

IDAHO DEPARTMENT OF FISH AND GAME

FEDERAL AID IN FISH RESTORATION
1994 Job Performance Report
Program F-71-R-18



REGIONAL FISHERIES MANAGEMENT INVESTIGATIONS MCCALL SUBREGION (Subprojects I-C, II-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 IV.	POPULATION MANAGEMENT

By

Paul J. Janssen, Regional Fishery Biologist
Kimberly Apperson, Regional Fishery Biologist
Donald R. Anderson, Regional Fishery Manager
Joel Patterson, Fishery Technician

December 1997
IDFG 97-36

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JOB PERFORMANCE REPORT

State of: Idaho

Program: Fisheries Manactement F-71-R-18

Project I: Surveys and Inventories Subproject I-C: McCall Subregion

Job: a

Title: Mountain Lakes Investigations

Contract Period: July 1, 1993 to June 30, 1994

ABSTRACT

Since 1988, several high mountain lakes in the Payette National Forest have been monitored by Idaho Department of Fish and Game and Payette National Forest Service personnel. The cumulative data from sampling the fish populations within these lakes from 1988 through 1993 has been computed and a synopsis presented in this report.

Of the 18 lakes sampled in 1993, Disappointment Lake and Upper Hazard Lake were specifically monitored to determine the results of bull trout *Salvelinus confluentus* introductions. Bull trout were found only in Disappointment Lake. These fish grew approximately 120 mm in length and 119 g in weight in the 13 months since stocked on June 23, 1992.

Fish population status in each lake was determined by collecting fish with gill nets and/or hook-and-line. Two different methods were used to evaluate fish condition. In the case of rainbow trout *Oncorhynchus mykiss* and brook trout *S. fontinalis*, the relative weight (W_r) index was used. The other method used for determining fish condition in all other fish sampled was the standard metric Fulton type condition factor $K_u = (W / L^3) * X$.

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INTRODUCTION

Since 1988, several high mountain lakes in the Payette National Forest have been monitored by Idaho Department of Fish and Game (IDFG) and Payette National Forest (PNF) personnel. The purpose of monitoring these lakes was to assess the fish population status, physical habitat, and past stocking strategies. The cumulated data from sampling the fish populations within these lakes from 1988 through 1993 has been computed and a synopsis presented in this report.

Of the 18 lakes sampled in 1993, Disappointment Lake and Upper Hazard Lake were specifically monitored to determine the results of bull trout *Salvelinus confluentus* stockings from 1992. Disappointment Lake was rotenoned in 1991 to remove the stunted brook trout *S. fontinalis* population in the lake (Janssen and Anderson 1994a). Upper Hazard lake was stocked with bull trout in an attempt to control brook trout stunting in the lake.

OBJECTIVES

1. To evaluate fisheries management techniques in high mountain lakes.
2. To identify problems and/or opportunities in fish populations in lakes that currently are not being directly managed.

METHODS

In 1989, the Idaho Department of Fish and Game entered into a cooperative project with the Payette National Forest to assess fish population status, physical habitat parameters and past stocking strategies in a selected number of alpine lakes (Janssen and Anderson 1994a, 1994b). This program was continued through 1993. IDFG and PNF personnel worked together to collect the data used in this report and a more detailed habitat survey report (Weaver 1992).

Fish population status in each lake was determined by collecting fish with gill nets and/or hook-and-line. Typically, one or two 150-ft experimental type diving gill nets were set perpendicular to the shore using an inflatable raft. The nets were set in the evening and pulled the next morning. All fish collected were weighed in grams and measured using total length in millimeters. Depth profile images were completed on lakes that had not been done previously. Physical and chemical habitat parameters were measured on several lakes and the techniques used are described in Weaver (1992).

Two different methods were used to evaluate fish condition. In the case of rainbow trout *Oncorhynchus mykiss* and brook trout, the relative weight (W_r) index was used because it eliminates the bias of changing K_{t1} factors with different lengths of fish; i.e. smaller trout typically have a poorer K_{t1} value than do larger specimens from the same population (Janssen and Patterson 1994). The optimum length/weight equations ($\log W_s$) used for brook trout and rainbow trout are given below (Cooper 1961 in Carlander 1969):

$$\text{(brook trout) } \log W_s = -5.26 + 3.15 \log L$$

$$\text{(rainbow trout) } \log W_s = -5.19 + 3.1 \log L$$

where L = total length in mm

$$\text{Relative Weight Index } W_r = (W / W_s) * (100)$$

Optimal length/weight equations for brown trout *Salmo trutta*, cutthroat trout *O. clarki*, bull trout, kokanee salmon *O. nerka kennerlyi*, and cutthroat/rainbow hybrids were not available at the time of this report. The other method used for determining fish condition in all other fish sampled was the standard metric Fulton type condition factor $K_t = (W / L^3) * X$; (Nielsen and Johnson 1983). Average W_r and K_{t1} values were computed for each species and each lake in the year it was sampled. Length frequencies were developed using 25 mm size classes. All fish less than or equal to 125 mm were grouped into the 125 mm size class and so on. It should be noted that in some cases not all fish netted were actually weighed, however each mean condition factor (K_{t1} or W_r) was calculated from only those fish weighed. Mean relative weights (W_r) were only used on rainbow trout and brook trout, thereby producing values well above those values associated with the Fulton type condition factors, i.e. any value above 2.0 on the tables will be a W_r value not a K_t value (Nielsen and Johnson 1983).

RESULTS

Fish length and weight data collected from 1988 through 1992 is presented in Tables 1, 2 and 3. A total of 18 lakes were sampled in 1993 (Table 4). A legend for the abbreviations given to fish species in Tables 1-4 is listed below.

BRK = Eastern brook trout
BRN = brown trout
BT = bull trout
CT = westslope cutthroat trout
CT/RBT = cutthroat/rainbow hybrid
KOK = kokanee salmon
RBT = rainbow trout

Of the two bull trout lakes sampled in 1993, bull trout were found only in Disappointment Lake. These fish grew approximately 120 mm in length and 119 g in weight in the 13 months since planted on June 23, 1992 at 140 mm and 32 g. Only stunted brook trout were collected in Upper Hazard Lake.

Stunted brook trout populations were found in several lakes sampled in 1993. Nets set in Rainbow Lake (catalog #07-0164) contained 96 brook trout, most of which were less than 250 mm. The same type of data was obtained from Buck Lake. Brook trout collected in Nick Lake (catalog #07-0475) were longer in total length than brook trout collected in other lakes in 1993. Total lengths ranged from 250 to 350 mm. While brook trout lengths were longer, average relative weights remained low at 60.9.

Black (catalog #07-0560), Twenty-Mile #1 (catalog #09-0395), and W.F. Monumental #7 lakes contained good populations of rainbow trout. W.F. Monumental #7 and Buckhorn (catalog #07-0484) lakes contained large cutthroat trout.

Rainbow trout up to 350 mm were found among stunted brook trout in Rainbow Lake (catalog #07-0164).

DISCUSSION

A number of stocking changes were made as a result of the work done on mountain lakes. Both Black Lake (07-0560) and Buck Lake (07-0160) were removed from the stocking schedule. Both lakes were found to contain large populations of brook trout, while no stocked fish were found. Apparently survival of stocked fish in these lakes was minimal.

Table 1. Length frequencies and mean condition indices of fish sampled in high mountain lakes in 1989, except Deep Lake 1988.

Lake name	Catalog Number	Species (n)	Condition index	125	150	175	200	225	250	275	300	325	350	375	400
Anderson	09-0336	BRK (49)	75.1	4	6	11	18	6	3						1
Blackwell	09-0366	RBT (37)	86.3	6	9	2	1	8	1	1	5	2			2
Deep	09-0406	BRK (99)	67.8	14	21	5	21	25	11	2					
		BRN (2)	0.95				2								
Deep 1988	09-0406	BRK (44)	46.2		1	5	16	11	8	2	1				
Hum	07-0364	CT (4)	0.87	1		1						1			1
Kennally	09-0298	RBT (1)	105.6												1
Lava Butte	07-0220	BRK (39)	78.1		4	13	9	6	5	2					
		RBT (1)	82.2					1							
Lava Butte	07-0223	BRK (107)	77.8		7		44	43	13						
		RBT (3)	84.5					1	2						
Rapid	09-0312	BRK (32)	110.2	2	3	3	6	5	5	1	2	5			
		BRN (1)	1.3				1								
Skein	09-0274	BRN (29)	1.0				6	17	6						
		CT (22)	1.1	15	5				1		1				
		RBT (1)	84.0									1			
Snowslide	09-0355	BRK (51)	74.3		1	1	8	20	19		1				1
		RBT (3)	87.2						2	1					
Trail	09-0403	BRK (29)	79.8	3	8	2	5	6	3	2					

Note: All size classes (in mm) include fish less than or equal to that particular size class. Rainbow trout and brook trout condition indices given as relative weight, all other condition indices are given as the standard Fulton type.

Table 2. Length frequencies and mean condition indices of fish sampled in high mountain lakes in 1990, except Deep and Trail 1991.

Lake name	Catalog Number	Species (n)	Condition index	125	150	175	200	225	250	275	300	325	350	375	400
Anderson	09-0336	BRK (26)	69.3				7	11	7	1					
		BRN (8)	0.77				1	2	3	2					
Blackmare	07-0507	BRK (45)	63.8	1	1	5	19	15	4						
Buckhorn	07-0494	RBT (3)	93.1				1				1				1
Deep	09-0406	BRK (40)	67.3				15	11	10	4					
		BRN (7)	0.93						2	2	1	2			
Deep 1991	09-0406	BRK (2)	62.6					1	1						
		BRN (4)	0.92					1	1			1	1		
Loon	07-0387	BRK (24)	49.1	7	8	1	4	3	1						
		BT (1)	0.88												1
Loon	07-0393	RBT (2)	109.0			1			1						
Malony	09-0338	CT (16)	0.97		1	2	5	4	2		2				
		BRN (1)	1.1								1				
Rapid	09-0312	BRK (32)	93.1		1	1	2	5	5	2	2	6	7	1	
		BRN (2)	N/A								2				
Square Top	07-0505	BRK (44)	62.0	3	1	3	21	16							
Scribner	07-0224	BRK (54)	88.8		3	7	3	3	2	11	11	4			
		RBT (3)	99.0								1	2			
Trail	09-0403	BRK (28)	84.6	1		5	12	9	1						
		BRN (1)	1.2								1				
Trail 1991	09-0403	BRK (31)	67.6	1	2	3	3	5	4	4	7	2			
Upper Hazard	07-0170	BRK (67)	79.2			5	37	18	5	2					

Note: All size classes (in mm) include fish less than or equal to that particular size class. Rainbow trout and brook trout condition indices are given as the standard Fulton type.

Table 3. Length frequencies and mean condition indices of fish sampled in high mountain lakes in 1992.

Lake name	Catalog Number	Species (n)	Condition index	125	150	175	200	225	250	275	300	325	350	375	400
Anderson	09-0336	BRK (14)	72.0			1		2	9	1		1			
Blackwell	09-0366	RBT (35)	90.1			1	4	6	8	4	7	5			
		CT/RBT (4)	0.96						1			1	1	1	
		KOK (2)	0.85				1					1			
Deep	09-0406	BRK (14)	76.0				2	4	7	1					
		BRN (2)	0.92						1		1				
Kennally	09-0298	CT (7)	1.2										3	2	2
Rapid	09-0312	BRK (19)	76.7			1		1	2	2	4	3	2	4	
Skein	09-0274	BRN (2)	1.0									2			
		RBT (1)	84.0								1				
		CT (1)	1.0											1	
Snowslide	09-0355	BRK (25)	77.9			5	1	7	9	2	1				
Trail	09-0403	BRK (16)	77.9				1	7	4	3		1			

Note: All size classes (in mm) include fish less than or equal to that particular size class. Rainbow trout and brook trout condition indices given as relative weight, all other condition indices are given as the standard Fulton type.

TEXT

Table 4. Length frequencies and mean condition indices of fish sampled in high mountain lakes in 1993.

Lake name	Catalog Number	Species (n)	Condition index	125	150	175	200	225	250	275	300	325	350	375	400
Black	07-0560	RBT (20)	48.4			1					5	12	2		
Black	07-0160	BRK (5)	66.8				1		2	2					
Buck	07-0153	BRK (64)	76.1	3		5	6	16	32	2					
Buckhorn	07-0484	RBT (2)	61.1			1								1	
		CT (11)	0.83			1	2		1		2	1	3		1
Buckhorn	07-0485	CT (8)	0.75								1	1	3	3	
Disappointment	07-0158	BT (10)	0.85					1	2	3	4				
Nick	07-0475	BRK (15)	60.9						2	2	6	3	2		
Nick	07-0476	CT (12)	0.56	1			2	3	2	3	1				
		CT/RBT (2)	0.74									1		1	
Rainbow	07-0164	BRK (96)	49.9	5		5	35	32	16	3					
		RBT (5)	57.9	2	1							1	1		
Rainbow	07-0480	RBT (7)	77.3									2	2	3	
20 Mile #1	09-0395	RBT (25)	51.2	6		1		1	1	1	8	5	2		
		CT/RBT (3)	0.7								1		2		
20 Mile #2	09-0396	RBT (4)	66.4								2	1			1
20 Mile #3	09-0397	RBT (4)	66.9			1		1	1	1					
20 Mile #4	09-0398	RBT (12)	58.6	1	1		1		3	2	4				
Upper Hazard	07-0170	BRK (64)	64.6	2	2	1	19	21	18	1					
WF Mon #5	07-0683	RBT (2)	76.7						1	1					
		CT/RBT (3)	0.82				1			2					
WF Mon #6	07-0684	CT (9)	0.69				1	4	1		1	1	1		
WF Mon #7	07-0685	CT (21)	0.75				2	4	5	6	2	1		1	

Note: All size classes (in mm) include fish less than or equal to that particular size class. Rainbow trout and brook trout condition indices given as relative weight, all other condition indices are given as the standard Fulton type.

TEXT

Upper Nick Lake was found to be fishless. The USFS would like us not to stock this lake as they plan to conduct acid rain studies there.

West Fork Monumental Lake #5 was found to contain both rainbow and cutthroat trout even though it is not on the current stocking schedule. No evidence of natural reproduction was found. This lake should be put back on the stocking schedule.

A small number of large fish were collected from Twenty-Mile Lake #2 indicating the need to increase the number of fish stocked there. Currently it receives 1,000 rainbow trout. This number should probably be increased to 3,000.

RECOMMENDATIONS

1. Continue to monitor fish populations in high mountain lakes in the region for the high mountain lake data base.
2. Continue working with the Payette National Forest personnel collecting baseline fishery and habitat data in high mountain lakes.
3. Continue to pursue ways of controlling stunted brook trout populations.

LITERATURE CITED

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JOB PERFORMANCE REPORT

State of: Idaho Program: Fisheries Management F-71-R-18
Project I: Surveys and Inventories Subproject I-C: McCall Subregion
Job: b Title: Lowland Lakes Investigations

Contract Period: July 11 1993 to June 30. 1994

ABSTRACT

We trawled Payette Lake on two nights in August 1993 to obtain population estimates of kokanee salmon *Oncorhynchus nerka kennerlyi*. We also monitored the return of \$5.00 reward tags placed on lake trout *Salvelinus namaycush* since 1988. The total population size of age 1+ and 2+ kokanee was estimated to be 301,744 and 117,215 fish, respectively. Survival of hatchery stocked kokanee, planted in May 1993, was estimate to be 8.8%. We estimated total kokanee biomass of age 0+, 1+, and 2+ fish in Payette Lake to be 2.5 kg/ha, which was a 48% increase over the 1992 estimate.

A total of 132 tagged lake trout were assumed to exist in Payette Lake at the beginning of 1993. A total of two \$5.00 reward tags were returned in 1993. One fish was killed and the other fish was released without the tag. The harvest exploitation rate was estimated to be 0.8%. Two tags were placed on lake trout in 1993.

To determine return rates of "put-and-take" rainbow trout *O. mykiss* in Brundage and Horsethief reservoirs, 300 fish from each of their 1992 stocking quotas were tagged with \$5.00 reward tags. After two years, 13.7% and 44% of those tags were returned from Brundage and Horsethief reservoirs, respectively.

A standard lowland lake survey was completed on C. Ben Ross Reservoir on May 18, 1993 to examine the fish community and determine if a special regulation for largemouth bass *Micropterus salmoides* was warranted. We collected a total of five species of fish: largemouth bass, black crappie *Pomoxis nigromaculatus*, bluegill *Lepomis macrochirus*, largescale sucker *Catostomus macrocheilus*, and mountain whitefish *Prosopium williamsoni*. Of all the fish collected, largemouth bass were most abundant in terms of number, while largescale suckers were most abundant in terms of biomass. We found C. Ben Ross Reservoir to have a healthy, viable largemouth bass population. Five strong age classes were collected. Growth rates were good for bass, with fish reaching 12 inches in four years. However, there were very few bass larger than 12 inches in the population, a result of harvest once those fish reached a legal size. We found a good forage base in the reservoir. Bluegill and black crappie populations were well established and viable. As a result of these findings we made the recommendation to implement a special regulation of a two bass limit, none between 12 and 16 inches. The recommendation also included a no harvest of bass until July 1. The recommendation became law on January 1, 1994.

Smallmouth bass *M. dolomieu* have become well established in Cascade Reservoir in the last three years. We collected smallmouth bass in 1993 with electrofishing gear to get baseline information on age and growth rates of these fish. We collected a total of 193 smallmouth bass in 57 minutes of actual electrofishing time. Fish ranged in size from 150 mm and 57 g to 360 mm and 705 g. Ages of fish ranged from 2+ to 5+, with the majority of fish being 3+. Age 3+ and 4+ smallmouth bass averaged 215 mm and 335 mm, respectively, in total length. Relative weights of Cascade smallmouth bass were excellent averaging 101 g.

To examine the current status of the fishery in Little Payette Lake, we electrofished and gillnetted the lake. We collected a total of 178 rainbow trout which ranged in total length from 150 mm to 510 mm. We also collected kokanee, smallmouth bass, largescale suckers, redbside shiners *Richardsonius balteatus*, and squawfish *Ptychocheilus oregonensis*. We found that largescale suckers and squawfish

made up 88% of the biomass of the fish community. Growth rates for Kamloops strain rainbow trout have dropped significantly from 12.8 mm/month in 1989 to 6.2 mm/month in 1993. At this time there is no reason to consider a catch and release regulation for Little Payette Lake. Unwanted fish species in the lake are a major threat to the fishery.

Lost Valley Reservoir was gillnetted in 1993 to examine changes in the fish community since the rotenone treatment in 1991. We collected a total of 72 fish: 45 rainbow trout, 5 brook trout, 16 yellow perch *Perca flavescens*, and 6 brown bullheads *Ictalurus nebulosus*. Rainbow trout ranged in total length and weight from 160 mm and 40 g up to 454 mm and 740 g. Condition factors of rainbow trout averaged 0.99.

Both Upper Payette Lake and Granite Lake were stocked on September 30, 1992 with 17,409, 6.5-inch splake *S. fontinalis* x *S. namaycush*. These fish were sampled in 1993 to track growth and condition. We found that the splake in Upper Payette Lake had grown approximately 43 mm in 9 months and had total length, weight, and condition factor averages of 298 mm, 71 g, and 0.80. We found that the splake in Granite Lake had grown approximately 61 mm in the same 9-month period and had total length, weight, and condition factor averages of 226 mm, 92 g, and 0.81.

Brundage Reservoir was stocked in July 1990 with 25,840, 4.5-inch Eagle Lake strain rainbow trout, all of which were marked with an adipose clip. Since stocking, we have sampled these fish in 1992 and 1993 to monitor growth rates and condition. We collected 13 adipose-clipped rainbow trout on July 28, 1993. These fish averaged 292 mm and 211 g with an average condition factor of 0.84. These fish had grown only 178 mm in 36 months.

Oxbow Reservoir had a special bass regulation implemented on January 1, 1992. In May 1993, we sampled the smallmouth bass populations with electrofishing gear in Oxbow and Hells Canyon reservoirs to determine the effects of the new regulation. Hells Canyon Reservoir was used as a control to help monitor changes in the bass populations of Oxbow Reservoir. We collected a total of 203 and 287 smallmouth bass in Hells Canyon and Oxbow reservoirs, respectively. No significant changes were found in length frequencies of bass >300 mm in either reservoir.

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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. (1991). Management programs undertaken in 1990 focused primarily on kokanee *Oncorhynchus nerka kennerlyi* standing crops and, to a limited degree, on lake trout *Salvelinus namaycush* tagging.

Rainbow Trout Put-and-Take Evaluations

Both Brundage and Horsethief reservoirs have put-and-take rainbow trout *O. mykiss* programs. Brundage Reservoir gets an annual quota of 5,000 fish in a one-time plant shortly after ice out. Horsethief Reservoir receives two stockings a year; one of 10,000 fish in May and another of 5,000 fish in October.

To justify these stockings, the Five Year Fisheries Management Plan calls for an average return of 40% by number or 100% by weight of these fish. Therefore, in 1992 the put-and-take rainbow trout stockings in the two above mentioned reservoirs were evaluated.

C. Ben Ross Reservoir

C. Ben Ross Reservoir is one of only two warmwater reservoirs in the McCall Subregion of the Southwest Region. The primary fishery in the reservoir includes largemouth bass *Micropterus salmoides*, black crappie *Pomoxis nigromaculatus*, and bluegill *Lepomis macrochirus*.

In the past couple of years we had a number of anglers express concern for the disappearance of largemouth bass in the reservoir. We also received a petition, with approximately 50 signatures, expressing concern for the reduced number of largemouth bass seen in the creel and asking us to implement a special regulation.

In May 1993, we completed a standard survey on C. Ben Ross Reservoir to answer and address some of the concerns expressed about the bass fishery.

Cascade Reservoir

In the past three years, the incidence of smallmouth bass *M. dolomieu* in the creel at Cascade Reservoir has increased significantly. Some very large bass in the 21-inch range have been reported. In 1993, a smallmouth bass tournament was held on the reservoir; this was the first bass tournament held on Cascade Reservoir for many years. Because of this change in smallmouth bass interest and incidence in the creel, we collected baseline data for smallmouth bass in 1993 to monitor population structure and growth rates.

Little Payette Lake

Little Payette Lake has been described previously by Janssen and Anderson (1992). Public comment in the past year has suggested that Little Payette Lake be made a catch and release fishery. To examine the current status of the fishery in Little Payette Lake and to help answer the question of what effects a catch and release fishery would have, we collected needed data from Little Payette Lake in 1993.

Lost Valley Reservoir

Lost Valley Reservoir was chemically treated in the fall of 1991 to remove an unwanted yellow perch *Perca flavescens* population. The treatment and fishery are previously described in Janssen and Anderson (1993). Yellow perch were collected in gill nets in the spring of 1992. Population sampling was completed on the reservoir to examine the yellow perch and rainbow trout.

Salmonid Stocking Evaluations

Both Upper Payette Lake and Granite Lake were stocked in the fall of 1992 with 13,409 and 4,000, 6.5-inch splake *S. fontinalis* x *S. namaycush*, respectively. These fish were sampled in 1993 to track growth and condition.

Brundage Reservoir was stocked in July 1990 with 25,840, 4.5-inch Eagle Lake strain rainbow trout, all of which were marked with an adipose clip. Since stocking, we have sampled these fish in 1992 (Janssen and Anderson 1993) and 1993 to monitor growth rates and condition.

Hells Canyon Reservoir Complex

A special bass regulation went into effect January 1, 1992 on Oxbow Reservoir. The regulation is a protected slot of 12 to 16 inches, with no bass harvest allowed until July 1. After July 1, the bass limit is two fish. The smallmouth bass population structure and growth rates were described by Janssen and Anderson (1993 and 1994). Hells Canyon Reservoir does not have a special bass regulation and is being used as a control in monitoring age structure changes in Oxbow Reservoir smallmouth bass. In 1993, the bass population was sampled in both reservoirs to determine any effects of the new regulation after one year.

METHODS

Payette Lake

Kokanee were sampled in Payette Lake on August 17 and 18, 1993 with a midwater trawl. Methodology for trawling technique was reported by Bowles et al. (1986, 1987) and Grunder (1991). All kokanee captured were checked for an adipose fin clip, which indicated fish stocked from Mackay Fish Hatchery in 1993. A total of 125,400 adipose-clipped age 0+ kokanee were stocked in May 1993. All estimates made for Payette Lake were based on a total surface area of 1,715 ha. This figure represents the usable area of the lake by kokanee (depth greater than 40 ft).

Lake trout have been captured by hook-and-line by volunteer fishermen throughout the spring and summer months since 1988. These fish were tagged with \$5.00 reward cinch up spaghetti tags. All tag returns by anglers in 1993 were recorded.

Rainbow Trout Put-and-Take Evaluations

Brundage Reservoir received a total of 6,000 put-and-take rainbow trout stocked in 1992. A \$5.00 reward tag was placed on the lower jaw of 300 of these fish

Five dollar reward tags were placed on 300 of the 10,000 put-and-take rainbow trout stocked in Horsethief Reservoir during May 1992. No tags were placed on the second plant of 5,000 fish in October.

We assumed the percent of tags returned from the initial 300 tags equaled the percent return of put-and-take trout to the creel, and that all tags are returned. Therefore, the estimates given are an absolute minimum.

C. Ben Ross Reservoir

A standard lowland lakes survey was completed on C. Ben Ross Reservoir on May 17-18, 1993. We electrofished a total of 60 minutes. We set two trap nets and two floating (F) and two diving (D) standard experimental gill nets overnight (Appendix A). All fish collected were measured to the nearest mm and weighed to the nearest 5 g. Scales were taken from five fish from every 10 mm length group. Fish scales were later aged and length back-calculations made.

Cascade Reservoir

We used boat electrofishing to sample bass along the shoreline of Cascade Reservoir on August 9, 1993. All smallmouth bass collected were weighed and measured. Scales were taken from five fish in every 10 mm length group. The fish were then released back into the reservoir. Fish scales were later examined in the lab to determine age and make back-calculations of growth.

The area of the reservoir sampled included the rocky shoreline adjacent to the Cascade City golf course. We also sampled the rocky shoreline in the vicinity of Crown Point.

In addition to the electrofishing effort, we collected scales from smallmouth bass caught during the bass tournament on August 14, 1993. We used this opportunity to collect scale samples from larger fish.

Little Payette Lake

We electrofished Little Payette Lake in late May and early June to obtain growth and population information on rainbow trout. All trout collected were anaesthetized, weighed and measured, and marked with a lower caudal punch. Fish were marked to get population estimates for rainbow trout.

We also gillnetted in August to get population and biomass proportions of all species of fish present in the lake. We set four experimental gill nets (one floating and three diving) perpendicular to shore with one end attached to shore. The small and large mesh ends of the nets were placed alternately closest to shore. The nets were placed in the lake in late afternoon and retrieved the following morning.

Lost Valley Reservoir

We placed a total of two gill nets in Lost valley Reservoir on September 15, 1993. The gill nets were Department standard floating gill nets. The nets were set perpendicular to shore with the small mesh ends attached to the shore. We set them in the afternoon and retrieved them the next morning.

Salmonid Stocking Evaluations

We gillnetted Upper Payette Lake on June 30, 1993. We set two standard experimental gill nets perpendicular to shore with one end attached to shore. The nets were set in the afternoon, fished all night, and pulled the next morning.

In Granite Lake on July 2, 1993, we set two diving experimental gill nets perpendicular to shore. The net end closest to shore was set in approximately 10 feet of water. This was done to avoid catching large numbers of redbreasted shiners *Richardsonius balteatus*. We set the nets in the afternoon, fished them all night, and pulled them the next morning. On September 3, 1993, we set three gill nets. Two were set similar to those set in July, and the third net was a diving net set in water of approximately 100 feet deep.

In Brundage Reservoir, we set nets on two different occasions; June 16 and July 28, 1993. On both occasions we used two standard gill nets; one floating and one diving. Both nets were set perpendicular to shore with one end attached to shore. We set them in the afternoon, let them fish all night, and pulled them the next morning.

Hells Canyon Reservoir Complex

We electrofished both Hells Canyon and Oxbow reservoirs on the nights of May 4 and 5, 1993. We used the same techniques and transects as described by Janssen and Anderson (1993). Smallmouth bass collected were measured to the nearest mm.

RESULTS

Payette Lake

Kokanee Population Status

The total population size of wild age 0+ kokanee in Payette Lake in August 1993 was estimated to be 301,744 fish (Table 1). The estimate of wild age 1+ kokanee was 117,215 fish, and there were an estimated 11,444 hatchery-origin age 0+ kokanee. The size of hatchery age 0+ kokanee averaged slightly smaller than age 1+ wild kokanee, but the ranges overlapped. Lengths of hatchery age 0+ fish ranged from 90 to 150 mm, and lengths of wild age 1+ ranged from 170 to 190 mm. We estimated survival of hatchery stocked kokanee, planted in May, to be 8.8% at the time of trawling.

Survival of the wild age 0+ 1992 cohort to age 1+ in 1993 was estimated to be 39%. Estimated mean densities (fish/ha) of age 0+ and 1+ were 176 and 68 fish/ha respectively (Table 1). This was a 49% increase in densities of age 0+ fish and a 277% increase for age 1+ fish compared to the 1992 estimates.

Total kokanee biomass (hatchery and wild), not including adult fish (this years spawners), was estimated at 2.5 kg/ha, a 48% increase over the 1992 estimate. Total biomass, including 1993 spawner escapement estimates, was 11 kg/ha. Due to inefficiencies in the trawl, this biomass estimate includes very few fish >180 mm (age 2+) in length that did not spawn this year. This estimate includes an

Table 1 Summary of midwater trawl data collected at Payette Lake, Idaho, 1980, 1988, 1989, 1990, 1991, and 1992 with 95% error bounds in $\pm(\%)$. All estimates are based on a useable surface area of 1,715 ha (>40 ft depth).

Year of Estimate	Number Stocked	AGE				Adult Soawn(3+) ^o	Spawner Biomass
		0+	1+	2+	3+ ^o		
Number of Hatchery Kokanee							
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	0			
1992	130,530	19,774(79%)	0	0			
1993	125,400	11,444(98%)	0	0			
Number of Wild/Natural Kokanee							
1980		100,000	73,000	16,000	**	20,000	
1988		74,800(40%)	<2,000(85%)	9,000(88%)	**	26,400	
1989		120,000(33%)	21,000(33%)	0	**	16,800	
1990		134,000(45%)	26,000(45%)	10,000(100%)	**	19,200	
1991		128,000(28%)	67,500 ^o	1,187	**	20,800	
1992		202,240(21%)	30,887(41%)	5,015(118%)	**	37,000	
1993		301,744(104%)	117,215(65%)	7,271(83%)	**	58,810	
Mean Wild Kokanee Density (fish/ha)							
1980		50	36	8	10		
1988		43	20	5	NA	15.5	
1989		72	22	5	NA	9.8	
1990		78	34	3	NA	11.2	4.1 kg/ha
1991		75	39 ^o	0.69	NA	12.1	5.4 °
1992		118	18	3	NA	18.3	.1 °
1993		176	68	4.2	NA	34.3	8.5 °

^o These fish spawned the following fall.

* Based on spawner escapement counts in North Fork Payette River.

* Includes wild and stocked fish.

* Includes hatchery fish of which age is unknown.

** Estimates not reliable because fish greater than 200 mm are not completely vulnerable to the trawl.

unquantified component of shoreline spawning kokanee which were first documented in December 1993.

Lake Trout Population Status

A total of 154 lake trout have been tagged with reward tags since 1988. We tagged two fish in 1993 (Table 2). Of all the tagged fish, 17 are known dead through 1993. In 1993, one tagged fish was recaptured and released, and one fish was caught and killed. Since 1988, a total of 17 tagged fish have been recaptured and killed, 17 have been caught and re-released, and 5 were released with the tag removed.

The harvest exploitation rate of lake trout in 1993 was 0.8%. Catch and release exploitation was approximately 0.8%. These estimates were made using some assumptions that are erroneous. These include 100% tag return rate, 100% tag retention, and 100% survival of tagged fish. Therefore, the estimates made are minimums. Lengths and weights of fish caught in 1993 were 91 cm and 9.0 kg and 56 cm and 8.8 kg.

Rainbow Trout Put-and-Take Evaluations

A total of 29 tags were returned from Brundage Reservoir in 1992 for an estimated return to the creel of put-and-take rainbow trout of 9.6%. Tags were returned from mid-June through mid-November.

Tags continued to be returned well into 1993 from Brundage Reservoir, with the last tagged fish being caught in September. We had a total of 12 tags returned in 1993. We estimated a total return of 13.7% of the 1992 stocking through 1993. Size of fish caught remained small with the average being around 254 mm, indicating poor growth rates.

A total of 116 tags were returned from Horsethief Reservoir for an estimated return to the creel of put-and-take rainbow trout of 38.7%. Tags were reported being collected from the end of May through the early part of February 1993. This would indicate good survival of these fish in Horsethief Reservoir.

Tags continued to be returned well into 1993 from Horsethief Reservoir as well. A total of 17 tags were returned in 1993 since the time of last years report. Using the 17 additional tags, we calculated a total return of 44% of the 1992 put-and-take stocking. Size of fish returned in 1993 averaged around 12.5 inches.

C. Ben Ross Reservoir

We collected five species of fish: largemouth bass, black crappie, bluegill, largescale sucker *Catostomus macrocheilus*, and mountain whitefish *Prosopium williamsoni*. Of all the fish collected, largemouth bass were most abundant in terms of number, while largescale suckers were most abundant in terms of biomass (Table 3).

We collected 194 largemouth bass. This population was made up of four strong year classes. Growth was good with 4-year-old fish averaging 302 mm. Relative weights of bass averaged 86 over all size classes (Table 4). Relative weights generally improved as bass size increased.

We collected 87 black crappie, which consisted of a large group of fish ranging from 210 to 290 mm (Table 5). We found these fish ranged from 4 to 11 years old, with the majority of fish being 6 to 9 years old. We collected only one crappie less than 200 mm in length. This fish was 123 mm. Relative weights for black crappie averaged 92.1.

Table 2. Payette Lake trout tagging information from 1988 through 1991.

Year	New tags _____	Tags caught & released ___	Tags caught & fish killed _	Tags removed fish released
1988	73	4	3	
1989	16	0	0	
1990	38	8	1	
1991	25	4	6	
1992	0	1	6	4
1993	2	0	1	1
Total	154	17	17	5

Total # of tags remaining in lake beginning in 1993: 132
 Total # of tags remaining in lake beginning in 1994: 132

Table 3. Percent frequency of occurrence and relative biomass of the different species of fish collected in May, 1993 in C. Ben Ross Reservoir, in one unit of effort.

Species	# Caught	% of Catch all species	Total biomass (kg)	% Biomass all species
Largemouth bass	194	49	25.8	36
Black crappie	87	22	18.5	23
Bluegill	89	22.5	2.3	3
Largescale sucker	22	5.5	30.2	37
Mountain whitefish	4	1	1.0	1

Table 4. Total number of fish collected, percent of total, and average weight and relative weights of individual fish in each 1 cm length group collected in the standard survey of C. Ben Ross Reservoir in May 1993.

TOTAL LENGTH	Largemouth Bass				Black Crappie				Bluegill			
	# Col.	% of Ttl.	Ave. Wgt.	Rel. Wgt.	# Col.	% of Ttl.	Ave. Wgt.	Rel. Wgt.	# Col.	% of Ttl.	Ave. Wgt.	Rel. Wgt.
<100	26	13	6		0				56	63	65	
100	1	0.5	10	73.5	0				7	8	20	92
110	6	3	14	73.5	0				7	8	38	99
120	14	7	18	79	1	1	20	85	5	6	34	95
130	6	3	24	82	0				1	1	40	92
140	7	4	28	77	0				2	2	55	88
150	4	2	41	63	0				4	4.5	76	101
160	2	1	47.5	84	0				1	1	104	116
170	2	1	60	89	0				2	2	116	106
180	6	3	65	81	0				3	3	149	108
190	5	3	82	71	0				1	1	185	119
200	5	3	105	69	0							
210	20	10	122	93.5	3	3	168	106				
220	12	6	138	93	20	23	164	95				
230	9	5	173	87	13	15	190	92				
240	9	5	192	95	19	22	212	90				
250	7	4	205	91	18	21	240	889				
260	5	3	239	91.5	7	8	281	94				
270	6	3	265	87.5	5	6	314	92				
280	14	7	301	91	1	1	360	96				
290	8	4	333	92								
300	7	4	347	87								
310	9	5	396	88								
320	1	0.5	450	94.5								
330	0											
340	2	1	487	82								

Table 5. Average back-calculated lengths for each age class of each species of game fish collected from C. Ben Ross Reservoir, collected in May 1993.

<u>Largemouth Bass</u>							<u>Bluegill</u>								
Year	Back-calculation Age						Year	Back-calculation age							
Class	Age	N	1	2	3	4	5	Class	Age	N	1	2	3	4	
1992	1	20	129					1992	1	1	108				
1991	2	25	102	197				1991	2	10	43	110			
1990	3	19	81	164	247			1990	3	7	39	97	142		
1989	4	17	89	175	261	301		1989	4	2	41	102	129	176	
1988	5	2	102	222	281	310	343	1988	5	1	39	9100	122	141	162
All Classes			101	182	255	302	343				45	104	137	164	162
N		83	83	63	38	19	2			21	21	20	10	3	1

<u>Black Crappie</u>															
Back-Calculation Age															
Year	Class	Age	N	1	2	3	4	5	6	7	8	9	10	11	
1992				1	0										
1991				2	1	57	123								
1990	3		0												
1989	4		4	69	134	195	226								
1988	5		2	65	138	195	210	222							
1987	6		7	72	140	184	212	230	249						
1986	7		6	70	134	171	195	221	238	257					
1985	8		5	74	143	171	190	209	224	242	256				
1984	9		4	73	122	151	174	192	209	222	236	246			
1983	10		1	66	98	130	146	167	180	194	207	219	236		
1982	11		1	74	121	149	169	185	198	212	227	241	252	260	
All Classes				70	134	174	498	213	229	238	242		241	244	260
N			31	31	31	30	30	26	24	17	11	6	2	1	

We collected 89 bluegill which consisted of five age classes. The strongest age class in terms of numbers was age 1 fish, making up 62% of the fish by number (Tables 4 and 5). Bluegill lengths ranged from <100 to 191 mm. Relative weights of bluegill increased with size of fish. At 100 to 110 mm the average relative weight was 92, and from 160 to 191 mm the average relative weight was 110.

Cascade Reservoir

We collected 193 smallmouth bass in 57 minutes of actual electrofishing time. Fish ranged in size from 150 mm and 57 g to 360 mm and 705 g. Ages of fish ranged from 2+ to 5+ (Table 6) with the majority of fish being 3+. Relative weights of smallmouth bass were excellent averaging from 92 to 110. Relative weight appeared to improve with size up to 300 mm.

We collected lengths, weights, and scales from 15 smallmouth bass from the bass tournament (fish brought in for the weigh-in had to be 12 inches or greater). The fish ranged from 309 mm and 355 g to 395 mm and 840 g (Table 7).

Little Payette Lake

We had varying degrees of success electrofishing for trout in Little Payette Lake. The lake was electrofished on May 20 and June 3, 1993. The first night of electrofishing, which was mainly a trial effort, netted a total of 88 fish in 38 minutes of actual shocking time. Fish were very abundant along the shoreline.

When we attempted the full effort on June 3, fish were difficult to capture with only 72 rainbow trout being collected by two electrofishing boats in approximately 4 total hours of actual fishing time. The majority of fish had moved away from the shoreline. Also, water conductivity was minimal for electrofishing (24 umhos). Voltage pulsators had to be turned up to maximum power to have a field big enough to pull in fish. Even then, fish had to be close to the electrodes to be caught in the field. We did not collect enough fish to make population estimates.

We collected 159 rainbow trout in two nights of electrofishing. Rainbow trout collected with electrofishing gear ranged in length from 150 mm to 510 mm (Table 8). Average length, weight, and condition factor were calculated for each group and displayed in Table 8. In addition to rainbow trout, kokanee, smallmouth bass, largescale suckers, redbase shiners, and northern squawfish *Ptychocheilus oregonensis* were collected.

We collected 19 rainbow trout, 5 kokanee, 10 smallmouth bass, 1 brook trout, 62 northern squawfish, and 36 largescale suckers with gill nets in Little Payette Lake on August 17, 1993. We found, in terms of biomass, squawfish and largescale suckers were the most abundant with 35.87 kg and 32.0 kg, respectively (Table 9). Rainbow trout were the third most abundant in biomass with 7.29 kg being collected. We collected no redbase shiners in gill nets.

Rainbow trout collected in gill nets ranged in total length from 160 to 445 mm (Tables 8, 10, 11). Condition factors were moderately low, with the average being about 0.87. Condition factors, on average, declined as fish size increased (Table 9).

Lost Valley Reservoir

We collected a total of 72 fish, of which 45 were rainbow trout, 5 were brook trout, 16 were yellow perch, and 6 were bullheads. The rainbow trout ranged in size from 160 mm and 40 g up to 454 mm and 740 g (Table 12). Rainbow trout were in very good condition with an average condition factor of 0.99. The condition factor of rainbow trout was very consistent through all sizes of fish collected.

Table 6. Average back-calculated lengths of smallmouth bass collected from Cascade Reservoir in August 1993.

Year Class	Age	N	Back-calculated Age				
			<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Smallmouth bass							
1992	1	1	0				
1991	2	14	67	157			
1990	3	53	69	130	215		
1989	4	6	76	155	241	341	
1988	5	2	73	148	221	315	357
All Classes		69	138	218	335	357	
N		75	75	75	61	8	2

Table 7. Length frequencies of smallmouth bass collected in Cascade Reservoir in August 1993 from electrofishing and bass tournament.

Total Length (mm)	Electrofishing		Bass Tournament	
	Total Number	Ave. Wr	Total Number	Ave. Wr
150	1			
160	1			
170	5	96		
180	7	98		
190	10	92		
200	28	98		
210	25	103		
220	32	102		
230	22	102		
240	28	102		
250	15	104		
260	9	107		
270	3	110		
280	1	100		
290	0			
300	1	100	2	94
310	1	98	4	96
320	0		2	97
330	0		0	
340	0		1	91
350	0		1	105
360	1	105	0	
370	0		1	107
380			2	103.5
390			2	104.5

Table 8. Length frequencies of rainbow trout collected in Little Payette Lake in May and June 1993 from electrofishing and in August 1993 from gillnetting. (1) denotes an adipose-clipped, Pennask strain rainbow.

Total Length (mm)	Electrofishing Total Number	Gillnetting Total Number
150	1	
160	2	1
170	1	
180	1	1
190	5	
200	2	
210	5	
220	4	
230		
240	3	
250	7	1
260	7	
270	16	1
280	16(1)	
290	23	
300	16	1
310	5	2
320	7	2
330	3	
340	4	1
350	2(1)	
360		
370	2	
380	2	4
390	5(1)	
400	4(1)	2
410	3(1)	
420	3(1)	1
430		1
440	1	1
450	2(1)	
460		
470		
480		
490		
500		
510	1	

Table 9. Average lengths, weights, and condition (Ktl) of rainbow trout, by length groups, collected from Little Payette Lake on May 20 and June 2, 1993.

Length Inc.	N	Ave.	Ave. Length	Ave.
150-180	4	164	30	0.69
180-230	18	210	67	0.73
240-310	90	284	202	0.89
310-360	19	329	313	0.90
360-430	20	400	516	0.84
430-460	3	448	--	--
460-420	1	510	--	--
440-520	4	464	--	--
	159			

Table 10. Numbers and biomass of all species of fish collected with gill nets on August 17, 1993 on Little Payette Lake.

Species	N	of total by Number	Total Weight (kg)	% of Total by Weight
rainbow trout	19	14.3	7.39	9.6
smallmouth	10	7.5	1.47	1.9
kokanee	5	3.7	0.41	0.5
squawfish	63	47.4	35.87	46.7
largescale sucker	35	27	32.0	41.7

Table 11. Average lengths, weights, and condition (Ktl) of rainbow trout, by length groups, collected from Little Payette Lake with gill nets on August 17, 1993.

Length Inc.	N	Ave. Length	Ave. Weight	Ave. Ktl
160-190	2			
240-350	9	304	279	0.95
380-410	6	391	520.5	0.87
420-450	3	433	625	0.77

Table 12. Length frequencies of rainbow trout, brook trout and yellow perch collected from Lost Valley Reservoir on September 15, 1993.

Total Length	Rainbow trout N	Brook trout N	Yellow perch N
160	3		
170	4		
180	3	3	
190	4	5	
200	4		
210	3	1	
220	1	2	1
230		3	1
240		1	
250	2		2
260		1	
270	1		
280			
290	2		
300	1		
310			
320	2		
330			
340	1		1
350			
360	1		
370			
380	4		
390	2		
400	2		
410	1		
420	1		
430	2		
440			
450	1		

A larger number of small yellow perch were expected in the nets. It appears that predation by large yellow perch and rainbow trout on young yellow perch is keeping their numbers from growing as fast as first expected.

Salmonid Stocking Evaluations

In Upper Payette Lake we collected four splake from the 1992 stocking. They averaged 208 mm in total length and 71 g. They had an average condition factor of 0.80. In addition to splake, we collected 30 largescale suckers, 7 mountain whitefish, and 3 brook trout.

We collected 12 splake on July 2 and 3 from Granite Lake and 3 splake on September 3, 1993. These fish averaged 226 mm in total length and 92 g in July. They had an average condition factor of 0.81. They averaged 263 mm and 146 g with an average condition factor of 0.80 in September. We examined stomachs of splake collected in July and found they were feeding exclusively on midge larvae. Stomachs were filled to capacity.

In Brundage Reservoir, we collected seven adipose-clipped rainbow trout on June 13 and 15 and July 28, 1993. In June, these fish averaged 292 mm and 211 g with an average condition factor of 0.84. In July, these fish averaged 298 mm and 239 g with an average condition factor of 0.89. On May 26, 1992, the adipose-clipped fish in Brundage averaged 249 mm (Janssen and Anderson 1994), an increase of 43 mm in 12.5 months or 49 mm in 14 months.

Hells Canyon Reservoir Complex

We electrofished nine transects on Hells Canyon Reservoir and ten transects on Oxbow Reservoir. These were the same transects that were sampled in 1991 and 1992. We collected a total of 203 and 287 smallmouth bass in Hells Canyon Reservoir and Oxbow Reservoir, respectively. Smallmouth bass lengths ranged from 66 mm to 345 mm in Hells Canyon and 102 mm to 335 mm in Oxbow Reservoir. Length frequencies peaked at 260 mm to 269 mm in Hells Canyon Reservoir and at 240 mm to 249 mm in Oxbow Reservoir (Figures 1 and 2).

DISCUSSION

Payette Lake

The kokanee population in Payette Lake continues to grow. Since 1988, the estimated number of age 1+ fish has increased four-fold. Biomass of adult spawners increased from an estimated 4.1 kg/ha in 1990 to 8.5 kg/ha in 1993, while numbers of spawners increased from 19,200 to 58,810.

Survival rates of spawner to progeny spawner have also changed greatly. For each fish that spawned in 1988 an estimated 1.4 fish survived to spawn in 1992. For each fish that spawned in 1989, 3.5 fish survived to spawn in 1993 (assuming that the majority of spawners are age 3+).

Reasons for these dramatic changes are unknown but may include changes in predator numbers and/or changes in nutrient levels in the lake.

C. Ben Ross Reservoir

We found C. Ben Ross Reservoir to have a healthy, viable largemouth bass population. Five strong age classes were collected as noted above. All age classes were generally of equal strength. We found good growth rates for bass, with fish reaching 12 inches in four years. Good numbers of bass up to 12 inches in length

Figure 1. Length frequencies of Oxbow Reservoir smallmouth bass collected by electrofishing in May 1993.

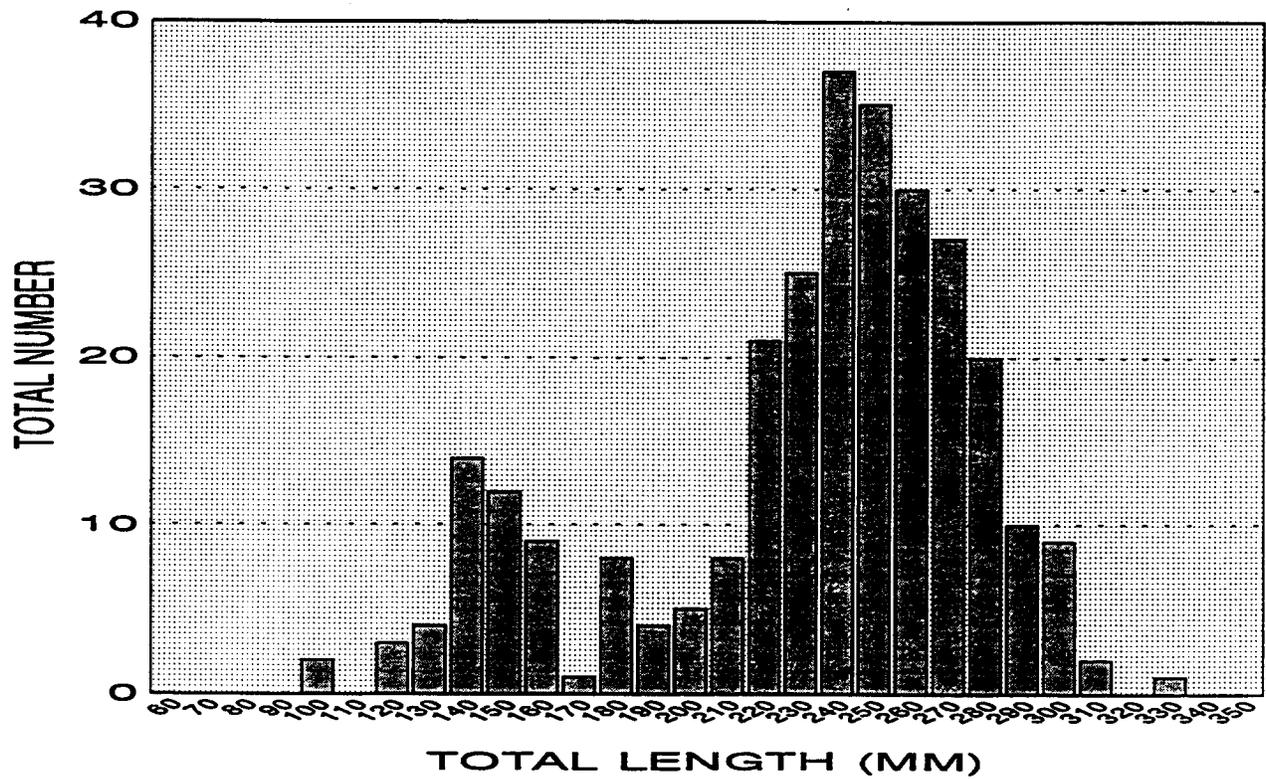
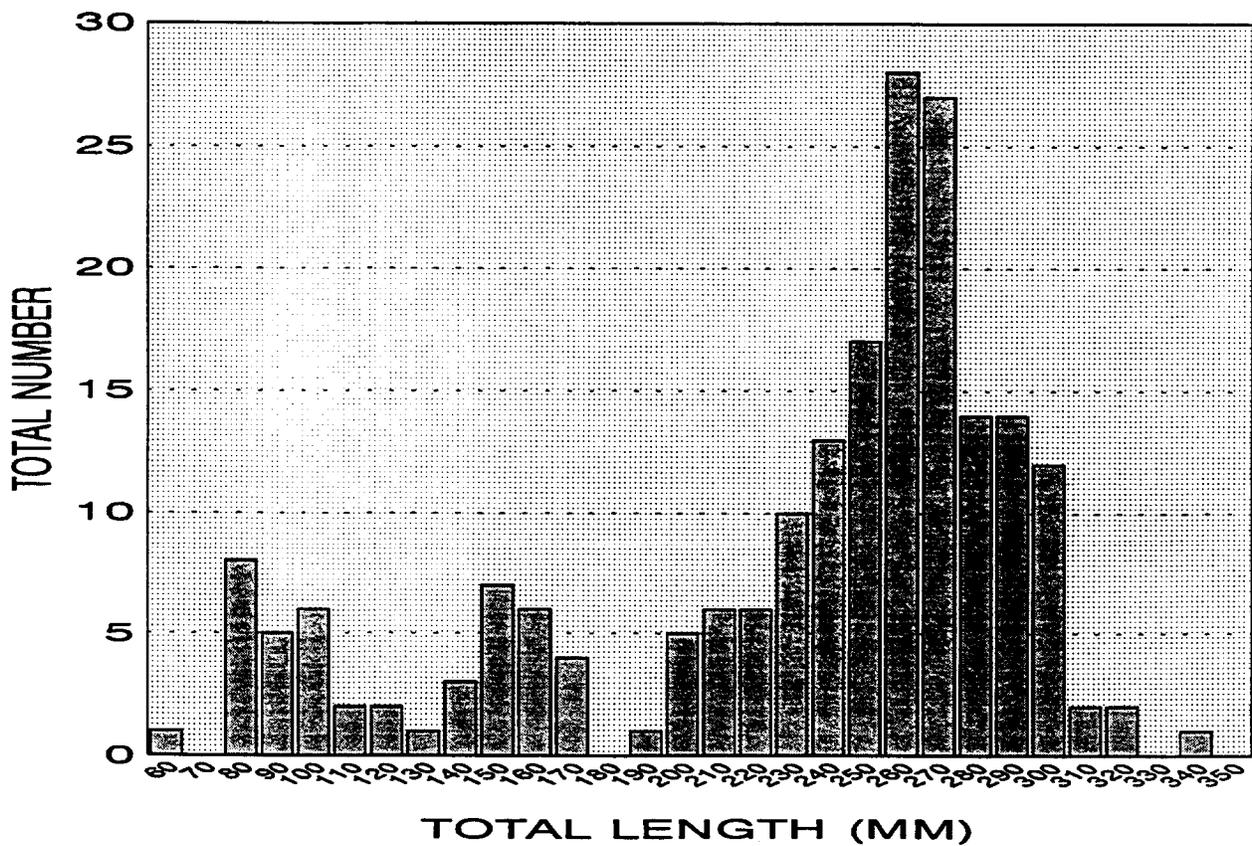


Figure 2. Length frequencies of Hells Canyon Reservoir smallmouth bass collected by electrofishing in May 1993.



were present. However, there were very few bass larger than 12 inches in the population, a result of harvest once those fish reached a legal size.

We also found a good forage base in the reservoir. Bluegill and black crappie populations were well established and viable.

As a result of these findings, we made the recommendation to implement a two bass limit, none between 12 and 16 inches. The recommendation also included a no harvest of bass until July 1. The recommendation became law on January 1, 1994.

By the end of the first year of the new regulation (1994) we expect to find some 14 inch bass. By the end of 1996 we expect to have some bass greater than 16 inches being harvested, with excellent numbers of bass in the slot.

Little Payette Lake

At this time there is no reason to consider a catch and release regulation on Little Payette Lake. Some dramatic changes have occurred in the Little Payette Lake fishery in the last six years that threaten the rainbow trout fishery. Since 1988, less than one year after its rotenone treatment, the fish community has shifted from one of predominantly rainbow trout and redbreasted sunfish to one that is predominantly largescale suckers and northern squawfish.

In 1988, largescale suckers and northern squawfish made up approximately 30% of the fish community in terms of biomass. In 1993, we found that suckers and squawfish made up approximately 88% of the biomass of the fish community.

Growth rates of rainbow trout have slowed dramatically. Grunder and Anderson (1990) reported rainbow trout growth of 75 mm in less than four months in 1988 (June to September). In 1989, the Kamloops strain rainbow trout had grown 147 mm in 11.5 months (early June 1988 to early May 1989) for an average of 12.8 mm/month (Grunder and Anderson 1991).

Two different size groups of Kamloops strain rainbow trout were planted in Little Payette Lake in Late April 1992. When samples of these fish were collected in late May 1993, 13 months later, they had grown an average of 80 mm or 6.2 mm/month. This is a 50% reduction in growth from 1988-1989 to 1992-1993.

Growth rates and survival are expected to decrease as the sucker and squawfish populations grow.

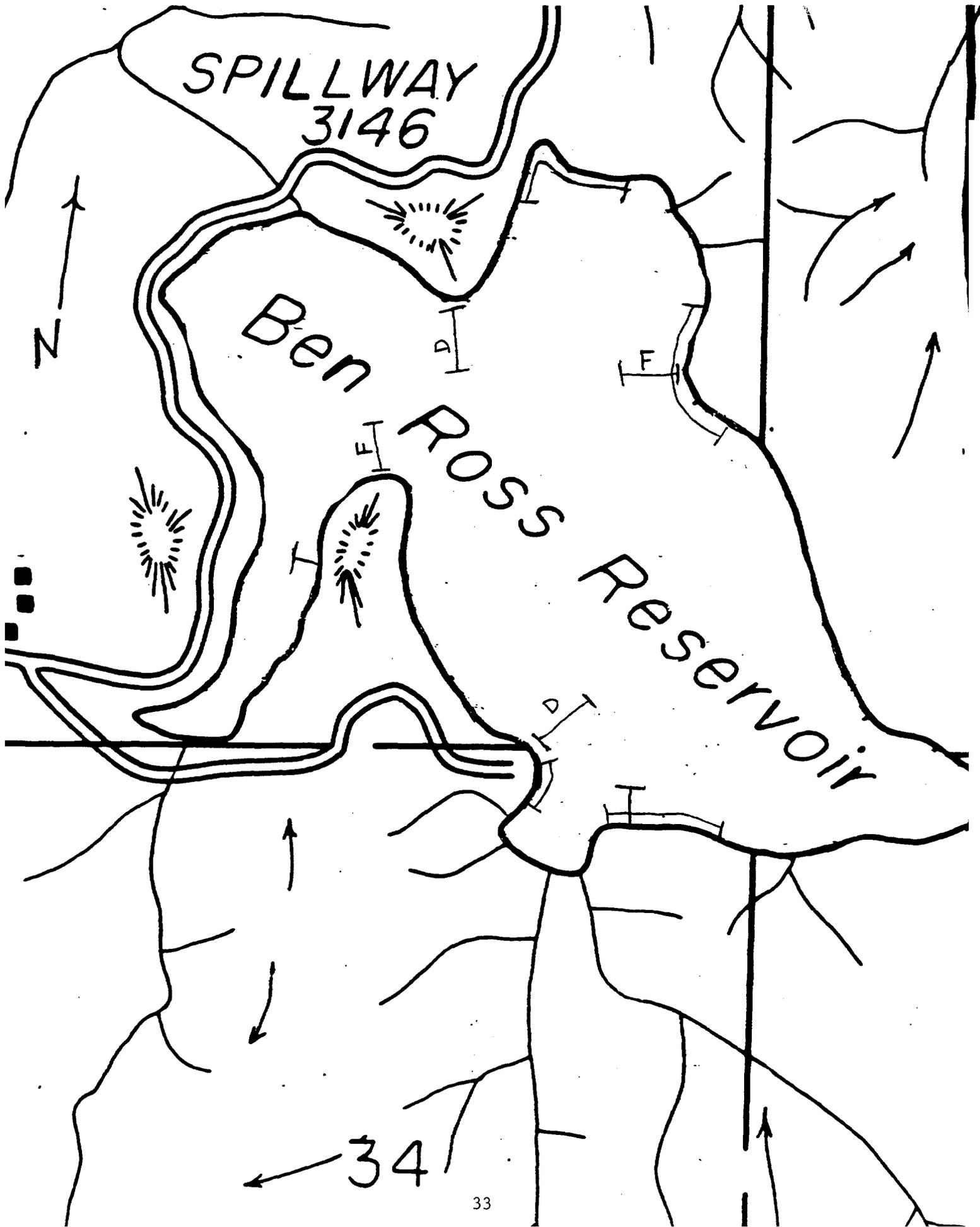
Hells Canyon Reservoir Complex

After one year of the new bass regulation in Oxbow Reservoir, there has been little change in the smallmouth bass population structure. Numbers and percents of bass over 300 mm are similar to that found in 1991 and 1992 (Janssen and Anderson 1993 and 1994). There is a strong 2-year-old age class in Oxbow and strong 1- and 2-year-old age classes in Hells Canyon.

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A P P E N D I X



JOB PERFORMANCE REPORT

State of: Idaho Name: Fisheries Management F-71-R-18
Project I: Surveys and Inventories Subproject I-C: McCall Subregion
Job: c Title: Rivers and Streams Investigations
Contract Period: July 1- 1993 to June 30. 1994

ABSTRACT

The cutthroat trout *Oncorhynchus clarki* regulation on the South Fork Salmon River was changed to catch and release fishing only in 1986. The lower section of the South Fork Salmon River (below the Secesh River) had not been sampled since 1986. This study was used to repeat the snorkel transects on this section of the South Fork Salmon River to determine if the cutthroat trout population had responded to the regulation change. We sampled a total of four traditional transects using two snorkelers that floated downstream through the transect. Snorkelers recorded species and an estimate of total length for each fish observed. We observed cutthroat trout, wild rainbow/steelhead trout *O. mykiss* juveniles, chinook salmon *O. tshawytscha* juveniles, bull trout *Salvelinus confluentus*, and mountain whitefish *Prosopium williamsoni*. We found cutthroat trout in three of the four transects sampled. Densities were low, ranging from 0.29 to .87 fish/100 m². However, this was a significant increase over that found in 1984 and 1985 when cutthroat trout were found in only one of the four transects.

Big Creek, a tributary to the Middle Fork Salmon River, contains a substantial cutthroat trout fishery and was made a catch and release fishery in 1982. The creek has been sampled several times since then to monitor the cutthroat trout population. A standard stream survey had not been performed on the middle reach (Cabin Creek upstream to 1/2 mile above Monumental Creek) of Big Creek since the regulation change in 1982. In August 1993, we completed two stream surveys and one additional snorkel transect on the middle reach of the creek. In addition to the standard surveys, we sampled the creek with hook-and-line gear to record as many total lengths of fish as possible. We kept fish lengths separate for two sections of the middle reach of the creek: 1) Monumental Creek downstream to Coxey Hole, and 2) Ccxev Hole downstream to Cabin Creek. Overall, length frequencies of cutthroat trout were very similar to that reported in other recent studies. However, we found length frequencies and species composition were different for the two sections. Fish in the upper section were found to be cutthroat trout >12 inches and chinook salmon juveniles. In the lower section we found cutthroat trout <12 inches and steelhead juveniles. Species and length statistics were similar between hook-and-line obtained lengths and lengths estimated from fish observed during snorkel transects. Chinook salmon juveniles were found only in most upstream snorkel transects. One bull trout was also captured with hook-and-line gear in the lower section.

Resident and anadromous fish species densities from permanent snorkel sample sites in the South Fork Salmon, upper Middle Fork Salmon, and Little Salmon river drainages are presented for 1988 through 1993. This data became available to the McCall Subregion with a transfer in anadromous parr monitoring responsibilities from the research section to the fisheries management section and will be included in this report in the future.

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OBJECTIVES

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

INTRODUCTION

South Fork Salmon River (Below the Secesh River Confluence)

Cutthroat trout *Oncorhynchus clarki* fishing regulations on the South Fork Salmon River drainage changed in 1984 from a 6-fish limit to a 1-fish limit. In 1986 the fishing regulation for cutthroat trout changed again to catch and release fishing only. The South Fork Salmon River fishery (below the Secesh River confluence) had not been examined since the salmon and steelhead investigations in 1986 (Anderson et al. 1987).

This study was used to find out how the cutthroat trout fishery below the Secesh River confluence had responded to these regulation changes.

Big Creek

Big Creek, a tributary to the Middle Fork Salmon River, was made a catch and release fishery in 1982. Previous to and since that time, the creek has been sampled several times to monitor wild trout populations. A description of the Big Creek fishery and the changes in it due to the regulation changes is given by Grunder et al. (1990) and Janssen et al. (1994).

A standard stream survey had not been performed on the middle section (Cabin Creek upstream to 1/2 mile above Monumental Creek) of Big Creek since the regulation change in 1982. During this study, stream surveys were completed on the middle section of the creek. Fish were also collected for length frequency statistics.

Idaho Habitat and Natural Production Monitoring

Beginning in 1984, IDFG began an evaluation of existing and proposed habitat improvement projects for anadromous fish (Petrosky and Holubetz 1985). Since then this work has developed into annual surveys of fish densities in permanent sites throughout anadromous waters in Idaho. Bonneville Power Administration funded this work.

In 1993, responsibility for collecting this trend information was transferred to the fisheries management section and supervised from individual regional offices. This change presented the opportunity to incorporate data on resident as well as anadromous fish species in this report. Drainages now monitored by McCall Subregion personnel include the South Fork Salmon River, Little Salmon River, and some tributaries to the Middle Fork Salmon River (Table 1).

METHODS

South Fork Salmon River (Below the Secesh River Confluence)

A total of four traditional transects were snorkeled on the South Fork Salmon River. These transects were located between the confluence of the Secesh River, downstream to the U.S. Forest Service South Fork Salmon River guard station. The traditional transect locations were described in Anderson et al. (1987). The

Densities of salmonids observed in some permanent monitoring sites within the South Fork Salmon, Little Salmon, Middle Fork Salmon River drainages, Idaho, 1988 through 1993.

Stream	Year	Area sampled		Number of fish/100 m ²													
				Chinook		Wild steelhead		Adipose clipped steel-head	Catch-able rain-bow trout	Cutthroat trout		Bull trout		Brook trout		Whitefish	
		Total (m ²)	No. of sites	Age 0	Age 1	<305 mm	>305 mm					<305 mm	>305 mm	<305 mm	>305 mm	<305 mm	>305 mm
Big Creek (trib to M Fk Salmon R)	1988	5.749	3	2.314	0.035	3.636	0	0	0	0.191	1.183	0.017	0.139	0	0	0.226	1.496
	1989	9.420	4	2.431	0.032	2.643	0	0	0	1.518	0.786	0	0.127	0	0	0.234	1.242
	1990		3	1.483	0.290	2.591	0	0	0	0.634	0.774	0	0.064	0.054	0	0.236	0.645
	1991	5.422	3	0.941	0	1.992	0	0	0	0.277	0.516	0	0.037	0	0	0.203	0.480
	1992	12.629	5	1.924	0.230	2.882	0	0	1.386	0.214	0.491	0.032	0.016	0.396	0	1.790	0.768
	1993	7.859	5	1.680	0.318	4.059	0	0	0	0.242	0.178	0.025	0	0.127	0	0	0.725
Boulder Creek (trib to Little Salmon R)	1988	5.308	9	7.875	0.075	21.101	0.038	0.113	0.038	0	0	0.019	0.019	5.049	0.038	0	0
	1989	4.922	6	39.334	0.183	27.185	0.061	0	0.081	0	0	0.081	0.020	0.752	0	0.041	0.061
	1990	2.983	4	13.210	1.039	20.619	0.067	0.034	0.034	1.073	0	0.034	0	0.570	0.034	0	0
	1991	2.883	4	7.181	0.104	14.501	0.347	0.069	0	1.145	0	0	0	2.081	0.069	0	0
	1992	2.718	4	2.391	0	25.717	0.258	0	0	6.034	0.037	0.147	0	2.796	0.037	0	0
	1993	3.362	4	0.476	0.030	3.599	0	0	0	0.030	0	0	0	0.119	0	0.059	0.059
Chamberlain Creek (trib to Salmon R)	1988	944	2	1.059	0	9.850	0	0	0	0.106	0.212	0	0	0	0	3.071	0.106
	1989	3.915	6	14.637	0.255	10.064	0.026	0	0	0.026	0	0.051	0	0	0	3.065	0.153
	1990	3.221	4	18.130	1.397	15.926	0	0	0	0.031	0	0.373	0	0	0	2.887	0.031
	1991	4.008	6	8.059	0.424	5.215	0.050	0	0	0.225	0.025	0.399	0.025	0	0	1.073	0.025
	1992	14.308	22	7.527	0.105	9.512	0	0	0	0.126	0	0.259	0.014	0	0	0.699	0.056
	1993	data not available at this time															

Stream	Year	Area sampled		Number of fish/100 m ²													
				Chinook		Wild steelhead		Adipose clipped steelhead	Catchable rainbow trout	Cutthroat trout		Bull trout		Brook trout		Whitefish	
		Total (1 ²)	No. of sites	Age 0	Age 1	<305 mm	>305 mm					<305 mm	>305 mm	<305 mm	>305 mm	<305 mm	>305 mm
Dollar Creek (trib to S Fk Salmon R)	1988	436	1	0.229	0	7.796	0	0	0	0	0	0	0	0.688	0	0	0
	1989	543	1	0	0	4.605	0	0	0	0	0	0.184	0	1.289	0	0	0
	1990	563	1	0	0	1.066	0	0	0	0.355	0	0	0	0	0	0	0
	1991	585	1	0	0	3.077	0	0	0	0	0	0	0	0	0	0	0
	1992	796	2	0.251	0	0.628	0	0	0	0	0	0	0	0	0	0	0
	1993	767	2	0	0	0.521	0	0	0	0.261	0.130	0.130	0	0	0	0	0
Hazard Creek (trib to Little Salmon R)	1988	1.404	1	0.641	0	35.684	0	5.057	3.917	0	0	0	0	0	0	0.783	0
	1989	1.663	1	0.180	0.120	18.218	0	1.323	0.541	0	0	0.120	0.120	0	0	0.180	0
	1990	3.248	2	0.031	0	18.073	0	4.464	0.123	0.062	0	0.031	0.062	0	0	0.185	0.092
	1991	1.448	1	0	0.069	14.982	0.829	2.278	0	2.831	0	0.138	0	0	0	0	0.276
	1992	1.930	2	0	0	15.133	0.052	2.125	0	4.301	0	0	0	0	0	0.052	0
	1993	2.184	2	0	0	6.228	0.550	1.008	2.427	0	0	0	0.137	0.137	0	0.046	0
Johnson Creek (trib to E Fk S Fk Salmon R)	1988	8.784	8	25.285	0.057	2.846	0	0	0.080	0	0	0	0.011	0.433	0	0.023	0.057
	1989	8.473	8	3.435	0.012	1.263	0.012	0	0	0	0	0	0	1.428	0	0.142	0.047
	1990	25.319	28	0.280	0	0.249	0.004	0	0	0	0	0	0	0.205	0	0.043	0.008
	1991	2.567	2	0.273	0	1.520	0.078	0	0	0.662	0	0	0	0	0	0	0.156
	1992	6.659	7	0.240	0.030	0.736	0	0	0	0	0	0	0	0.105	0	0.135	0.180
	1993	10.128	9	5.499	0	1.155	0.030	0	0	0.010	0	0	0.010	0.375	0	0.079	0.158
Lake Creek (trib to Secesh R)	1988	1.358	2	2.061	1.178	1.988	0	0	0	0	0	0.074	0	1.988	0.074	0	
	1989	1.512	2	8.533	0	21.696	0	0	0	0	0	0	0	37.307	0.132	0	0
	1990	1.512	2	14.683	1.653	1.124	0	0	0	0	0	0	0.132	2.844	0	0.331	0.066
	1991	1.442	2	8.807	0.902	0.208	0	0	0	0.069	0	0.069	0	0.971	0	0.069	0
	1992	3.778	7	6.009	0.106	2.568	0	0	0	0	0	0.026	0.026	1.668	0	0.900	0
	1993	data not available at this time															

chinook parr density influenced by local recent stocking

Stream	Year	Area sampled		Number of fish/100 m ²													
				Chinook		Wild steelhead		Adipose clipped steelhead	Catchable rainbow trout	Cutthroat trout		Bull trout		Brook trout		Whitefish	
		Total (i ²)	No. of sites	Age 0	Age 1	<305 rim	>305 nm					<305 mm	>305 mm	<305 mm	>305 mn	<305 man	>305 mm
Lick Creek (trib to Secesh R)	1988	259	1	0	0	21.663	0	0	0	0	0	0	0	0	0	0	0
	1989	291	1	0	0	52.957	0	0	0	0	0	0	0	0	0	2.063	0
	1990	855	1	1.871	0	18.239	0	0	0	0.234	0	0	0	0	0	0.117	0
	1991	717	1	0	0	6.278	0.140	0	0	4.406	0	0	0	0	0	0	0
	1992	2.764	3	0.724	0.036	18.419	0	0	0	0.832	0	0	0	0.036	0	0	0
	1993	2.644	2	0.189	0	13.617	0	0	0	0.340	0	0.076	0	0.303	0	0.076	0.378
Little Salmon River	1988	4.436	3	0.074	0.383	8.274	0	0.924	0.090	0	0	0.023	0	0	0	1.285	0.113
	1989	9.213	6	0.890	0.011	5.655	0.076	0.033	0	0	0	0	0	0	0	0.119	0.065
	1990	3.709	3	0.512	0.216	12.970	0.027	3.155	0	0	0	0	0.027	0	0	0.216	0.243
	1991	3.299	2		0.212	8.426	0.485	0	0	0.394	0.121	0	0	0	0	0.152	0.152
	1992	4.551	3	0.242	0.066	8.591	0.110	0.088	0	1.384	0.022	0	0	0	0	0.132	0.857
	1993	4.284	3	0.023	0.303	7.959	0.397	0	0.023	0	0	0	0	0	0	0.023	0.047
Marble Creek (trib to Middle Fk Salmon R)	1988	3.770	6	0	0	0.796	0.027	0	0	4.801	0.027	0	0.080	0	0	0	0.133
	1989	2.548	4	0	0	0.118	0	0	0	4.592	0.039	0.118	0	0	0	0.039	0.039
	1990	1.649	4	0	0	0.789	0	0	0	5.945	0.546	0	0	0	0	0.121	0.182
	1991	1.769	5	0	0	0	0	0	0	6.614	0.283	0.057	0	0	0	0.057	0
	1992	2.048	5	0	0	0	0	0	0	1.026	0	0	0	0	0	0	0
	1993	1.427	3	0	0	2.944	0	0	0	6.027	0.070	0	0.070	0	0	0.140	0.070
Monumental Creek (trib to Big Creek, M Fk Salmon R)	1988	3.514	5	9.362	0.797	7.370	0	0	0	0.085	0	0.057	0	0	0		D
	1989	3.681	5	3.803	0	1.548	0.054	0	0	1.929	0	0	0.027	0	0	0.054	0.109
	1990	6.956	10	2.789	5.995	0.316	0	0	0	4.572	0.086	0.058	0	0	0.029	0.374	0
	1991	2.526	3	1.227	0	0.792	0	0	0	0.792	0.079	0	0	0	0	0	0.040
	1992	3.170	5	3.249	0.095	0.095	0.126	0	0	1.325	0.063	0.032	0.032	0	0	0.032	0.095
	1993	3.625	5	0.993	0	2.842	0	0	0	0.331	0.055	0	0	0.414	0	0.138	0.110

^bwhitefish not counted

Stream	Year	Area sampled		Number of fish/100 m ²													
				Chinook		Wild steelhead		Adipose clipped steel-head	Catchable rain-bow trout	Cutthroat trout		Bull trout		Brook trout		Whitefish	
				Age 0	Age 1	<305 mm	>305 mm			<305 mm	>305 mm	<305 mm	>305 mm	<305 mm	>305 mm	<305 mm	>305 mm
Total (m ²)	No. of sites																
Rapid River (trib to Little Salmon R)	1988	1.240	1	7.097	0.565	32.581	0	0	0	0	0	0.323	0.081	0	0	0	0
	1989	1.360	1	6.103	0.147	19.191	0	0	0	0.074	0	0.294	0.074	0	0	0	0
	1990	11.921	14	0.193	0.008	8.716	0.109	0	0	0.025	0.008	0.084	0.075	0	0	0	0
	1991	2.736	7	0.146	0	7.786	0.402	0	0	0	0	0.037	0.183	0	0	0	0
	1992	8.659	11	1.790	0.058	12.587	0.196	0	0	0.012	0.012	1.039	0.092	0.012	0	0	0
	1993	9.172	10	0.469	0.425	8.995	0.153	0	0	0	0	0.240	0.098	0	0	0	0
West Fork Rapid River	1988	598	1	0	0.167	21.557	0	0	0	0	0	1.170	0	0	0	0	0
	1989	783	1	1.277	0.255	8.429	0.128	0	0	0	0	0.894	0.128	0	0	0	0
	1990	990	2	0	0	9.091	0.202	0	0	0	0	0.303	0	0	0	0	0
	1991	519	1	0	0	6.362	0	0	0	0	0	0	0.193	0	0	0	0
	1992	960	2	0	0	14.585	0.104	0	0	0	0	0.833	0	0	0	0	0
	1993	680	1	0	0	7.496	0.147	0	0	0	0	0.588	0	0	0	0	0
Rock Creek (tributary to Johnson Creek)	1988	374	1	148.857	0	0	0	0	0	0	0	0	0	15.784	0	0	0
	1989	329	1	3.340	0	0.304	0	0	0	0	0	0	0	121.166	0	0	0
	1990	572	2	0.699	0	0	0	0	0	0	0	0	0	22.382	0	0	0
	1991	0	0														
	1992	309	1	0	0	0	0	0	0	0	0	0	0	0.972	0	0	0
	1993	432	1	0	0	0	0	0	0	0	0	0	0	0.925	0	0	0
Rush Creek (trib to Bia Creek)	1988	0	0														
	1989	--	1	0	0	37	0	0	0	0	1	0	0	0	0	0	0
	1990	518	1	0.193	0	18.357	0	0	0	0.966	0.773	0.386	0.580	0	0	0	0.580
	1991	4.417	12	0	0	5.275	0.068	0	0	3.169	0.770	0.113	0	0.091	0.023	0.294	0.362
	1992	4.445	10	0.202	0	2.587	0	0	0	1.822	0.922	0.067	0.067	0	0	0.405	0
	1993	data not available at this time															

area not measured; actual fish counts reported

Stream	Year	Area sampled		Number of fish/100 m ²													
						Wild steelhead		Adipose clipped steelhead	Catchable rainbow trout	Cutthroat trout		Bull trout		Brook trout		Whitefish	
		Total (m ²)	No of sites	Age 0	Age 1	<305 mm	>305 mm			<305 mm	>305 mm	<305 mm	>305 mm	<305 mm	>305 mm	<305 mm	>305 mm
South Fork Rush Creek	1988	0	0														
	1989	0	0														
	1990	0	0														
	1991	155	1	0	0	0.647	0	0	0	0	0	1.294	0	0.647	0	0	0
	1992	263	2	0	0	9.871	0	0	0	0.759	0	2.278	0	0	0	0	0
	1993	data not available at this time															
South Fork Salmon River	1988*	48.824	15	1.780	0.012	1.677	0.023	0	0	0.016	0.014	0	0.002	0	0	0	0
	1989	12.338	8	16.964	0.041	3.518	0.008	0	0	0.713	0	0.024	0	0.008	0	0.875	1.094
	1990	14.178	8	7.568	0.113	9.085	0	0	0	0.028	0	0	0	0.021	0.007	0.797	0.282
	1991	14.831	8	1.531	0.007	3.621	0.007	0	0	0.034	0	0	0	0.007	0.007	0.479	0.600
	1992	14.803	8	1.398	0.007	1.790	0.027	0	0	0.331	0.007	0.007	0.027	0	0	0.351	0.615
	1993	15.898	11	5.523	0	2.940	0.031	0	0	0.094	0.013	0	0.013	0.019	0	0.056	1.689
East Fork South Fork Salmon River	1988	4.472	3	0.398	0.021	2.599	0	0	0.063	0	0	0	0.042	0	0	0	0
	1989	4.524	3	0.332	0	2.586	0.044	0	0	0	0.022	0.022	0	1.039	0	0.774	0.066
	1990	4.679	3	0.513	0.021	3.228	0.278	0	0	0.085	0	0.021	0.064	0.043	0	1.988	1.069
	1991	5.153	3	1.281	0.039	1.242	0.330	0	0.019	0.330	0	0.019	0	0	0	0.155	0.369
	1992	4.091	3	1.564	0.098	2.224	0.049	0	0	1.662	0.147	0.049	0.049	0	0	0.758	2.200
	1993	3.495	2	1.345	0	1.202	0	0	0	0.114	0.086	0.029	0.029	0	0	0.315	0.687
Sand Creek (tributary to Johnson Creek)	1988	447	1	137.603	0	0	0	0	0	0	0	0	0	13.417	0	0	0
	1989	404	1	0	0.248	0	0	0	0	0	0	0	0	21.782	0	0	0
	1990	769	2	0	0	0	0	0	0	0	0	0	0	3.642	0	0	0
	1991	0	0														
	1992	362	1	0	0	0.553	0	0	0	0	0	0	0	1.934	0	0	0
	1993	364	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0

*data from three Stolle Meadows sites omitted because area not measured

Stream	Year	Area sampled		Number of fish/100 m ²														
				Chinook		Wild steelhead		Adipose clipped steel-head	Catch-able rain-bow trout	Cutthroat trout		Bull trout		Brook trout		Whitefish		
		Total (m ²)	No. of sites	Age 0	Age 1	<305 mm	>305 mm					<305 mm	>305 mm	<305 mm	>305 mm	<305 m	>305 mn	<305 m
Secesh River	1988	3.532	3	13.362	0.226	3.793	0	0	0	0	0	0	0.028	0.057	0	0.170	0.085	
	1989	3.433	3	4.574	1.136	1.282	0	0	0	0.961	0	0	0	0.874	0	0.874	0	
	1990	3.432	3	0.175	2.273	0.204	0	0	0	0	0	0	0	0	0	0.146	0.291	
	1991	5.038	4	0.953	0	0.040	0	0	0	0	0	0	0.198	0.020	0	0	0.079	0.119
	1992	9.975	11	7.037	0.120	2.165	0	0	0	0	0	0	0.090	0	0.040	0	0.491	0.130
	1993	data not available at this time																
Whiskey Creek (tributary to Johnson Creek)	1988	0	0															
	1989	0	0															
	1990	394	2	9.400	0.254	0.508	0	0	0	0	0	0	0	9.654	0	0	0	
	1991	0	0															
	1992	0	0							--								
	1993	0	0															

transects sampled were numbered 18, 19, 20, and 22 (Table 2) as referenced in Anderson et al. (1987).

Each transect was sampled using two snorkelers that floated downstream. While floating downstream, each snorkeler recorded each fish observed by species and size. Length of the transect and underwater visibility were measured. These figures were multiplied together and multiplied again by two to determine the area sampled by the two snorkelers in each transect.

Big Creek

Standard stream surveys (as described in an intradepartment memo dated August 10, 1992) were completed on two locations of the middle section of Big Creek in August 1993. The two transects we sampled were located 1) directly adjacent to Carpenter Gulch (first drainage downstream from Little Ramey Creek), and 2) approximately .4 mile upstream from Doe Creek. A third transect site, just upstream from Hard Boil Bar, was snorkeled but no physical habitat measurements were made. We collected fish data from all three transects using upstream snorkeling techniques. Maps and exact location descriptions of each transect site are found in Appendix A.

In addition to the standard surveys, we sampled the creek with hook-and-line gear to record as many fish lengths as possible. We kept fish lengths separate for two sections of the creek, 1) Monumental Creek downstream to Coxey Hole, and 2) Coxey Hole downstream to Cabin Creek. No weights or scales were taken to prevent injury to fish.

Idaho Habitat and Natural Production Monitoring

Criteria for selecting sampling sites was reported by Rich et al. (1993) and Leitzinger et al. (1993). A standardized snorkeling technique was used at all sites. Some of the data presented was collected in cooperation with the Nez Perce and Shoshone-Bannock tribes.

RESULTS

South Fork Salmon River (Below the Secesh River Confluence)

We observed a total of 12 cutthroat trout in the four transects sampled (Table 3). Those fish ranged in size from 5 to 12 inches with the majority of fish ranging from 5 to 8 eight inches. The most abundant species observed were wild rainbow trout/steelhead. We observed significant number of age 0 chinook salmon in three of the four transects.

Big Creek

We completed two standard stream survey transects and a third snorkel transect on August 25 and 27, 1993 (Tables 4, 5, 6, 7, 8, and 9). Fish observed while snorkeling were predominantly cutthroat trout and mountain whitefish in the upper two snorkel transects. We perceived a change in cutthroat trout lengths as we moved downstream. In the most upstream transect, cutthroat trout lengths ranged from 10 to 15 inches (Table 5). In the middle transect, they ranged in length from 8 to 15 inches. And in the lowest downstream transect, cutthroat trout lengths ranged from 4 to 12 inches.

Table 2. South Fork Salmon River snorkel transect physical data, 1993.

Trans #	Location	Number Snorkelers	Transect Length (m)	Transect Vis. (m)	Corridor Area (m ²)
18	Sheep Cr	2	114	6.6	1,505
19	Res. Cr	2	78.5	6.6	1,036
20	Bear Cr	2	122	3.7	903
22	SFSR GS	2	82	3.8	623

Table 3. Fish numbers per m² x 100 by species and size observed during snorkel transects in the SFSR in 1993.

Transect #	Wild Rainbow				Wild Cutthroat				Wild Bull Trout			
	18	19	20	22	18	19	20	22	18	19	20	22
Length Class (in)												
3		0.4	0.19	0.44	0.32							
4		1.5	3.5	1.1	0.32							
5		0.46	2.6	1.3	1.3		0.19		0.32			
6		0.07	1.6	0.77	0.96							
7		0.13	0.19	1.0	1.12		0.1	0.22	0.16			
8			0.1	0.11				0.11				
9				0.22	0.16							0.16
10		0.13	0.19						0.16	11		
12									0.16			
>12					0.32(15 in)							
0.16(18)												
TOTAL	2.69	8.37	4.94	4.5	0	.29	.33	.87	0	.16	0.16	
Transect #	18	19	20	22	-							
Age												
Chinook	2.7	5.8	.22	5.2								
Adult whitefish	.73	1.4	3.1	.48								

Table 4. Comparisons of observed densities (number/100 m²) of all cutthroat trout, rainbow trout/steelhead and age 0 chinook salmon between 1984, 1985, 1986 and 1993 in the lower South Fork Salmon River.

Transect #	Cutthroat				Steelhead				Chinook Age 0			
	1984	1985	1986	1993	1984	1985	1986	1993	1984	1985	1986	1993
18	0	0	0	0	0.03	0	0	2.69	1.5	<0.1	0	2.7
19	0	0	0.06	0.29	1.9	2.0	2.7	8.37	2.2	0.5	1.5	5.8
20	0	0	0	0.33	0.7	2.5	3.3	4.94	2.1	2.1	4.2	0.22
22	0.24	0.04	0.10	0.87	0.8	0.2	1.0	4.5	1.2	0	0.7	5.2

Table 5. Big Creek snorkel transect physical data collected August 25, 1993.

Transect Location	Snorkeled	Stream Width (m)	Transect Length (m)	Transect Vis. (m)	Transect Area (m)
Carpenter Gulch (CG)	2	17.95	85	8.2	1,526
Hard Boil Bar (HB)	2	27	84		2,268
Doe Creek(DC)	2	18	119	6.4	2,142

Table 5. Big Creek snorkel transect physical data collected August 25, 1993.

Table 6. Fish numbers/100 m², by species and size, observed during snorkel transects in Big Creek on August 25, 1993.

Transect #	Wild cutthroat			Wild rainbow			Wild bull		
	CG	HB	DC	CG	HB	DC	CG	HB	DC
Length Class (in)									
3									
4			0.14						
5						0.28			
6			0.28		0.09	0.65			
7									
8		.04				0.09			
9					0.09				
10	0.13		0.23						
11	0.06				0.04				
12	0.13	0.04	0.19						
13	0.06	0.09							
14		0.04							
15	0.06	0.04							
Age 0 Chinook	0.79	0	0	0	0	0			
Adult Whitefish	1.3	0	0	0	0.49	1.03			

CG = Carpenter Gulch
 HE = Hard Boil Bar
 DC = Doe Creek

Table 7. Big Creek habitat data collected from the Carpenter Gulch stream survey site on August 25, 1993.

Date: 8/25/93
 Total Length (m): 85
 Water vel. (Dye Time): lmin. 35sec
 Channel Type: B
 Habitat Type %s. Pool: 5 Riffle: 45 Run: 45 Pocket Water: 5

Transect Name: Carpenter Gulch
 Water Temp.: 47° F @ 1200
 Vertical Drop (m): .59m
 Visibility (m): 8.2m

Trans. length from bottom	Width (m)	L to R	Depth	Sand	Gravel	Rubble	Bould.	Bed rock
0	21.2	1/4	0.8			30	70	
		1/2	0.65		5	10	85	
		3/4	0.35		10	70	20	
25	16.8	1/4	0.7			15	85	
		1/2	0.6		10	30	60	
		3/4	0.35		30	50	20	
55	14.6	1/4	0.5					100
		1/2	0.85		5	25	70	
		3/4	0.3		10	40	50	
85	19.2	1/4	0.325		40	40	20	
		1/2	0.4		30	30	40	
		3/4	0.45		10	40	50	

Table 8. Big Creek habitat data collected from the Doe Creek stream survey site on August 27, 1993.

Date: 8/27/93

Transect Name: Doe Creek

Total Length (m): 119

Water Temp.: 52F° @ 1600

Water velocity (Dye Time): 2 min 28 sec

Vertical Drop (m): .72

Channel Type: B

Visibility (m): 6.4

Habitat Type °s.

Pool: 25

Riffle: 20

Run: 35

Pocket Water: 20

Trans. length from bottom	Width (m)	L to R	Depth	Sand	Gravel	Rubble	Bould.	Bed rock
0	65	1/4						
		1/2		WATER				
		3/4						
60	56	1/4						
		1/2				TOO		
		3/4						
90	63	1/4						
		1/2						DEEP
		3/4						
119	33	1/4						
		1/2						
		3/4						

We observed 12 age 0 chinook salmon parr in the uppermost transect (Carpenter Gulch). We saw no chinook salmon parr in the other two snorkel transects. The furthest downstream snorkel transect (Doe Creek) had the highest number and percentage of wild rainbow trout of all the transects. Rainbow trout observed in two transects ranged from 5 to 9 inches in length.

DISCUSSION

South Fork Salmon River (Below the Secesh River Confluence)

Densities of all species observed appeared to have increased since snorkel observations made in the mid 1980s. Cutthroat densities improved in three of the four transects completed (Table 3). In 1985, in three of the transects no cutthroat trout were observed and in transect #22 cutthroat densities were only 0.04 fish/100 m². By comparison in 1993, cutthroat were observed in three of the four transects, and in those three transects, densities ranged from 0.29 to 0.87 fish/100 m². No cutthroat were observed in transect #18 in any of the years sampled. While there appears to be an improvement in cutthroat numbers their densities remain low.

Big Creek

The Big Creek cutthroat trout fishery remains similar to previous years sampling. Of some concern however, is the drop in number of 12 inch and greater cutthroat trout between Coxey Hole and Cabin Creek. it is unknown whether this is a result of habitat change or angling mortality (hooking mortality and/or illegal harvest). The Cabin Creek to Coxey Hole section of Big Creek is a popular, fly in, fishing area and angling mortality may be a problem. Snorkeling transect data suggests that the lower area of the creek sampled was more important to wild rainbow trout and small cutthroat (<12 inches) trout in late summer than was the upper area. The upper area was dominated by cutthroat trout >12 inches.

Table 9. Fish numbers by species and size measured during hook and line surveys on Big Creek, on August 25-28, 1993.

Transect #	Wild <u>Cutthroat</u>		Wild <u>rainbow</u>		Wild <u>bull</u>	
	1	2	1	2	1	2
Length Class (cm)						
15	1					
16						
17						
18						
19				1		
20				1		
21	1	1				
22	1					
23						
24	1					
25	2					
26						
27	1					
28		2				
29		2				
30	3	7				
31	1	4				
32	2	4				
33		2				
34	1	2				
35	1	2				
36	1	4				
37	1	1				
38	1	1				
39						
40		1				1

1 = Cabin Creek To Coxey Hole
 2 = Coxey Hole To Monumental Creek

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JOB PERFORMANCE REPORT

State of: Idaho

Name: Fisheries Management F-71-R-18

Project I: Surveys and Inventories

Subproject I-C: McCall Subregion

Job: d

Title: Salmon and Steelhead Investigations

Contract Period: July 1, 1993 to June 30, 1994

ABSTRACT

The McCall Subregion salmon and steelhead investigations data are incorporated in a separate, statewide "Salmon and Steelhead Investigations" report.

Authors:

Don Anderson
Regional Fishery Manager
Kimberly Apperson
Regional Fishery Biologist

JOB PERFORMANCE REPORT

State of: Idaho

Name: Fisheries Management F-71-R-18,

Project II: Technical Guidance

Subproject II-C: McCall Subregion

Contract Period: July 1, 1993 to June 30, 1994

ABSTRACT

McCall Subregion fishery management personnel responded to 265 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 for 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 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.

Author:

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.
- 4.

RESULTS

Table 1 lists the public and private entities and number of contracts and responses made for each during 1993.

Table 1. Summary of technical guidance responses and activities by McCall Subregion fisheries management personnel in 1993.

Agency or individuals	Number of responses
U.S. Forest Service	36
U.S. Bureau of Land Management	10
U.S. Environmental Protection Agency	1
U.S. Army Corps of Engineers	3
U.S. Soil Conservation Service	18
Idaho Department of Water Resources	10
Idaho Department of Lands	16
Idaho Department of Health and Welfare	14
Idaho Department of Transportation	1
Idaho Outfitters & Guides Board	11
Health Districts	6
Hydroelectric developers	12
Private fish pond owners	17
Public meetings and presentations	25
Mining	4
County Commissions	12
LeBois Resort developers	14
U.S. Fish & Wildlife Service	6
Bureau of Reclamation	7
Nez Perce Tribe	6
Little Salmon River spill contacts	10
National Marine Fisheries Service	8
Municipalities	9
Idaho Department of Parks and Recreation	4
Total	265

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.

JOB PERFORMANCE REPORT

State of: Idaho

Name: Fisheries Management F-71-R-18

Project IV: Population Management

Subproject IV-C: McCall Subregion

Contract Period: July 1, 1993 to June 30, 1994

ABSTRACT

We enhanced fish populations and fishing in the McCall Subregion waters by stocking approximately 1.4 million hatchery salmonids and 5,000 channel catfish *Ictalurus punctatus*.

Author:

Don Anderson
Regional Fishery Manager

Submitted by:

Paul J. Janssen
Regional Fishery Biologist

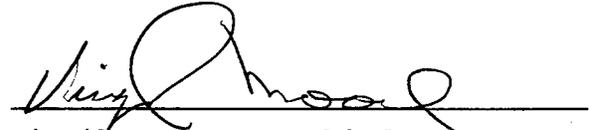
Kimberly Apperson
Regional Fishery Biologist

Donald R. Anderson
Regional Fishery Manager

Joel Patterson
Fishery Technician

Approved by:

IDAHO DEPARTMENT OF FISH AND GAME

A handwritten signature in black ink, appearing to read "Virgil K. Moore", is written over a horizontal line.

Virgil K. Moore, Chief
Bureau of Fisheries

A handwritten signature in black ink, appearing to read "Bill Hutchinson", is written over a horizontal line.

Bill Hutchinson
State Fisheries Manager