is felt to be fairly insignificant in terms of numbers and biomass.

Table 1. Summary of mid-water trawl data collected at Payette Lake, Idaho in 1980, and 1988 through 1996 with 95% error bounds in ±(%). All estimates are based on a useable surface area of 1,715 ha (> 40 ft depth).

Number of Hatchery Kokanee

Year of Estimate	Number Stocked	Age 0+	Age 1+	Age 2+	Age 3+[1]	Spawners (3+)[2]	
1988	350,000	34,000	0	0			
1989	350,000	18,000	0	0			
1990	301,000	27,000	0	0			
1991	158,000			0			
1992	130,530	19,774(79%)					
1993[c]	125,400	11,444(98%)	0	0			
1994	0 (stockings discontinued)		0				

Number of Wild/Natural Kokanee

1980	100,000	73,000	16,000	20,000	20,000	
1988	74,800(40%)	<2,000(85%)	9,000(88%)	[4]	22,800	
1989	120,000(33%)	21,000(33%)	0	[4]	14,500	
1990	134,000(45%)	26,000(45%)	10,000(100%)	[4]	16,700	
1991	128,000(28%)	67,500	1,187	[4]	18,000	
1992	202,240(21%)	30,887(41%)	5,015(118%)	[4]	29,300	
1993[3]	301,744(104%)	117,215(65%)	7,271(83%)	[4]	59,310	
1994	152,689(88%)	46,974(54%)	30,432(99%)	[4]	44,200	
1995	194,242(57%)	107,929(33%)	54,635(65%)	8,373(84%)	55,450	
1996	251,339(51%)	132,234(63%)	35,205(44%)	22,056	60,707	

Estimated Wild Kokanee Densities (fish/ha)

1980	58	43	9	10	
1988	44	<2	5	NA	13
1989	70	12	0	NA	8
1990	78	15	6	NA	10
1991	75	39[5]	0.69	NA	10.5
1992	118	18	3	NA	17
1993[3]	176	68	4	NA	35
1994	89	27	18	NA	26
1995	113	63	32	4.9	32
1996	147	77	21	13	35

Estimated Wild Kokanee Biomass (KG/HA)

						Total
1980	.04	0.9	0.5	1.8		6.9
1988	.06	.03	NA	NA	4.6	5.2
1989		0.24 (for ages 0+,1+ and 2+ combined)			2.9	3.1
1990	.07	0.13	0.8	0.6	3.5	5.1
1991	.075	1.2[5]	0.1	NA	5.3	6.7
1992	.15	1.1	0.45	NA	6.4	8.1
1993[3]	.10	1.8	0.6	NA	8.5	11.0
1994	.10	1.9	0.6	NA	5.5	8.1
1995	.04	1.4	2.8	0.8	4.8	9.8
1996	.05	1.07	1.6	1.75	5.7	10.2

[1]These fish spawned the following fall
[2]Based on corrected spawner escapement counts in N. Fork Payette River (1.73 X peak spawner count)(Frost and Bennett, 1994)
[3]Estimate was made in August instead of September when other years estimates were made.
[4] Estimates not reliable because fish greater than 200mm are not completely vulnerable to the trawl.
[5] Includes age 0+ hatchery fish.

Lake Trout Population Estimate

Biologists estimated the total lake trout population at 730 $\pm$ 85% (Appendix A.). Mean densities were 0.45/ha. This was low when compared with Priest Lake, Idaho where lake trout densities were 1.46/ha. These estimates are no doubt low due to the hydroacoustic technique=s inability to detect fish lying directly on or very close to the bottom.

1996 Angler Use Survey

From January 19 through July 4, 1996 we estimated that anglers spent 3,516 total hours (1.6 hrs/ha) to catch 341 fish (Tables 3 and 5). Of these fish, 188 were kept and 153 released. Catch rate estimates averaged 0.07 f/h for all fish caught (Table 7). Average catch rate for all fish harvested was 0.05 f/h. This compares with 0.13 and 0.09 f/h for all fish caught and harvested respectively in 1995 (Table 6).

Kokanee were the most numerous in the creel with an estimated 159 harvested. There were also, 8 rainbow trout *Oncorhynchus mykiss*, 8 cutthroat trout *Oncorhynchus clarki lewisi*, and 13 lake trout harvested (Table 5).

Boat anglers made up 90% of all angling pressure, spending an estimated 3,180 hours. Shore anglers accounted for 167 hours (5%) and ice anglers 169 hours (5%).

Total Angler Use (May 1995 through June 1996)

We found that 11,849 hours (5.5 h/ha or 2.2 h/ac) were spent to catch 1,381 fish from May 1995 through June 1996 (Tables 2, 3, 4 and 5.). Boat , shore and ice anglers spent 11,304, 376 and 169 hours respectively. Weekend anglers accounted for 56% of total angling pressure. Of the 1,516 fish caught, 925 (61%) were harvested and of those, 638 (69%) were kokanee.

Total angling pressure (hrs/acre) was low when compared to other waters around the state. Some examples include: Little Payette Lake: 6.5 h/ac.; Henry=s Lake: 46 h/ac.; Dworshack Reservoir: 9.5 hrs/ac.; Brownlee Reservoir: 57 h/ac.; Redfish Lake: 8.3 h/ac; and Hayden Lake: 22 h/ac (Al VanVooren, Fisheries Research Coordinator, IDFG, personal contact).

Table 2. Angling pressure estimates for May through October 1995 by angler type and day type on Payette Lake.

Date	Day Type[a]	Boat Angler Hours	Bank Angler Hours	Total Angler Hours
4/30-5/27/95	WD	222	0	222
	WE	1,728	34	1,762
Interval 1 Total:		1,950	34	1,984
+/- 95%CI:		881	68	884
5/28-6/29/95	WD	1,331	0	1,331
	WE	1,247	175	1,422
Int 2 Tot:		2,578	175	2,753
+/- 95%CI:		1,057	308	1,101
6/25-7/22/95	WD	738	0	738
	WE	812	0	812
Int 3 Tot:		1,550	0	1,550
+/- 95%CI:		545	0	545
7/23-8/19/95	WD	882	0	882
	WE	272	0	272
Int 4 Tot:		1,154	0	1,154
+/- 95%CI:		376	0	376
8/20-9/16/95	WD	424	0	424
	WE	425	0	425
Int 5 Tot:		849	0	849
+/- 95%CI:		341	0	341
9/17-10/14/95	WD	0	0	0
	WE	14	0	14
Int 6 Tot:		14	0	14
+/- 95%CI:		27	0	27
10/15-11/11/95	WD	0	0	0
	WE	29	0	29
Int 7 Tot:		29	0	29
+/- 95%CI:		59	0	59
1995 SEASON TOT:	WD	3,597	0	3,597
	WE	4,527	209	4,736
	ALL	8,124	209	8,333
+/- 95%CI:	ALL	1,566	315	1,598

[a] WE = weekends, WD = weekdays

Table 3. Angling pressure estimates for January through July 4, 1996 by angler type and day type on Payette Lake.

Date	Day Type[a]	Boat Angler Hours	Bank Angler Hours	Total Angler Hours
1/19-3/22/96	ICE	0	0	169
Interval 1 Total:				
+/- 95%CI:				NA
4/15-4/28/96	WD	58	19	77
	WE	284	0	284
Int 2 Tot:		342	19	361
+/- 95%CI:		213	39	216
4/29-5/12/96	WD	255	0	255
	WE	448	106	554
Int 3 Tot:		703	106	809
+/- 95%CI:		271	141	305
5/13-5/26/96	WD	17	0	17
	WE	440	0	440
Int 4 Tot:		457	0	457
+/- 95%CI:		348	0	348
5/27-6/9/96	WD	316	11	328
	WE	38	0	38
Int 5 Tot:		354	11	366
+/- 95%CI:		217	23	218
6/10-6/23/96	WD	509	0	509
	WE	154	31	184
Int 6 Tot:		663	31	693
+/- 95%CI:		297	61	303
6/24-7/4/96	WD	242	0	242
	WE	419	0	419
Int 7 Tot:		661	0	661
+/- 95%CI:		348	0	348
1996 SEASON TOT:	WD	1,397	30	1,427
	WE	1,783	137	1,919
	ICE			169
	ALL	3,180	167	3,516
+/- 95%CI:	ALL	704	160	722
1995-96	WD	4,994	30	5,025
TOTALS	WE	6,310	346	6,655
	ICE			169
	ALL	11,304	376	11,849

[a] WE = weekends, WD = weekdays

Table 4. Total harvest estimates by species and date for May through October 1995 for Payette Lake.

Date	Day type[a]	Fish Kept	Fish Release	Fish Caught	Kokanee	Lake Trout	Rbt wild	Rbt hatchery	Cutt wild	Cutt pens	Rainbow x cutt	Unseen trout
4/30-5/27/95	WD	0	0	0	0	0	0	0	0	0	0	0
	WE	77	55	132	0	33	33	0	0	0	11	0
Interval 1 Total:		77	55	132	0	33	33	0	0	0	11	0
+/- 95%CI:		99	76	129	0	42	69	0	0	0	5	0
5/28-6/24/95	WD	41	13	54	28	0	13	0	0	0	0	0
	WE	67	13	80	27	7	13	0	13	7	0	0
Int 2 Tot:		108	26	134	55	7	26	0	13	7	0	0
+/- 95%CI:		108	36	117	61	10	39	0	21	13	0	0
6/25-7/22/95	WD	39	51	90	7	0	0	0	0	0	0	32
	WE	63	73	136	45	0	9	9	0	0	0	0
Int 3 Tot:		102	124	126	52	0	9	9	0	0	0	32
+/- 95%CI:		127	101	174	62	0	19	17	0	0	0	49
7/23-8/19/95	WD	105	79	184	96	0	0	0	0	0	0	9
	WE	42	17	59	42	0	0	0	0	0	0	0
Int 4 Tot:		147	96	235	138	0	0	0	0	0	0	9
+/- 95%CI		153	78	171	153	0	0	0	0	0	0	18
8/20-9/16/95	WD	162	65	226	162	0	0	0	0	0	0	0
	WE	115	72	187	72	0	43	0	0	0	0	0
Int 5 Tot:		277	137	413	234	0	43	0	0	0	0	0
+/- 95%CI:		329	127	302	311	0	76	0	0	0	0	0
9/17-10/14/95	WD	0	0	0	0	0	0	0	0	0	0	0
	WE	0	0	0	0	0	0	0	0	0	0	0
Int 6 Tot:		0	0	0	0	0	0	0	0	0	0	0
+/- 95%CI:		0	0	0	0	0	0	0	0	0	0	0
10/15-11/11/95	WD	0	0	0	0	0	0	0	0	0	0	0
	WE	0	0	0	0	0	0	0	0	0	0	0
Int 7 Tot:		0	0	0	0	0	0	0	0	0	0	0
+/- 95%CI:		0	0	0	0	0	0	0	0	0	0	0
1995 Season Total:												
+/-95% CI:		711	438	1,040	479	40	111	9	13	7	11	41
		411	199	426	358	43	111	17	21	13	23	67

[a] WE = weekends, WD = weekdays

Table 5. Total harvest estimates by species and date for January through July 4, 1996 for Payette Lake.

Date	Day type[a]	Fish Kept	Fish Released	Fish Caught	Kokanee	Lake Trout	Rbt Wild	Rbt Hatchery	Cutt wild	Cutt pens
1/19-3/22/96	ICE	3	73	76	0	0	3	0	0	0
Interval 1 Total:		3	73	76	0	0	3	0	0	0
4/15-4/28/96	WD	0	0	0	0	0	0	0	0	0
	WE	0	0	0	0	0	0	0	0	0
Int 2 Tot:		0	0	0	0	0	0	0	0	0
+/- 95%CI:		0	0	0	0	0	0	0	0	0
4/29-5/12/96	WD	13	0	13	0	13	0	0	0	0
	WE	8	0	8	0	0	0	0	8	0
Int 3 Tot:		21	0	21	0	13	0	0	8	0
+/- 95%CI:		30	0	30	0	26	0	0	16	0
5/13-5/26/96	WD	0	0	0	0	0	0	0	0	0
	WE	0	32	32	0	0	0	0	0	0
Int 4 Tot:		0	32	32	0	0	0	0	0	0
+/- 95%CI		0	52	52	0	0	0	0	0	0
5/27-6/9/96	WD	13	0	13	13	0	0	0	0	0
	WE	0	6	6	0	0	0	0	0	0
Int 5 Tot:		13	6	19	13	0	0	0	0	0
+/- 95%CI:		24	10	26	24	0	0	0	0	0
6/10-6/23/96	WD	63	0	63	63	0	0	0	0	0
	WE	0	23	23	0	0	0	0	0	0
Int 6 Tot:		63	23	86	63	0	0	0	0	0
+/- 95%CI:		77	24	80	77	0	0	0	0	0
6/24-7/4/96	WD	40	0	40	40	0	0	0	0	0
	WE	48	19	67	43	0	0	5	0	0
Int 7 Tot:		88	19	107	83	0	0	5	0	0
+/- 95%CI:		89	27	98	86	0	0	10	0	0
1996 Season Total:		188	153	341	159	13	3	5	8	**0**
+/-95% CI:		124	64	143	118	26	0	10	16	**0**
1995-96 TOTALS		899	591	1,381	638	53	114	105	21	**7**

[a] WE = weekends, WD = weekdays

Table 6. Estimated catch/harvest rates (fish/hour) for May through October 1995 for Payette Lake.

Date	Day type [a]	Catch Rate			Kokanee		Rainbow trout wild		Lake Trout		Cutthroat wild		Rainbow trout x cutthroat		Cutthroat Net pens	
		Kept	Released	Caught	Kept	Released	Kept	Released	Kept	Released	Kept	Released	Kept	Released	Kept	Released
4/30-	WD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5/25/95	WE	0.04	0.03	0.07	0	0	0.02	0	0.02	0.03	0	0	0.01	0	0	0
5/25-	WD	0.04	0.01	0.05	0.02	0	0.01	0	0	0.01	0	0	0	0	0	0
6/24/95	WE	0.05	0.01	0.06	0.02	0	0.01	0	0.01	0.01	0.01	0	0	0	0.01	0
6/25-	WD	0.09	0.07	0.16	0.01	0	0	0	0	0.07	0	0	0	0	0	0
7/22/95	WE	0.08	0.09	0.17	0.06	0	0.01	0	0	0.02	0	0	0	0	0	0
7/23-	WD	0.11	0.09	0.20	0.11	0	0	0	0	0.05	0	0	0	0	0	0
8/19/95	WE	0.16	0.06	0.22	0.16	0	0	0	0	0	0	0	0	0	0	0
8/20-	WD	0.38	0.15	0.53	0.38	0	0	0	0	0	0	0	0	0	0	0
9/16/95	WE	0.27	0.17	0.44	0.17	0	0.10	0	0	0	0	0	0	0	0	0
9/17-	WD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/14/95	WE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10/15-	WD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11/11/95	WE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1995	WD	0.09	0.05	0.13	0.07	0.00	0.00	0	0	0.02	0	0	0	0	0	0
CR	WE	0.08	0.05	0.14	0.06	0.00	0.02	0	0	0.01	0	0	0	0	0	0
	All	0.09	0.05	0.13	0.07	0.00	0.01	0	0	0.02	0	0	0	0	0	0

[a] WE = weekends, WD = weekdays

Table 7. Estimated catch/harvest rates (fish/hour) for January through July 4, 1996 for Payette Lake.

	Day type [a]	Catch Rate			Kokanee		Lake Trout		Rainbow trout Wild		Rainbow trout Catch		Cutthroat Wild		Cutthroat Net Pens	
		Kept	Released	Caught	Kept	Released	Kept	Released	Kept	Released	Kept	Released	Kept	Released	Kept	Released
1/19-3/22/96	ICE	0.02	0.43	0.45	0	0	0	0.43	0	0	0	0	0	0	0	0
4/15-4/28/96	WD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	WE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/29-5/12/96	WD	0.05	0	0.05	0	0	0.05	0	0	0	0	0	0	0	0	0
	WE	0.02	0	0.02	0	0	0	0	0	0	0	0	0	0	0	0
5/13-5/26/96	WD	0	0	0	0	0	0	0	0	0	0.	0	0	0	0	0
	WE	0	0.07	0.07	0	0.01	0	0	0	0	0	0.01	0	0	0	0
5/27-6/9/96	WD	0.04	0	0.04	0.04	0	0	0	0	0	0	0	0	0	0	0
	WE	0	0.16	0.16	0	0	0	0	0	0	0	0	0	0	0	0
6/10-6/23/96	WD	0.12	0	0.12	0.12	0	0	0	0	0	0	0	0	0	0	0
	WE	0	0.13	0.13	0	0	0	0	0	0	0	0	0	0	0	0
6/24-7/4/96	WD	0.17	0	0.17	0.17	0	0	0	0	0	0	0	0	0	0	0
	WE	0.11	0.05	0.16	0.10	0.02	0	0.02	0	0	0.01	0	0	0	0	0
1996 TOTALS	WD	0.06	0	0.06	0.06	0	0.01	0	0	0	0	0	0	0	0	0
	WE	0.02	0.07	0.09	0.02	0	0	0	0	0	0	0	0	0	0	0
	Season	0.05	0.02	0.07	0.04	0	0.01	0	0	0	0	0	0	0	0	0
1995-96 TOTALS	WD	0.06	0	0.06	0.06	0	0.01	0	0	0	0	0	0	0	0	0
	WE	0.02	0.07	0.01	0.02	0	0	0	0	0	0	0	0	0	0	0
	All	0.05	0.02	0.07	0.04	0	0.01	0	0	0	0	0	0	0	0	0

[a]WE=weekends, WD=weekdays

Little Payette Lake

We collected 325 fish in gill nets during the survey on October 17, 1996. This included 204 large-scale suckers *Catostomus macrocheilus*, 66 squawfish *Ptychocheilus oregonensis*, 44 rainbow trout, 1 kokanee, 5 splake, 4 rainbow trout X cutthroat trout hybrids and 1 smallmouth bass. Left ventral fin clips were found on four of 44 rainbows collected.

Salmonids made up 17% of the biomass and 16.5% by number of all fish collected (Table 8). Rainbow trout ranged in total length from 230 to 502 mm. Rainbow trout X cutthroat trout hybrids ranged in total length from 433 to 601 mm. Quality sized (>406 mm) rainbow trout and hybrids made up 25% of all trout collected. Of the 12 trout greater than 406 mm, four were rainbow X cutthroat hybrids. Two fish, both hybrids, were greater than 508 mm (Table 9). Condition factors (Ktl) averaged 0.98 for all length groups of rainbow trout. Average rbt Ktl's were 0.97 and 0.99 for fish less than and greater than 406 mm respectively (Table 10).

We found growth rates for rbt stocked in 1993 and 1994 to be slow. Daily growth rates since sampled on 10/28/94 averaged 0.16 mm for left ventral marked fish stocked in 1994 (Table 11).

Table 8. Numbers and biomass of all species of fish collected with gill nets on October 17, 1996 on Little Payette Lake.

Species	N	% of Total by Number	Total Weight (kg)	% of Total by Weight
Rainbow trout	44	13.5	18.9	12
Rainbow X cutthroat hybrid	4	1.2	6.6	4.2
Splake	5	1.5	1.4	.89
Small mouth bass	1	.3	.7	.4
Kokanee	1	.3	.04	.025
Squawfish	66	20	32	20.3
Largescale sucker	204	63	97.75	62
	325		157.4	

Table 9. Length frequencies of rainbow trout and rainbow X cutthroat trout hybrids (#) gill netted in Little Payette Lake in October 1996.

Total Length (mm)	Total Number	
200	0	
210	0	
220	0	
230	1	
240	0	
250	1	
260	0	
270	1	
280	2	
290	4	
300	7	
310	3	
320	1	
330	1	
340	2	
350	3	
360	3	
370	1	
380	2	
390	0	
400	4	406mm =16 inches
410	1	
420	1	
430	1 (1)	
440	3	
450	1	
460	0	
470	0	
480	0	
500	1 (1)	
540	(1)	
600	(1)	

Table 10. Average length, weight and condition (Ktl) of rainbow trout, by length group, collected from Little Payette Lake on October 17, 1996.

Total Length (mm)	N	Average Length (mm)	Average Weight (g)	Average Ktl
0-406 (<16 in.)	35	324	321	0.97
407-550 (16 in.)	9	440.5	850	0.99

Table 11. Lengths (± 95% confidence interval) and weights of marked rainbow trout at time of stocking and at time of gill netting.

Date	Clip	Action	Average Total Length	Average Weight (g)	Days in Lake	Growth/Day (mm)
06/15/93	R. Max	Stocked	197	84	0	--
10/28/94	R. Max	Gillnet	314.5 ± 30	292	498	0.24
10/17/95	R. Max	Gillnet	332.2 ± 42	359	852	0.05 *
05/06/94	L. Vent	Stocked	227.25	134	0	--
10/28/94	L. Vent	Gillnet	295 ± 10	215	176	0.38
10/17/95	L. Vent	Gillnet	341 ± 14	384	531	0.13 *
10/17/96	L. Vent	Gillnet	399 ± 16	557	896	0.16*

* Since last sample on 10/28/94

C. Ben Ross Reservoir

We found a shift in the population structure of largemouth bass in C. Ben Ross Reservoir since 1993. A total of 27% of all bass collected in 1996 were larger than 12 inches compared with 6.5% in 1993 (Table 12). We also found more age classes present in 1996 (7) than in 1993 (5) (Table 13). Of all the bass collected in 1996, 50% had hooking scars and/or abrasions.

Table 12. Total number of largemouth bass collected, % of total, average weight and relative weights of individual fish in each 1 cm length group, collected electrofishing on C. Ben Ross Reservoir in May, 1993 and June 1996.

		1993 Largemouth Bass			1996 Largemouth Bass			
Total Length	**Number Collected**	**% of Total**	**Average Weight**	**Relative Weight**	**Number Collected**	**% of Total**	**Average Weight**	**Relative Weight**
<100	26	13	6	--	4	9	--	--
100	1	.5	10	73.5	1	2	--	--
110	6	3	14	73.5	2	5	--	--
120	14	7	18	79	2	5	--	--
130	6	3	24	82	0	--	--	-
40			8	7			-	-
50			1	3		-	-	-
60			7.5	4		-	-	-
70			0	9		-	-	-
80			5	1		-	-	-
90			2	1		-	-	-
00			05	9		-	-	-
10	0	0	22	3.5			-	-
20	2		38	3		-	-	-
30			73	7			00	17
40			92	5			25	07
50			05	1		-	-	-
60			39	1.5			00	11
70			65	7.5			07.5	07
80	4		01	1		2	35	04
90			33	2			88	07

00			47	7			-	-
	12 inches							
10			96	8			60	06
20		5	50	4.5			00	8
30		-	-	-			00	9
40			87	2			05	3
50		-	-	-			05	0
60		-	-	-			18	5
70		-	-	-			-	-

Table 13. Average back-calculated lengths for each age class of largemouth bass collected from C. Ben Ross Reservoir, in May 1993 and June 1996.

Largemouth Bass 1993								Largemouth Bass 1996								
Year	Age	N	Back-Calculation Age					Year	Age	N	Back-Calculation Age					
			1	2	3	4	5				1	2	3	4	5	6	7
								1995	1	2	112						
								1994	2	4	114	214					
								1993	3	11	108	203	283				
1992	1	20	129					1992	4	6	113	202	273	307			
1991	2	25	102	197				1991	5	6	98	174	247	289	322		
1990	3	19	81	164	247			1990	6	2	83	164	219	271	323	352	
1989	4	17	89	175	261	301		1989	7	1	82	188	228	262	327	345	365
1988	5	2	102	222	281	310	343										
All Classes				101	182	255	302				106	195	265	292	323	350	365
N		83	83	63	38	19	2			32	32	30	26	15	9	3	1

Splake Introduction Evaluations

We collected 10 and 6 splake respectively from Granite and Upper Payette lakes with gill nets in 1996. Splake in Granite Lake averaged 339 mm and 340 g with a condition factor (Ktl) of .872. They ranged in length from 322 to 387 mm and in weight from 275 to 540 g. We collected three splake from the original 1992 stocking from Upper Payette Lake. These fish averaged 400 mm in total length, 712 g with a Ktl of 1.06. The other three fish collected from Upper Payette Lake had a clipped adipose fin and averaged 467 mm, 879 g with an average Ktl of 0.85.

We found that splake in Granite Lake had fed primarily on chironomid larvae. The primary food item found in stomachs of splake collected from Upper Payette Lake was juvenile large-scale suckers. (4 of 5 stomachs examined that contained any food item).

Cascade Reservoir Angler Counts

We found that three holidays had been sampled every year during past intensive creel surveys. These were Memorial Day, July 4th and Labor Day. We found that an average of the angler counts by angler type, for each of these days was an indicator of annual angling pressure on Cascade Reservoir (Table 14). While the sample size was not sufficient to show statistical difference, every annual average of the holiday counts, correctly ranked angling pressure by year and type. (i.e., in 1982 shore angler and boat, average counts and actual estimates both showed that shore angling pressure was somewhere between that estimated in 1991 and 1992 and that boat angler hours were the highest of all three years sampled.)

Average angler counts in 1996 were lower than that found in 1982, 91 and 92 (Table 14.). This included both fishing boat and shore angler counts. While no quantitative data were collected in 1996 angling reports indicated that it was a poor fishing year for yellow perch and a fair year for rainbow trout.

Oxbow and Hell=s Canyon Reservoirs

Tournament anglers caught a large number of smallmouth bass over 12 inches. Totals of 388 and 90 bass greater than 12 inches were weighed in at the tournaments on Hell=s Canyon and Oxbow Reservoirs respectively (Table 15). Many bass larger than 12 inches were culled by tournament anglers to get the most weight for a limit of five fish. At the Oxbow tournament 90 bass were brought to the weigh-in but there was a total of 366 bass (82%) larger than 12 inches actually caught and measured by tournament anglers (Table 15). There were 80 bass smaller than 12 inches and 8 bass larger than 16 inches caught during the Oxbow Reservoir tournament.

During the Hell=s Canyon tournament 388 bass larger than 12 inches were weighed in and no counts or measurements were made on other bass caught. Comparison of bass populations between the two reservoirs was difficult because at the Hell=s Canyon tournament only bass brought to the weigh in were measured and counted and no angler effort data was kept.

We collected 71 smallmouth bass on Oxbow Reservoir with electrofishing gear of which 13 (18%) were larger than 12 inches (Table 15). Back calculations from fish scale annuli analysis indicated that it

took 4 to 8 years for smallmouth bass to reach 12 inches in Oxbow Reservoir (Table 16). The average 12 inch fish was 5 years of age.

Table 14. Average boat and shore angler counts on Cascade Reservoir on three major holidays: Memorial Day, July 4th and Labor day, in 1982, 91, 92, and 96 with corresponding intensive creel survey pressure estimates.

	Year			
	1982	1991	1992	1996
	Average of holiday counts			
Ave # Boats	154	41.5	52.5	35
Ave # Shore Anglers	85	32	116	27
Total Of Averages	239	73.5	168.5	62
	Actual Pressure Estimate (Hours x 1000)			
Boat	255.6	135.2	144.2	N/A
Shore	129.8	102.0	177.3	N/A
Total Pressure	385.4	237.2	321.5	N/A

Table 15. Length frequencies of smallmouth bass collected from Oxbow and Hell=s Canyon reservoirs by bass tournament anglers and by elecrofishing in 1996.

Total Length (mm)	Oxbow Reservoir			
	Electrofishing	Tournament (All Bass)	Tournament (>12" Culled)	Tournament (>12" Culled)
60	1	--	--	--
110*	1	--	--	--
120	2	--	--	--
130	5	--	--	--
140	7	--	--	--
150	10	--	--	--
160	7	1	--	--
170	11	--	--	--
180	6	--	--	--
190	3	--	--	--
200	0	--	--	--
210	0	1	--	--
220	1	--	--	--
230	0	--	--	--
240	1	3	--	--
250	0	--	--	--
260	2	22	--	--
270	0	--	--	--
280	0	--	--	--
290	1	51	--	--
300	1	--	--	--
310	1	152	9	76
320	1	--	--	--
330	5	--	--	--
340	3	112	16	155
350	1	--	--	--
360	1	70	36	124
390	0	26	22	25
410	0	5	4	5
440	0	2	2	2

480	0	1	1	1

Table 16. Average back-calculated lengths for each age class of smallmouth bass collected during a bass tournament from Oxbow Reservoir on May 4, 1996.

Smallmouth Bass

Year Class	Age	N	Back-Calculation Age										
			1	2	3	4	5	6	7	8	9	10	11
1991	5	6	95	176	267	322	352	0	0	0	0	0	0
1990	6	12	88	159	222	270	313	347	0	0	0	0	0
1989	7	8	84	150	208	254	293	328	361	0	0	0	0
1988	8	2	84	142	183	230	265	285	325	355	0	0	0
1987	9	1	73	128	171	202	225	241	268	305	340	0	0
1986	10	0	0	0	0	0	0	0	0	0	0	0	0
1985	11	1	116	160	222	249	282	314	346	390	546	447	460
All Classes		30	88	158	223	271	308	330	346	351	378	447	460
N		30	30	30	30	30	30	24	12	4	2	1	1

RECOMMENDATIONS

1. Continue annual trawling in Payette Lake to monitor kokanee age class strength.

2. Continue to monitor nongame fish populations and their effects on rainbow trout in Little Payette Lake.

3. Examine splake in Granite Lake and Upper Payette Lake in 1998 to determine stocking needs.

4. Continue the quality bass regulation on C. Ben Ross Reservoir.

5. Continue holiday angler counts annually on Cascade Reservoir to monitor angling pressure.

6. Continue monitoring effects of the bass regulation change on Oxbow Reservoir.

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APPENDIX

Appendix A. Hydroacoustic Assessment of Fish Stocks in Payette Lake, 1996**.**

Hydroacoustic Assessment of Fish Stocks in Payette Lake, 1996

by
Melo A. Maiolie and Steve Elam

INTRODUCTION

The following is our first attempt at estimating fish populations in Payette Lake using hydroacoustic methodology. Our goals were to confirm or refute kokanee density estimates made by mid-water trawling and to estimate the density of large lake trout.

METHODS

We used a Simrad split-beam echosounder to conduct hydroacoustic surveys of Payette Lake and EP-500 software (version 4.5) to analyze echograms. The lake was divided into three basins (strata) and transects were spaced uniformly in each basin. Where feasible, transects started or ended on shoreline points. We felt this would make a more permanent transect location although it may have bias the estimates by including more of the preferred habitat for lake trout. A total of eighteen transects were surveyed on the night of June 17, 1996. Boat speed was about 3.8 mph with the echosounder set to ping at 0.3 s intervals with a pulse with of 3 milliseconds.

We graphed the frequency distribution of mean target strengths to distinguish size classes of kokanee, and to distinguish lake trout from kokanee. Fish Atracks≅ (a series of returned echos from a single fish) were defined by the following criteria: 2 or more echos, not more than a 30 cm change in depth, no more than 1 missing ping in the track, fish movement from bow to stern, and a signal strength with less than a 10 dB change in intensity.

Areas of the three basins of Payette Lake were calculated using a compensating polar planimeter. The west basin contained 844 ha over 10 m deep, the middle basin contained 82 ha, and the east basin contained 680 ha.

For kokanee, the middle and eastern basins were combined, and the western basin was kept separate. Population estimates were made by multiplying the mean density of fish in each section by the area of that section. Ninety percent confidence limits on the kokanee population estimate were made using stratified uniform sampling design. Lake trout estimates were calculated without dividing the lake into sections. The short transects in the middle section were combined into one transect so that it would be comparable in length to other transects. Log (x+1) transformations were applied to the lake trout density estimates, but still failed to normalize the data.

RESULTS

Four distinct sizes of fish could be distinguished. Target strengths from -59 dB to -52 dB were defined as age 0 kokanee, -51 dB to -43 dB as age 1 kokanee, -42 dB to -33 dB as age 2 and 3 kokanee,

and all signals over -33 dB as lake trout. Age 2 and 3 kokanee could not be separated on the basis of target strength. The four target strength groups corresponded to fish sizes of 1 inch, 4 inch, 10 inch and >20 inches based on Love=s equation.

Fish densities on each transect are provided in Table 1. Whole-lake population estimates were: 423,450 (+/- 18%) age 0 kokanee, 194,070 (+/- 25%) age 1 kokanee, 166,590 (+/- 22%) age 2 and 3 kokanee, and 730 lake trout (90% confidence limit was from 107 fish to 2,460 fish). Age 0 kokanee were most numerous near the shoreline and surface of the lake. Lake trout were detected at depths from 11 m to 64 m. Most lake trout were near the bottom, however, one fish in the west arm was 20 m down in 70 m of water.

DISCUSSION

Kokanee abundance was much higher than anticipated. If 1/3 of the group of fish classified as age 2 and 3 are recruited to the fishery, then there are about 35 fish/ha in the fishery. (This is a guess since no data exist to make this separation.) Densities at this level should provide a very good kokanee fishery, with catch rates of about 1.5 fish/h. This population could have a potential harvest of about 25,000 fish - a potentially significant fishery. These density estimates are in sharp contrast with the last 8 years of trawling (Table 2). By trawling, age 2 and age 3 kokanee abundance estimates were very low with almost no age 3 kokanee reported. Either the trawl estimates or the acoustic estimates are in error. Parkinson et al. 1994(Trans. Am. Fish. Soc. Vol. 123, No. 6) compared the southern Idaho trawler to the two northern trawlers and found no significant difference between the two types of trawlers. However, not finding a difference does not mean a difference did not exist. When we were out on Coeur d=Alene lake doing the comparison, the slower souther Idaho boat was not very effective. In 20 trawl hauls the southern trawler caught only 18% as many kokanee as the Dworshak boat for fish over 210 mm, (59 fish versus 313). I strongly suspect this shows the southern trawler to be increasingly ineffective as kokanee size increases. This bias could become even more pronounced as kokanee exceed 12 inches.

The other possibility is that some of the fish in the open water are not kokanee but rather squawfish or trout. The hydroacoustics can not distinguish species so some other sampling could be helpful if there are any doubts.

Lake trout abundance was very low based on these soundings. Only 5 large lake trout were detected in 25 miles of surveying. Most transects showed no lake trout. Mean density of lake trout was 0.45 fish/ha or one lake trout every 2.2 ha (one lake trout every 5.5 acres). This compares to Priest Lake densities of 1.46 lake trout/ ha for fish over -32 dB (one lake trout over 20 inches for every 1.7 acres). Priest Lake therefore had over 3 times the density of medium to large lake trout, and Priest lake is not known for its abundance of large fish.

Our 90% confidence limits on the Payette Lake lake trout estimates were very wide: 107 to 2,460 fish. This was due in part to the lack of lake trout on many transects. In future surveys, a better sampling design would be to increase the length of the transects to about 8 km so that at least one fish would likely be encountered on each transect. We suspect that hydroacoustic estimates may also be bias to the low side. Lake trout which lay directly on the bottom would be undetectable. Even using the high end of the confidence estimate, Payette Lake may have only a few thousand large lake trout. As such, it illustrates how fragile a resource it may be, and lends support to the very restrictive regulations if this trophy fishery is to persist.

Appendix A. Continued.

RECOMMENDATIONS

1. Compare the southern trawler to the northern trawlers in a lake with large kokanee. Modify the boat as needed to make it effective on larger fish. There are serious questions as to the accuracy of trawling results from the southern Idaho boat.

2. Attempt to develop a kokanee fishery. I suggest the use of canned white corn, downriggers, and WD-40 and see what happens. There was a good article in Idaho Wildlife , spring 95, on how to do this.

3. Determine what percent of the age 2 and 3 kokanee are age 3. You will need a faster trawler to do this, but it will help to make better sense out of the acoustic estimates.

4. Do the lake trout surveys again during the peak of summer stratification and redesign the survey with longer transects.

Appendix A. Continued.

Table 1. Densities (fish/ha) of kokanee and lake trout estimated by hydroacoustic surveys in Payette Lake, Idaho.

Transect #	Age 0 kokanee	Age 1 kokanee	Age 2 and 3 kokanee	Lake trout
1	120	30	51	0
2	180	116	146	0
3	123	77	112	0
4	146	104	101	1.13
5	53	38	58	1.22
6	82	33	23	1.32
7	135	138	50	0
8	224	104	85	0
9	231	101	15	4.76
10	264	149	95	2.00
11	446	299	119	0
12	376	361	177	0
13	554	304	187	0
14	539	52	80	0
15	701	176	167	0
16	453	60	148	0
17	491	80	72	0
18	262	153	173	0

1996 ANNUAL PERFORMANCE REPORT

State of: Idaho

Program: Fisheries Management F-71-R-21

Project I: Surveys and Inventories

Subproject I-C: McCall Subregion

Job: c

Title: Rivers and Streams Investigations

Contract Period: July 1, 1996 to June 30, 1997

ABSTRACT

We estimated the 1996 kokanee *Oncorhynchus nerka kennerlyi* spawning run in the North Fork Payette River, above Payette Lake to be 60,707 fish with a total biomass of 9,834 kg.

We surveyed fish and habitat in three transects on the North Fork Payette River (NFPR) between Payette Lake and Cascade Reservoir. The fish community in all three transects were dominated by species other than salmonids in both numbers and biomass. The potential for a quality trout fishery in the NFPR was limited by three main habitat attributes: the lack of fish cover, low productivity and stream bank erosion.

We also completed an Idaho Department of Fish and Game (IDFG) standard stream survey on Bear Creek on Marshall Mountain. This stream was very high gradient with a small population of rainbow trout *O. mykiss*.

Anglers were guided by Wapiti Meadows Ranch Outfitters in a three mile section of the South Fork Salmon River below the confluence with the East Fork South Fork Salmon River, throughout the East Fork South Fork Salmon River, and in lower Johnson Creek. All fishing was catch-and-release. Steelhead/redband trout *O. mykiss*, cutthroat trout *O. clarki*, mountain whitefish *Prosopium williamsoni*, and bull trout *Salvelinus confluentus* were reported in the catch. Average catch rates ranged from 1.1 to 1.6 fish per hour.

Three temperature recorders monitored the upper Little Salmon River throughout the summer. Mean daily river temperature peaked at 22EC in late July and again in mid August. The highest maximum daily temperature recorded was 25.8EC at Station 3. The highest minimum daily temperature was 19.8EC. Overall, river temperatures were similar to those recorded in 1995.

A single temperature recorder in Mud Creek, just below the confluence with Little Mud Creek, under the Highway 95 bridge, recorded temperatures successfully throughout the summer. Average daily temperature remained below 21EC. The highest maximum daily temperature recorded was 25.1EC. The highest minimum daily temperature recorded was 17.2EC.

Crews canoed and fished the Little Salmon River on July 2, from Meadow Creek Bridge to Round Valley Creek. Catch rate for rainbow trout was 0.6 fish per hour. Two squawfish *Ptychocheilus oregonensis* were the only other species caught.

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OBJECTIVES

To maintain information for fishery management activities and decisions for rivers and streams.

INTRODUCTION

North Fork Payette River Above Payette Lake

The spawning run of kokanee *Oncorhynchus nerka kennerlyi* in the North Fork Payette River (NFPR) from Payette Lake has been monitored since 1988 to assess spawning escapement and to serve as a method of validating kokanee population/density estimates and survival estimates from trawling (Janssen et al. 1997). This work was completed again in 1996.

North Fork Payette River Below Payette Lake

Habitat quality and standard stream surveys were completed at three locations on the river to determine quality trout potential (as defined in the five year management plan) of the NFPR between Payette Lake and Cascade Reservoir.

Bear Creek (Marshall Mountain)

We completed an IDFG standard stream survey on Bear Creek on Marshall Mountain.

South Fork Salmon River Guided Fishery

Wapiti Ranch guides catch-and-release fishing on a section of the South Fork Salmon River from the Hamilton Creek to Threemile Creek, downriver from the confluence with the Secesh River. The outfitter is required to report effort and catch. Annual reports will allow us to track trends in this fishery.

Upper Little Salmon River Temperature and Fisheries Monitoring

The upper Little Salmon River drainage is the focus of ongoing riparian habitat improvement projects, and some improvements in agricultural land use practices. Debate has risen regarding what specific factors limit salmonid populations in the drainage. The effect of high summer water temperature as a factor limiting salmonid abundance and distribution in the drainage is unknown. The recent availability of affordable temperature recorders made it possible to continuously monitor summer temperatures. Monitoring began in 1994.

High turbidity prevented crews from estimating fish abundance in the upper Little Salmon River by snorkeling. The river is too large and good habitat too sparse for electrofishing to be a practical way to estimate fish abundance. Because angling pressure is low and the river is surrounded completely by private land, we decided to sample by floating and angling.

METHODS

North Fork Payette River Above Payette Lake

We visually counted all live spawning kokanee on four different dates through the peak of the spawning run. The counts were made by walking the entire stretch of river utilized by spawning. The total spawning run estimate was then made by multiplying the largest daily, live spawner count by 1.73 (Frost 1995).

North Fork Payette River Below Payette Lake

Trout habitat in the NFPR was evaluated using the Habitat Quality Index developed by Binns (1982). Biologists also completed the IDFG standard stream survey at each site.

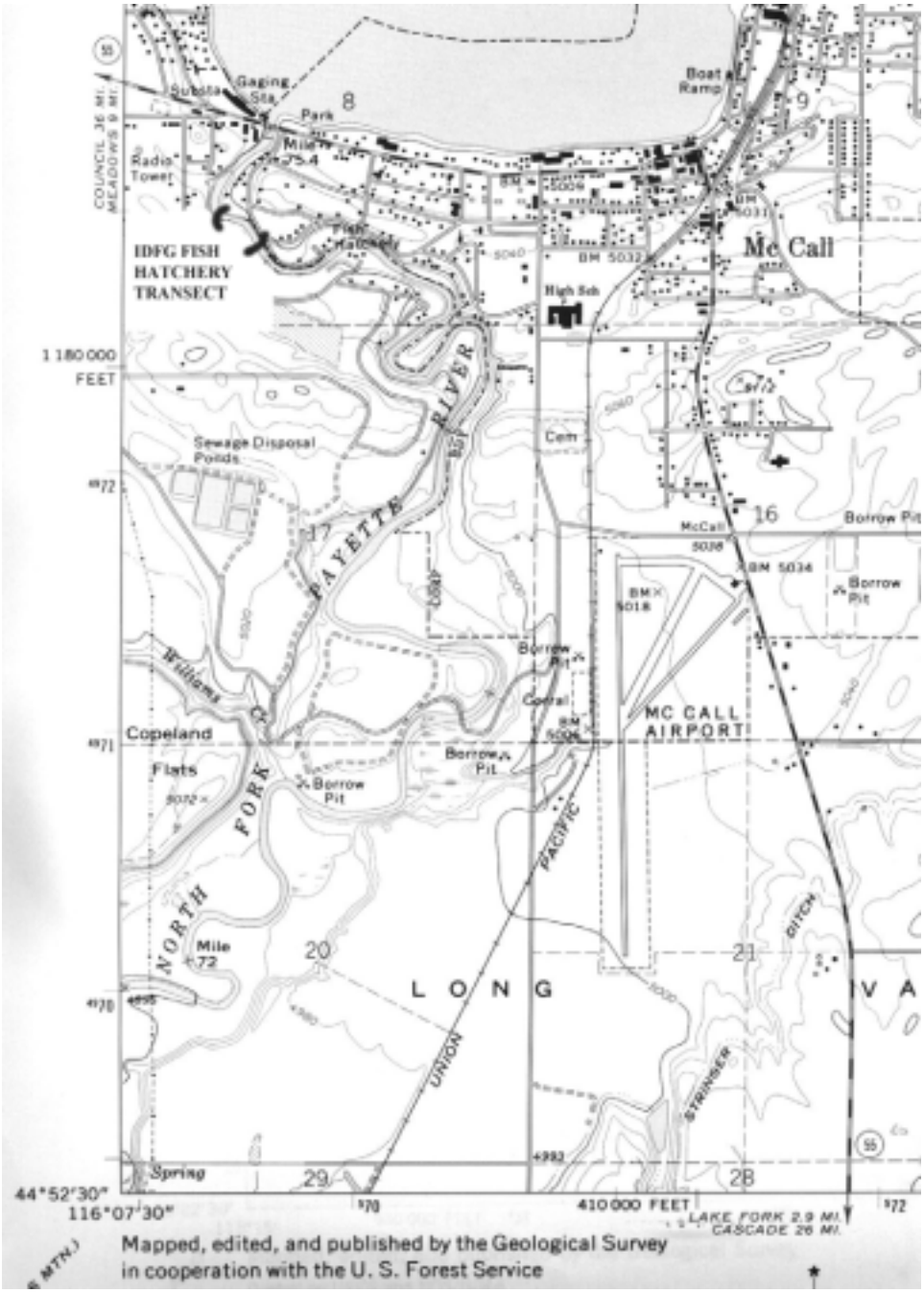
Three sites were surveyed on the river. The first site was located just upstream of the IDFG McCall fish hatchery complex (Figure 1). The second site was located approximately 4.5 air miles downstream from the Payette Lake dam (Figure 2). The third survey site was located approximately 3 mile upstream of the Hartsell Bridge (Figure 3).

We used electrofishing gear to sample fish in the transect. We made two passes, collecting all fish observed to make population and biomass estimates. All fish collected were identified to species, counted, weighed and measured.

Electronic temperature recorders were placed in two locations on the NFPR. One recorder was placed adjacent to the IDFG fish hatchery and the second recorder was placed approximately 4.5 air miles south of the Payette Lake dam.

Bear Creek (Marshall Mountain)

We used the IDFG standard stream survey methods to complete the survey. One pass was made with electrofishing equipment to determine fish species present.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Park
Radio Tower
Fish Hatchery
High Sch
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Borrow Pit
MC CALL AIRPORT
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DITCH
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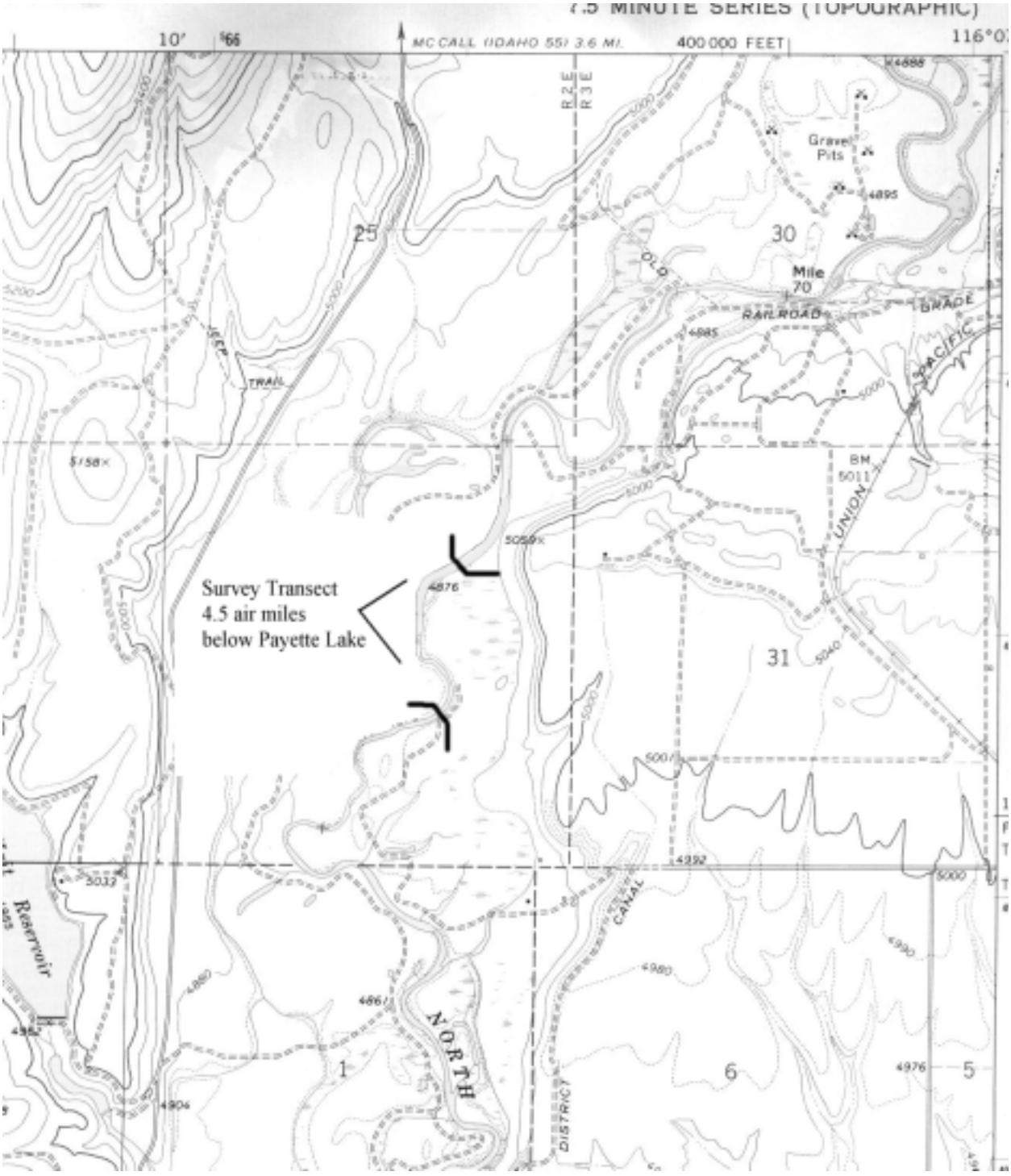
CASCADE 26 MI.
Mapped, edited, and published by the Geological Survey
in cooperation with the U. S. Forest Service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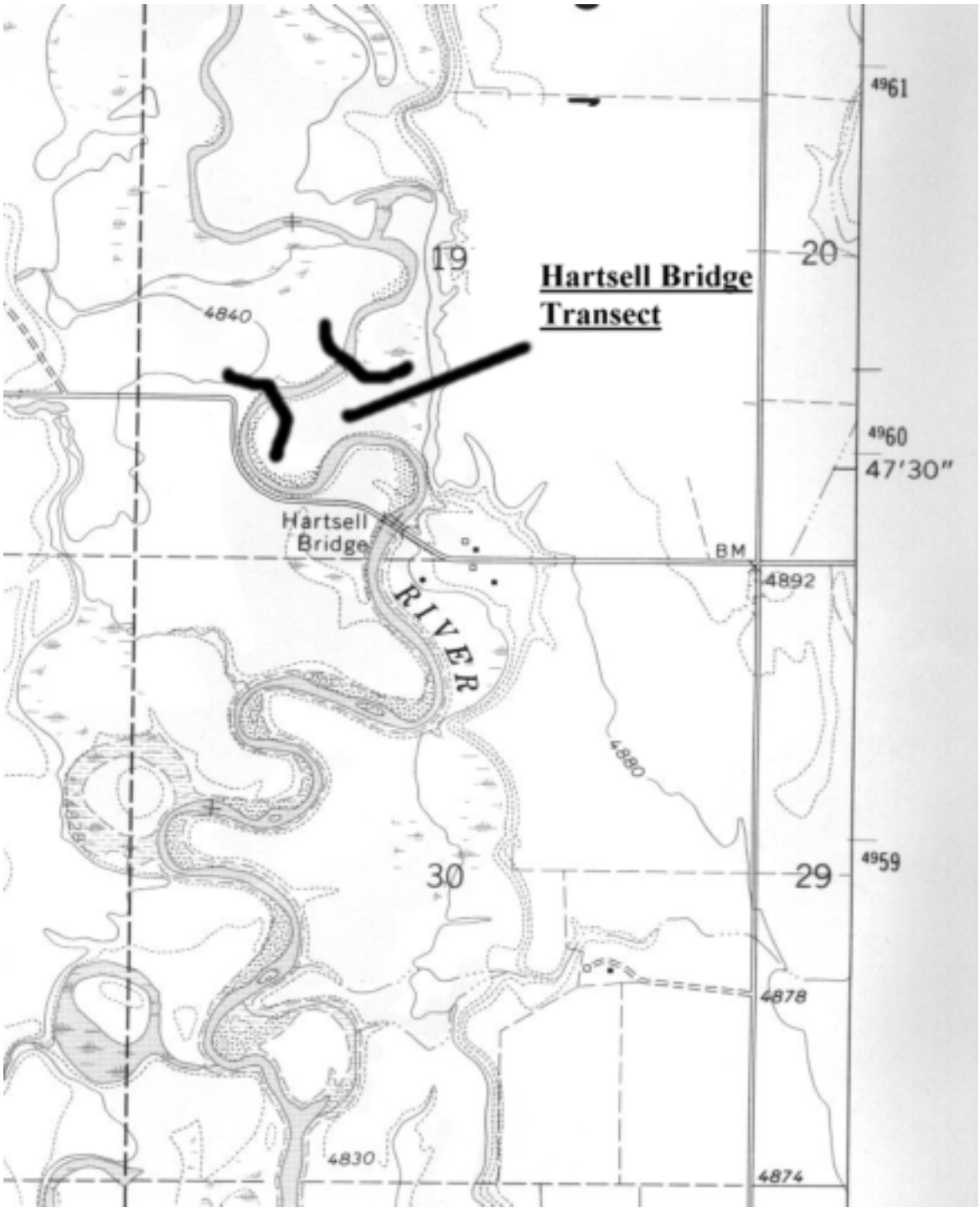
5040
5000
4992
Reservoir
3032
CANAL
4980
4990
4860
4861
NORTH
1
6
5
4976
4904
DISTRICT


Hartsell Bridge
Transect
19
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Hartsell
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4874

South Fork Salmon River Guided Fishery

We provided Wapiti Meadows Ranch with angler diaries made specifically for monitoring this fishery. Guides were asked to have clients record time fished, species caught, and fish length to the nearest inch. There was also space provided in the diary for comments, and an opportunity for the angler to have his or her diary returned after analysis.

Upper Little Salmon River Temperature and Fisheries Monitoring

Three Hobo temperature recorders (model HTI -5 to +35EC) monitored water temperature continuously in the Little Salmon River, recording a temperature every 2.4 hours from June 12 through September 25, 1996. The upstream recorder (Station 1) was placed under the bridge on Hubbard Lane, approximately 500 m upstream from the irrigation diversion. Station 2 was approximately 50 m downstream from the Meadow Creek subdivision bridge, adjacent to Highway 95 road mile 163.4 and at 45EN Latitude. Station 3 was adjacent to Highway 95, 5.4 miles north of the intersection with Highway 55, under a recently constructed bridge on Alvin Hall=s ranch. An additional recorder was placed in Mud Creek, immediately below the confluence with Little Mud Creek under the Highway 95 bridge. All recorders were in water tight ABS containers and secured to a four-foot rebar driven into the substrate to hold the recorder in the middle of the water column.

Six people in three canoes floated and fished the Little Salmon River on July 2, from Meadow Creek Bridge (45th parallel) to Round Valley Creek. Spinning gear and lures were used. All fish caught were released immediately after measuring.

RESULTS

North Fork Payette River Above Payette Lake

We observed the first kokanee on the 8th of September. The peak spawner count was 35,090 live fish on September 23, 1995. The total spawning run estimate for 1995 was 60,707 fish. This is the highest spawner count since counts were begun in 1988 (Table 1). Average fork length of post spawned fish was 247 mm and 245 mm for males and females respectively. The average prespawn weight of these fish was 162 g. (Calculated from fish collected from trawling in August 1996, using fish of similar length).

Table 1. Estimated total kokanee spawning run size and biomass from 1988 through 1996 for Payette Lake.

Year	Peak Count	Est. # Spawners	KG/HA	#/HA	Average Weight/fish (g)
1988	13,200	22,800	4.6	13.3	346
1989	8,400	14,500	2.9	8.4	349
1990	9,642	16,700	3.5	9.7	358
1991	10,400	18,000	5.3	10.5	505
1992	16,945	29,300	6.4	17.1	377
1993	34,994	59,310*	8.5	34.6	245
1994	25,550	44,200	5.5	25.8	214**
1995	32,050	55,450	4.8	32.3	147
1996	35,090	60,707	5.7	35.4	162***

* Estimate made from shore and weir counts (Frost and Bennett, 1994)
** From gill net data of captured spawners in Payette Lake during lake survey.
*** From Trawling collections made in September 1996.

North Fork Payette River Below Payette Lake

We found that the potential for a quality trout fishery in the NFPR was limited by three main habitat attributes: the lack of fish cover, low productivity and stream bank erosion (Tables 2, 4, and 6). Lack of fish cover was the only universal problem found to be severe in all three survey locations. Bank erosion was found to get progressively worse the further downstream we surveyed. Low productivity is an inherent problem in the Idaho Batholith geological area.

Stream bottom substrates changed noticeably as we moved downstream. Rubble and boulder size material dominated the transect just upstream of the fish hatchery (Table 3). Gravel and rubble dominated the substrate at the transect 4.5 miles downstream from the dam (Table 5) while sand was the primary substrate in the Hartsell Bridge transect (Table 7).

We found that nongame fish species were the most numerous in both numbers (Figure 4) and biomass in the two transects furthest upstream (Tables 8 and 9). Nongame fish species collected in all three transects included: largescale sucker *Catostomus macrocheilus*, longnose dace *Rhinichthys cataractae*, northern squawfish *Ptychocheilus oregonensis*, redside shiner *Richardsonius balteatus*, shorthead sculpin *Cottus confusus*, yellow perch *Perca flavescens*, and brown bullhead *Ameiurus nebulosus*.

Nongame fish made up 93% of the total biomass collected at the IDFG fish hatchery transect,. Wild

rainbow trout *Oncorhynchus mykiss* made up the remaining 7%. We found that nongame fish, mountain whitefish *Prosopium williamsoni* and wild rainbow trout made up 73, 16, and 11% respectively of the biomass collected at the transect 4.5 miles below Payette Lake. We found that whitefish, nongame fish, yellow perch, and wild rainbow trout made up 48, 26, 15, and 11% respectively, of the biomass collected at the Hartsell Bridge transect.

Wild rainbow trout biomass was found to be relatively low at 2 kg/ha at all three sites (Table 9).

Daily stream temperatures fluctuated more but averaged lower at the downstream temperature recording site (4.5 miles downstream of dam)(Figures 5 and 6). Average water temperatures exceeded 20^{o} C on 15 days and exceeded 22^{o} C on two days at the upstream site. The downstream site exceeded 20^{o} C on 9 days and never exceeded 22^{o} C. Temperatures were higher near the dam and was probably a result of water release methods over the dam. Water at the dam flows over dam boards therefore only the warm, very top layer of Payette Lake is released. Changes in water release methods could cool stream water temperatures.

Table 2. Habitat attributes and scores for the Binn=s Habitat Quality Index survey completed on August 20, 1996, on the NFPR just upstream from the IDFG hatchery complex.

CHEMICAL DATA		PHYSICAL DATA	
Water Temp C^{o}:	23	Thalweg Length (m):	115
pH:	6.9	Mean Depth (m):	0.41
Cond:	21	Velocity (m/sec):	0.44
		Wetted Channel Width (m):	16.78
		Volume (m^3/sec):	3.01
		Station Surface Area (m):	1929

HQI HABITAT ATTRIBUTES				SCORE
Late Summer Flow (CDF/ADF):		0.318	X1:	3
Annual Flow Variation:		79.25	X2:	2
Maximum Ave. Summer Water Temp:	23 C^{o}	X3:	2	
Nitrate Nitrogen:		0.032 mg/l	X4:	1
Fish Cover:	696 m^2	36%	X7:	2
Eroding Banks:	15 m	13%	X8:	3
Substrate (Model II):		6 Macro./dm^2	X9:	1
Water Velocity:		44 cm/sec	X10:	3
Stream Width:	16.8 m	X11:	2	

F=X3(X4)(X9)(X10) S=X7(X8)(X11)
F+1=7 S+1=13

HQI=20

HQI SCORE

Actual Standing Crop (trout):	2 lb/acre	2 kg/ha
Predicted Standing Crop (trout):	20 lb/acre	23 kg/ha
Habitat Quality (units):	22 lb/acre	24 kg/ha

Table 3. Habitat data collected from the NFPR (IDFG fish hatchery) stream survey.

Stream: NFPR Transect Name: Upstream of IDFG hatchery
Date: 8/20/96
EPA Reach: 17050123-033
Total Length: 115 m — Water Temp.: 23* C
Conductivity: 21 — Water vel.(Dye Time): 4 min. 22 sec.
Ave. width: 16.8 m — Ave. depth: 0.41 m
Gradient %: .96 — CFS: 106
Channel Type: B — Visibility (m): NA
Habitat Type %: Pool: — Riffle: Run: — Pocket Water:

Trans. length from bottom	Width (m)	L to R	Depth (m)	Sand	Gravel	Rubble	Boulder	Bed rock
0	15	3	.5	--	20	50	30	--
		2	.5	--	--	50	50	--
		:	.3	--	--	10	90	--
30	11.7	3	.3	--	--	10	90	--
		2	.6	--	--	20	80	--
		:	.4	--	--	20	80	--
68	18.2	3	.2	--	--	100	--	--
		2	.5	--	20	60	20	--
		:	.4	--	70	--	30	--
98	22.2	3	.5	--	10	10	80	--
		2	.1	--	--	10	90	--
		:	.6	20	60	20	--	--

Table 4. Habitat attributes and scores for the Binn=s Habitat Quality Index survey completed on August 12, 1996, on the NFPR 4.5 air miles downstream from the Payette Lake dam.

CHEMICAL DATA		PHYSICAL DATA	
Water Temp C^{o}	23	Thalweg Length (m):	391
pH:	6.9	Mean Depth (m):	0.35
Cond:	20	Velocity (m/sec):	0.332
		Wetted Channel Width (m):	15.73
		Volume (m^3/sec):	1.75
		Station Surface Area (m):	6,148

HQI HABITAT ATTRIBUTES				SCORE
Late Summer Flow (CDF/ADF):		0.318	X1:	3
Annual Flow Variation:		79.25	X2:	2
Maximum Ave. Summer Water Temp:	23 C^{o}	X3:	2	
Nitrate Nitrogen:		0.137 mg/l	X4:	3
Fish Cover:	225 m^2	4%	X7:	0
Eroding Banks:	161 m	41%	X8:	2
Substrate (Model II):	54 Macro./dm^2		X9:	4
Water Velocity:		32 cm/sec	X10:	3
Stream Width:	15.7 m	X11:	2	

F=X3(X4)(X9)(X10) S=X7(X8)(X11)
F+1=73 S+1=1

HQI=57

HQI SCORE

Actual Standing Crop (trout):	2 lb/acre	2 kg/ha
Predicted Standing Crop (trout):	57 lb/acre	64 kg/ha
Habitat Quality (units):	62 lb/acre	69 kg/ha

Table 5. Habitat data collected from the NFPR (4.5 mi. below dam) stream survey.

Date: 8/12/96
EPA Reach: 17050123-033
Total Length: 391 m — Water Temp.: 23* C
Conductivity: 20 — Water vel.(Dye Time): 20 min. 30 sec.
Ave. width: 15.7 m — Ave. depth: 0.35 m
Gradient (% vert. drop): 0.2% — CFS: 62
Channel Type: C — Visibility (m): NA
Habitat Type %: Pool: 5 Riffle: 29 Run: 61 Pocket Water: 5

Trans. length from bottom	Width (m)	L to R	Depth	Sand	Gravel	Rubble	Boulder	Bed rock
0	12	3	.2	--	40	60	--	--
		2	.2	--	65	35	--	--
		:	.3	20	40	40	--	--
125		3	.3	--	70	30	--	--
		2	.4	30	50	20	--	--
		:	.3	10	80	10	--	--
250		3	.2	10	80	10	--	--
		2	.6	50	30	20	--	--
		:	.8	10	60	30	--	--
391		3	.3	--	60	40	--	--
		2	.4	10	70	20	--	--
		:	.2	40	60	--	--	--

Table 6. Habitat attributes and scores for the Binn=s Habitat Quality Index survey completed on August 20, 1996, on the NFPR upstream from the Hartsell Bridge.

CHEMICAL DATA		PHYSICAL DATA	
Water Temp C^{o}:	24	Thalweg Length (m):	195
pH:	6.9	Mean Depth (m):	0.58
Cond:	21	Velocity (m/sec):	0.40
		Wetted Channel Width (m):	22.4
		Volume (m^3/sec):	5.28
		Station Surface Area (m):	4,363

HQI HABITAT ATTRIBUTES				SCORE
Late Summer Flow (CDF/ADF):		0.318	X1:	3
Annual Flow Variation:		79.25	X2:	2
Maximum Ave. Summer Water Temp:		24 C^{o}	X3:	2
Nitrate Nitrogen:		0.093 mg/l	X4:	1
Fish Cover:	108 m^2	2%	X7:	0
Eroding Banks:	195 m	100%	X8:	0
Substrate (Model II):		47 Macro./dm^2	X9:	3
Water Velocity:		40.5 cm/sec	X10:	3
Stream Width:	22.4 m	X11: 2		

F=X3(X4)(X9)(X10)
F+1=19

S=X7(X8)(X11)
S+1=1

HQI=24

	HQI SCORE	
Actual Standing Crop (trout):	2 lb/acre	2 kg/ha
Predicted Standing Crop (trout):	24 lb/acre	27 kg/ha
Habitat Quality (units):	26 lb/acre	29 kg/ha

Table 7. Habitat data collected from the NFPR (just upstream of Hartsell Bridge) stream survey.

Date: 8/20/96
EPA Reach: 17050090
Total Length: 195 m Water Temp.: 24* C
Conductivity: NA Water vel.(Dye Time): 8 min. 2 sec.
Ave. width: 22.4 m Ave. depth: 0.58 m
Gradient (% vert. drop): 0.2% CFS: 185
Channel Type: C Visibility (m): NA
Habitat Type %: Pool: 3 Riffle: 40 Run: 56 Pocket Water: 1

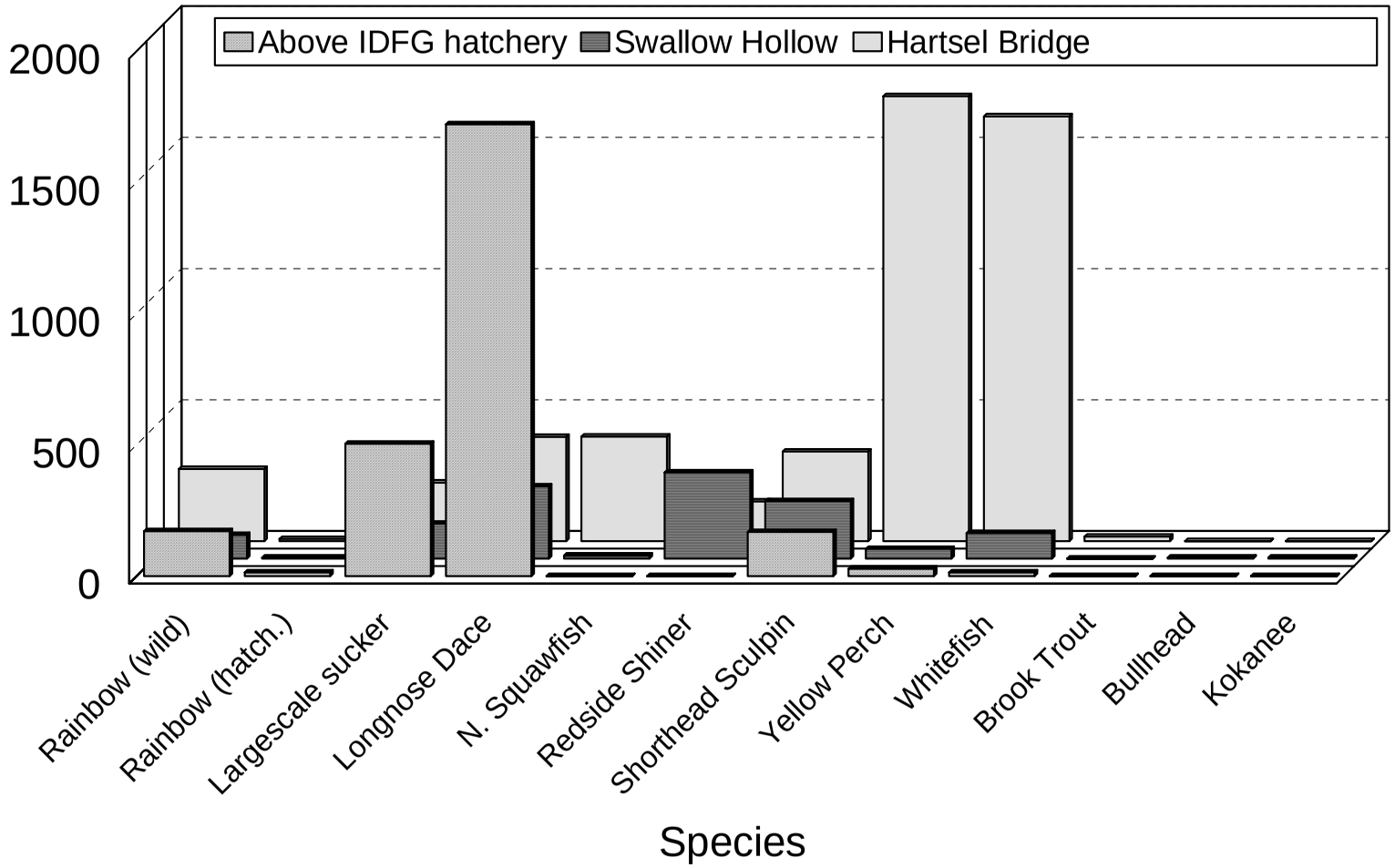
Trans. Length from Bottom	Width (m)	L to R	Depth (m)	Sand	Gravel	Rubble	Boulder	Bed rock
0	26	3	.2	100	--	--	--	--
		2	.6	10	90	--	--	--
		:	.6	5	95	--	--	--
90	17.6	3	.3	100	--	--	--	--
		2	.8	95	5	--	--	--
		:	1.4	60	40	--	--	--
135	17.9	3	.3	90	10	--	--	--
		2	.6	40	60	--	--	--
		:	.7	10	90	--	--	--
195	28	3	.5	100	--	--	--	--
		2	.4	50	50	--	--	--
		:	.6	40	20	--	--	40(hard pan)

Table 8. Population estimates (number/mile) by species in the three survey sites sampled on the NFPR in August 1996.

Species	Hatchery	4.5 mi.	Hartsell Bridge
Rainbow (wild)	171	90	275
Rainbow (hatch.)	14	4	8
Largescale sucker	504	133	223
Longnose Dace	1,721	275	397
N. Squawfish	0	12	398
Redside Shiner	0	328	151
Shorthead Sculpin	168	219	341
Yellow Perch	28	37	1,695
Whitefish	14	97	1,618
Brook Trout	0	0	17
Brown Bullhead	0	4	0
Kokanee	0	4	0

Table 9. Fish biomass estimates in kg/ha and kg/stream mile in the NFPR by transect, sampled in 1996 (hatchery trout are not included).

Species	kg/ha	kg/stream mile
Just Upstream of the IDFG Fish Hatchery		
Wild rainbow	2.0	5.4
Nongame fish	22.7	67.1
TOTAL	24.7	72.5
4.5 Miles Downstream of Payette Lake Dam		
Wild rainbow	2.0	5.1
Whitefish	2.8	7.8
Nongame fish	12.5	34.6
TOTAL	17.3	47.5
Upstream of Hartsell Bridge		
Wild rainbow	2.0	7.2
Whitefish	8.3	32.4
Yellow Perch	2.6	10.1
Nongame fish	4.5	17.6
TOTAL	17.4	67.3


Above IDFG hatchery
Swallow Hollow
Hartsel Bridge
2000
1500
1000
500
0
Rainbow (wild)
Rainbow (hatch.)
Largescale sucker
Longnose Dace
N. Squawfish
Redside Shiner
Shorthead Sculpin
Yellow Perch
Whitefish
Brook Trout
Bullhead
Kokanee
Species

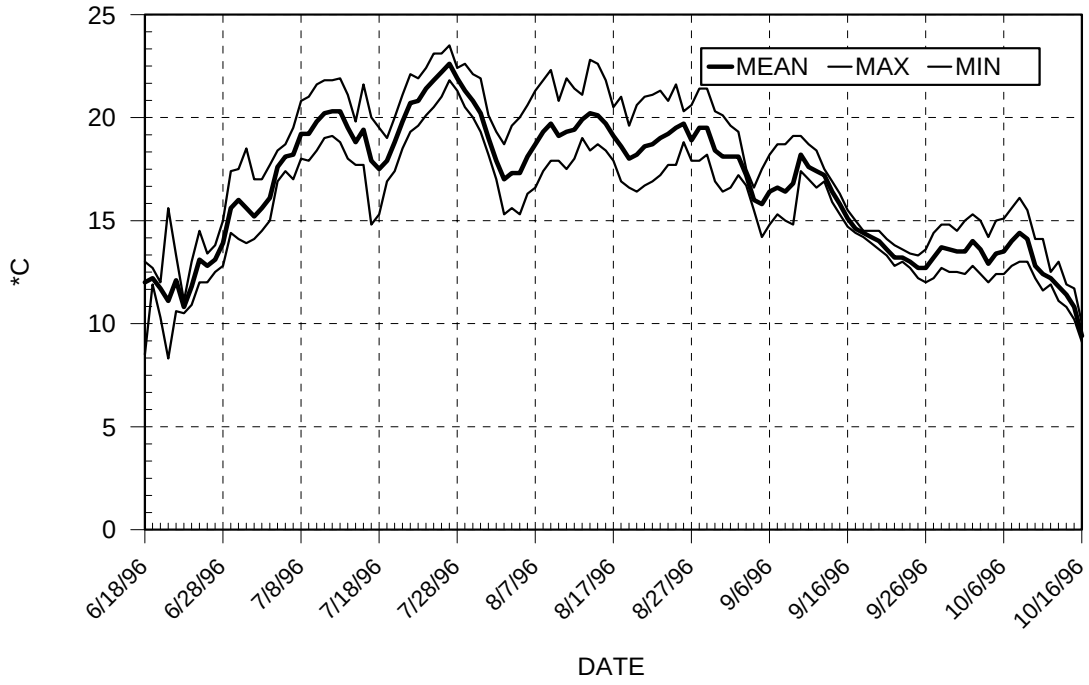


Figure 5. Average, minimum and maximum temperatures for the North Fork Payette River, adjacent to the IDFG fish hatchery.

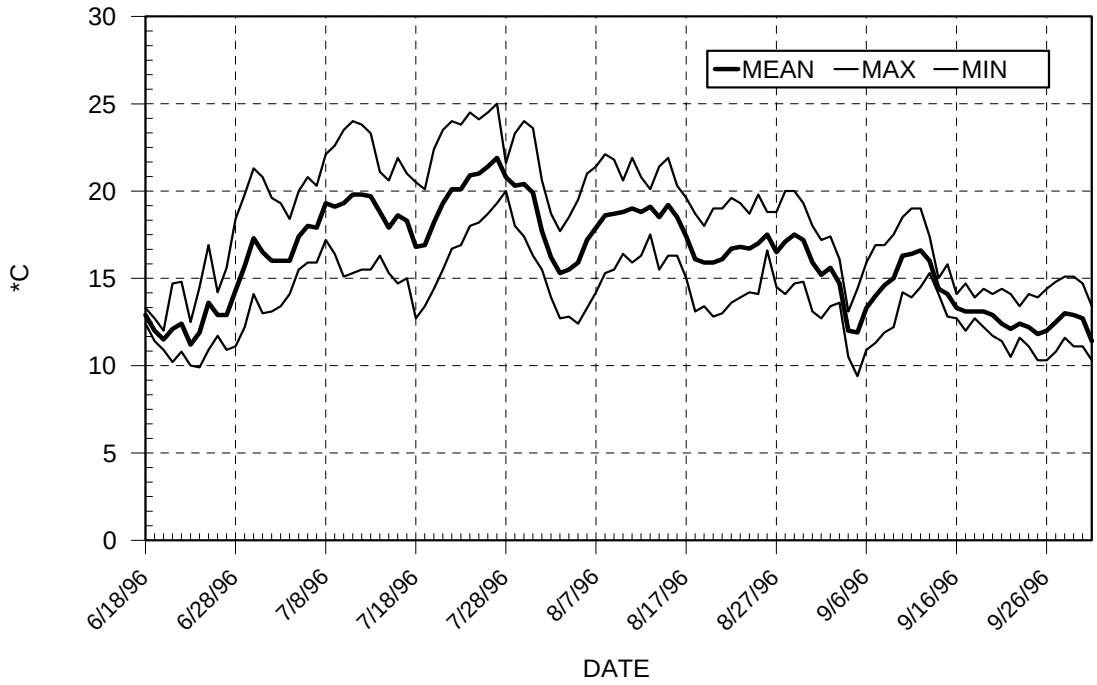


Figure 6. Average, minimum and maximum temperatures for the North Fork Payette River, Swallow Hollow area in 1996.

Bear Creek (Marshall Mountain)

Bear Creek was a very high gradient stream (6% vertical drop) with a dense, mature forest canopy. The stream itself was quite stable with little erosion, however sand and silt were being delivered to the stream via recent logging activities on a very steep slope and from the road system in the drainage.

We found sand and gravel to be the dominant substrate class in most of the transect (Table 10). We collected three rainbow trout with electrofishing gear. We also observed four to five Colombia spotted frogs *Rana luteiventris*, numerous tailed frog tadpoles *Ascaphus truei* and four Idaho giant salamanders *Dicamptodon aterrimus*. The salamanders were collected while electrofishing.

South Fork Salmon River Guided Fishery

We received information from guided trips that took place from July 4 through August 2. Steelhead/redband trout *O. mykiss*, westslope cutthroat trout *O. clarki lewisi*, mountain whitefish, and bull trout were reported in the catch (Table 11). Catch rate for all species combined was 1.27 fish per hour in the South Fork Salmon River; 1.65 f/h in the East Fork South Fork Salmon River; and 1.12 fish per hour in lower Johnson Creek. Steelhead parr/redband trout continued to dominate the catch in 1996, with proportion of cutthroat trout in the catch decreasing since 1995.

Upper Little Salmon River Temperature and Fisheries Monitoring

Recorders monitored river temperatures from June 12 through September 25, 1996. A rapid drop in river level caused recorders at stations 2 and 3 to be exposed to air temperature from July 8 through July 25. Average daily temperatures for June ranged from 9.7 to 19.7EC (Figure 7; Appendix A). Average daily temperatures for July ranged from 15.9 to 22.4EC. Average daily temperatures for August ranged from 15.4 to 21.9. Average daily temperatures for September ranged from 7.6 to 18.2EC. Maximum temperatures exceeded 20EC for >6 hours on 55/107 days at Station 1; 29/107 days at Station 2; and 36/106 days at Station 3.

The recorder in Mud Creek monitored water temperature continuously from Jun 29 through September 25 (Figure 8). Average daily temperatures for July ranged from 15.3 to 20.3EC. Average daily temperatures for August ranged from 15.1 to 20.3EC. Average daily temperatures for September ranged from 6.7 to 16.7EC. Maximum daily temperatures exceeded 20EC for >6 hours on 55/90 days.

Mostly natural rainbow trout were caught by angling in the Little Salmon River (Table 12). In addition to rainbow trout two small squawfish (190mm and 70mm) were caught. Canoeing and fishing the river from Meadow Creek Bridge to Round Valley Creek took nine hours.

Table 10. Habitat data collected from the Bear Creek stream survey on September 13, 1996.

Date: 9/13/96 Alka.: 40
EPA Reach: PH: 7.2
Total Length: 237 ft Water Temp.: 24* C
Conductivity: NA Water vel.(Dye Time): 2 min. 25 sec.
Ave. width: 6.25 ft. Ave. depth: 0.48 ft
Gradient (% vert. drop): 6% CFS: 4.9
Channel Type: C Visibility (m): NA
GPS Coords (UTM=s, NAD27): 11T0589841 5031933
Habitat Type %: Pool: 9 Riffle: 45 Run: 45 Pocket Water: 1

Trans. Length from Bottom	Width (ft)	L to R	Depth (ft)	Sand	Gravel	Rubble	Boulder	Bed rock
0	4.5	3	.7	10	30	60	--	--
		2	.35	20	20	60	--	--
		:	.5	40	60	--	--	--
100	6.5	3	.35	15	35	60	--	--
		2	.45	20	60	20	--	--
		:	.4	30	70	--	--	--
180	8.0	3	.35	30	30	20	20	--
		2	.35	35	35	30	--	--
		:	.30	30	70	--	--	--
237	6.0	3	.80	--	--	--	100	--
		2	.90	--	50	--	50	--
		:	.30	--	30	--	70	--

Table 11. Fish caught and released during guided angling trips with Wapiti Meadows Ranch Outfitters, South Fork Salmon River (SFSR) downriver from the East Fork South Fork Salmon River (EFSFSR) confluence, EFSFSR and Johnson Creek, 1996. Average catch rates for individual streams were: SFSR = 1.21 fish/hr; EFSFSR = 1.65 fish/hr; Johnson Creek = 1.12 fish/hr

Fish length (inches)	South Fork Salmon River				East Fork South Fork Salmon River				Johnson Creek		
	STHD/[a] Redband Trout	WCT[a]	MWF[a]	BT[a]	STHD/ Redband Trout	WCT	BT	MWF	STHD/ Redband Trout	WCT	BT
4	2	5	--	--	1	--	--	--	1	--	--
5	9	--	--	--	4	--	--	--	1	--	--
6	62	11	--	--	51	--	1	--	9	--	--
7	52	5	--	--	7	1	--	--	6	--	--
8	29	12	--	--	14	3	--	--	1	--	--
9	29	--	--	--	12	--	--	--	3	--	--
10	36	1	--	--	9	4	--	--	2	2	--
11	21	--	--	--	2	1	--	1	--	--	--
12	13	4	--	--	2	2	--	1	3	1	--
13	2	3	--	--	--	--	--	2	--	1	--
14	4	3	2	--	--	1	--	1	--	10	--
15	2	1	1	--	--	2	--	--	--	5	--
16	2	1	--	--	--	1	--	--	1[b]	11	1

[a]STHD=Steelhead, WCT=Westslope cutthroat; MWF=Mtn. Whitefish; BT=Bull trout

[b]redband x cutthroat hybrid

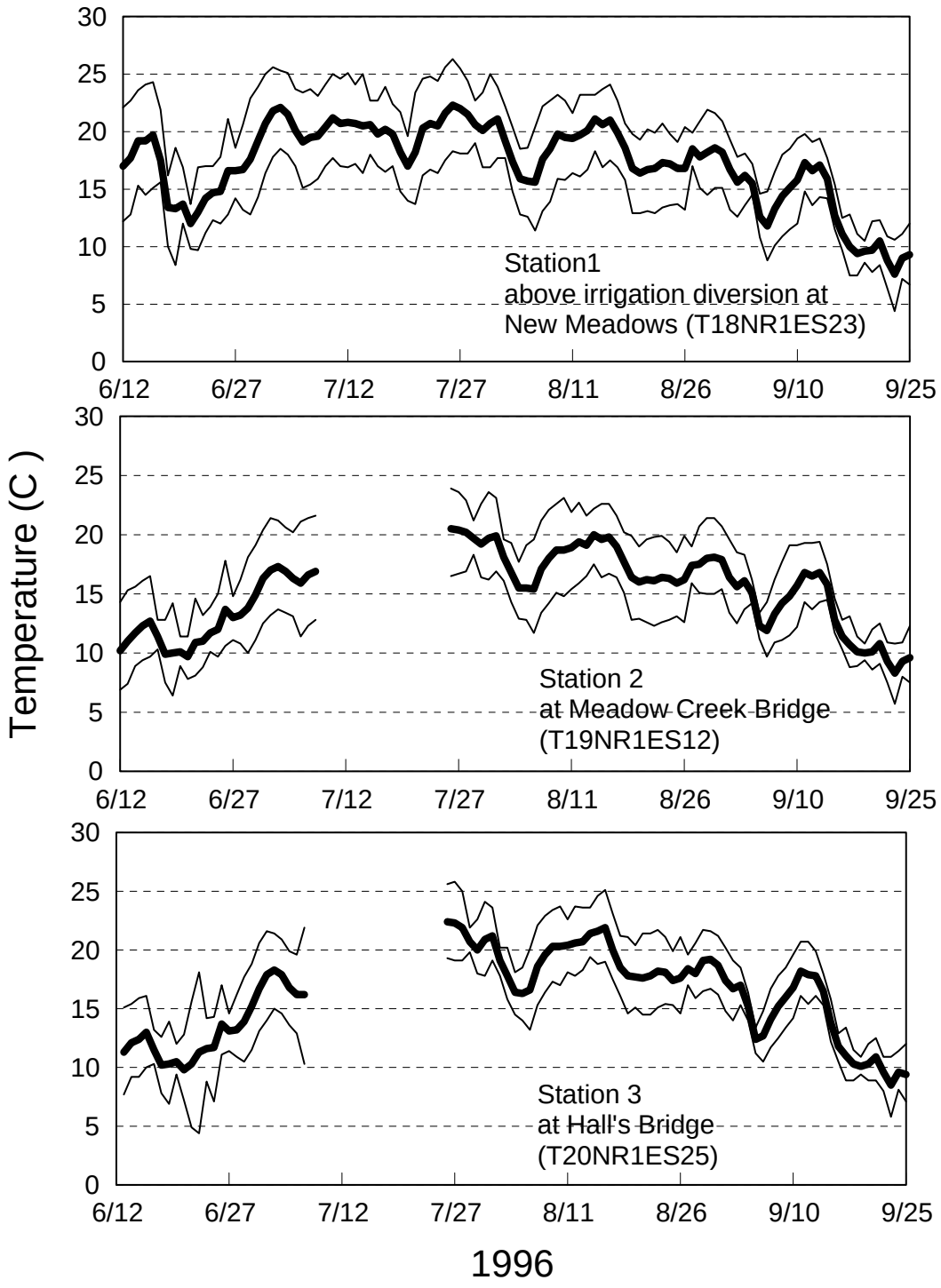
Table 11. Continued

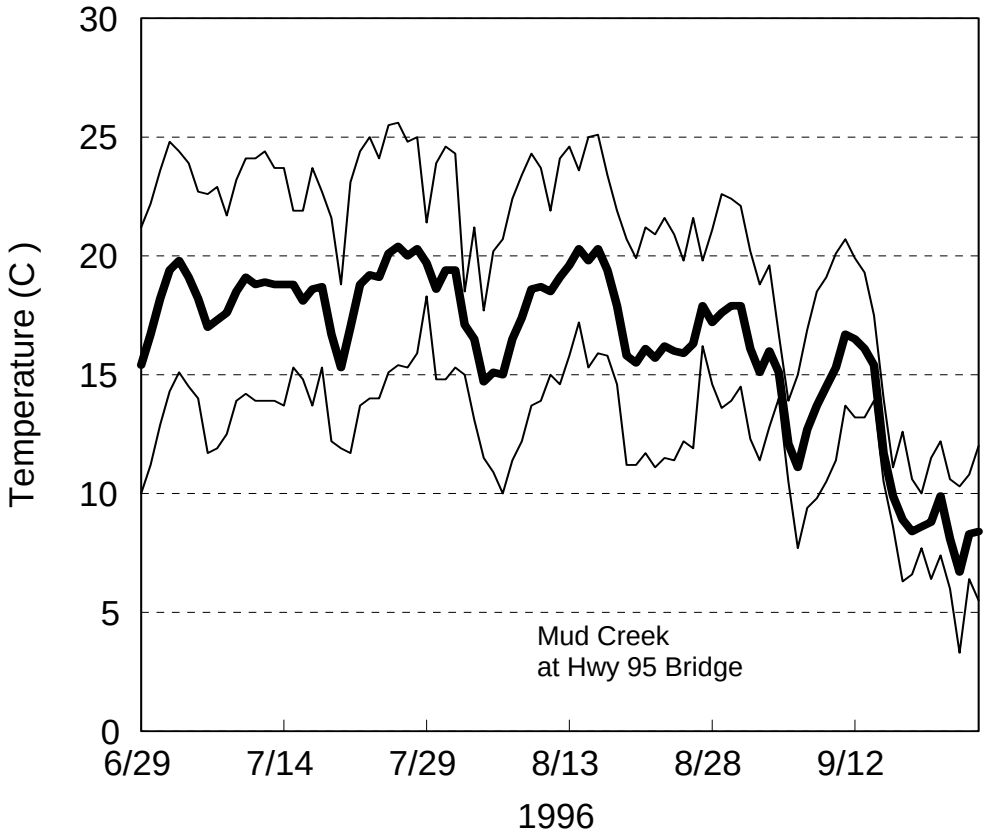
Fish length (inches)	South Fork Salmon River				East Fork South Fork Salmon River				Johnson Creek		
	STHD/[c] Redband Trout	WCT[a]	MWF[a]	BT[a]	STHD/ Redband Trout	WCT	BT	MWF	STHD/ Redband Trout	WCT	BT
17	--	--	--	--	--	--	--	--	--	3	--
18	--	1	--	1	--	--	--	--	--	1	--
19	--	--	--	--	--	--	--	--	--	--	--
20	--	--	--	--	--	--	--	--	--	--	--
21	--	1	--	--	--	--	--	--	--	--	--
22	--	--	--	--	--	--	--	--	--	--	--
23	--	--	--	--	--	--	--	--	--	--	--
24	--	--	--	--	--	--	--	--	--	--	--
25	--	--	--	--	--	--	--	--	--	--	--
Total	264	48	3	1	102	15	1	5	27	34	1

[a]STHD=Steelhead, WCT=Westslope cutthroat; MWF=Mtn. Whitefish; BT=Bull trout
[b]redband x cutthroat hybrid

Table 12. Lengths and number of rainbow trout sampled from the Little Salmon River by angling, July 2, 1996. River reach sampled was from Meadow Creek Bridge to Round Valley Creek.

Fish Length (mm)	Wild/Natural Rainbow Trout	Hatchery Rainbow Trout	Fish Length (mm)	Wild/Natural Rainbow Trout	Hatchery Rainbow Trout
120	1	--	290	--	--
130	--	--	300	--	--
140	--	--	310	--	--
150	1	--	320	--	--
160	--	--	330	1	--
170	--	--	340	1	--
180	1	--	350	--	--
190	2	--	360	1	--
200	4	--	370	--	--
210	--	--	380	--	--
220	--	--	390	--	--
230	1	1	400	--	--
240	--	--	410	--	--
250	3	--	420	--	--
260	2	--	430	--	--
270	1	--	440	--	--
280	--	1	450	1	--


Temperature (C)
30
25
20
15
10
5
0
6/12
6/27
7/12
7/27
8/11
8/26
9/10
9/25
Station1
above irrigation diversion at
New Meadows (T18NR1ES23)
Station 2
at Meadow Creek Bridge
(T19NR1ES12)
Station 3
at Hall's Bridge
(T20NR1ES25)
1996


30
25
20
15
10
5
0
Temperature (C)
Mud Creek
at Hwy 95 Bridge
6/29
7/14
7/29
8/13
8/28
9/12
1996

DISCUSSION

South Fork Salmon River Guided Fishery

Angler catch rate in 1996 was comparable to that in 1995 (1.2 fish/hr), but lower than reported in 1994 (2.3 fish/hr), the first year of monitoring. Westslope cutthroat trout continued to be less prevalent in the catch than in 1994. Year to year variation in this fishery may be due to many factors. 1994 was a low water year; 1995 and 1996 were above normal water years. Information representative of the fishery and fish populations will only be gained over several years of monitoring.

Upper Little Salmon River Temperature and Fisheries Monitoring

Summer river temperatures were comparable to those recorded in 1995. Maximum temperatures rose above 20EC for several hours each day from late June through mid-August. A consistent pattern is developing with regard to differences in temperatures among the stations. Station 2 continued to be the coolest, probably because of the local effect from Goose Creek inflow. In 1995 Station 3 was moved upriver approximately 0.5 miles to under a newly constructed bridge, where it remained shaded and in flowing water throughout the monitoring period. In 1994 Station 3 was located at the outside of a meander, and at low flows was in still water. The new location is more representative of salmonid habitat. Stations 1 and 2 are appropriate sites to continue to monitor because temperature recorders remain shaded and in flowing water. The Bureau of Land Management maintains temperature recorders in the river from Round Valley Creek to the confluence with the Salmon River. No additional sites should be needed to characterize river temperatures throughout the mainstem Little Salmon River. Summer temperature monitoring will continue indefinitely to identify trends with weather, flow regime, and recovery of the riparian community.

Mud Creek is a headwater tributary to the Little Salmon River. The temperature monitoring station is within a riparian exclosure on land owned by Boise Cascade Corporation. This station will be monitored annually indefinitely to identify trends in stream temperature with varying weather, flow, and recovery of the riparian community.

In spite of 650 catchable rainbow trout being stocked the previous day and within the reach sampled, only two of 21 fish caught in our sample were hatchery fish. A total of 2,000 catchable rainbow were stocked in the upper Little Salmon River on July 1, dispersed as follows: 1,000 from Highway 95 bridge in New Meadows; 650 from Zims Bridge; and 350 from Smokey Boulder Bridge.

RECOMMENDATIONS

1. Continue kokanee spawner counts in the NFPR to monitor Payette Lake kokanee stocks and to help calibrate kokanee trawling work.

2. Work with the Lake Reservoir Irrigation Company to change the way water is released from the Lardo dam through the summer months to reduce water temperatures in the NFPR.

3. Monitoring of the guided fishery in the South Fork Salmon River should be continued and snorkel sites established in 1994 should be surveyed when flow conditions allow.

4. We should continue to monitor summer river temperatures in the Little Salmon River on an annual basis. This will create a long-term database to evaluate changes in river temperature with recovery of the riparian community.

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APPENDICES

Appendix A. Daily mean, maximum, and minimum river temperatures (C), upper Little Salmon River, 1996. Missing data are due to recorders being out of water.

Date	Station 1			Station 2			Station 3		
	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min
06/12/96	17.0	22.1	12.2	10.2	14.3	6.9			
06/13/96	17.7	22.7	12.8	11.0	15.3	7.4	11.3	15.1	7.7
06/14/96	19.2	23.6	15.3	11.7	15.6	8.9	12.1	15.4	9.2
06/15/96	19.2	24.1	14.5	12.3	16.1	9.4	12.4	15.9	9.2
06/16/96	19.7	24.3	15.1	12.7	16.5	9.7	13.0	16.1	10.0
06/17/96	17.5	21.9	15.6	11.4	12.8	10.3	11.5	13.2	10.3
06/18/96	13.4	16.2	10.0	9.9	12.8	7.5	10.2	12.6	7.8
06/19/96	13.3	18.6	8.4	10.0	14.2	6.4	10.3	13.9	6.9
06/20/96	13.7	16.9	12.0	10.1	11.4	8.9	10.5	12.0	9.4
06/21/96	12.0	13.7	9.8	9.7	11.4	7.8	9.8	12.8	7.2
06/22/96	13.0	16.9	9.7	10.9	14.6	8.1	10.3	15.6	4.9
06/23/96	14.2	17.0	11.2	11.0	13.2	8.8	11.3	18.1	4.4
06/24/96	14.7	17.0	12.3	11.7	13.9	10.1	11.6	14.2	8.8
06/25/96	14.8	17.8	12.0	12.0	15.0	9.7	11.7	14.3	7.1
06/26/96	16.6	21.1	12.8	13.7	17.8	10.6	13.7	17.0	11.1
06/27/96	16.6	18.6	14.2	13.0	14.8	11.1	13.1	14.6	11.4
06/28/96	16.7	20.6	13.2	13.2	16.2	10.8	13.2	16.2	10.9
06/29/96	17.6	22.9	12.8	13.8	18.1	10.0	13.9	17.7	10.5
06/30/96	19.2	23.9	14.3	14.9	19.1	11.1	15.2	18.8	11.5
07/01/96	20.7	25.0	16.4	16.3	20.4	12.5	16.7	20.6	13.1
07/02/96	21.8	25.6	17.8	17.0	21.4	13.2	17.9	21.6	14.0
07/03/96	22.1	25.3	18.5	17.3	21.2	13.7	18.3	21.4	15.0
07/04/96	21.5	25.1	18.0	16.9	20.6	13.4	17.9	20.9	14.6
07/05/96	20.1	23.7	17.0	16.3	20.2	13.1	16.8	19.9	13.6
07/06/96	19.1	23.4	15.1	15.9	21.1	11.4	16.2	19.6	12.9
07/07/96	19.5	23.7	15.4	16.6	21.4	12.3	16.2	21.9	10.3
07/08/96	19.6	23.1	15.9	16.9	21.6	12.8	---	---	---
07/09/96	20.4	24.1	17.0	---	---	---	---	---	---
07/10/96	21.2	25.0	17.7	---	---	---	---	---	---
07/11/96	20.7	24.6	17.0	---	---	---	---	---	---
07/12/96	20.8	25.1	16.9	---	---	---	---	---	---
07/13/96	20.7	24.1	17.2	---	---	---	---	---	---
07/14/96	20.5	25.0	16.4	---	---	---	---	---	---
07/15/96	20.6	22.7	18.0	---	---	---	---	---	---

Appendix A. Continued

	Station 1			Station 2			Station 3		
Date	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min
07/18/96	19.8	22.4	17.0	---	---	---	---	---	---
07/19/96	18.2	21.7	14.8	---	---	---	---	---	---
07/20/96	17.0	19.6	14.0	---	---	---	---	---	---
07/21/96	18.2	23.4	13.7	---	---	---	---	---	---
07/22/96	20.3	24.6	16.2	---	---	---	---	---	---
07/23/96	20.7	24.8	16.7	---	---	---	---	---	---
07/24/96	20.5	24.4	16.4	---	---	---	---	---	---
07/25/96	21.6	25.6	17.5	---	---	---	---	---	---
07/26/96	22.3	26.3	18.3	20.5	23.9	16.5	22.4	25.6	19.3
07/27/96	22.0	25.5	18.1	20.4	23.6	16.7	22.3	25.8	19.1
07/28/96	21.5	24.4	18.1	20.2	22.9	16.9	21.9	25.0	19.1
07/29/96	20.6	22.7	19.0	19.7	21.2	18.3	20.7	21.9	19.8
07/30/96	20.1	23.4	16.9	19.2	22.6	16.4	20.0	22.6	18.0
07/31/96	20.7	25.0	16.9	19.7	23.6	16.2	20.9	24.1	17.8
08/01/96	21.1	23.9	17.7	19.9	23.1	16.9	21.2	23.6	19.1
08/02/96	19.2	22.2	17.7	18.1	19.6	16.1	19.1	20.2	17.8
08/03/96	17.4	20.4	14.8	16.8	19.3	14.3	17.8	20.2	15.8
08/04/96	15.9	18.5	12.8	15.5	17.7	12.9	16.4	18.1	14.5
08/05/96	15.7	18.6	12.6	15.5	19.1	12.8	16.3	18.5	14.0
08/06/96	15.6	20.4	11.4	15.4	19.6	11.7	16.6	20.1	13.2
08/07/96	17.6	22.2	13.1	17.1	21.2	13.4	18.6	22.1	15.3
08/08/96	18.5	22.7	13.9	18.0	22.1	14.2	19.6	22.9	16.4
08/09/96	19.8	23.2	15.9	18.7	22.6	15.1	20.3	23.4	17.3
08/10/96	19.5	22.7	15.8	18.7	23.1	14.8	20.3	23.7	17.0
08/11/96	19.4	21.6	16.4	18.9	21.9	15.4	20.4	22.6	18.1
08/12/96	19.7	23.2	16.1	19.4	22.7	15.9	20.6	23.7	17.8
08/13/96	20.1	23.2	16.7	19.1	21.6	16.5	20.7	23.6	18.3
08/14/96	21.1	23.2	18.3	20.0	22.2	17.5	21.4	23.6	19.4
08/15/96	20.6	23.7	16.9	19.6	22.6	16.4	21.6	24.6	18.8
08/16/96	21.0	24.1	17.5	19.8	22.6	16.7	21.9	25.1	19.0
08/17/96	19.9	22.7	16.9	19.0	21.6	16.4	20.0	23.1	17.5
08/18/96	18.6	20.7	15.8	17.7	20.2	15.1	18.5	21.2	16.1
08/19/96	16.8	19.8	12.9	16.4	19.9	12.8	17.8	21.1	14.6
08/20/96	16.4	19.3	12.9	16.0	19.0	12.9	17.7	20.4	15.1
08/21/96	16.7	20.2	13.1	16.2	19.6	12.6	17.6	21.4	14.5

08/22/96	16.8	19.9	12.9	16.1	19.8	12.3	17.8	21.4	14.5

Appendix A. Continued

Date	Station 1			Station 2			Station 3		
	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min
08/23/96	17.3	20.7	13.4	16.4	19.9	12.6	18.2	21.7	15.1
08/24/96	17.2	19.8	13.6	16.3	19.4	12.8	18.1	21.1	15.4
08/25/96	16.8	19.1	13.7	15.9	18.5	13.1	17.4	19.9	15.3
08/26/96	16.8	20.4	13.2	16.2	19.9	12.6	17.6	21.1	14.6
08/27/96	18.5	19.9	17.0	17.4	19.0	15.9	18.4	19.6	17.0
08/28/96	17.8	20.9	15.1	17.5	20.7	15.1	18.0	20.6	15.9
08/29/96	18.2	21.9	14.5	18.0	21.4	15.0	19.1	21.7	16.5
08/30/96	18.6	21.6	15.1	18.1	21.4	15.0	19.2	21.6	16.7
08/31/96	18.2	20.9	15.1	17.9	20.7	15.4	18.7	21.2	16.2
09/01/96	16.7	19.3	13.2	16.4	19.6	13.4	17.4	20.2	14.8
09/02/96	15.6	17.8	12.6	15.6	18.5	12.5	16.7	19.1	14.0
09/03/96	16.2	18.1	13.6	16.1	18.3	13.7	17.0	18.5	15.3
09/04/96	15.5	17.2	14.5	15.1	16.2	14.2	15.2	16.4	14.0
09/05/96	12.6	14.6	10.8	12.3	13.4	11.2	12.4	13.4	11.2
09/06/96	11.8	14.8	8.8	11.9	14.3	9.7	12.7	14.8	10.5
09/07/96	13.3	16.5	10.1	13.3	16.2	10.9	14.1	16.7	11.7
09/08/96	14.4	18.0	10.9	14.2	17.7	11.1	15.2	17.8	12.5
09/09/96	15.1	18.5	11.5	14.8	19.1	11.5	16.0	18.5	13.4
09/10/96	15.8	19.4	12.0	15.7	19.1	12.2	16.8	19.6	14.2
09/11/96	17.3	19.8	14.8	16.8	19.3	14.3	18.2	20.7	16.1
09/12/96	16.6	19.1	13.6	16.5	19.3	13.7	17.9	20.7	15.4
09/13/96	17.1	19.4	14.3	16.8	19.4	14.3	17.8	19.9	16.1
09/14/96	15.9	17.7	14.2	15.8	17.5	14.5	16.5	18.0	15.3
09/15/96	12.7	15.4	11.5	12.8	14.6	11.7	13.8	15.8	12.2
09/16/96	11.1	12.5	9.7	11.4	12.8	10.3	11.8	12.9	10.5
09/17/96	10.0	12.8	7.5	10.7	13.1	8.8	11.0	13.4	8.9
09/18/96	9.4	11.1	7.5	10.1	11.4	8.9	10.3	11.5	8.9
09/19/96	9.6	10.5	8.6	10.0	10.8	9.4	10.1	10.9	9.4
09/20/96	9.7	12.2	7.8	10.1	12.0	8.6	10.3	12.0	8.9
09/21/96	10.5	12.3	8.4	10.8	12.5	9.1	10.9	12.5	8.9
09/22/96	8.8	10.9	6.4	9.3	10.9	7.5	9.6	10.9	8.0
09/23/96	7.6	10.6	4.4	8.3	10.8	5.7	8.5	10.9	5.8
09/24/96	9.0	11.1	7.2	9.3	10.9	8.0	9.6	11.4	8.1
09/25/96	9.3	12.0	6.7	9.6	12.3	7.5	9.4	12.0	7.1

Appendix B. Daily mean, maximum, and minimum stream temperatures (EC), Mud Creek, 1996.

Date	Mean	Max	Min
6/29/96	15.4	21.2	10.0
6/30/96	16.7	22.2	11.2
7/1/96	18.2	23.6	12.9
7/2/96	19.4	24.8	14.3
7/3/96	19.8	24.4	15.1
7/4/96	19.1	23.9	14.5
7/5/96	18.2	22.7	14.0
7/6/96	17.0	22.6	11.7
7/7/96	17.3	22.9	11.9
7/8/96	17.6	21.7	12.5
7/9/96	18.5	23.2	13.9
7/10/96	19.1	24.1	14.2
7/11/96	18.8	24.1	13.9
7/12/96	18.9	24.4	13.9
7/13/96	18.8	23.7	13.9
7/14/96	18.8	23.7	13.7
7/15/96	18.8	21.9	15.3
7/16/96	18.1	21.9	14.8
7/17/96	18.6	23.7	13.7
7/18/96	18.7	22.7	15.3
7/19/96	16.7	21.6	12.2
7/20/96	15.3	18.8	11.9
7/21/96	17.0	23.1	11.7
7/22/96	18.8	24.4	13.7
7/23/96	19.2	25.0	14.0
7/24/96	19.1	24.1	14.0
7/25/96	20.1	25.5	15.1
7/26/96	20.4	25.6	15.4
7/27/96	20.0	24.8	15.3
7/28/96	20.3	25.0	15.9
7/29/96	19.7	21.4	18.3
7/30/96	18.6	23.9	14.8
7/31/96	19.4	24.6	14.8
8/1/96	19.4	24.3	15.3
8/2/96	17.1	18.5	15.0
8/3/96	16.5	21.2	13.1

Appendix B. Continued.

Date	Mean	Max	Min
8/4/96	14.7	17.7	11.5
8/5/96	15.1	20.2	10.9
8/6/96	15.0	20.7	10.0
8/7/96	16.5	22.4	11.4
8/8/96	17.4	23.4	12.2
8/9/96	18.6	24.3	13.7
8/10/96	18.7	23.7	13.9
8/11/96	18.5	21.9	15.0
8/12/96	19.1	24.1	14.6
8/13/96	19.6	24.6	15.8
8/14/96	20.3	23.6	17.2
8/15/96	19.8	25.0	15.3
8/16/96	20.3	25.1	15.9
8/17/96	19.4	23.4	15.8
8/18/96	17.9	21.9	14.6
8/19/96	15.8	20.7	11.2
8/20/96	15.5	19.9	11.2
8/21/96	16.1	21.2	11.7
8/22/96	15.7	20.9	11.1
8/23/96	16.2	21.6	11.5
8/24/96	16.0	20.9	11.4
8/25/96	15.9	19.8	12.2
8/26/96	16.3	21.6	11.9
8/27/96	17.9	19.8	16.2
8/28/96	17.2	21.1	14.6
8/29/96	17.6	22.6	13.6
8/30/96	17.9	22.4	13.9
8/31/96	17.9	22.1	14.5
9/1/96	16.1	20.2	12.3
9/2/96	15.1	18.8	11.4
9/3/96	16.0	19.6	12.8
9/4/96	15.1	16.7	14.0
9/5/96	12.1	13.9	10.5
9/6/96	11.1	15.0	7.7
9/7/96	12.7	16.9	9.4
9/8/96	13.7	18.5	9.8

Appendix B. Continued.

Date	Mean	Max	Min
9/9/96	14.5	19.1	10.5
9/10/96	15.3	20.1	11.4
9/11/96	16.7	20.7	13.7
9/12/96	16.5	19.9	13.2
9/13/96	16.1	19.3	13.2
9/14/96	15.4	17.5	13.9
9/15/96	11.7	14.0	10.5
9/16/96	9.9	11.1	8.6
9/17/96	8.9	12.6	6.3
9/18/96	8.4	10.6	6.6
9/19/96	8.6	10.0	7.7
9/20/96	8.8	11.5	6.4
9/21/96	9.9	12.2	7.4
9/22/96	8.1	10.6	6.0
9/23/96	6.7	10.3	3.3
9/24/96	8.3	10.8	6.4
9/25/96	8.4	12.0	5.5

1996 ANNUAL PERFORMANCE REPORT

State of: Idaho

Program: Fisheries Management F-71-R-21

Project I: Surveys and Inventories

Subproject I-C: McCall Subregion

Job: d

Title: Salmon and Steelhead Investigations

Contract Period: July 1, 1996 to June 30, 1997

ABSTRACT

McCall Subregion salmon and steelhead investigations are incorporated in separate statewide reports. These reports include: ASalmon and Steelhead Investigations,≅ ASalmon Spawning Ground Surveys,≅ AIdaho Supplementation Studies,≅ and AIdaho Habitat/Natural Production Monitoring.≅

Author:

Don Anderson
Regional Fishery Manager

1996 ANNUAL PERFORMANCE REPORT

State of: Idaho

Program: Fisheries Management F-71-R-21

Project II: Technical Guidance

Subproject II-C: McCall Subregion

Contract Period: July 1, 1996 to June 30, 1997

ABSTRACT

McCall Subregion fishery management personnel responded to 368 requests and opportunities for technical input. Comments were provided to state and federal agencies on proposed activities for which they have regulatory authority. Advice and technical assistance were provided to private businesses and the public on activities associated with fish, or having impacts on fish populations or fish habitat. The major topics of involvement included stream channel alterations, mining, and land management planning. We provided data and technical advice to an increased number of fisheries consultants.

We also gave presentations to schools, sportsperson groups, and civic organizations. We answered many questions from the angling public on fishing opportunities, regulations, techniques, and specific waters.

Keywords: Technical assistance

Authors:

Don Anderson
Regional Fishery Manager

OBJECTIVES

1. To protect or minimize impacts to McCall area fisheries by providing technical fisheries input to government agencies with regulatory or land management authority.

2. To provide technical fisheries input, guidance, and advice to private entities and the general public.

3. To promote understanding of the environmental requirements of fish populations and appreciation of their values.

RECOMMENDATIONS

1. Continue to provide technical fisheries input to the entities which most affect fish populations.

2. Continue to provide technical guidance and advice to private interests and the general public.

3. Expand efforts to educate the public in the environmental requirements for fish.

RESULTS

The following (Table 1) lists the public and private entities and number of contracts and responses made for each during 1995.

Table 1. Summary of technical guidance responses and activities by McCall fisheries management personnel in 1995.

Agency or Individuals	Number of Responses
U.S. Forest Service	33
U.S. Bureau of Land Management	4
U.S. Environmental Protection Agency	6
U.S. Army Corps of Engineers	11
U.S. Natural Resources Conservation Service	12
U.S. Bureau of Reclamation	13
Idaho Department of Water Resources	11
Idaho Department of Lands	18
Idaho Department of Health and Welfare/DEQ	11
Idaho Department of Transportation	3
Idaho Outfitters & Guides Board	5
Health Districts	2
Hydroelectric developers	2
Private fish pond owners	18
Public meetings and presentations	12
Mining	7
County Commissions	7
U.S. Fish & Wildlife Service	9
Nez Perce Tribe	6
National Marine Fisheries Service	11
Municipalities	4
Idaho Department of Parks and Recreation	4
Trout Unlimited	4
Big Payette Lake Water Quality Council	5

Table 1. Continued.

Agency or Individuals	Number of Responses
Columbia River Intertribal Fish Commission	1
Idaho State Legislators	3
Cascade Reservoir Restoration TAC	12
Boise Cascade Corporation	6
Consultants	18
Universities	3
Northwest Power Planning Council	3
Oregon Department of Fish and Wildlife	5
Federal Highways	2
Total	254

1996 ANNUAL PERFORMANCE REPORT

State of: Idaho

Program: Fisheries Management F-71-R-21

Project III: Habitat Management

Subproject III-C: McCall Subregion

Contract Period: July 1, 1996 to June 30, 1997

ABSTRACT

The attraction channel for the Rapid River Hatchery adult trap was modified to allow uninterrupted passage of bull trout *Salvelinus confluentus* and resident rainbow trout *Oncorhynchus mykiss*. This modification was funded by Idaho Power Company.

The Regional Fishery Manager participated on a technical advisory committee for the Big Payette Lake Water Quality Council. The group conducted studies and developed a comprehensive technical report identifying nutrient and bacterial contamination sources and recommended remedial action. The technical report leads to a lake management plan and an implementation program which is expected to halt, or possibly reverse, eutrophication of Payette Lake.

Fishery personnel participated on a technical advisory committee for the Cascade Restoration Project to improve water quality and fish habitat in Cascade Reservoir. Cascade Reservoir is listed as a water quality limited water by the Idaho Division of Environmental Quality, not fully supporting beneficial uses, including cold water biota. The technical advisory committee was directed to identify phosphorus sources and develop reduction measures. A Total Maximum Daily Load (TMDL) will be established that will result in a 37% reduction in phosphorus loading. Draft source plans were prepared and will be implemented as funding allows.

The opportunity for a conservation easement on private property in Burgdorf Meadows was evaluated and pursued. This is a critical spawning area for wild summer chinook salmon *Oncorhynchus tshawytscha* and was imminently at risk of recreation home development. We prepared a proposal and sought funding to allow the Idaho Department of Fish and Game to acquire the easement.

Data were collected and analyzed to allow recommendation of a stream resource maintenance flow for the North Fork Payette River between Payette Lake and Upper Payette Lake. This flow will protect kokanee salmon *Oncorhynchus nerka kennerlyi* spawning habitat from future stream diversion.

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