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REGIONAL FISHERIES MANAGEMENT INVESTIGATIONS
SALMON REGION (Subprojects I-H, II-H, III-H, IV-H)

PROJECT I.	SURVEYS AND INVENTORIES
Job a.	Salmon Region Mountain Lakes Investigations
Job b.	Salmon Region Lowland Lakes Investigations
Job c1.	Salmon Region Rivers and Streams Investigations - Wild Trout Population Surveys
Job c2.	Salmon Region Rivers and Streams Investigations - Middle Fork Salmon River Snorkeling Transects
Job d.	Salmon Region Salmon and Steelhead Investigations
PROJECT II.	TECHNICAL GUIDANCE
PROJECT III.	HABITAT MANAGEMENT
PROJECT IV.	POPULATION 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-H: Salmon Region

Job: a

Title: Mountain Lakes Investigations

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

ABSTRACT

We surveyed five mountain lakes in the Salmon Region during July and August 1996. All five lakes are within the Frank Church - River of No Return Wilderness Area. Each lake was surveyed for use, status of fishery, fish population, and post stocking strategies. We also surveyed Jimmy Smith, Herd and Carlson lakes, which are accessible by off-road vehicles.

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OBJECTIVES

1. Evaluate the Salmon Region mountain lake fish stocking program.

2. Collect data on species composition, access, trail conditions, angler/camper use, and spawning habitat for selected Salmon Region mountain lakes.

3. Collect baseline fisheries data in mountain lakes with stunted brook trout populations so that future management actions, such as predator introductions, can be evaluated.

METHODS

Idaho Department of Fish and Game personnel used gill nets and/or hook-and-line sampling gear to sample fish communities in five mountain lakes. Sinking monofilament gill nets, 45.7 m x 1.8 m with mesh ranging from 1.9 cm to 6.35 cm, were set overnight at each lake. We used a small one-man raft and set nets perpendicular to shore with the small mesh nearest shore.

RESULTS & DISCUSSION

We set gill nets in five Salmon Region mountain lakes: Island, Ruffneck, Langer, and Valley Creek #1 and #2. Results of each survey are documented in Appendix A-E

We also set gill nets in three semi-remote Salmon Region lakes that have off-road vehicle access: Carlson, Jimmy Smith, and Herd lakes (Appendix F-H).

Carlson Lake, located in the Pahsimeroi drainage, contains a stunted population of brook trout *Salvelinus fontinalis*. Gill netting in 1992 returned 71 brook trout with a mean length of 209 mm. A similar effort in 1996 returned 103 brook trout with a mean length of 217 mm. In 1993 we stocked 700 Kamloops rainbow trout *Oncorhynchus mykiss* (mean length 254 mm) in Carlson as a predator, to reduce the number of brook trout and increase their mean length. None of the Kamloops rainbow trout planted in 1993 were captured in gill nets in 1996.

Jimmy Smith Lake, located in the East Fork Salmon River drainage, contains a population of naturally reproducing rainbow trout. Gill netting in Jimmy Smith Lake in June 1996 produced 10.2 fish/h, mean length 213 mm (N=157). Historical data from 1966, on file at the Salmon Region office, indicates little change over 30 years in Jimmy Smith Lake rainbow trout size distribution. These earlier data (N=99) reported a rainbow trout mean length of 217 mm.

Herd Lake, also located in the East Fork Salmon River drainage, contains a population of naturally reproducing rainbow trout. Gill netting in Herd Lake during June

1996 returned 0.94 fish/hr, mean length 258 mm (N=15). The low number of fish captured and the larger than normal mean length may be a result of a reported winter kill during the winter of 1994/95. Historical data from 1967 reported rainbow trout mean length at 215 mm (N=77).

Several predatory species have been stocked in mountain lakes in an effort to decrease fish numbers and increase average lengths. These introductions have had limited success in Idaho. A strong spawning run of rainbow trout was observed in Lake Creek, the only tributary to Herd Lake, during spring 1996. In order to further reduce the number of rainbow trout in Herd Lake and increase the average length, we are considering a migration barrier in Lake Creek.

APPENDICES

Appendix A. Alpine lake survey data for Island Lake, 1996.

LAKE LOCATION

Lake name: Island Survey date: 7-27-96
IDFG catalog no.: 07-1127 Primary drainage: Bear Creek
Secondary drainage: Beaver Creek County: Custer
USFS ranger district: Challis Wilderness area: FCRNR
Section: 11 Township: 13N Range: 11E Elevation (ft): 8200

USE

No. Campsites: 3 No. Firepits: 5 Litter: 1 √ m ____ h
Trail around lake: complete ____ partial √ trampled ____ yes √ no
Access: good trail (mi) 3.8 poor trail (mi) ____ cross country (mi)
Trailhead location: Langer Monument (Seafoam Road 008)

FISHERY AND FISH POPULATIONS

Creel Survey

No fishermen: 3 Hours fished: 6 No. Fish caught: 1
Fish/hour: 0.16 Fish abundance: 1 √ m ____ h

Length Frequency

Total Length (mm)

Species	0-49	50-99	100-149	150-199	200-249	250-299	300-349	350-399	› 400
Rbt					1				
TOTAL					1				

Stocking History

Year	Species	Number of fish	Comments
1981	R1/C2	2,400	Mackay Hatchery
1988	C2	1,000	Mackay Hatchery
1991	C2	1,000	Mackay Hatchery
1995	K1	1,000	Mackay Hatchery

COMMENTS

Very few fish were observed in the lake. However, numerous fish were observed in the outlet stream that connects Island Lake to Ruffneck Lake. There appears to be plenty of natural reproduction potential and we should consider elimination of stocking.

Appendix B. Alpine lake survey data for Ruffneck Lake, 1996.

LAKE LOCATION
Lake name: Ruffneck Survey date: 7-27-96
IDFG catalog no.: 07-1130 Primary drainage: Bear Creek
Secondary drainage: Beaver Creek County: Custer
USFS ranger district: Challis Wilderness area: FCRNR
Section: 11 Township: 34N Range: 11E Elevation (ft): 8200

USE
No. Campsites: 3 No. Firepits: 2 Litter: 1 √ m ____ h
Trail around lake: complete √ partial ____ trampled ____ yes ____ no
Access: good trail (mi) 4.2 poor trail (mi) ____ cross country (mi)
Trailhead location: Langer Monument (Seafoam Road 008)

FISHERY AND FISH POPULATIONS

Creel Survey
No fishermen: 1 Hours fished: 0.5 No. Fish caught: 4
Fish/hour: 8 Fish abundance: 1 ____ m ____ h √

Length Frequency

Total Length (mm)

Species	0-49	50-99	100-149	150-199	200-249	250-299	300-349	350-399	› 400
R1			2	2					
TOTAL			2	2					

Stocking History

Year	Species	Number of fish	Comments
1981	R1/C2	1,440	Mackey Hatchery
1988	C2	1,000	Mackay Hatchery
1991	C2	1,000	Mackay Hatchery
1995	K1	1,130	Mackay Hatchery

COMMENTS
Many small rainbow trout observed along shoreline. Cutthroat trout up to 14 in caught by angler interviewed July 27, 1996. Inlet stream that connects Ruffneck Lake to Island Lake approximately 200 yd long with suitable spawning substrate. Should consider discontinuance of stocking.

Appendix C. Alpine lake survey data for Langer Lake, 1996.

LAKE LOCATION

Lake name: Langer Survey date: 7-27-96
IDFG catalog no.: 07-1133 Primary drainage: Bear Creek
Secondary drainage: Beaver Creek County: Custer
USFS ranger district: Challis Wilderness area: FCRNR
Section: 12 Township: 13N Range: 11E Elevation (ft): 8200

USE

No. Campsites: 4 No. Firepits: 5 Litter: 1 √ m _____ h
Trail around lake: complete _____ partial √ trampled √ yes _____ no
Access: good trail (mi) 3.4 poor trail (mi) _____ cross country (mi)
Trailhead location: Langer Monument (Seafoam Road 008)

FISHERY AND FISH POPULATIONS

Creel Survey

No fishermen: 2 Hours fished: 24 No. Fish caught: 8
Fish/hour: 0.33 Fish abundance: 1 √ m _____ h

Length Frequency

Total Length (mm)

Species	0-49	50-99	100-149	150-199	200-249	250-299	300-349	350-399	› 400
C2								4	4
TOTAL								4	4

Stocking History

Year	Species	Number of fish	Comments
1981	C2	1,000	Mullan Hatchery
1988	C2	1,000	Mackay Hatchery
1991	C2	1,250	Mackay Hatchery
1995	K1	1,250	Mackay Hatchery

COMMENTS

Very low westslope cutthroat trout density, few fish observed rising or cruising, very large westslope cutthroat trout in excellent condition.

Appendix D. Alpine lake survey data for Valley Creek Lake #1, 1996.

LAKE LOCATION
Lake name: Valley Creek Lake #1 Survey date: 8-07-96
IDFG catalog no.: 07-1585 Primary drainage: Valley Creek
Secondary drainage: Salmon River County: Custer
USFS ranger district: Wilderness area:
Section: 17 Township: 12N Range: 13E Elevation (ft): ___

USE
No. Campsites: ___ No. Firepits: ___ Litter: 1 √ m ___ h
Trail around lake: complete ___ partial √ trampled ___ yes √ no
Access: good trail (mi) ___ poor trail (mi) ___ cross country (mi) 0.5
Trailhead location: Basin Butte lookout road 032

FISHERY AND FISH POPULATIONS

Creel Survey
No fishermen: ___ Hours fished: ___ No. Fish caught:
Fish/hour: ___ Fish abundance: 1 √ m ___ h

Length Frequency

Total Length (mm)

Species	0-49	50-99	100-149	150-199	200-249	250-299	300-349	350-399	› 400
TOTAL									

Stocking History

Year	Species	Number of fish	Comments
1975	C2	1,000	Mullan Hatchery
1988	C2	500	Mackay Hatchery
1991	C2	750	Mackay Hatchery
1995	C2	250	Mackay Hatchery

COMMENTS
Two 3 hr daytime gillnet sets captured no fish. No fish observed cruising and very few fish seen rising. Inlet stream 2 ft wide with 100 ft of suitable spawning habitat.

Appendix E. Alpine lake survey data for Valley Creek Lake #2, 1996.

LAKE LOCATION
Lake name: Valley Creek Lake #2 Survey date: 8-07-96
IDFG catalog no.: 07-1587 Primary drainage: Valley Creek
Secondary drainage: Salmon River County: Custer
USFS ranger district: Wilderness area:
Section: 16 Township: 12N Range: 13E Elevation (ft): ___

USE
No. Campsites: 0 No. Firepits: 1 Litter: 1 √ m ___ h
Trail around lake: complete ___ partial ___ trampled ___ yes √ no
Access: good trail (mi) ___ poor trail (mi) ___ cross country (mi) 1
Trailhead location: Basin Butte lookout road 032

FISHERY AND FISH POPULATIONS

Creel Survey
No fishermen: ___ Hours fished: ___ No. Fish caught:
Fish/hour: ___ Fish abundance: 1 √ m ___ h

Length Frequency
Gill Net Total Length (mm)

Species	0-49	50-99	100-149	150-199	200-249	250-299	300-349	350-399	› 400
C2				1					
TOTAL									

Stocking History

Year	Species	Number of fish	Comments
1981	C2	1,000	Mullan Hatchery
1988	C2	500	Mackay Hatchery
1991	C2	750	Mackay Hatchery
1995	C2	250	Mackay Hatchery

COMMENTS
One gillnet set in the daytime for 1.5 hr captured one 6 in westslope cutthroat trout. Several other small fish observed and very few fish seen rising.

Appendix F. Alpine lake survey data for Carlson Lake, 1996.

LAKE LOCATION

Lake name: Carlson Lake Survey date: 6-13-96
IDFG catalog no.: 07-1303 Primary drainage: Salmon
Secondary drainage: Pahsimeroi River County: Custer
USFS ranger district: Challis Wilderness area:
Section: 17 Township: 11N Range: 23W Elevation (ft): 7000

USE

No. Campsites: 4 No. Firepits: 5 Litter: l ____ m √ h
Trail around lake: complete √ partial ____ trampled √ yes ____ no
Access: good trail (mi) ____ poor trail (mi) ____ cross country (mi)
Trailhead location: Double Springs Road

FISHERY AND FISH POPULATIONS

Creel Survey

No fishermen: ____ Hours fished: ____ No. Fish caught:
Fish/hour: ____ Fish abundance: l ____ m ____ h √

Length Frequency

Gill net (2) Total Length (mm)

Species	0-49	50-99	100-149	150-199	200-249	250-299	300-349	350-399	› 400
Bk				32	55	12	4		
TOTAL				32	55	12	4		

Stocking History

Year	Species	Number of fish	Comments
1993	K2	702	10.5 in - Nampa
1975	R1	512	6 in - Mackay
1975	Bk	2,685	1-3 in - Sandpoint
1955	Bk	1,500	3 in - Mackay

COMMENTS

Two 15-hour overnight gillnets set caught 103 brook trout (3.5 CPUE) 164-310 mm TL. No inlet or outlet streams. Carlson Lake was stocked with 10.5 in Kamloops strain rainbow trout in 1993 in an effort to reduce Brook trout numbers and to increase average length. No Kamloops were captured in 1996.

Appendix G. Alpine lake survey data for Jimmy Smith Lake, 1996.

LAKE LOCATION

Lake name: Jimmy Smith Survey date: 6-11-96
IDFG catalog no.: 07-1345 Primary drainage: East Fork Salmon River
Secondary drainage: Lake Creek County: Custer
USFS ranger district: Challis Wilderness area:
Section: 25 Township: 10N Range: 17W Elevation (ft):

USE

No. Campsites: 3 No. Firepits: 5 Litter: 1 ____ m √ h
Trail around lake: complete ____ partial √ trampled √ yes ____ no
Access: good trail (mi) ____ poor trail (mi) ____ cross country (mi)
Trailhead location: Lake Creek Road

FISHERY AND FISH POPULATIONS

Creel Survey

No fishermen: ____ Hours fished: ____ No. Fish caught:
Fish/hour: ____ Fish abundance: 1 ____ m ____ h √

Length Frequency

Gill net Total Length (mm)

Species	0-49	50-99	100-149	150-199	200-249	250-299	300-349	350-399	› 400
R1				65	66	18	6		
TOTAL				65	66	18	6		

Stocking History

Year	Species	Number of fish	Comments
1938	R1	96,000	Mackay
1937	R1	75,000	Mackay

COMMENTS

One 15-hour overnight gillnet set caught 155 rainbow trout (10.1 CPUE) 155-332 mm TL. Two inlet and one outlet streams with suitable spawning habitat.

Appendix H. Alpine lake survey data for Herd Lake, 1996.

LAKE LOCATION

Lake name: Herd Lake Survey date: 6-11/12-96

IDFG catalog no.: 07-1343 Primary drainage: East Fork Salmon

Secondary drainage: Herd Creek County: Custer

USFS ranger district: Challis Wilderness area:

Section: 23 Township: 9N Range: 19W Elevation (ft):

USE

No. Campsites: 1 No. Firepits: 1 Litter: 1 ____ m √ h

Trail around lake: complete ____ partial √ trampled √ yes ____ no

Access: good trail (mi) 1/4 poor trail (mi) ____ cross country (mi)

Trailhead location: Herd Creek Road

FISHERY AND FISH POPULATIONS

Creel Survey

No fishermen: ____ Hours fished: ____ No. Fish caught:

Fish/hour: ____ Fish abundance: 1 ____ m √ h

Length Frequency

Gill net Total Length (mm)

Species	0-49	50-99	100-149	150-199	200-249	250-299	300-349	350-399	› 400
R1				2	3	10			
TOTAL				2	3	10			

Stocking History

Year	Species	Number of fish	Comments
NONE			

COMMENTS

One 16-hour overnight gillnet set caught 15 rainbow trout (0.94 CPUE) 160-292 mm TL. One inlet stream, Lake Creek, provides suitable spawning area for approx. 1/3 mile, mean width 2 m. Heavy winter kill reported 1994/95 may account for low CPUE. High number of spawners (6 ft.) in inlet.

1996 ANNUAL PERFORMANCE REPORT

State of: Idaho | Program: Fishery Management F-71-R-21

Project I: Surveys and Inventories | Subproject I-H: Salmon Region

Job: b | Title: Lowland Lake Investigations

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

ABSTRACT

We used gill nets, electrofishing, and trap nets to survey the fish communities in Williams Lake and Mosquito Flats Reservoir during June 1996. Rainbow trout *Oncorhynchus mykiss* and bull trout *Salvelinus confluentus* were the only species captured in Williams Lake, with rainbow trout comprising 97% of the catch. Brook trout *S. fontinalis* comprised 36% of the catch in Mosquito Flat Reservoir, while stocked rainbow trout comprised the balance. As an alternative management strategy, we stocked fingerling rainbow trout in Mosquito Flat Reservoir in 1994 and 1995. These fingerings represented approximately 56% of the rainbow trout captured in Mosquito Flat Reservoir in 1996.

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INTRODUCTION

Williams Lake, a mesotrophic lake, is located in north-central Lemhi County at 1,600 m elevation. The surface area is 73 ha, maximum depth is 56 m, and mean depth is 23 m. The principle inflow is Lake Creek, with some inflow from springs and intermittent streams. Rainbow trout *Oncorhynchus mykiss* and bull trout *Salvelinus confluentus* are the only fish species recorded in the lake.

Water quality degradation, caused by nutrient input from eroded sediments from the watershed and leaching of septic systems, may be responsible for the reduction in fish numbers and fish harvested Williams Lake. Low winter and summer oxygen concentrations probably limit fish survival. Winter dissolved oxygen concentrations fall below 5 mg/l within 2-4 m of the surface. In summer and winter, dissolved oxygen concentrations of 1 mg/l occur as shallow as 8 m.

Mosquito Flats Reservoir is located on Challis Creek 10 miles west of Challis, Idaho, and stores 793 acre-feet of irrigation water. The reservoir was built in 1954 and is a popular fishery with local residents. The Idaho Department of Fish and Game (IDFG) has water rights to 28% of the storage, reserved as a minimum pool. This represents a 222 acre-foot pool with a surface area of approximately 8.5 ha.

METHODS

We conducted standardized lowland lake surveys at Mosquito Flat Reservoir and Williams Lake during June 1996. We used two floating and two sinking monofilament gill nets, 45.7 m x 1.8 m, with six panels ranging from 1.9 cm x 6.35 cm bar mesh. We set the nets perpendicular to shore with the smallest mesh towards shore.

At Mosquito Flat Reservoir, we fished over-night, equaling two units of effort. In Williams Lake, we fished with gill nets for only 2 1/2 hours and checked them continually to reduce mortality on natural rainbow trout.

We electrofished on Mosquito Flat Reservoir at night and along the shoreline for 0.8 hours of "current on" time. Electrofishing was conducted for 0.95 h of "current on" time at Williams Lake. Our electrofishing boat has boom-mounted electrodes that use approximately 500 volts of pulsed DC current and 3 to 4 amps.

We set two trap nets with 0.9 m x 1.8 m frames, 22.8 m leads, 1.9 cm bar mesh, and crowfoot throats on the first and third of five hoops. We set trap nets overnight in Mosquito Flat Reservoir equaling 2 units of effort and for 9.25 h in Williams Lake equaling 1 unit of effort.

RESULTS AND DISCUSSION

Mosquito Flat Reservoir

We collected 171 fish in gill nets and 49 in trap nets in Mosquito Flat Reservoir on June 18, 1996 (Appendix A-C). Rainbow trout and brook trout *S. fontinalis* were the only species captured, with rainbow trout comprising 84% of the catch.

Catchable size rainbow trout (N=92) lengths ranged from 185-396 mm with a mean of 259 mm. Fish planted as fingerlings in 1994 and 1995, and recaptured in 1996 (N=93) ranged from 116-300 mm with a mean of 221 mm at time of capture. Brook trout (N=36) ranged from 166-255 mm with a mean length of 201 mm. Catch per unit of gill net effort for the two sinking and two floating gill nets ranged from 2.1 to 6.7 fish/h.

We collected 243 fish by electrofishing in Mosquito Flat Reservoir on June 18, 1996. We fished for 0.80 h of "current on" time with a catch rate of 304 fish/h.

Rainbow trout and brook trout were the only species collected by electrofishing. Brook trout (N=133) were the most abundant species, comprising 55% of the catch. They ranged from 85-257 mm with a mean length of 164 mm. Catchable size rainbow trout (N=38) ranged from 188-475 mm with a mean of 288 mm. Rainbow trout from 1994 and 1995 fingerling plants (N=72) ranged from 76-310 mm with a mean of 210 mm.

In June 1992 IDFG personnel conducted a similar survey at Mosquito Flat Reservoir with gill nets, electrofishing, and trap nets. It yielded 272 fish with brook trout comprising 90% of the catch. These fish had a mean length of 191 mm. The remaining 10% were catchable size rainbow trout with a mean length of 279 mm.

To reduce brook trout numbers and/or increase their average length, 500 bull trout (mean length 292 mm) were released in Mosquito Flat Reservoir in 1993. Mosquito Flat Reservoir was also stocked with 4,072 Fishhook Creek kokanee in June 1995. Neither bull trout nor kokanee were collected in our 1996 sampling effort. As an alternative management option, the IDFG released 7,500 and 10,000 76-mm put-grow-and-take rainbow trout fingerlings in Mosquito Flat Reservoir in 1994 and 1995, respectively

Mosquito Flat Reservoir will be surveyed again during May 1997 to determine the status of previous fry and fingerling plants.

Williams Lake

We sampled 266 fish in Williams Lake on June 14, 1996 (Appendix D-F). Rainbow trout and bull trout were the only species captured with rainbow trout comprising 97% of the catch.

We captured 214 fish by electrofishing. Rainbow trout lengths (N=212) ranged from 65-485 mm with a mean length of 139 mm. Two bull trout captured had a mean length of 333 mm. We electrofished for 0.95 h and had a catch rate of 227 fish/h.

We set two trap nets in Williams Lake; however, due to the steep shoreline this sampling technique was ineffective. The trap nets collected three rainbow trout ranging in length from 287-447 mm.

We caught 46 fish in gill nets in 2 1/2 h in Williams Lake. Bull trout comprised 9% of the catch and ranged in length from 205-455 mm with a mean length of 295 mm. Rainbow trout captured in gills nets (N=42) ranged from 140-500 mm with a mean length of 271 mm.

From 1937 through 1981, IDFG managed Williams Lake as a put-and-grow fishery. Information from anglers suggests that Williams Lake produced 2-3 kg rainbow trout during this time. In 1981, stocking was discontinued and Williams Lake is now managed as a wild trout fishery.

Pressure from vocal anglers has increased over the years, requesting the Department to discontinue the wild trout management and reinitiate stocking. To satisfy these anglers without resorting to stocking domestic rainbow trout, Lake Creek spawners were collected and spawned during spring 1996. Sixteen females and 40 males were spawned on two dates (May 1 and May 13) and their eggs incubated in eight Heath trays. The incubation trays were set up in Lake Creek approximately 1/2 mile below Williams Lake at the old state hatchery site. These fry (14,000) were released in Lake Creek above Williams Lake after button-up. Volunteers helped gather brood stock, maintain eggs and release fry. This program will continue in 1997.

APPENDICES

Appendix A. Mosquito Flat Reservoir; data summary (all gears).

LAKES AND RESERVOIRS
STANDARD DATA BASE

FISH COMMUNITY CHARACTERISTICS

LAKE/RESERVOIR NAME: Mosquito Flats REGION: 7 DATE: 06/18/96

Catch per Unit* of Combined Gear Sampling Effort					
SPECIES	**LENGTH - RANGE (mm)**	**No.**	**%**	**Wt. (kg)**	**%**
Rainbow	65 - 500	190.2	50.8		
Brook Trout	85 - 257	184.2	49.2		
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
GAME FISH SUBTOTAL:		374.4	99.7		
Sculpin	96 - 96	1.3	0.3		
	-				
	-				
	-				
	-				
	-				
	-				
NON-GAME FISH SUBTOTAL:		1.3	0.3		
ALL SPECIES TOTAL:		375.7	100%		100%

*one hour electrofishing, one trap net night, and one combined floating and sinking gill net night.

Appendix B. Mosquito Flat Reservoir data sheet.

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
DATA SHEET (1) OF (2)

LAKE/RESERVOIR NAME : Mosquito Flat Reservoir REGION: Salmon .

DATE: 6/18/96 Sample Crew Leader: Liter/Curet .

Length Range	Species Rainbow trout .								
(mm)	GN	T N	E F	Add'l	(mm)	GN	T N	E F	Add'l
<80			1		370-379	1		1	
80-89					380-389			2	
90-99					390-399	1		1	
100-109					400-409				
110-119		1			410-419			2	
120-129					420-429				
130-139					430-439				
140-149					440-449				
150-159			2		450-459				
160-169	1		1		460-469				
170-179			1		470-479			1	
180-189	2		3		480-489				
190-199	1	3	11		490-499				
200-209	11	11	20		500-509				
210-219	21	13	17		510-519				
220-229	23	8	17		520-529				
230-239	12	4	7		530-539				
240-249	14	1	3		540-549				
250-259	6		3		550-559				
260-269	13		2		560-569				
270-279	5		3		570-579				
280-289	9	1	2		580-589				
290-299	11		2		590-599				
300-309	3		3		600-609				
310-319	3		1		610-619				
320-329	4				620-629				
330-339	1				Batch:				
340-349			1		Size				
350-359			1		Number	142	42	110	
360-369			1		TOTAL WT.				

Appendix C. Mosquito Flat Reservoir data sheet.

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
DATA SHEET (2) OF (2)

LAKE/RESERVOIR NAME : Mosquito Flat Reservoir REGION: Salmon .
DATE: 6/18/96 Sample Crew Leader: Liter/Curet .

Length Range	Species Brook trout .								
(mm)	GN	T N	E F	Add'l	(mm)	GN	T N	E F	Add'l
<80					370-379				
80-89			4		380-389				
90-99			6		390-399				
100-109			7		400-409				
110-119			8		410-419				
120-129			13		420-429				
130-139			4		430-439				
140-149			10		440-449				
150-159			12		450-459				
160-169	2		9		460-469				
170-179	7		11		470-479				
180-189	3	2	13		480-489				
190-199	3		7		490-499				
200-209	4	2	9		500-509				
210-219	3	2	9		510-519				
220-229		1	4		520-529				
230-239	4		4		530-539				
240-249	1				540-549				
250-259	2		3		550-559				
260-269					560-569				
270-279					570-579				
280-289					580-589				
290-299					590-599				
300-309					600-609				
310-319					610-619				
320-329					620-629				
330-339					Batch:				
340-349					Size				
350-359					Number	29	7	133	
360-369					TOTAL WT.				

Appendix D. Williams Lake; data summary (all gears).

LOWLAND LAKES AND RESERVOIRS
STANDARD DATA BASE

FISH COMMUNITY CHARACTERISTICS

LAKE/RESERVOIR NAME: Williams Lake REGION: 7 DATE: 06/14/96

Catch per Unit* of Combined Gear Sampling Effort					
SPECIES	**LENGTH - RANGE (mm)**	**No.**	**%**	**Wt. (kg)**	**%**
Rainbow	65 - 500	116.3	91.6		
Bull Trout	205 - 460	10.6	8.4		
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
GAME FISH SUBTOTAL:		126.9	100		
	-				
	-				
	-				
	-				
	-				
NON-GAME FISH SUBTOTAL:		0	0		
ALL SPECIES TOTAL:		126.9	100%		100%

*one hour electrofishing, one trap net night, and one combined floating and sinking gill net night.

Appendix E. Williams Lake data sheet.

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF (species): Rainbow trout Date: 06/14/1996

LAKE/RESERVOIR: Williams Lake PERIOD:

Length Range (mm)	# of fish	%	Mean wt (gm)	Wr	Age(s)	Maturity M I/M	F I/M	Length range (mm)	# of fish	%	Mean wt (gm)	Wr	Age(s)	Maturity M I/M	F I/M
								280-289	4	2					
50-59								290-299	1	< 1					
60-69	1	< 1						300-309	1	< 1					
70-79	5	2						310-319	1	< 1					
80-89	9	3						320-329	1	< 1					
90-99	22	9						330-339	4	2					
100-109	28	11						340-349							
110-119	42	16						350-359	3	1					
120-129	39	15						360-369	3	1					
130-139	22	9						370-379	3	1					
140-149	27	10						380-389	4	2					
150-159	7	3						390-399	4	2					
160-169	6	2						400-409							
170-179	2	1						410-419							
180-189	1	< 1						420-429							
190-199								430-439	3	1					
200-209	2	1						440-449	1	< 1					
210-219	2	1						450-459	3	1					
220-229	1	< 1						460-469	1	< 1					
230-239								470-479							
240-249	1	< 1						480-489	1	< 1					
250-259	1	< 1						490-499							
260-269								500-509	1	< 1					
270-279	1	< 1						TOTAL	259						

TOTAL CATCH: Gill net 41 Electrofishing 214 Trap net 3
TOTAL CATCH PER EFFORT (Fish/hr): Gillnet 4 Electrofishing 225 Trap net < 1

Appendix F. Williams Lake data sheet.

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF (species): Bull trout Date: 06/14/1996

LAKE/RESERVOIR: Williams Lake PERIOD:

Length range (mm)	# of fish	%	Mean wt (gm)	Wr	Age(s)	Maturity M I/M	Maturity F I/M	Length range (mm)	# of fish	%	Mean wt (gm)	Wr	Age(s)	Maturity M I/M	Maturity F I/M
								280-289							
50-59								290-299							
60-69								300-309							
70-79								310-319							
80-89								320-329							
90-99								330-339							
100-109								340-349							
110-119								350-359							
120-129								360-369							
130-139								370-379							
140-149								380-389							
150-159								390-399	1	14					
160-169								400-409							
170-179								410-419							
180-189								420-429							
190-199								430-439							
200-209	3	43						440-449							
210-219								450-459	1	14					
220-229	1	14						460-469	1	14					
230-239								470-479							
240-249								480-489							
250-259								490-499							
260-269								500-509							
270-279								TOTAL	7						

TOTAL CATCH: Gill net 5 Electrofishing 2 Trap net 0
TOTAL CATCH PER EFFORT (Fish/hr): Gillnet 1.67 Electrofishing 2.1 Trap net 0

1996 ANNUAL PERFORMANCE REPORT

State of: Idaho

Program: Fishery Management F-71-R-21

Project I: Surveys and Inventories

Subproject I-H: Salmon Region

Job: c1

Title: Rivers and Streams Investigations - Wild Trout Population Surveys

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

ABSTRACT

During summer 1996, we surveyed fish populations in Napias Creek (tributary to Panther Creek) and Pine Creek (an East Fork Salmon River tributary). Bull trout *Salvelinus confluentus* was the only species found in upper Napias Creek. In lower Napias Creek, only steelhead/rainbow trout *Oncorhynchus mykiss* and brook trout *S. fontinalis* were observed. Westslope cutthroat trout *O. clarki lewisi* was the only species taken in Pine Creek.

We sampled the mainstem Middle Fork Salmon River and tributaries, including Indian Creek, Tomahawk Creek (tributary to Indian Creek), Marble Creek, Loon Creek, Cache Creek (tributary to Loon Creek), Wilson Creek and Big Creek, for fish population information, health status, genetic composition and water quality. In Tomahawk and Cache creeks, we sampled by electrofishing using multiple-pass removals to derive population estimates. In the mainstem Middle Fork Salmon River and the remaining tributaries, we sampled by angling.

To re-establish a fishable population of westslope cutthroat trout, we used multiple-pass electrofishing to remove 4,804 brook trout from Valley Creek in 1996. Later, 496 westslope cutthroat trout from several area streams were transplanted into this creek.

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OBJECTIVES

1. Determine species composition, relative abundance, size and age structure of fish populations in selected Salmon Region tributaries.

2. Establish baseline water quality information for selected waters in the Middle Fork Salmon River drainage.

3. Develop fish health baseline information on bacterial kidney disease and whirling disease in the Middle Fork Salmon River drainage.

4. Determine genetic composition of fish from selected Middle Fork Salmon River tributaries.

5. Determine the effectiveness of multiple-pass electrofishing in reducing brook trout *Salvelinus fontinalis* abundance in Valley Creek and ultimately reestablish westslope cutthroat trout *Oncorhynchus clarki lewisi* in Valley Creek.

STUDY AREA

Napias and Pine Creeks

We sampled three sites in Napias Creek, one approximately 3.2 km upstream of Meridian Gold Beartrack Mine, and two below the mine. Pine Creek was sampled 0.4 km above its confluence with East Fork Salmon River.

Middle Fork Salmon River and Tributaries

For analysis, we pooled data from the Middle Fork Salmon River into two groups: an upper section, located between Indian and Marble creeks, and a lower section, located between Wilson and Cradle creeks.

We sampled Indian, Marble, Loon, Wilson and Big creeks within one mile of their confluence with the Middle Fork Salmon River. Tomahawk Creek, a tributary to Indian Creek, was sampled 0.8 km upstream of its confluence with Indian Creek. We electrofished Cache Creek, a Loon Creek tributary, 6.8 km above its confluence with Loon Creek.

Valley Creek

We concentrated efforts on upper Valley Creek, beginning 11.2 km above its confluence with the Salmon River and extending 21 km upstream from the creek's mouth. We also included the lower 0.8 km of several tributaries to Valley Creek.

METHODS

We used electofishing to survey fish in Tomahawk, Napias, Pine, and Cache creeks, using a Smith-Root SR-15 backpack unit, and attempted to catch all sizes of game and non-game fish. We set block nets at either end of the transects unless natural barriers were present (i.e., waterfall, beaver dam, or high-gradient riffle). We worked upstream, with each consecutive pass immediately after and with equal effort to the previous pass. Two passes were generally made, but occasionally we needed a third pass to achieve reduction.

Personnel measured fish to total length, placed them in holding pens, and monitored them for recovery until all passes were completed. When we finished electrofishing, each fish was returned to the habitat where it was captured. We estimated relative abundance of all fish captured, and assumed that capture probabilities did not vary with species. No attempt was made to differentiate between rainbow and steelhead trouts *O. mykiss*. We used the maximum likelihood estimator to estimate fish abundance and probability of capture.

Density estimates are reported as fish sampled per 100 m^2 of transect surface area. We combined data from all size classes to calculate density estimates of individual trout species; however, because very small fish were not efficiently sampled, we used only fish 50 mm and larger in the population estimates

Department personnel captured fish in larger tributaries and the mainstem Middle Fork Salmon River by a combination of electrofishing and angling. We recorded total fish lengths and collected both otoliths, which we later read to determine fish age. Sex and maturity were based on condition of gonads. We recorded caecal fat estimates according to Goede and Barton (1990), with 0 being no fat on caeca, 1 being less than 25% fat on caeca, 2 being less than 50% fat on caeca, and 3 being less than 75% fat on caeca.

IDFG personnel at the Eagle Fish Health Laboratory completed the fish health analysis on fish from tributaries to Middle Fork Salmon River. They measured bacterial kidney disease (BKD) by the ELISA method.

We collected genetic samples from each tributary sampled. Several possible westslope cutthroat trout /golden trout hybrids were collected in Cache Creek. We sent these fish to Dr. Richard Wallace, Ichthyologist at University of Idaho, Retired, for identification. Results are not available at the time of this printing.

Wapiti Outfitters recorded size structure catch rate of their client's catch in Marble Creek and the mainstem Middle Fork Salmon River.

We electrofished Valley Creek and removed any brook trout captured. Valley Creek is small enough to be electrofished by wading. One or two, 2-man teams used a Smith-Root SR-15 backpack electrofishing unit operated at 200-300 V, and 3 amps of pulsed DC current.

RESULTS AND DISCUSSION

Napias and Pine Creeks

Bull trout *S. confluentus* was the only fish species we collected in Napias Creek above Meridian Gold Beartrack Mine. We estimated bull trout density at 8.5 fish/100 m^2 (Table 1). Total lengths of bull trout in Napias Creek ranged from 71-136 mm with a mean of 113 mm.

We found only rainbow/steelhead trout and brook trout in Napias Creek below the mine site. Rainbow/steelhead and brook trout numbers, densities and lengths for Napias Creek are reported in Tables 1 and 2.

Westslope cutthroat trout was the only salmonid species we collected in Pine Creek. We estimated westslope cutthroat trout density in Pine Creek to be 16 fish/100 m^2. Total lengths ranged from 83-200 mm with a mean total length of 137 mm (Tables 1 and 2).

Middle Fork Salmon River and Tributaries

Westslope cutthroat trout was the only salmonid species we found in Tomahawk Creek, an Indian Creek tributary. We collected 51 westslope cutthroat trout for age and growth analysis; however, only 12 were captured in our multiple pass population estimate effort. We estimated westslope cutthroat trout density in Tomahawk Creek to be 6.7 fish/100 m^2 with a mean total length of 106 mm (Tables 1 and 2). Tailed frogs *Ascaphus truei*, both larvae and adults, were present at densities comparable to trout.

In Cache Creek, a Loon Creek tributary, we estimated trout density (westslope cutthroat trout, westslope cutthroat trout/golden trout hybrids and brook trout) to be 4.1 fish/100 m^2. We collected a total of 29 westslope cutthroat trout and 4 brook trout; however, only 11 westslope cutthroat trout and 4 brook trout were collected in our multiple pass electrofishing effort and used in the density estimate. These 29 westslope cutthroat trout ranged from 68-231 mm with a mean total length of 124 mm (Tables 1 and 2).

Lengths, ages, caecal fat levels, sex and maturity status are presented in Appendix A-K for all streams sampled in the Middle Fork Salmon River drainage.

Table 1. Estimates of trout densities (all species) and capture probabilities for Salmon Region streams sampled during August 1996. Estimates are for trout >5 cm total length.

Site	Date Surveyed	Density (fish/100 m^2)	Lower 95% CI	Upper 95% CI	Capture Prob (P)	Total Captured
Napias Creek (#1 above mine)	8-14-96	8.5	7.9	9.1	.78	14
Napias Creek (#2 below mine)	8-14-96	11.7	10.8	12.6	.68	40
Napias Creek (#3 below mine)	8-14-96	15.5	14.6	16.4	.78	18
Pine Creek	8-19-96	16	14.1	17.1	.90	9
Cache Creek	8-9-96	4.1	3.4	4.7	.65	15
Tomahawk Creek	8-6-96	6.7	6.7	7.5	.86	12

Table 2. Minimum, maximum, and mean total length (TL) of trout (by species) captured in Salmon Region streams during August 1996.

Stream	Date Surveyed	Min TL (mm)	Max TL (mm)	Mean TL (mm)	Sample Size
Bull Trout					
Napias Creek #1	8-14-96	71	136	113	14
Rainbow/steelhead trout					
Napias Creek #2	8-14-96	68	235	142	9
Napias Creek #3	8-14-96	62	217	126	20
Brook Trout					
Napias Creek #2	8-14-96	68	194	139	9
Napias Creek #3	8-14-96	56	145	107	18
Cache Creek	8-9-96	127	179	149	4
Westslope Cutthroat Trout					
Pine Creek	8-16-96	83	200	137	9
Cache Creek	8-9-96	68	231	124	29
Tomahawk Creek	8-6-96	68	151	106	51

Bacterial kidney disease was present with low to high ratings throughout the drainage (Appendix L and M). In general, the more isolated tributaries (Tomahawk Creek, Cache Creek and the upper Middle Fork), had low ratings for BKD. Lower in the drainage the ratings for BKD were mostly moderate to high. We did not observe clinical signs of bacterial kidney disease on any fish. All samples that tested moderate or high by ELISA, were also tested by Fluorescent Antibody Techniques (FAT), all of which were negative.

Whirling disease was not confirmed on any samples in the Middle Fork drainage. However, we observed Myxobolus spp. spores in Wilson and Big creek fish, and we presumptively identified it in lower Cache Creek fish and the Middle Fork fish collected between Loon Cr. and Wilson Cr. (Appendix L and M). In all cases infection rates were low and no cartilage damage was evident.

We collected water samples from Indian, Marble, Cache and Big creeks, and from three adjacent locations in the Middle Fork (Appendix N). Water hardness (mg/l $CaCO_3$) ranged from 40 to 60. Conductivity (µmhos) ranged from 84 to 122. Values reported in Appendix N should be comparable between sites, but may not be accurate as we calibrated instruments before the trip but not during the sampling.

Fish sampled by angling of clients from Wapiti Outfitters are shown in Appendix O (Middle Fork) and Appendix P (Indian Creek).

Valley Creek

We electrofished upstream for 7 miles during late August, September, and October 1996. We found westslope cutthroat trout with increasing frequency as we moved upstream into the higher gradient headwaters. We feel we were especially effective at reducing brook trout numbers in October, when pairs of spawning brook trout were removed from their redds and the redds destroyed.

We will make a rough estimate of our removal efficiency after the 1997 field season when we compare fish/hour removed in 1996 versus 1997. Fish stocked in Valley Creek in 1995 and 1996 are reported in Table 3.

Table 3. Trout stocked into Valley Creek in 1995 and 1996.

Species	Number	Size Range	Source Stream	Date Released
Westslope cutthroat trout	96	3-10	Upper Yankee Fork Salmon River and Mackay Creek	10-12-95
Bull trout	7	3-10	Upper Yankee Fork Salmon River and Mackay Creek	10-12-95
Westslope cutthroat trout	30	12+	Middle Fork (Dagger Falls)	6-24-96
Westslope cutthroat trout	13	5-14	Middle Fork (Dagger Falls)	7-31-96
Westslope cutthroat trout	100,000	1	Sandpoint Hatchery*	9-26-96
Bull trout	26	3-8	Mayfield Creek (tributary to Loon Creek)	10-15-96
Westslope cutthroat trout	325	3-7	Grouse Creek (tributary to Loon Creek)	10-15-96
Westslope cutthroat trout	25	3-8	Fisher Creek (tributary to Salmon River)	10-15-96

*Montana strain westslope cutthroat trout

LITERATURE CITED

Goede, R.W., and B.A. Barton. 1990. Organismic indices and an autopsy-based assessment as indicators of health and condition of fish. American Fisheries Society Symposium 8:93-108.

APPENDICES

Appendix A. Length, age, sex, maturity, and caecal fat estimates of rainbow trout collected on August 11, 1996 from Wilson Creek (tributary to Middle Fork Salmon River).

Length (mm)	Age	Sex	Maturity	Caecal Fat
106	1	M	Immature	0
110	1	F	Immature	0
111	1	Unk	Unk	0
111	1	Unk	Unk	0
120	1	Unk	Unk	0
122	1	F	Immature	0
122	1	Unk	Immature	0
123	2	F	Immature	0
124	1	Unk	Unk	0
136	1	F	Immature	0
141	2	M	Spawned Out	1
153	2	M	Mature Next Year	1
155	2	M	Immature	1
156	2	M	Mature Next Year	1
158	2	M	Regenerating	1
160	3	F	Mature Next Year	0
162	2	F	Immature	0
165	2	M	Spawned Out	1
165	2	M	Immature	0
168	2	M	Regenerating	1
171	2	F	Immature	1
172	2	M	Mature Next Year	3
176	2	M	Spawned Out	3
181	2	M	Regenerating	2
185	2	M	Unk	1
187	2	M	Unk	2
189	2	M	Spawned Out	2
198	3	M	Spawned Out	2
200		F	Spawned Out	0
201	4	M	Regenerating	2
215		M	Spawned Out	2
228		M	Spawned Out	1
248	3	M	Spawned Out	1

Appendix B. Length, age, sex, maturity, and caecal fat estimates of westslope cutthroat trout collected on August 11, 1996 from Wilson Creek (tributary to Middle Fork Salmon River).

Length	Age	Sex	Maturity	Caecal Fat
181	2	M	Immature	1
220	4	F	Mature Next Year	0
327	8	F	Spawned Out	1

Appendix C. Length, age, sex, and maturity of westslope cutthroat trout collected on August 6, 1996 from Tomahawk Creek (tributary to Indian Creek).

Length (mm)	Age	Sex	Maturity
68	1	Unk	Immature
70	1	F	Immature
70	1	M	Immature
72		F	Immature
77		M	Immature
80		F	Immature
80		M	Immature
84	1	F	Immature
86		M	Immature
88		F	Immature
88		M	Immature
89		M	Immature
89		M	Immature
89		F	Immature
90		M	Immature
90		F	Immature
93		F	Immature
93		M	Immature
94		M	Immature
96		F	Immature
97		F	Immature
97		F	Immature
98	2	F	Immature
100		M	Immature
101		Unk	Immature
101		F	Immature
101		M	Immature
102		F	Immature
105		M	Mature Next Year
106	2	F	Immature
108		M	Mature Next Year
109		Unk	Unk
111		M	Immature
112		F	Immature
112		M	Immature
115		M	Mature Next Year

Appendix C. Continued.

Lengths (mm)	Age	Sex	Maturity
116		F	Immature
116		F	Immature
118		M	Mature Next Year
123	2	M	Mature Next Year
125	2	M	Mature Next Year
127		M	Mature Next Year
129	2	M	Mature Next Year
132		F	Unk
141	3	F	Immature
147		M	Mature Next Year
151	3	M	Mature Next Year

Appendix D. Length, age, sex, and maturity of westslope cutthroat trout collected on August 7, 1996 from upper Middle Fork Salmon River Section (between Indian and Marble creeks).

Length (mm)	Age	Sex	Maturity
170	4	M	Immature
173	3	M	Immature
178	3	F	Immature
179		M	Unk
180	4	M	Immature
181		M	Immature
184	4	M	Immature
186	4	M	Immature
188		M	Immature
189		F	Immature
196	3	M	Immature
205	5	M	Immature
208	4	F	Immature
209	5	F	Immature
215	4	F	Immature
218	4	F	Immature
219	5	F	Mature Next Year
220	4	F	Immature
221	4	F	Immature
223	3	M	Immature
240	6	M	Immature
240		F	Immature
248	4	F	Immature
272	4	M	Spawned Out
304	5	M	Unk
310	6	F	Mature Next Year
324		M	Unk
325	5	M	Spawned Out
333	5	M	Spawned Out
337	5	M	Unk
346	5	M	Unk
355	5	M	Spawned Out
357	7	F	Spawned Out

Appendix E. Length, sex, and maturity of rainbow trout collected on August 6, 1996 from Indian Creek.

Length (mm)	Sex	Maturity
88	M	Immature
91	M	Immature
92	F	Immature
93	F	Immature
96	M	Mature Next Year
99	F	Immature
133	F	Immature
183	M	Immature
195	M	Mature Next Year

Appendix F. Length, age, sex, maturity, and caecal fat estimates of rainbow trout collected on August 7, 1996 from Marble Creek.

Length (mm)	Age	Sex	Maturity	Caecal Fat
104		M	Immature	0
113		F	Immature	1
115	1	M	Immature	0
145	2	M	Immature	0
152	2	M	Immature	1
158	2	F	Immature	1
159	2	M	Immature	0
165	2	F	Immature	1
168	3	F	Immature	0
177		M	Spawned Out	1
179	2	M	Spawned Out	1
222	3	M	Spawned Out	2
238	3	M	Spawned Out	2
252	4	M	Spawned Out	2

Appendix G. Length, age, sex, maturity, and caecal fat estimates of westslope cutthroat trout collected on August 7, 1996 from Marble Creek.

Length (mm)	Age	Sex	Maturity	Caecal Fat
130	2	M	Immature	0
152	3	M	Immature	0
164	3	F	Immature	0
217	3	M	Immature	0
227	4	F	Immature	0
283	5	F	Mature Next Year	1
294	5	M	Spawned Out	1

Appendix H. Length, age, sex, and maturity of westslope cutthroat trout/golden trout hybrids collected on August 9, 1996 from Lower Cache Creek (tributary to Loon Creek).

Length	Age	Sex	Maturity
68		Unk	Unk
76		Unk	Unk
108		F	Immature
120		M	Immature
125		M	Immature
131		M	Immature
133		F	Unk
137		M	Unk
138		F	Unk
141		M	Unk
146		F	Immature
157		F	Unk
172		F	Unk
175	3	F	Immature
224	4	M	Mature

Appendix I. Length, sex, maturity, and caecal fat estimates of westslope cutthroat trout/golden trout hybrids collected on August 9, 1996 from Upper Cache Creek (tributary to Loon Creek).

Length (mm)	Sex	Maturity	Caecal Fat
78	Unk	Immature	0
80	Unk	Immature	0
83	Unk	Immature	0
86	Unk	Immature	0
89	Unk	Immature	0
90	Unk	Immature	0
92	Unk	Immature	0
96	Unk	Immature	0
99	Unk	Immature	0
101	Unk	Immature	0
108	Unk	Immature	0
108	Unk	Immature	0
225	M	Mature	1
231	M	Mature	0

Appendix J. Length, age, sex, maturity, and caecal fat estimates of westslope cutthroat trout collected on August 12, 1996 from Big Creek (tributary to Middle Fork Salmon River).

Length (mm)	Age	Sex	Maturity	Caecal Fat
193	5	M	Immature	0
201	4	M	Unk	0
220	4	F	Immature	0
263		F	Mature Next Year	0
290	6	M	Regeneration	0
330	8	F	Mature Next Year	1
341	6	F	Spawned Out	1

Appendix K. Length, age, sex, maturity, and caecal fat estimates of westslope cutthroat trout collected on August 11 and 12, 1996 from Lower Middle Fork (between Wilson Creek and Cradle Creek).

Length (mm)	Age	Sex	Maturity	Caecal Fat
195	4	F	Immature	0
202	4	F	Immature	0
205	5	F		
210	5	F	Immature	
224	4	F	Immature	0
235	4	M	Regenerating	1
242	6	F	Immature	0
248	3	F	Immature	
264	6	F	Mature Next Year	1
265	4	F		
271	6	F	Mature Next Year	1
272	5	F	Mature Next Year	3
273	5	F		
276	3	M	Regenerating	1
279	5	F		
279	6	M	Mature (Regenerating)	1
280	4	M	Regenerating	2
282	6	M		
285	5	F		
286	3	M	Immature	
286	4	M		
292	5	F		
301	5	F	Mature Next Year	3
302	5			
308	6	F		
311	7	F		
314	5	F		
315	5	F	Mature	3
322	6	M	Mature	
337	5	M	Mature	
346	8	M	Mature (Regenerating)	1

Appendix L. Fish health samples analyzed at Eagle Laboratory from Middle Fork Salmon River drainage (August 1996).

Accession #	Drainage	Tributary	Abbreviation	Species*	ELISA	Whirling Disease	Genetics
96-280	Indian Creek	Tomahawk Creek	TC	C2	10 pools of 5	10 pools of 5	25
96-281	Indian Creek	Indian Creek	IC	R1	0	2 pools of 5	9
96-282	Middle Fork-Upper	main from Indian Creek to Marble Creek	UMF	C2	6 pools of 5 1 pool of 3	6 pools of 5 1 pool of 3	24
96-283	Marble Creek		MAR	C2	1 pool of 3 1 pool of 4	1 pool of 3 1 pool of 4	0
96-284	Marble Creek		MAR	R1	0	2 pools of 5 1 pool of 4	0
96-285	Loon Creek	Cache Creek – upper	UCA	GN/C2	2 pools of 5 1 pool of 4	2 pools of 5 1 pool of 4	14
96-285	Loon Creek	Cache Creek - upper	UCA	BK	1 pool of 4	1 pool of 4	0
96-286	Loon Creek	Cache Creek - lower	LCA	GN/C2	3 pools of 5	3 pools of 5	15
96-287	Middle Fork	Loon Creek to Wilson Creek	LMF	C2	4 pools of 4	4 pools of 4	16
96-288	Wilson Creek		WC	C2	1 pool of 3	1 pool of 3	3
96-289	Wilson Creek		WC	R1	0	6 pools of 5 1 pool of 3	0
96-290	Big Creek		BC	C2	1 pool of 3 1 pool of 4	1 pool of 3 1 pool of 4	7
96-291	Middle Fork - Lower	Wilson Creek to Cradle Creek	LMF	C2	3 pools of 5	3 pools of 5	15

* C2 = westslope cutthroat trout, R1 = rainbow trout, GN = golden trout, BK = brook trout.

Appendix M. BKD and WD results of resident trout samples from Middle Fork Salmon River (Idaho) and selected tributaries from Indian Creek to mouth, collected August 1996.

Accession #	Drainage	Tributary	Species[a]	ELISA[b]	ELISA-Results	Polymerase Chain Reaction-Results	Whirling Disease (WD)[c]	WD Results
96-280	Indian Creek	Tomahawk Creek	C2	10 pools of 5	6/10 +(all low)		10 pools of 5	0/50
96-281	Indian Creek	Indian Creek	R1	0	0		2 pools of 5	0/9
96-282	Middle Fork-Upper	main from Indian Creek to Marble Creek	C2	6 pools of 5 1 pool of 3	7/7 +(1 low, 5 mod, 1 high)		6 pools of 5 1 pool of 3	0/33
96-283	Marble Creek		C2	1 pool of 3 1 pool of 4	2/2 +(1 mod, 1 high)	3a,3b Negative	1 pool of 3 1 pool of 4	0/7
96-284	Merble Creek		R1	0	0		2 pools of 5 1 pool of 4	0/14
96-285	Loon Creek	Cache Creek - upper	GN/C2	2 pools of 5 1 pool of 4	1/3 + (low)		2 pools of 5 1 pool of 4	0/14
95-285	Loon Creek	Cache Creek– upper	BK	1 pool of 4	1/1 + (low)		1 pool of 4	0/4
96-286	Loon Creek	Cache Creek - lower	GN/C2	3 pools of 5	3/3 + (all low)		3 pools of 5	1/3 + Myxobolus spp.(presumptive)
96-287	Middle Fork	Loon Creek to Wilson Creek	C2	4 pools of 4	4/4 + (1 low, 1 mod, 2 high)	Pool 3-1a,1b Pool 4-2a,2b Positive	4 pools of 4	2/4 + Myxobolus spp. Presumptive. No spores observed by Histo
96-288	Wilson Creek		C2	1 pool of 3	1/1 + (mod)		1 pool of 3	0/3
96-289	Wilson Creek		R1	0	0		6 pools of 5 1 pool of 3	1/7 + Myxobolus spp. Spore observed in nerve tissue not in cartilage or bone.
96-290	Big Creek		C2	1 pool of 3 1 pool of 4	2/2 + (both mod)		1 pool of 3 1 pool of 4	1/2 + Myxobolus spp. Spore in digest not confirmed in bone or cartilage
96-291	Middle Fork - Lower	Wilson Creek to Cradle Creek	C2	3 pools of 5	3/3 + (2 mod, 1 high)	Pool 1-4a,4b Positive	3 pools of 5	0/30

[a]C2 = westslope cutthroat trout, R1 = rainbow trout, GN = golden trout, BK = brook trout.
[b]ELISA: +indicates positive result. If positive, sample reported by number of pools. If negative, sample reported by number of fish.
[c]WD: Myxobolus sp. spores present by digest; no spores in bone or cartilage, spore observed in nervous tissue.

Appendix N. Water chemistry, Middle Fork Salmon River drainage, 1996.

Stream	Location	Date/Time	Conductivity (µmhos)	TDS (mg/l)	Temp (°C)	Hardness mg/l ($CaCO_3$)
MFSR[a]	Above Indian Cr	8/7/96	93	62		
Indian Cr	Near Mouth	8/7/96	102	68		
Marble Cr	Near Mouth	8/8/96 10:00AM	84	55	9	40
MFSR	Below Marble Cr	8/8/96 10:48AM	92	62	12.5	40
Cache Cr	Near Mouth	8/9/96 10:30 AM	98	66	10	60[b]
MFSR	Above Big Cr	8/12/96 3:00PM	104	70	18	
Big Cr	Near Mouth	8/12/96 3:00PM	122	82	17	

[a] MFSR = Middle Fork Salmon River
[b]Hach Kit 34.2 mg/l ($CaCO_3$)

Appendix O. Fish caught and released during guided angling trips with Wapiti Meadows Ranch Outfitters, Middle Fork Salmon River, 1996.

Fish length (inches)	Species		
	Steelhead/ Rainbow Trout	Westslope Cutthroat Trout	Bull Trout
4			
5	2		
6	6	5	
7	2	7	
8	7	18	
9		3	
10	2	7	
11		1	
12	2	11	
13		4	
14		6	
15		1	
16		2	
17			
18			
19			
Total	21	69	

Appendix P. Fish caught and released during guided angling trips with Wapiti Meadows Ranch Outfitters, Indian Creek, Middle Fork Salmon River, 1996.

Fish length (inches)	Species		
	Steelhead/ Rainbow Trout	Westslope Cutthroat Trout	Bull Trout
4	1	3	
5	1	1	
6	28	7	
7	4	4	
8	12	5	
9	5		
10	5	5	
11	3	1	
12	1	4	
13		1	
14	1	11	
15			
16			
17			
Total	61	42	0

1996 ANNUAL PERFORMANCE REPORT

State of: Idaho

Program: Fisheries Management F-71-R-21

Project I: Surveys and Inventories

Subproject I-H: Salmon Region

Job No: c2

Title: Rivers and Streams Investigations - Middle Fork Salmon River Snorkeling Transects

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

ABSTRACT

Mean densities of age 1 and older westslope cutthroat trout *Oncorhynchus clarki lewisi*, juvenile rainbow/steelhead trout *O. mykiss*, and juvenile chinook salmon *O. tshawytscha* counted in Middle Fork Salmon River transects in 1996 were 0.7, 0.2, and 0.007 fish/100 m^2, respectively.

In Middle Fork Salmon River tributary transects, mean densities of all age classes of westslope cutthroat trout, rainbow/steelhead trout, and chinook salmon averaged 1.0/100 m^2, 1.7/100 m^2, and 0.008/100 m^2, respectively.

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INTRODUCTION

The Middle Fork Salmon River (MFSR), part of the Wild and Scenic Rivers System, flows through a remote area in east central Idaho. All of the mainstem is within the Frank Church River of No Return Wilderness Area. The Middle Fork originates at the confluence of Bear Valley and Marsh creeks near Cape Horn Mountain and flows 171 km to its confluence with the main Salmon River 92 km downstream from Salmon, Idaho (Figure 1).

Road access exists to Dagger Falls and to the headwaters of some tributaries via primitive roads. The lower 156 km of the Middle Fork is accessible only by aircraft, float boats, or horse/foot trails. The MFSR is a major recreational river that offers a wide variety of outdoor and backcountry opportunities. The number of people floating the river has increased substantially in the past 34 years from 625 in 1962 to 10,507 in 1996 (U.S. Forest Service, Salmon-Challis National Forest, Middle Fork Ranger District).

The earliest MFSR fishery study, conducted in 1959 and 1960, evaluated westslope cutthroat trout *Oncorhynchus clarki lewisi* life history and seasonal movements (Mallet 1963). In 1971, additional studies were initiated to monitor MFSR westslope cutthroat trout abundance and to evaluate catch-and-release regulations established in 1972. Similar regulations were adopted for major tributaries in the early and mid-1980s

Part of the studies initiated in 1971 included establishment of snorkeling transects which were surveyed periodically (Corley 1972; Jeppson and Ball 1977, 1979). Since 1971, several additional studies have been initiated within the Middle Fork and its tributaries. In 1981, Thurow (1982, 1983, and 1985) initiated a project to evaluate wild steelhead trout *O. mykiss*. In 1985, another study was initiated to determine juvenile steelhead, chinook salmon *O. tshawytscha,* and westslope cutthroat trout densities in the mainstem and its tributaries (Reingold and Davis 1987a, 1987b, 1988; Lukens and Davis 1989; Davis et al. 1992; Schrader and Lukens 1992; Liter and Lukens 1992).

This report, a continuation of the 1985 study, presents data collected in August 1996 pertaining to fish densities in the Middle Fork Salmon River drainage.

OBJECTIVE

Monitor juvenile steelhead trout and chinook salmon densities within the Middle Fork and its tributaries.

METHODS

From August 8 to 13, 1996, we surveyed all 29 Middle Fork Salmon River transects (Table 1), seven traditional MFSR tributary transects and six additional transects in four tributaries (Table 2)

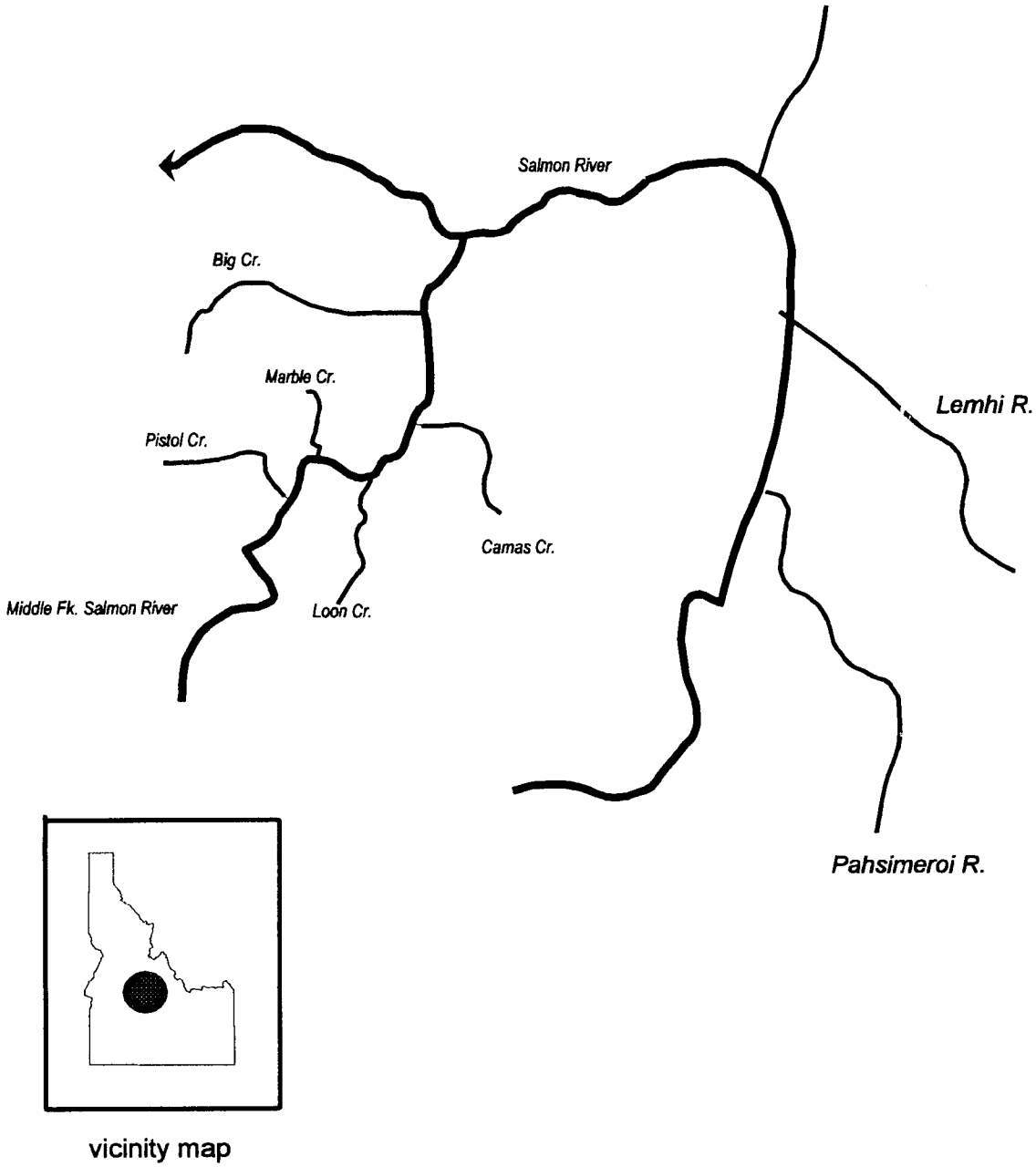

Figure 1. Middle Fork Salmon River, Idaho.

Table 1. Locations and dimensions of Middle Fork Salmon River snorkeling transects, August1996.

Fish type[a]	Location (river km)[b]	Transect name	Length (m)	Visibility (m)	Visible corridor (m)	Area (m^2)	Passes
Sh	0.3	Boundary	54	7.3	14.6	803	1
C2/Ck	4.3	Gardell's Hole	70	6.1	12.2	854	1
C2/Ck	8.8	Velvet	50	4.8	9.6	480	1
Sh	13.6	Elkhorn	125	5.6	11.2	1,400	1
Sh	21.3	Sheepeater	93	5.2	10.4	967	1
C2/Ck	24.5	Greyhound	76	7.1	14.3	1,087	1
Sh	29.6	Rapid River	88	4.8	9.6	845	1
Sh	40.0	Indian	221	6.0	12.0	2,652	1
C2/Ck	44.3	Pungo	70	10.7	21.4	1,498	1
C2/Ck	51.0	Marble Pool	153	11.3	33.9	5,187	1
Sh	52.3	Ski-jump	83	6.0	12.0	1,000	1
C2/Ck	60.6	Lower Jackass	250	7.8	15.6	3,900	1
Sh	64.6	Cougar	117	7.7	15.4	1,802	1
C2/Ck	73.9	Whitey Cox	106	6.6	19.8	2,099	1
Sh	74.1	Rock Island	110	5.9	17.7	1,947	1
C2/Ck	82.9	Hospital Pool	135	6.8	13.6	1,836	1
Sh	84.3	Hospital Run	165	6.5	13.0	2,145	1
C2/Ck	92.6	Tappan Pool	110	6.6	13.2	1,452	1
Sh	92.8	Lower Tappan	120	6.6	13.2	1,584	1
C2/Ck	106.6	Flying B	120	5.6	16.8	2,016	1
Sh	108.6	Airstrip	106	6.3	12.6	1,336	1
Sh	119.7	Survey	100	6.4	12.8	1,280	1
C2/Ck	124.6	Big Creek Bridge	88	6.5	13.0	1,144	1
Sh	127.8	Love Bar	86	5.9	11.8	1,015	1
C2/Ck	135.8	Ship Island	160	4.8	9.6	1,536	1
Sh	144.0	Little Ouzel	100	4.8	9.6	960	1
C2/Ck	144.6	Otter Bar	215	4.8	9.6	2,064	1
C2/Ck	151.5	Goat Creek Pool	106	5.5	11.0	1,166	1
Sh	151.8	Goat Creek Run	66	5.5	11.0	726	1

[a] Sh-steelhead, C2-westslope cutthroat trout, Ck-chinook salmon.
[b] River km starts at Dagger Falls.

Table 2. Middle Fork Salmon River tributary snorkeling transects, August 1996.

Transect Name		Length (m)	Area (m^2)	Location
Pistol Creek #1	(lower)	95.0	1,543	At mile marker 16
Pistol Creek #2	(upper)	46.4	775	Above mile marker 16
Indian Creek #1[a]	(lower)	85.7	686	
Indian Creek #2[a]	(upper)	134.3	1,612	
Marble Creek #1	(lower)	55.0	770	Above pack bridge
Marble Creek #2	(upper)	109.4	1,313	
Loon Creek #1	(lower)	52.3	894	Below pack bridge
Loon Creek #2	(upper)	39.2	447	360 m above pack bridge
Camas Creek #1	(lower)	70.3	1,202	From pack bridge downstream
Camas Creek #2	(upper)	40.6	658	
Big Creek #1	(lower)	69.0	566	360 m above mouth
Wilson Creek[a]	(L-4)	36.3	265	1.2 km above mouth
Wilson Creek[a]	(L-5)	36.1	260	1.4 km above mouth

[a]Transects reestablished in 1996.

The techniques used to survey these transects are described by Reingold and Davis (1987a, 1987b) and Scully et al. (1990).

We conducted project angling throughout the mainstem MFSR below Indian Creek using conventional fly fishing and spin cast gear to further evaluate fish species and length compositions.

All data was compared to previous information to identify trends.

RESULTS

Middle Fork Salmon River Snorkeling Transects

The total numbers of westslope cutthroat trout, juvenile rainbow/steelhead trout, and juvenile chinook salmon counted in MFSR transects were 296, 84, and 2 respectively (Table 3). Mean densities were 0.7, 0.2, and 0.007 fish/100 m^2 for westslope cutthroat trout, rainbow/steelhead trout and chinook salmon, respectively (Table 4).

Middle Fork Salmon River Tributary Snorkeling Transects

Juvenile rainbow/steelhead trout densities ranged from 0 to 10.8 fish/100 m^2 and averaged 1.7 (Table 5). Mean juvenile chinook salmon density was 0.008 fish/100 m^2 and ranged from 0 to 0.1. Westslope cutthroat trout densities averaged 1.0 fish/100 m^2 and ranged from 0.2 to 2.6.

Project Angling

Idaho Department of Fish and Game project anglers caught 400 fish: westslope cutthroat trout (70.0%), rainbow/steelhead trout (29.0%), mountain whitefish *Prosopium williamsoni* and northern pikeminnow *Ptychocheilus oregonenis* (1.0%) (Figure 2.). Westslope cutthroat trout lengths averaged 263 mm and rainbow/steelhead trout 204 mm.

Table 3. Total number of westslope cutthroat trout and rainbow/steelhead trout by length group (mm), chinook salmon by age group, and other fish species counted in Middle Fork Salmon River transects, August 1996.

Transect	Westslope cutthroat trout					Rainbow/steelhead trout				Chinook salmon		Bull trout	White-fish	Other[a]	Total fish
	<75	75-150	150-230	230-300	>300	75-150	150-230	230-300	>300	Age 0	Age 1				
Boundary	0	1	3	4	1	0	0	0	0	0	0	0	20	0	29
Gardell's Hole	0	0	0	0	0	0	0	0	0	0	0	0	1	6	7
Velvet	0	1	4	10	8	0	2	0	0	0	0	2	9	0	36
Elkhorn	0	0	0	2	7	1	3	1	0	0	0	0	6	0	20
Sheepeater	0	0	2	2	2	2	3	0	0	0	1	0	5	0	17
Greyhound	0	1	2	5	9	0	1	0	0	0	0	0	12	2	32
Rapid River	0	0	3	0	0	2	3	0	0	0	0	0	16	2	26
Indian	0	1	8	16	17	2	3	0	0	0	0	0	30	2	79
Pungo	0	1	7	13	5	1	4	0	0	0	0	1	14	0	46
Marble Pool	0	0	8	8	3	0	0	0	0	0	0	2	26	0	47
Ski-jump	0	0	0	0	0	0	2	2	0	0	0	0	4	0	8
Lower Jackass	0	4	11	9	10	7	19	2	0	0	0	0	22	140	224
Cougar	0	1	0	0	1	0	0	0	0	0	0	0	4	0	6
Whitey Cox	0	0	12	18	14	1	8	1	0	0	0	0	8	8	70
Rock Island	0	0	1	1	0	0	3	0	0	0	0	0	5	0	10
Hospital Pool	0	0	3	1	1	0	0	0	0	0	0	0	4	29	38
Hospital Run	0	0	0	1	1	0	2	0	0	0	0	0	10	0	14
Tappan Pool	0	0	1	4	0	0	1	0	0	0	0	0	9	3	18
L. Tappan Run	0	0	2	1	0	0	2	0	0	0	0	0	8	0	13
Flying B	0	0	6	1	2	0	0	0	0	0	0	0	6	4	19
Survey	0	0	0	1	1	0	0	0	0	0	0	0	5	33	40
Big Creek Bridge	0	4	6	6	0	2	2	0	0	0	0	0	10	1	31
Love Bar	0	0	1	1	0	1	0	0	0	0	1	0	18	11	33
Ship Island	0	0	1	1	0	0	0	0	0	0	0	0	26	72	100
Little Ouzel	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Otter Bar	0	0	1	4	3	0	0	0	0	0	0	0	5	24	37
Goat Creek Pool	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Goat Creek Run	0	0	1	2	1	0	0	0	0	0	0	0	16	35	55
Column total	0	15	83	111	87	19	58	6	0	0	2	5	310	372	1068
Grand total			296				83			2		5	310	372	1068

[a]Suckers *Catostomas spp.*, northern pikeminnow *Ptychocheilus oregonenis*, and redside shiners *Richardsonius balteatus*.

Table 4. Densities of westslope cutthroat trout, rainbow/steelhead trout, and chinook salmon (fish/100 m^2) in Middle Fork Salmon River snorkeling transects, August 1996.

Transect	Westslope cutthroat trout	Rainbow trout/ steelhead	Chinook salmon	Total fish[a]
Boundary	0.9	0.0	0.0	3.6
Gardell's Hole	0.0	0.0	0.0	0.1
Velvet	4.8	0.4	0.0	7.5
Elkhorn	0.6	0.4	0.0	1.4
Sheepeater	0.6	0.5	0.1	1.8
Greyhound	1.6	0.1	0.0	2.9
Rapid River	0.4	0.6	0.0	3.1
Indian	1.6	0.2	0.0	3.2
Pungo	1.7	0.3	0.0	3.1
Marble Pool	0.4	0.0	0.0	0.9
Ski-jump	0.0	0.4	0.0	0.8
Lower Jackass	0.9	0.7	0.0	5.7
Cougar	0.1	0.1	0.0	0.3
Whitey Cox	2.1	0.5	0.0	3.3
Rock Island	0.1	0.2	0.0	0.5
Hospital Pool	0.3	0.0	0.0	2.1
Hospital Run	0.1	0.1	0.0	0.6
Tappan Pool	0.3	0.1	0.0	1.2
Lower Tappan Run	0.2	0.1	0.0	0.8
Flying B	0.4	0.0	0.0	0.9
Airstrip	0.1	0.0	0.0	0.9
Survey	0.2	0.0	0.0	3.1
Big Cr. Bridge	1.4	0.3	1.2	2.7
Love Bar	0.2	0.1	0.1	3.3
Ship Island	0.1	0.0	0.0	6.5
Little Ouzel	0.0	0.0	0.0	0.1
Otter Bar	0.4	0.0	0.0	1.8
Goat Creek Pool	0.1	0.0	0.0	0.1
Goat Creek Run	0.6	0.0	0.0	7.6
Average	0.7	0.2	0.007	2.4

[a]Total fish also includes suckers *Catostomus spp.*, northern pikeminnow *Ptychocheilus oregonenis*, and redside shiners *Richardsonius balteatus*, mountain whitefish *Prosopium williamsoni*, and bull trout *Salvelinus confluentus*.

Table 5. Total numbers by length group (mm) and density (fish/100 m^2) of rainbow/steelhead trout and westslope cutthroat trout, total numbers by age group and density (fish/100 m^2) of juvenile chinook salmon, and total numbers of mountain whitefish (Wf) and bull trout (BU) counted in Middle Fork Salmon River tributary snorkeling transects, August 1996. D = Density.

		Rainbow/steelhead trout						Westslope cutthroat trout						Chinook salmon			Wf	BU
Location	Area (m^2)	< 75	75 - 150	150– 230	230 300	> 300	D	< 75	75 - 150	150 230	230 300	> 300	D	Age 0	Age 1	D		
Pistol Creek #1 (lower)	1,543	0	14	11	1	0	1.7	0	5	7	2	1	1.0	0	0	0.0	8	0
Pistol Creek #2 (upper)	774	7	10	5	0	0	2.8	0	5	7	4	4	2.6	0	0	0.0	10	3
Indian Creek #1 (lower)	686	0	0	2	0	0	0.3	0	1	2	0	0	0.4	0	0	0.0	8	0
Indian Creek #2 (upper)	1,606	0	1	2	1	0	0.2	0	0	1	0	2	0.2	0	0	0.0	6	0
Marble Creek #1 (lower)	767	0	0	0	0	0	0.0	0	0	0	0	2	0.3	0	0	0.0	4	0
Marble Creek #2 (upper)	1,317	0	2	1	0	0	0.2	0	3	4	0	1	0.6	0	0	0.0	6	0
Loon Creek #1 (lower)	894	0	2	2	0	0	0.4	0	1	4	2	3	1.1	1	0	0.1	15	0
Loon Creek #2 (upper)	447	0	0	2	0	0	0.4	0	0	1	0	0	0.2	0	0	0.0	2	0
Camas Creek #1 (lower)	1,202	0	0	0	0	0	0.0	0	1	4	2	3	0.8	0	0	0.0	24	0
Camas Creek #2 (upper)	658	0	0	2	1	0	0.5	0	1	1	0	1	0.5	0	0	0.0	21	0
Big Creek #1 (lower)	566	0	7	6	0	0	2.3	0	1	3	4	1	1.6	0	0	0.0	12	0
Wilson Creek (L-4)	265	0	2	4	0	0	2.3	0	0	1	4	1	2.3	0	0	0.0	5	0
Wilson Creek (L-5)	260	2	16	10	0	0	10.8	0	2	2	1	0	1.9	0	0	0.0	3	1
Mean Density							1.7						1.0			0.008		

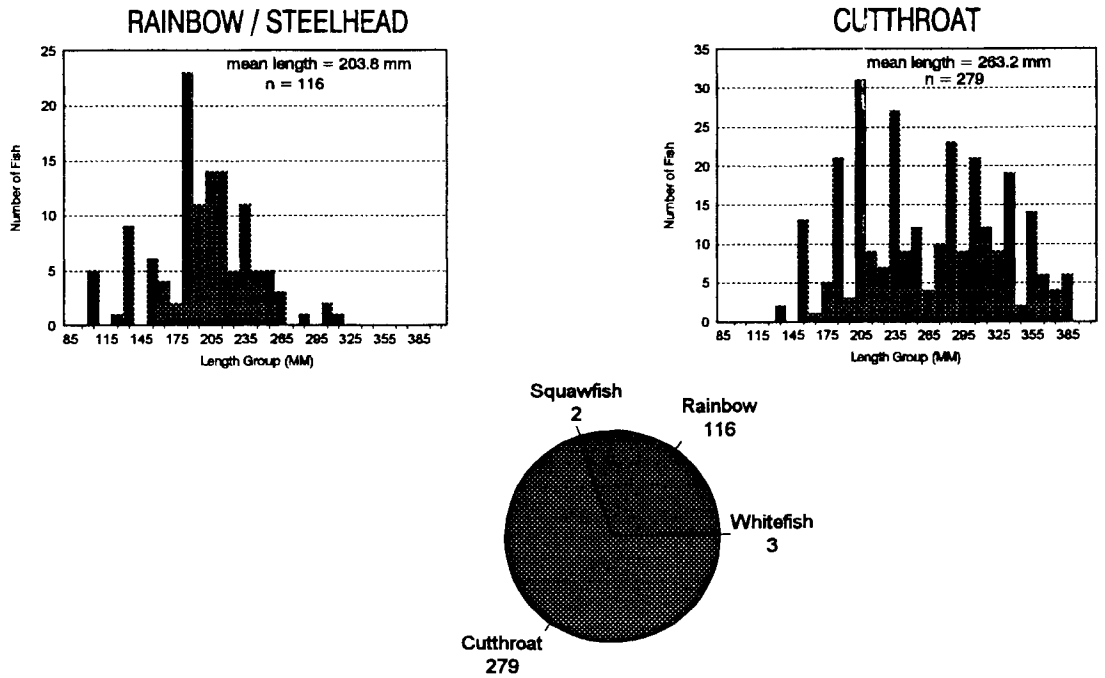

Figure 2. Species composition of fish caught by Department project anglers and length frequency of cutthroat trout and rainbow/steelhead, August 1996.

DISCUSSION

Middle Fork Salmon River Snorkeling Transects

A downward trend in juvenile steelhead densities, which started in 1986, leveled off in 1993 and increased slightly in 1996 (Figure 3). The overall downward trend probably reflects poor downstream migration conditions for smolts which resulted in reduced adult spawner escapement.

Juvenile chinook numbers in traditional MFSR transects continue to be severely depressed (Figure 4). Since 1989 there has been a dramatic decline in chinook for reasons similar to those for steelhead.

The density of westslope cutthroat trout, counted in westslope cutthroat trout/chinook salmon transects, increased in 1996 probably because of good water years in 1995 and 1996 (Figure 5). The density of westslope cutthroat trout larger than 300 mm were at the highest levels since 1987.

In 1971 when snorkeling transects were first established specifically for westslope cutthroat trout, observed numbers were low. Following establishment of catch-and-release regulations for the mainstem MFSR in 1972, westslope cutthroat trout numbers increased and appeared to peak in the early to mid-1980s.

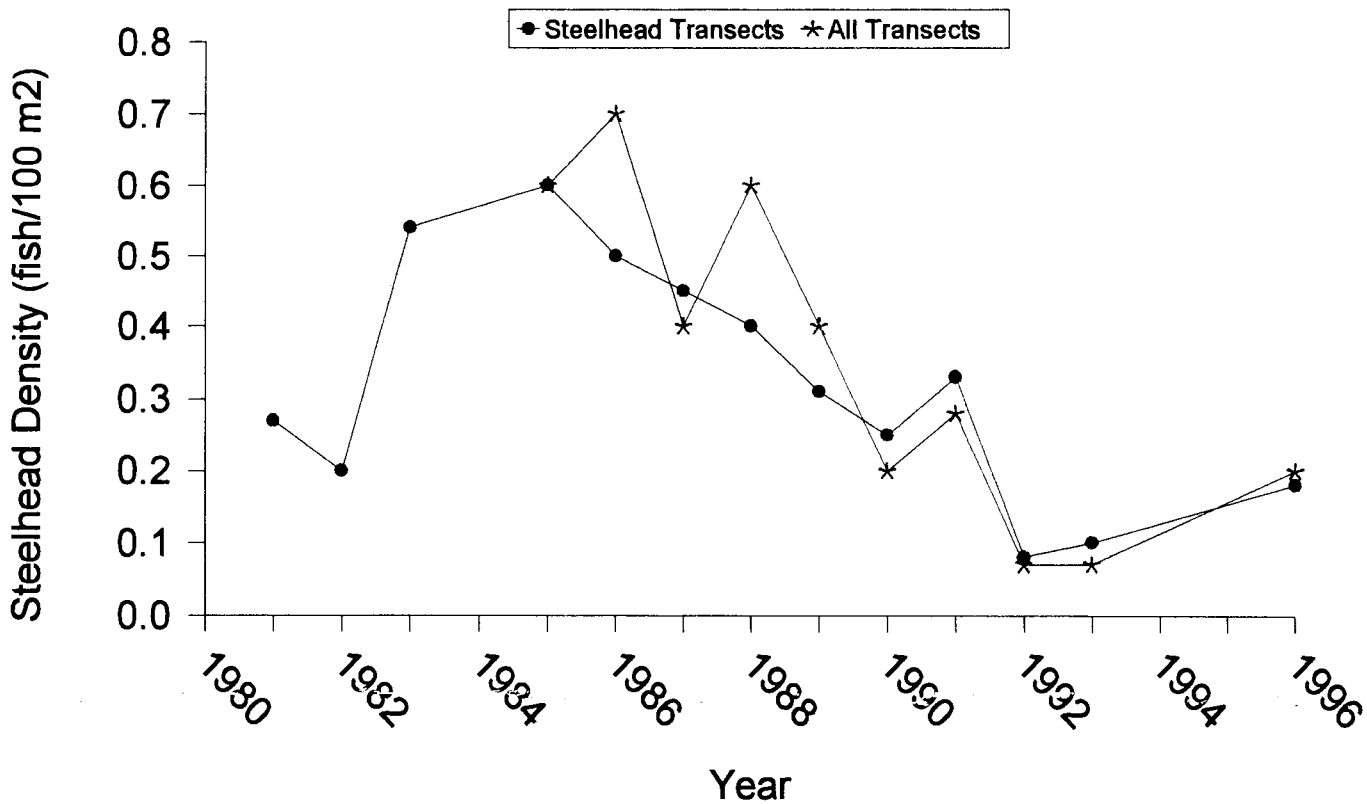

Figure 3. Densities of juvenile steelhead counted in all transects and in steelhead only transects (see Table 1) for Middle Fork Salmon River snorkeling surveys in 1981-1983, 1985-1993, and 1996. Data for 1981-1983 from Thurow (1982, 1983, 1985). Not all transects were sampled in all years.

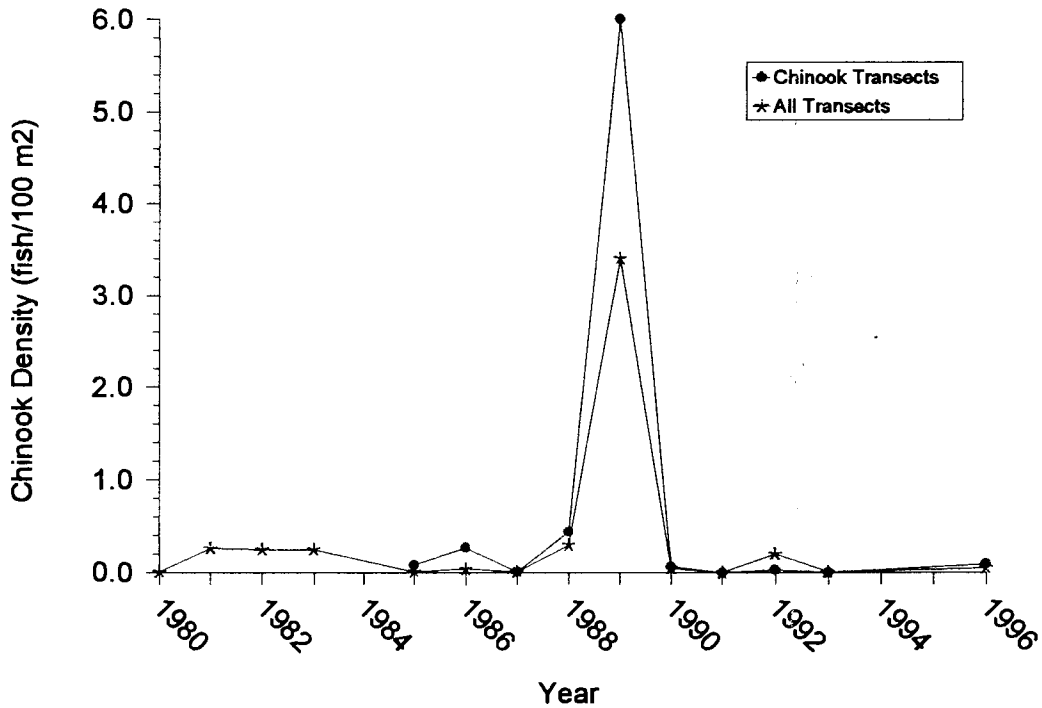

Figure 4. Densities of chinook salmon counted in all transects and in chinook/cutthroat only transects (see Table 1) for Middle Fork Salmon River snorkeling surveys in 1981-1983, 1985-1993, and 1996. Data for 1981-1983 from Thurow (1982, 1983, 1985). Not all transects were sampled in all years.

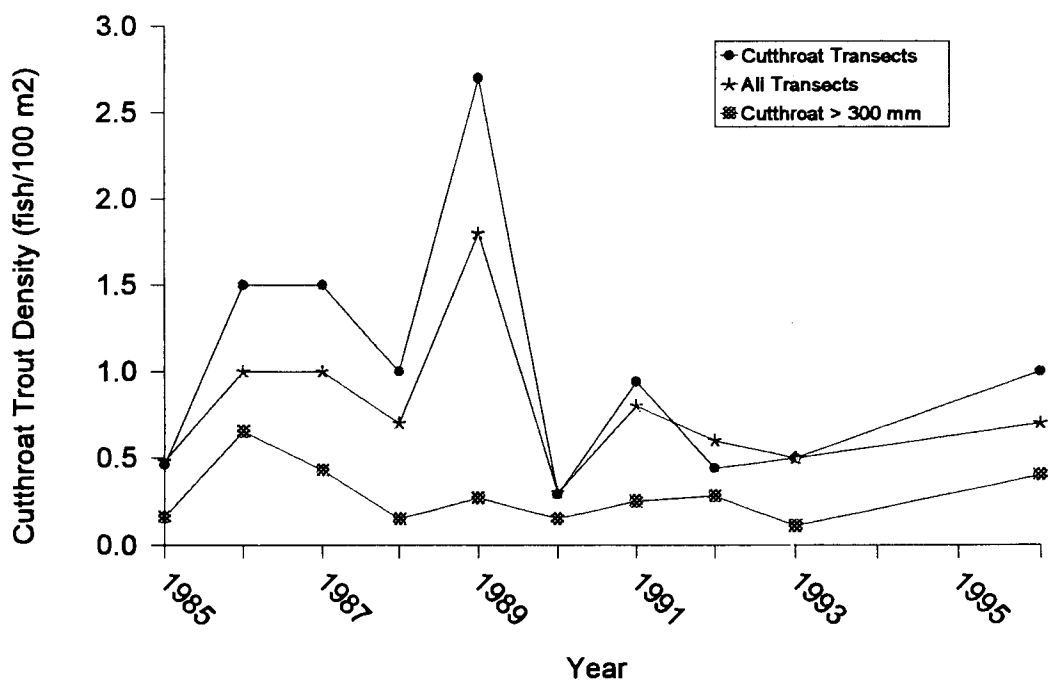

Figure 5. Densities of cutthroat trout counted in all transects and in cutthroat/chinook only transects (see Table 1) for Middle Fork Salmon River snorkeling surveys in 1985-1993, and 1996. Data for 1981-1983 from Thurow (1982, 1983, 1985). Not all transects were sampled in all years.

The trend during the early 1990s had been a general decline with very low numbers observed. However indications are westslope cutthroat trout are now slowly increasing in numbers and size (Figure 6). Liter and Lukens (1993) hypothesized westslope cutthroat trout declines may be attributed to drought. Since 1994, there has been a reprieve in the drought conditions experienced during the late 1980s and early 1990s coupled with a corresponding increase in westslope cutthroat trout. This supports Liter and Lukens supposition.

Middle Fork Salmon River Tributary Snorkeling Transects

Between 1993 and 1996, westslope cutthroat trout densities varied little in transects snorkeled (Figure 7). Although there was some slight variation in densities among tributaries, no major changes occurred. These changes probably reflect normal yearly population fluctuations. Excluding four data points for westslope cutthroat trout densities (Big Creek 1983, Pistol Creek 1985,1986, and Camas Creek 1988) tributary densities have varied little since 1981.

In 12 of the 13 transects snorkeled in the MFSR tributaries, no chinook salmon were seen. Loon Creek #1 was the only snorkel transect to contain chinook salmon. Chinook salmon densities have been low in all the MFSR tributaries snorkeled since 1990 (Figure 7).

Rainbow/steelhead trout densities overall remained essentially the same as in 1993; however, these levels are still at all time lows. Juvenile rainbow/steelhead trout densities, like those of chinook salmon, are heavily influenced by yearly spawner escapement.

Project Angling

Prior to the establishment of catch-and-release regulations in 1972, the proportion of westslope cutthroat trout larger than 300 mm caught by project anglers was approximately 20%. This proportion has fluctuated yearly ranging from 33 to 53% and averaging 43% since the regulation change. The proportion of large westslope cutthroat trout caught in 1996 was 33%. This fluctuation is probably the result of variation in sample timing, gear type, angler skill, and fish migration patterns.

Since the regulation change, the average length of creeled westslope cutthroat trout has increased 16 mm; however, the proportion of westslope cutthroat trout over 300 mm has approximately doubled.

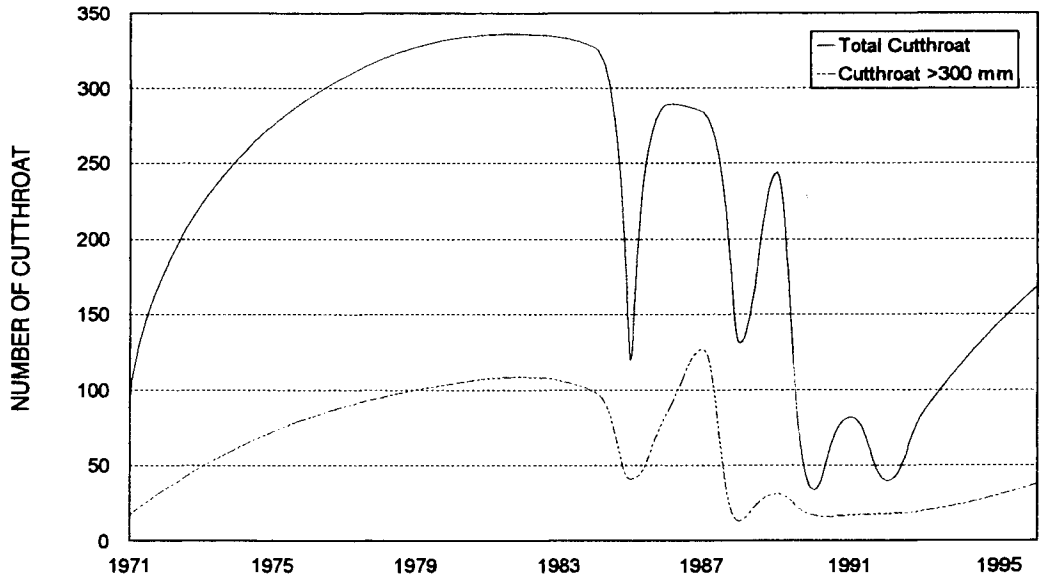

Figure 6. Numbers of cutthroat trout counted in traditional MFSR snorkeling transects (Pungo, Marble Pool, L. Jackass, Whitey Cox, Hospital Pool, Tappan Pool, Flying B, Big Creek Bridge, Ship Island, Otter Bar, and Goat Creek Pool, 1971-1996.

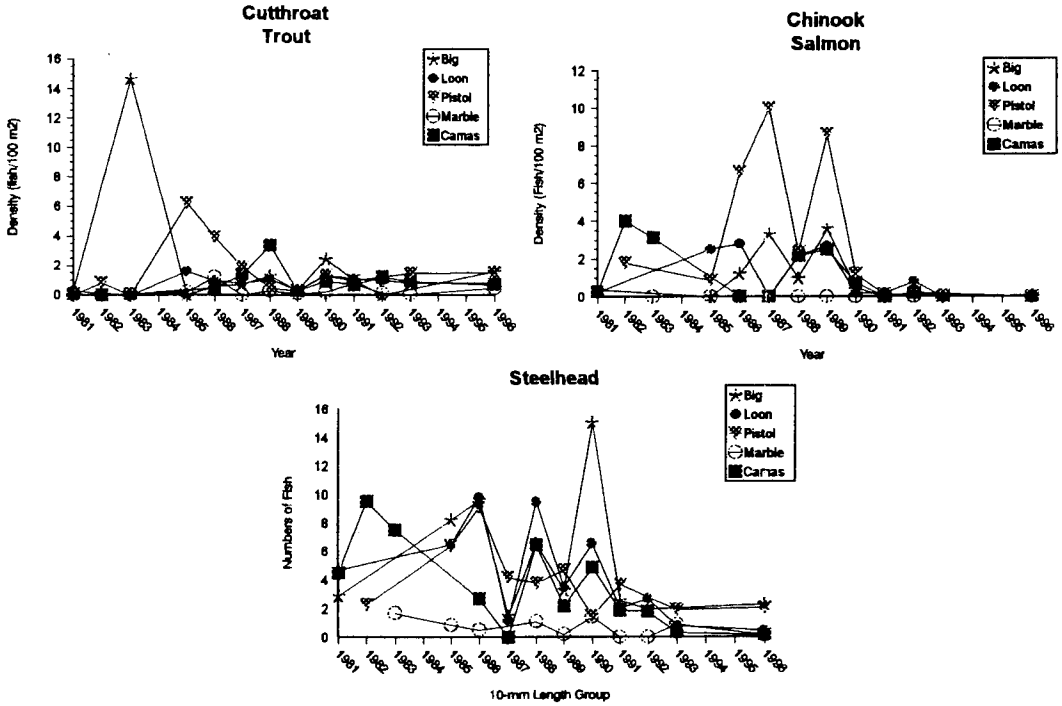

Figure 7. Densities of cutthroat trout, chinook salmon, and steelhead counted in Middle Fork Salmon River tributary snorkeling transects 1981-1983, 1985-1993, and 1996.

RECOMMENDATION

Continue monitoring densities of juvenile steelhead, westslope cutthroat trout, and chinook salmon in the MFSR and tributaries, snorkeling once every three years between the second week of July and the third week of August.

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1996 ANNUAL PERFORMANCE REPORT

State of: Idaho

Program: Fishery Management F-71-R-21

Project I: Surveys and Inventories

Subproject I-H: Salmon Region

Job: d

Title: Salmon and Steelhead Investigations

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

ABSTRACT

We conducted annual chinook salmon redd counts in the Marsh Creek drainage and in the Salmon, Lemhi, East Fork Salmon, Pahsimeroi, and Yankee Fork Salmon rivers. This data is included in the Idaho Department of Fish and Game 1996 annual salmon spawning ground surveys report.

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Regional Fishery Biologist

Michael R. Larkin
Regional Fishery Manager

1996 ANNUAL PERFORMANCE REPORT

State of: Idaho Program: Fishery Management F-71-R-21

Project II: Technical Guidance Subproject II-H: Salmon Region

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

ABSTRACT

During 1996, we provided technical assistance to all state and federal agencies requesting help. We submitted comments to several agencies and private entities concerning stream alterations, bank stabilization, mining operations, reclamation plans, fish rearing proposals, private ponds, water right applications, grazing allotments, timber sales, highway reconstruction, habitat improvement, bridge construction, and hydropower projects. We conducted on-site inspections of proposed, on-going, and completed projects.

We provided technical assistance at angler informational meetings, school presentations, and during development of the Salmon Region portion of the 1-800-ASK-FISH program. We responded to the general public in person, by telephone, and by mail to inquiries about fishing opportunities, techniques, regulations, and area specifics.

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Tom Curet
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OBJECTIVES

1. Assist the Department of Water Resources, the Department of Lands, the U.S. Army Corps of Engineers, and other state, federal, local, and private entities in evaluating the effects of habitat manipulation on fish and fish habitat.

2. Recommend procedures to minimize adverse effects of stream course alterations and to enhance aquatic habitat.

3. Provide information on all aspects of fisheries and aquatic habitat as requested.

4. Assist the Model Watershed Project and the Lemhi County Commissioners through the Lemhi County Riparian Habitat Conservation Agreement in designing and implementing fish habitat restoration projects.

METHODS

We responded to all requests for data, expertise, and recommendations from individuals, government agencies, and corporations. We attended meetings, conducted field inspections, and generated appropriate responses.

RESULTS

During 1996, we responded in writing to requests for technical assistance or comments on water and fishery-related matters as follows:

Agency	Number of Requests
Idaho Outfitters & Guides Licensing Board	2
U.S. Forest Service	9
Idaho Department of Water Resources	28
U.S. Department of Transportation	1
Private and Miscellaneous	9
U.S. Army Corps of Engineers	4
Custer/Lemhi County Commissioners	4
Shoshone-Bannock Tribe	20
U.S. Bureau of Reclamation	2

Inter-agency contacts were mainly by telephone. We usually responded to stream alteration proposals by meeting with the applicant on-site, determining the nature of the situation, and sending written comments to the permitting agency. Because the Salmon Region is so remote, we were often the only State agency representatives available to conduct on-site inspections.

We responded to numerous inquiries from the public (by telephone, letter, and in person) about when, where, and how to fish in the region, ranging from steelhead angling to alpine lake fishing.

We reported weekly steelhead fishing results on the local radio station and in area newspapers during the season.

We spent approximately 40 days of personnel time helping to develop the Lemhi County Riparian Habitat Conservation Agreement. The agreement establishes a framework for the cooperative management of all riparian areas in Lemhi County, regardless of ownership. A principal working group led by the county commissioners, and comprised of landowners and agency representatives, will prioritize county-wide projects and help coordinate agency and private landowner concerns. The goal is to improve riparian habitat in Lemhi County, using positive incentives to encourage good land stewardship. Over the next year we will work on a similar agreement in Custer County.

We are assisting the Idaho Department of Environmental Quality with the development of Basin Advisory Groups, Watershed Advisory Groups, and the Bull Trout Conservation Agreement.

The Salmon Region has no Information and Education or Regional Conservation Education personnel. During 1996 Salmon Region fisheries personnel conducted 30 presentations to approximately 375 students in four different schools.

RECOMMENDATIONS

1. Continue to give technical guidance on issues involving fishery resources in the Salmon Region.

2. Hire additional staff in the region to administer habitat issues and to meet information and education needs.

1996 ANNUAL PERFORMANCE REPORT

State of: Idaho Program: Fishery Management F-71-R-21

Project III: Habitat Management Subproject III-H: Salmon Region

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

ABSTRACT

We participated in the planning and construction of four riparian protection fences on the Lemhi River through the Model Watershed program. We also assisted on three stream bank stabilization projects at Hannah Slough and in the Lemhi and Pahsimeroi rivers.

U.S. Forest Service and U.S. Bureau of Land Management personnel assisted the Department in the removal of a fish migration barrier on Pattee Creek in the Lemhi River.

Authors:

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Regional Fishery Manager

1996 ANNUAL PERFORMANCE REPORT

State Of: Idaho

Program: Fisheries Management F-71-R-21

Project IV: Population Management

Subproject IV-H: Salmon Region

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

ABSTRACT

During the summer of 1996, the Salmon Region stocked 132 mountain lakes. The region stocked 109,250 fry in Salmon and Challis National Forest lakes. Species stocked included 6,500 Arctic grayling *Thymallus arcticus,* 4,500 rainbow trout *Oncorhynchus mykiss,* 90,250 westslope cutthroat trout *O. clarki lewisi, and 8,000* golden trout fry *O. aguabonita*. We used a Cessna 185 fixed-wing aircraft to stock Salmon Region lakes at a cost of $31.55 per lake.

Authors:

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OBJECTIVES

Maintain a viable high mountain lake fishery in the Salmon Region.

METHODS

We used a Cessna 185 fixed-wing aircraft to stock Salmon Region high mountain lakes. We summarized stocking records for each lake.

Volunteers stocked three mountain lakes in the Stanley area.

RESULTS

During the summer of 1996, we stocked 132 mountain lakes in the Salmon Region. We stocked 109,250 fry in Salmon and Challis National Forest lakes (Tables 1-6). Species stocked included 6,500 Arctic grayling *Thymallus arcticus*, 4,500 rainbow trout *Oncorhynchus mykiss,* 90,250 westslope cutthroat trout *O. clarki lewisi, and* 8,000 golden trout fry *O. aguabonita*. The cost of using the Cessna 185 fixed-wing aircraft was $31.55 per lake.

Table 1. Sawtooth Wilderness mountain lake fry plants, 1996.

Lake	Catalog No.	Species	Number Stocked
Imogene Lake 1	071713	R1[a]	3,000
Alpine Lake	071540	GN	1,150

[a] R1 = rainbow trout, GN = golden trout

Table 2. Challis National Forest mountain lake fry plants, 1996.

Lake	Catalog No.	Species	Number Stocked
Kidney Lake 1	071030	R1[a]	500
Rainbow Lake	070986	R1	1,000
Challis Creek Lake 2	071333	C2	250
Challis Creek Lake 3	071335	C2	250
W.Fk.Bear Creek Lake 1	071328	C2	250
Twin Creek Lake 2	071319	C2	250
Castle Lake 1	070835	C2	250
Castle Lake 2	070837	C2	250
Martindale Lake 1	070815	GR	1,000
Martindale Lake 2	070816	C2	750
Cache Creek Lake 3	070845	C2	250
Cache Creek Lake 5	070848	GR	500
Cache Creek Lake 1	070843	C2	250
Pole Lake	070834	C2	250
Liberty Lake 2	070833	C2	500
Rock Lake 1	070863	C2	500
Rock Lake 2	070864	C2	500
Falconberry Lake	070860	C2	500
Nelson Lake 1	070870	C2	500
Nelson Lake 2	070873	GR	1,000
Mystery Lake 3	070879	C2	500
China Lake 3	070885	C2	750
East Basin Lake 1	071514	C2	500
Kelly Lake	071575	C2	500
Mystery Lake 1	070876	GN	500
Mystery Lake 2	070877	GN	500
China Lake 2	070884	GN	500

[a] R1 = rainbow trout, C2 = westslope cutthroat trout, GR = Arctic grayling, GN = golden trout.

Table 3. White Cloud mountain lake fry plants, 1996.

Lake	Catalog No.	Species	Number Stocked
Elk Lake	071479	C2[a]	500
Thunder Lake	071679	C2	500
Lightening Lake	071680	C2	750
Hoodoo Lake	071463	C2	250
Martha Lake	071569	C2	500
Garland Lake 1	071468	C2	500
Garland Lake 2	071469	C2	500
Garland Lake 3	071470	C2	500
Swimm Lake	071467	C2	750
Gunsight Lake	071350	C2	500
Tincup Lake	071349	GR	1,000
Slide Lake	071363	C2	500
Sheep Lake	071356	C2	500
Cirque Lake	071369	C2	750
Sapphire Lake	071367	C2	750
Cove Lake	071364	C2	750
Gentian Lake	071370	C2	250
Snow Lake	071374	C2	250
Island Lake	071371	C2	500
Feldspar Lake	071380	GR	500
Dioxide Lake	071377	C2	250
Goat Lake	071375	C2	250
Big Frog Lake	071385	C2	1,000
Castle Lake	071420	C2	500
Drift/Shallow Lake	071424	C2	500
Headwall Lake	071405	C2	250
Lonesome Lake	071407	C2	250
Born Lake 2	071475	C2	250
Born Lake 3	071477	C2	250
Ocalkens Lake 1	071464	C2	500
Ocalkens Lake 2	071465	C2	750
Little Redfish Lake	071347	C2	250
Washington Lake 2	071444	C2	750
Phyllis Lake	071683	C2	1,000
Crater Lake	071460	C2	750
4th of July Lake	071685	C2	150

[a] C2 = westslope cutthroat trout, GR = Arctic grayling

Table 4. Big Horn Crags mountain lake fry plants, 1996.

Lake Name	Catalog No.	Species	Number Stocked
Pothole Lake	071184	C2[a]	500
Gentian Lake	071195	C2	500
Birdbill Lake	071197	C2	500
Sheepeater Lake	070620	C2	1,000
Shoban Lake	070619	C2	1,000
Airplane Lake	070618	C2	1,000
Harbor Lake	070796	C2	3,000
Wilson Lake	070794	C2	1,000
Heart Lake	070793	C2	2,000
Welcome Lake	070790	C2	3,000
Terrace Lake 3	070628	C2	500
Terrace Lake 2	070627	C2	500
Skyhigh Lake	070787	C2	1,000
Lost Lake	070740	C2	1,000
Turquoise Lake	070778	C2	1,000
Echo Lake	070777	C2	1,000
Reflection Lake	070770	C2	1,250
Twin Cove Lake	070773	C2	1,000
Doe Lake	070766	C2	750
Buck Lake	070764	C2	750
Ramshorn Lake	070755	C2	1,000
Paragon Lake	070756	C2	1,000
Plateau Lake	070632	C2	500
South Fork Lake	070630	C2	500
Big Clear Lake	071183	GN	1,500
Crater Lake	071185	GN	1,000
Gooseneck Lake	071187	GN	500
Glacier Lake	071189	GN	1,000
Golden Trout Lake	071201	GN	1,500

[a] C2 = westslope cutthroat trout, GN = golden trout

Table 5. Lemhi Range and Hat Creek Lakes mountain lake fry plants, 1996.

Lake	Catalog No.	Species	Number Stocked
Nez Perce Lake	071273	GR	500
Middle Fork Little Timber 1	071271	C2	1,000
Devils Lake	071260	C2	1,000
Big 8 Mile Lake	071264	C2	500
Dairy Lake	071263	C2	500
Everson Lake	071257	C2	1,500
Patterson Lake 2	071259	C2	250
Mill Creek Lake 1	071254	C2	1,500
Bray Lake 2	071247	C2	500
West Fork Hayden Lake 2	071249	C2	250
Wright Lake	071246	GR	500
Buck Creek Lake 3	071241	C2	250
Upper Buck Lake 4	071242	C2	500
Bear Valley Lake 1	071243	C2	1,500
Bear Valley Lake 2	071244	C2	1,000
Bear Valley Lake 3	071245	C2	250
McNutt Lake 4	071235	C2	500
Basin Lake 5	071237	C2	1,000
North Fork Hat Creek Lake	071285	C2	250
Hat Creek Lake 2	071288	GR	500
Hat Creek Lake 3	071289	C2	1,000
Hat Creek Lake 4	071290	C2	500
Hat Creek Lake 5	071293	C2	1,000
South Fork Moyer Creek Lake	071205	GR	500
Lower Iron Lake	071279	C2	1,000

[a] GR = Arctic grayling, C2 = westslope cutthroat.

Table 6. Continental Divide mountain lake fry plants, 1996.

Lake Name	Catalog No.	Species	Number Stocked
Bronco Lake	070566	C2[a]	1,000
Hidden Lake	070616	C2	2,000
Lost Packer Lake	070564	C2	1,000
Helen Lake	070573	C2	1,000
North Fork East Fork Reynolds Lake 2	070575	C2	1,000
North Fork East Fork Reynolds Lake 3	070578	C2	1,000
Line Lake	070603	C2	500
Allen Lake	071214	C2	1,000
Reingold Lake	071226	GR	500
Geertson Lake	071225	C2	1,000
Bohannon Lake	071228	C2	500
U.P. Lake	071220	C2	1,000
Pony Lake	071204	C2	500

[a] C2 = Westslope cutthroat trout, GR = Arctic grayling.

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