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Program F-71-R-22

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 c.	Salmon Region Rivers and Streams Investigations - Wild Trout Population Surveys
PROJECT II.	TECHNICAL GUIDANCE
PROJECT III.	HABITAT MANAGEMENT
PROJECT IV.	POPULATION MANAGEMENT

By

Mark Liter, Regional Fishery Biologist
Tom Curet, Regional Fishery Biologist
Mike Larkin, Regional Fishery Manager

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1997 ANNUAL PERFORMANCE REPORT

State of: Idaho

Program: Fisheries Management F-71-R-22

Project I: Surveys and Inventories

Subproject I-H: Salmon Region

Job: a

Title: Mountain Lakes Investigations

Contract Period: July 1, 1997 to June 30, 1998

ABSTRACT

We did not survey any Salmon Region mountain lakes during 1997.

Authors:

Mark Liter
Regional Fishery Biologist

Tom Curet
Regional Fishery Biologist

Mike Larkin
Regional Fishery Manager

1997 ANNUAL PERFORMANCE REPORT

State of: Idaho

Program: Fisheries Management F-71-R-22

Project I: Surveys and Inventories

Subproject I-H: Salmon Region

Job: b

Title: Lowland Lakes Investigations

Contract Period: July 1, 1997 to June 30, 1998

ABSTRACT

We did not survey any Salmon Region lowland lakes during 1997.

Authors:

Mark Liter
Regional Fishery Biologist

Tom Curet
Regional Fishery Biologist

Mike Larkin
Regional Fishery Manager

1997 ANNUAL PERFORMANCE REPORT

State of: Idaho

Program: Fishery Management F-71-R-22

Project I: Surveys and Inventories

Subproject I-H: Salmon Region

Job: c

Title: Rivers and Stream Investigations - Wild Trout Population Surveys

Contract Period: July 1, 1997 to June 30, 1998

ABSTRACT

The primary goal of this study was to determine the distribution of bull trout *Salvelinus confluentus.*

During summer 1997, project personnel surveyed 71 sites in 45 drainages to assess fish populations and size structure of salmonid species. We electrofished 42 sites on 26 North Fork Salmon River tributaries and 29 sites on 19 Salmon River tributaries, using multiple-pass removals to derive population estimates. Fish less than 70 mm total length were not included in the population estimates because they had a lower probability of capture by electrofishing.

We captured 915 trout. In order of abundance, they were rainbow trout/steelhead *Oncorhynchus mykiss*, westslope cutthroat trout *O. clarki lewisi*, bull trout, rainbow trout/westslope cutthroat trout hybrids, and brook trout *S. fontinalis.*

In Valley Creek, we removed 16,025 brook trout to reduce brook trout numbers, and transplanted 711 westslope cutthroat trout to reestablish a fishable population of westslope cutthroat trout. The Department also transplanted 215 bull trout into Valley Creek.

Project staff continued rainbow trout spawning ground surveys in the upper Lemhi River to monitor the benefits of Model Watershed sponsored habitat improvement projects and changes in fishing regulations. A substantial increase in redds was noted in 1998 compared to previous years.

Authors:

Mark Liter
Regional Fisheries Biologist

Tom Curet
Regional Fishery Biologist

Mike Larkin
Regional Fishery Manager

OBJECTIVES

1. Determine species composition, relative abundance, and size structure of salmonid populations in selected Salmon River and North Fork Salmon River tributaries, with emphasis on bull trout *Salvelinus confluentus*.

2. Determine the effectiveness of multiple pass electrofishing in reducing brook trout *S. fontinalis* abundance and reestablishing westslope cutthroat trout *Oncorhynchus clarki lewisi* in Valley Creek.

3. Determine baseline production levels of resident rainbow trout *O. mykiss* in the upper Lemhi River and monitor the effects of harvest restrictions and habitat improvement projects.

STUDY AREA AND METHODS

Salmon River Tributaries and North Fork Salmon River Tributaries

We used a Smith-Root SR-15 backpack unit and attempted to catch all sizes of game and non-game fish, setting block nets at either end of each transect unless natural barriers were present (i.e. waterfall, beaver dam or high gradient riffle). Transects ranged from 30-77 meters in length. We made passes going upstream, with each consecutive pass immediately after and with equal effort to the previous pass. Generally made two passes were sufficient, with a third occasionally needed to achieve reduction.

We measured fish to total length, placed them in holding pens, and monitored them for recovery until all passes were completed. Once electrofishing was completed, each fish was returned to the habitat where it was captured. We made no attempt to differentiate between rainbow trout and steelhead trout.

Density estimates were reported as fish sampled per $100m^2$ of transect surface area and were calculated using Microfish population software (Van Deventer and Platts, 1989). Because small fish are not efficiently sampled by electrofishing, we used only fish 70 mm and larger in the population estimates. If the sample size or distribution of fish among passes was insufficient for calculation of estimates using Microfish, we listed the sampled fish as 'observed', and did not include them in population estimate results.

Valley Creek

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. The project site began 9.6 km above the confluence of Valley Creek and the Salmon River, and continued 11.2 km upstream. The lower 0.8 km of several tributaries

was also included. We removed all brook trout captured.

Upper Lemhi River

In 1994 the Department began informal redd counts on Big Springs Creek, a tributary to the Lemhi River near Leadore. By 1997 we had established three transect areas to monitor long term trends in fish populations: two transects on Big Springs Creek and one on the mainstem Lemhi River. The two sites on Big Springs Creek include those portions of the creek that flow through the Karl Tyler and Darwin Neibaur ranches. The mainstem Lemhi River site includes the Merrill Beyeler Ranch from the upper fence approximately 100 meters upstream of the upper water gap to the lower fenced boundary.

We conduct redd counts annually between April 21 and May 3. Most spawning has ceased by the third week of April, therefore, the counts should represent the total spawning activity for the year.

RESULTS AND DISCUSSION

Salmon River Tributaries and North Fork Salmon River Tributaries

Appendices A, B, C, and D list survey sites, sampling dates, and transect measurements. We did not survey Crone Gulch due to low water. Detailed site measurements of streams are available at the Idaho Department of Fish and Game office in Salmon, Idaho.

We sampled 915 trout: 36% rainbow/steelhead trout, 27% westslope cutthroat trout, 20% bull trout, 14% rainbow trout/westslope cutthroat trout hybrids, and 3% brook trout. Appendices E and F list observed salmonid densities for each site by species and drainage. Combined density estimates within a stream are available at the Idaho Department of Fish and Game office in Salmon, Idaho.

Tables 1, 2, 3, 4 and 5 list population estimates with confidence intervals by species and by survey site. Appendices G, H, I, and J show population estimates with corresponding confidence intervals for all species of trout combined.

The East Fork Spring Creek had the highest estimated densities of rainbow/steelhead trout. The East Fork Pierce Creek and Salzer Creek had the highest estimated densities of westslope cutthroat trout. Carmen Creek had the highest estimated densities of bull trout. Sage and Colson creeks had the highest estimated densities of hybrid rainbow trout/cutthroat trout. We observed brook trout in only three streams (Hull, Dahlonega and Threemile creeks) and in low densities.

Table 1. Rainbow/steelhead trout (R1) population estimates, confidence intervals (CI), and capture probabilities for tributaries of the Salmon River and North Fork Salmon River.

Name of Drainage[a]	Observed R1/ 100m^2	Estimated[b] R1/ 100m^2	Lower 95% CI	Upper 95% CI	Capture Probability
Hull Creek, L	3	3	0.0	5.6	0.600
Hughes Creek, L	4	4	3.2	5.4	0.800
Hughes Creek, U	8	10	5.2	4.3	0.600
Ditch Creek, L	10	10	9.5	11.4	0.875
West Fork Hughes Creek	12	12	9.6	13.6	0.833
Dahlonega Creek	2	2	0.6	2.8	0.714
Pierce Creek, L	3	3	1.9	3.4	0.833
Indian Creek, L	5	6	3.5	7.6	0.684
Squaw Creek, L	8	8	6.3	8.9	0.833
Spring Creek, U	1	1	0.0	10.6	0.500
East Fork Spring Creek, L	12	12	10.7	13.5	0.733
East Fork Spring Creek, U	12	12	11.1	13.2	0.750
Pine Creek	6	7	4.7	9.1	0.700
Owl Creek	1	1	0.0	5.4	0.667
East Fork Owl Creek	4	4	2.7	4.9	0.833
Colson Creek, L	12	12	11.0	12.4	0.900
Butts Creek, L	14	14	12.7	14.6	0.880
Butts Creek, U	7	7	6.5	7.6	0.900
Corn Creek	14	14	12.9	15.4	0.852
Wheat Creek	9	9	8.5	10.3	0.900
Horse Creek, U	5	5	3.9	5.4	0.667
Woods Creek	10	10	10.0	12.7	0.769

[a] L = lower site, M = middle site, U = upper site.
[b] Only rainbow/steelhead trout trout > 70 mm were used in estimates.

Table 2. Westslope cutthroat trout (C1) population estimates, confidence intervals (CI), and capture probabilities for tributaries of the Salmon River and North Fork Salmon River.

Name of Drainage[a]	Observed C1/ 100m^2	Estimated[b] C1/ 100m^2	Lower 95% CI	Upper 95% CI	Capture Probability
Hull Creek, M	19	19	17.6	20.5	0.909
Ditch Creek, U	9	9	7.5	11.1	0.800
Salzer Creek, M	25	25	23.9	26.3	0.892
Salzer Creek, U	14	14	12.8	15.9	0.850
Threemile Creek, U	7	7	5.4	9.0	0.714
Threemile Creek, M	11	11	8.9	12.5	0.833
Nez Perce Creek	7	7	4.7	8.6	0.833
Hammerean Creek	9	9	6.2	12.3	0.778
Vine Creek, L	16	17	11.4	22.3	0.700
Vine Creek, U	19	19	17.8	20.4	0.917
Pierce Creek, L	2	2	0.0	5.6	0.600
Pierce Creek, U	7	8	1.2	15.7	0.522
East Fork Pierce Creek	21	21	19.7	21.8	0.929
Moose Creek, L	2	2	0.0	12.7	0.667
Sage Creek	10	10	5.5	14.6	0.750
Corral Creek	6	6	4.1	8.1	0.778
Spring Creek, U	11	11	9.9	12.5	0.696
East Fork Spring Creek, L	2	2	0.0	16.7	0.500
Pine Creek	1	1	0.0	2.9	0.750
Johnson Gulch	24	24	11.0	11.7	0.917
Deep Creek,	23	23	11.0	13.5	0.986
Fourth of July Creek, L	5	5	9.0	9.9	0.900
Wagonhammer Creek, L	9	9	4.0	6.0	0.800
Wagonhammer Creek, M	23	23	43.0	44.0	0.935

[a] L = lower site, M = middle site, U = upper site.
[b] Only westslope cutthroat trout >70 mm were used in estimates.

Table 3. Bull trout population estimates, confidence intervals (CI), and capture probabilities for tributaries of the Salmon River and North Fork Salmon River.

Name of Drainage[a]	Observed Bull trout/ $100m^2$	Estimated[b] Bull trout/ $100m^2$	Lower 95% CI	Upper 95% CI	Capture Probability
Sheep Creek, U	4	4	3.0	4.4	0.636
South Fork Sheep Creek	3	3	2.4	3.6	0.800
North Fork Sheep L	2	2	0.0	5.1	0.750
Twin Creek, L	4	4	3.8	4.6	0.846
Twin Creek, U	8	8	6.3	10.5	0.535
Indian Creek, U	4	4	1.5	5.8	0.545
West Fork Indian Creek	5	5	0.0	10.3	0.750
Corral Creek	3	3	0.0	7.4	0.667
Squaw Creek, LM	2	2	1.1	2.1	0.833
Boulder Creek	4	4	3.5	4.0	0.917
Horse Creek, U	1	2	0.0	10.6	0.231
Horse Creek, U2	14	14	12.3	16.0	0.833
Carmen Creek, L	7	7	5.7	7.5	0.818
Carmen Creek, U	9	10	7.8	12.7	0.694
Woods Creek	4	4	4.0	5.9	0.800
Fourth of July Creek, L	5	5	9.0	140.7	0.250
Fourth of July Creek, U	4	4	7.0	8.0	0.875

[a] L = lower site, M = middle site, U = upper site.
[b] Only bull trout >70 mm were used in estimates.

Table 4. Rainbow trout/westslope cutthroat trout hybrid trout population estimates, confidence intervals (CI), and capture probabilities for tributaries of the Salmon River and North Fork Salmon River.

Name of Drainage[a]	Observed Hybrids/ $100m^2$	Estimated[b] Hybrids/ $100m^2$	Lower 95% CI	Upper 95% CI	Capture Probability
Ditch Creek, U	2	2	0.0	11.4	0.667
Little Sheep Creek	9	9	6.3	11.5	0.833
Smithy Creek	2	2	0.0	14.9	0.667
West Fork Nez Perce Creek	6	6	0.0	11.8	0.750
Pierce Creek, L	5	5	3.8	5.8	0.818
Moose Creek, U	20	20	17.3	21.9	0.842
Sage Creek	22	22	19.4	24.1	0.867
West Fork Indian Creek	20	20	17.5	22.5	0.857
Squaw Creek, U	2	2	1.1	2.9	0.750
Colson Creek, L	2	2	0.0	4.0	0.750
Colson Creek, U	29	30	25.2	35.1	0.767
East Boulder Creek	10	11	30.0	43.1	0.492

[a] L = lower site, M = middle site, U = upper site.
[b] Only hybrid trout >70 mm were used in estimates.

Table 5. Brook trout population estimates[a], confidence intervals (CI), and capture probabilities for Hull Creek, tributary to the North Fork Salmon River.

Name of Drainage[b]	Observed Brook trout/ $100m^2$	Estimated[c] Brook trout/ $100m^2$	Lower 95% CI	Upper 95% CI	Capture Probability
Hull Creek, L	6	6	4.0	7.1	0.667
Hull Creek, U	3	3	1.3	3.8	0.800

[a] Brook trout were also captured in Dahlonega and Threemile creeks; however, due to small sample sizes, no population estimates could be calculated.
[b] L = lower site, M = middle site, U = upper site.
[c] Only brook trout >70 mm were used in estimates.

Tables 6, 7, 8, 9, and 10 summarize total length data for each trout species. The North Fork Salmon River and the East Fork Owl Creek contained larger rainbow trout than other areas sampled. Indian Creek and the North Fork Salmon River contained larger westslope cutthroat trout. Spring Creek and the West Fork of the North Fork Salmon River contained larger bull trout. Indian and Twin creeks contained larger rainbow trout/westslope cutthroat trout hybrids. The largest brook trout (230 mm) was in Hull Creek. Dahlonega Creek also contained large brook trout.

Valley Creek

There were increasing numbers westslope cutthroat trout as we moved upstream into the higher gradient headwaters. Sampling was in late August, September, and October. Removal seemed especially effective in October when pairs of spawning brook trout were taken off their redds and the redds destroyed.

The Idaho Department of Fish and Game transferred 711 westslope cutthroat trout and 215 bull trout from several area tributaries to repopulate Valley Creek with native stocks (Table 11). In 1998 we plan to implant radio transmitters in several stocks of westslope cutthroat trout and monitor their movements in or out of Valley Creek. This will show if one stock is more likely to remain in Valley Creek than the others.

Upper Lemhi River

Table 12 shows redd counts recorded since 1994. In 1998 there was a substantial increase in counts at all sites. These increases probably had several causes: (1) fishing regulations on the Lemhi River changed from no size limit to a 14-in minimum size restriction, (2) we completed several habitat improvement projects, and (3) Lemhi county experienced a reprieve in drought conditions in the late 1980s and early 1990s. Regional personnel will continue to monitor these population trends.

Table 6. Total lengths of rainbow/steelhead trout sampled in North Fork Salmon and Salmon rivers tributaries.

North Fork Salmon River Drainage	Sample Size[a]	Mean (mm)	Minimum (mm)	Maximum (mm)	Standard Deviation
North Fork Salmon River	9	165.0	113	220	*
Hull Creek	6	125.0	110	136	*
Hughes Creek	26	125.7	70	200	33.61
Ditch Creek	14	115.6	70	200	46.12
Allen Creek	9	102.8	80	155	*
West Fork Hughes Creek	10	118.0	80	198	37.57
Sheep Creek	2	123.5	72	175	*
Dahlonega Creek	5	140.4	90	215	*
Pierce Creek	5	140.6	88	190	*
Moose Creek	1	86.0	86	86	*

Salmon River Drainage	Sample Size	Mean (mm)	Minimum (mm)	Maximum (mm)	Standard Deviation
Indian Creek	13	124.7	77	182	29.71
Squaw Creek	12	116.3	75	195	36.25
Spring Creek	5	149.0	100	215	*
East Fork Spring Creek	26	128.1	70	175	21.07
Pine Creek	14	127.4	70	195	35.47
Owl Creek	2	80.0	75	85	*
East Fork Owl Creek	5	156.0	105	210	*
Colson Creek	18	121.7	75	218	44.81
Butts Creek	32	113.0	70	172	26.68
Corn Creek	23	131.3	73	180	36.31
Wheat Creek	9	131.9	86	205	*
Horse Creek	14	130.0	80	180	31.93
Woods Creek	10	137.1	90	158	27.00

[a] Only rainbow/steelhead trout >70 mm were used in estimates.
*Indicates no standard deviation calculated due to small sample size.

Table 7. Total lengths of westslope cutthroat trout sampled in North Fork Salmon and Salmon rivers tributaries.

North Fork Salmon River Drainage	Sample Size[a]	Mean (mm)	Minimum (mm)	Maximum (mm)	Standard Deviation
North Fork Salmon River	1	230.0	230	230	*
Hull Creek	10	95.5	70	130	22.42
Ditch Creek	13	127.1	70	180	33.16
Salzer Creek	50	119.6	70	250	34.30
West Fork Hughes Creek	1	150.0	150	150	*
Stein Gulch	2	129.0	90	168	*
Smithy Creek	3	81.7	70	100	*
Threemile Creek	15	109.7	70	200	35.70
Nez Perce Creek	5	103.0	85	140	*
West Fork Nez Perce	3	98.3	75	135	*
Hammerean Creek	7	111.9	75	160	*
Vine Creek	25	113.7	70	180	27.00
Pierce Creek	15	130.1	70	202	40.98
East Fork Pierce Creek	13	111.7	70	160	32.29
West Fork North Fork	4	117.5	75	145	*
Moose Creek	3	160.0	155	165	*
Johnson Gulch	11	90.4	72	130	16.08
Deep Creek	11	118.5	80	73	26.52

Salmon River Drainage	Sample Size	Mean (mm)	Minimum (mm)	Maximum (mm)	Standard Deviation
Sage Creek	6	127.2	97	167	*
Indian Creek	1	260.0	260	260	*
Corral Creek	7	120.0	105	155	*
Squaw Creek	2	180.0	165	195	*
Spring Creek	16	113.3	75	171	26.25
East Fork Spring Creek	2	179.0	155	203	*
Pine Creek	3	120.3	90	146	*
Colson Creek	2	139.0	138	140	*
Wagonhammer Creek	47	115.6	75	238	N/A
Fourth of July Creek	9	136.0	95	180	*

[a] Only westslope cutthroat trout >70 mm were used in estimates.
* Indicates no standard deviation calculated due to small sample size.

Table 8. Total lengths of bull trout sampled in North Fork Salmon and Salmon rivers tributaries.

North Fork Salmon River Drainage	Sample Size[a]	Mean (mm)	Minimum (mm)	Maximum (mm)	Standard Deviation
Sheep Creek	15	145.3	95	210	30.21
South Fork Sheep Creek	12	120.1	70	161	24.64
North Fork Sheep Creek	9	145.7	70	250	*
Twin Creek	45	133.1	70	230	47.35
West Fork North Fork	1	180.0	180	180	*
Moose Creek	2	160.0	100	220	*

Salmon River Drainage	Sample Size	Mean (mm)	Minimum (mm)	Maximum (mm)	Standard Deviation
Indian Creek	6	153.3	115	190	*
West Fork Indian Creek	3	113.7	98	145	*
Corral Creek	4	138.8	125	165	*
Squaw Creek	9	123.3	80	185	*
Spring Creek	1	210.0	210	210	*
Boulder Creek	11	133.8	115	180	22.12
Horse Creek	18	128.3	85	185	30.39
Woods Creek	4	110.3	98	138	*
Carmen Creek	43	153.7	70	210	35.36

[a] Only bull trout >70 mm were used in estimates.
* Indicates no standard deviation calculated due to small sample size.

Table 9. Total lengths of rainbow trout/westslope cutthroat trout hybrids sampled in North Fork Salmon and Salmon rivers tributaries.

North Fork Salmon River Drainage	Sample Size[a]	Mean (mm)	Minimum (mm)	Maximum (mm)	Standard Deviation
Hughes Creek	1	135.0	135	135	*
Ditch Creek	2	145.0	135	155	*
Stein Gulch	1	108.0	108	108	*
Little Sheep Creek	5	109.6	75	140	*
Smithy Creek	2	92.0	87	97	*
Threemile Creek	3	121.7	90	160	*
West Fork Nez Perce Creek	3	81.7	75	95	*
Twin Creek	1	168.0	168	168	*
Pierce Creek	18	131.2	80	200	36.39
West Fork North Fork Salmon River	2	107.5	85	130	*
Moose Creek	17	109.9	75	180	31.68

Salmon River Drainage	Sample Size	Mean (mm)	Minimum (mm)	Maximum (mm)	Standard Deviation
Sage Creek	13	119.2	70	183	32.33
Indian Creek	1	220.0	220	220	*
West Fork Indian Creek	12	111.3	91	144	18.67
Squaw Creek	8	127.3	80	145	*
East Fork Spring Creek	1	115.0	115	115	*
East Fork Boulder Creek	32	145.4	96	200	N/A
Pine Creek	1	71.0	71	71	*
East Fork Owl Creek	3	178.3	170	190	*
Colson Creek	26	108.6	75	185	28.29
Butts Creek	1	177.0	177	177	*
Corn Creek	1	130.0	130	130	*

[a] Only rainbow steelhead trout >70 mm were used in estimates.
* Indicates no standard deviation calculated due to small sample size.

Table 10. Total lengths of brook trout sampled in North Fork Salmon and Salmon rivers tributaries.

North Fork Salmon River Drainage	Sample Size	Mean (mm)	Minimum (mm)	Maximum (mm)	Standard Deviation
Hull Creek	10	159.8	120	230	34.92
Dahlonega Creek	3	170.0	130	220	*
Threemile Creek	1	135.0	135	135	*

[a] Only brook trout >70 mm were used in estimates.
* Indicates no standard deviation calculated due to small sample size.

Table 11. Fish stocked in Valley Creek in 1997.

Species	Number	Size Range (mm)	Source Stream	Date Released
Cutthroat trout	81	250-360	Middle Fork Salmon River (Dagger Falls)	6/17-25
Cutthroat trout	144	75-250	Rapid River and tributaries	9/5
Cutthroat trout	181	75-330	Little Morgan Creek (Pahsimeroi tributary)	10/9
Cutthroat trout	110	100-330	Morse Creek (Pahsimeroi tributary)	10/3
Cutthroat trout	77	100-310	Morse Creek (Pahsimeroi tributary)	9/29
Cutthroat trout	118	75-310	McKim Creek (Salmon River tributary)	10/6
Total Cutthroat trout	711			
Bull trout	15	100-250	Rapid River and Middle Fork Salmon River tributaries	9/5
Bull trout	22	100-310	Little Morgan Creek (Pahsimeroi tributary)	10/9
Bull trout	67	100-310	Morse Creek (Pahsimeroi tributary)	10/3
Bull trout	56	100-250	Morse Creek (Pahsimeroi tributary)	9/29
Bull trout	55	75-310	McKim Creek (Salmon River tributary)	10/6
Total Bull trout	215			

Table 12. Numbers of resident rainbow trout redds counted in Big Springs Creek (BSC) and mainstem Lemhi River, 1994-1998.

Year	Lemhi River at Beyeler Ranch[a]	BSC at Neibaur Ranch[b]	BSC at Tyler Ranch[c]	Total	Date
1994	-	-	-	40[d]	4/26/94
1995	-	57	57		5/3/95
1996	7	32	-	39	5/3/96
1997	8	44	45	97	4/21-5/3/97
1998	18	93	124	235	5/3/98

[a] Model Watershed habitat improvement project implemented spring 1995.
[b] Model Watershed habitat improvement project implemented summer 1996.
[c] Model Watershed habitat improvement project implemented spring 1998.
[d] Incidental count taken during habitat survey of Big Spring Creek.

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Appendix A. Site characteristics for the North Fork Salmon River and tributaries entering from the west side of Highway 93.

Drainage and Site[a]	1997 Survey Date	Transect Length (m)	Width 1 (m)	Width 2 (m)	Width 3 (m)	Width 4 (m)	Width 5 (m)	Mean Transect Width(m)	Transect Area (m^2)
North Fork Salmon River, M	8/04	50.0	7.0	7.6	8.3	8.3	10.0	8.2	412.0
North Fork Salmon River, M2	8/07	48.0	5.3	5.2	6.0	5.0	5.6	5.4	260.2
Hull Creek, L	7/15	53.0	1.5	2.0	2.0	2.2	2.5	2.0	108.1
Hull Creek, M	7/31	32.0	1.0	1.3	1.5	2.1	2.3	1.6	52.5
Hull Creek, U	7/15	50.0	2.1	3.8	3.2	4.0	2.5	3.1	156.0
Hughes Creek, L	7/30	48.0	4.4	5.0	3.0	4.0	3.0	3.9	186.2
Hughes Creek, U	7/30	54.0	3.8	3.0	3.6	3.5	6.0	4.0	214.9
Ditch Creek, L	7/30	38.0	4.4	3.7	2.5	3.0	4.0	3.5	133.8
Ditch Creek, U	7/30	37.5	5.0	2.8	3.2	3.1	3.1	3.4	129.0
Humbug Creek	7/30	*	*	*	*	*	*	*	*
Allan Creek	7/30	40.0	1.3	1.0	1.7	1.2	1.3	1.3	52.0
Salzer Creek, M	7/30	45.0	2.5	3.3	3.5	2.7	2.6	2.9	131.4
Salzer Creek, U	7/30	42.0	1.5	1.8	3.5	3.8	3.5	2.8	118.4
West Fork Hughes Creek	7/30	31.0	2.7	3.4	2.7	2.8	2.3	2.8	86.2
Friedorf Gulch	9/04	*	*	*	*	*	*	*	*
Johnson Gulch	9/04	57.0	0.9	1.3	0.5	0.8	0.6	0.8	230.9
Hammerean Creek	7/31	35.0	2.5	1.9	1.5	1.9	3.0	2.2	75.6
Quartz Creek	9/04	*	*	*	*	*	*	*	*
Deep Creek	9/04	42.0	1.7	1.1	0.8	1.0	1.2	1.1	47.9
Elk Creek	9/04	*	*	*	*	*	*	*	*
Twin Creek, L	8/04	77.0	4.5	4.6	9.0	10.1	5.9	6.8	525.1
Twin Creek, U	8/04	52.4	7.2	6.0	5.4	5.6	4.2	5.7	297.6
Vine Creek, L	7/29	50.0	2.0	2.0	1.8	1.6	1.5	1.8	89.0
Vine Creek, U	7/29	30.0	2.0	2.5	1.5	1.7	1.9	1.9	57.6
State Creek	9/10	*	*	*	*	*	*	*	*
West Fork North Fork Salmon River	7/29	46.0	2.7	2.3	2.8	4.0	4.2	3.2	147.2
Moose Creek, L	7/29	46.0	3.1	2.7	1.9	2.8	2.1	2.5	115.9
Moose Creek, U	7/29	40.0	1.3	1.4	2.2	2.3	3.0	2.0	81.6
Johnson Gulch	9/04	57.0	0.9	1.3	0.5	0.8	0.6	0.8	46.2
Deep Creek	9/04	42.0	1.7	1.1	0.8	1.0	1.2	1.1	47.9

*Indicates that no area measurements were taken.
[a] L = lower site, M = middle site, U = upper site.

Appendix B. Site characteristics for tributaries of the North Fork Salmon River entering from the east side of Highway 93.

Drainage and Site[a]	1997 Survey Date	Transect Length (m)	Width 1 (m)	Width 2 (m)	Width 3 (m)	Width 4 (m)	Width 5 (m)	Mean Transect Width(m)	Transect Area (m^2)
Sheep Creek, U	7/17	60.0	8.1	8.0	4.2	5.1	6.5	6.4	382.8
Sheep Creek, L	7/28	54.0	6.1	6.5	6.5	8.5	7.4	7.0	378.0
Sheep Creek, L2	7/28	42.0	6.0	5.7	5.4	5.2	6.4	5.7	241.1
Stein Gulch, L	7/28	41.0	2.0	1.2	0.5	0.6	1.0	1.1	43.5
Stein Gulch, U	7/28	32.0	0.5	0.7	1.2	1.0	0.6	0.8	25.6
South Fork Sheep Creek	7/17	63.0	8.2	8.4	5.3	5.6	4.5	6.4	403.2
Shewag Creek	7/17	*	*	*	*	*	*	*	*
Pruvan Creek	7/17	*	*	*	*	*	*	*	*
Little Sheep Creek	7/28	33.0	1.2	2.8	0.8	2.1	1.6	1.7	56.1
North Fork Sheep, U	7/17	61.0	4.5	4.5	4.0	3.5	3.0	3.9	237.9
North Fork Sheep, L	7/16	30.0	4.5	3.7	4.0	4.0	4.2	4.1	122.4
Bradley Gulch	7/17	*	*	*	*	*	*	*	*
Lick Creek	8/04	*	*	*	*	*	*	*	*
Dahlonega Creek	8/04	70.0	4.0	3.8	3.9	4.9	4.5	4.2	295.4
Smithy Creek	7/10	41.0	3.0	2.0	2.5	2.5	2.0	2.4	98.4
Threemile Creek, L	7/10	44.0	4.0	3.0	2.0	2.0	5.0	3.2	140.8
Threemile Creek, U	7/10	40.0	1.0	1.7	1.8	2.2	2.0	1.7	69.6
Threemile Creek, M	7/10	40.0	3.0	2.0	2.1	2.1	2.5	2.3	93.6
Nez Perce Creek	7/29	35.0	1.7	2.5	2.4	2.2	2.0	2.2	75.6
West Fork Nez Perce Creek	7/29	4.0	0.7	1.2	1.3	1.1	1.7	1.2	52.8
Creekone Gulch	7/01	*	*	*	*	*	*	*	*
Pierce Creek, L	8/07	64.0	3.3	2.6	3.0	4.2	1.6	2.9	188.2
Pierce Creek, U	8/07	59.0	4.2	3.2	2.8	3.4	1.4	3.0	177.0
East Fork Pierce Creek	8/07	55.0	1.0	1.8	0.8	1.2	0.9	1.1	62.7

*Indicates that no area measurements were taken.
[a] L = lower site, M = middle site, U = upper site.

Appendix C. Site characteristics for tributaries of the Salmon River entering at Spring Creek and below.

Drainage and Site[a]	1997 Survey Date	Transect Length (m)	Width 1 (m)	Width 2 (m)	Width 3 (m)	Width 4 (m)	Width 5 (m)	Mean Transect Width(m)	Transect Area (m^2)
Spring Creek, U	7/08	45.5	3.8	3.4	3.0	3.5	2.0	3.1	142.9
Spring Creek, L	7/08	34.0	5.4	5.1	4.6	5.2	4.9	5.0	171.4
East Fork Spring Creek, L	7/08	34.0	3.0	2.9	2.0	2.5	3.0	2.7	91.1
East Fork Spring Creek, U	7/08	35.0	4.3	3.1	4.0	3.2	3.0	3.5	123.2
Boulder Creek	7/09	70.0	4.1	4.6	3.9	4.5	3.9	7.2	294.0
Horsefly Gulch	8/25	*	*	*	*	*	*	*	*
Fool Hen Gulch	8/25	*	*	*	*	*	*	*	*
Pine Creek	7/31	42.0	4.8	5.2	5.6	6.2	4.1	5.2	217.6
Cove Creek	8/05	*	*	*	*	*	*	*	*
Owl Creek	8/05	40.0	8.2	6.0	6.5	7.1	6.1	6.8	271.2
East Fork Owl Creek	8/05	38.0	4.0	3.8	3.6	3.1	2.9	3.5	132.2
Wallace	9/05	*	*	*	*	*	*	*	*
Colson Creek, L	7/24	50.0	3.1	3.1	2.6	3.0	3.6	3.1	154.0
Colson Creek, U	7/24	39.0	2.1	2.0	2.0	1.6	2.5	2.0	79.6
Bear Basin Creek	7/57	*	*	*	*	*	*	*	*
Butts Creek, L	8/06	46.0	3.0	3.4	2.9	2.7	5.5	3.5	161.0
Butts Creek, U	8/06	40.0	3.0	3.5	4.2	2.9	4.1	3.5	141.6
Corn Creek	7/24	36.0	3.5	4.5	4.5	5.0	5.1	4.5	162.7
Wheat Creek	8/06	38.0	2.4	2.7	3.2	2.2	2.1	2.5	95.8
Horse Creek, U	7/21	50.0	4.8	5.2	7.1	8.5	4.6	6.0	302.0
Horse Creek, U2	7/21	59.0	1.2	1.4	2.1	2.4	1.9	1.8	106.2
Woods Creek	7/21	55.0	2.0	2.0	2.0	3.0	2.0	2.0	111.0

* Indicates that no area measurements were taken.

[a] L = lower site, M = middle site, U = upper site.

Appendix D. Site characteristics for tributaries of the Salmon River entering above Spring Creek.

Drainage and Site[a]	1997 Survey Date	Transect Length (m)	Width 1 (m)	Width 2 (m)	Width 3 (m)	Width 4 (m)	Width 5 (m)	Mean Transect Width(m)	Transect Area (m^2)
Sage Creek	7/31	36.0	1.0	1.4	1.3	2.0	2.6	1.7	59.8
Indian Creek, L	7/31	39.0	5.1	7.2	6.7	7.0	6.5	6.5	253.5
Indian Creek, U	7/22	45.0	4.5	4.2	3.0	2.7	4.0	3.7	165.6
West Fork Indian Creek	7/22	50.0	0.8	1.0	1.3	1.4	1.5	1.2	60.0
East Fork Indian Creek	7/23	*	*	*	*	*	*	*	*
Corral Creek	7/23	36.0	4.0	3.9	3.5	2.0	2.6	3.2	115.2
Brushy Gulch	7/23	*	*	*	*	*	*	*	*
Squaw Creek, L	7/15	45.0	2.5	2.8	2.5	2.8	4.0	2.9	131.4
Squaw Creek, LM	7/14	80.0	3.8	3.6	4.0	3.8	4.2	3.9	310.4
Squaw Creek, MU	7/14	60.0	4.0	3.0	3.5	4.4	3.0	3.6	214.8
Squaw Creek, U	7/14	77.0	4.2	4.0	4.0	4.5	2.5	3.8	295.7
E. Boulder Creek	8/14	88.0	3.0	5.0	2.5	2.8	3.1	3.3	288.6
Wagonhammer Creek, L	8/25	40.0	1.3	1.2	1.1	1.0	0.9	1.1	44.0
Wagonhammer Creek, M	8/25	86.0	1.6	3.7	2.3	1.9	1.4	2.2	187.5
Fourth of July Creek, L	9/10	45.0	3.6	4.1	4.7	4.7	4.7	4.4	196.2
Fourth of July Creek, U	9/10	38.0	7.1	3.8	2.9	3.7	4.9	4.5	170.2
Little Fourth of July Creek	8/25	*	*	*	*	*	*	*	*
Blacktail Creek	7/08	*	*	*	*	*	*	*	*
Boulder Creek	7/09	70.0	4.1	4.6	3.9	4.5	3.9	4.2	294.0
Carmen Creek, L	8/05	50.0	6.5	5.1	4.5	5.5	5.7	5.5	273.0
Carmen Creek, U	8/05	49.0	5.9	6.0	4.5	5.0	5.5	5.4	263.6
Freeman Creek	8/05	*	*	*	*	*	*	*	*

*Indicates that no area measurements were taken.
[a] L = lower site, M = middle site, U = upper site.

Appendix E. Observed trout per 100 m^2 in the North Fork Salmon River and tributaries.

Drainage Name	Rainbow Trout	Westslope Cutthroat Trout	Brook Trout	Bull Trout	Hybrid R1/C1 [a] Trout	All Trout
North Fork Salmon	1.3	0.1	0.0	0.0	0.0	1.5
Hull Creek	1.9	3.2	3.2	0.0	0.0	8.2
Hughes Creek	6.7	0.0	0.0	0.0	0.2	6.7
Ditch Creek	5.3	4.9	0.0	0.0	0.8	11.0
Allan Creek	17.3	0.0	0.0	0.0	0.0	17.3
Salzer Creek	0.0	20.0	0.0	0.0	0.0	20.0
West Fork Hughes Creek	12.0	1.2	0.0	0.0	0.0	12.8
Sheep Creek	0.2	0.0	0.0	1.5	0.0	1.7
Stein Gulch	0.0	2.9	0.0	0.0	1.4	4.3
South Fork Sheep Creek	0.0	0.0	0.0	2.9	0.0	2.9
Little Sheep Creek	0.0	0.0	0.0	0.0	9.0	9.0
North Fork Sheep	0.0	0.0	0.0	2.5	0.0	2.5
Bradley Gulch	*	*	*	*	*	*
Dahlonega Creek	1.7	0.0	1.0	0.0	0.0	2.7
Smithy Creek	0.0	3.0	0.0	0.0	2.0	5.1
Threemile Creek	0.0	4.9	0.3	0.0	1.0	6.2
Nez Perce Creek	0.0	6.7	0.0	0.0	0.0	6.7
W. Fork. Nez Perce	0.0	5.7	0.0	0.0	5.7	11.4
Crone Gulch	*	*	*	*	*	*
Hammerean Creek	0.0	9.2	0.0	0.0	0.0	9.2
Twin Creek	0.0	0.0	0.0	5.5	0.1	5.6
Vine Creek	0.0	17.0	0.0	0.0	0.0	17.0
Pierce Creek	1.4	4.1	0.0	0.0	5.0	10.4
East Fork Pierce Creek	0.0	20.7	0.0	0.0	0.0	20.7
West Fork North Fork Salmon River	0.0	2.7	0.0	0.7	1.3	4.7
Moose Creek	1.0	1.5	0.0	1.0	9.1	12.6
Johnson Gulch	0.0	24.0	0.0	0.0	0.0	24.0
Deep Creek	0.0	23.0	0.0	0.0	0.0	23.0
Fourth of July Creek	0.0	5.0	0.0	9.0	0.0	14.0

[a] R1 = rainbow trout; C1 = westslope cutthroat trout.
* Indicates no fish were found.

Appendix F. Observed trout per 100m^2 in Salmon River tributaries.

Drainage Name	Rainbow Trout	Westslope Cutthroat Trout	Brook Trout	Bull Trout	Hybrid R1/C1 [a] Trout	All Trout
Sage Creek	0.0	10.0	0.0	0.0	21.7	31.8
Indian Creek	3.1	0.2	0.0	1.4	0.2	5.0
West Fork Indian Creek	P[b]	0.0	0.0	5.0	20.0	25.0
East Fork Indian Creek	*	*	*	*	*	*
Corral Creek	0.0	6.1	0.0	3.5	0.0	9.5
Squaw Creek	1.3	0.2	0.0	0.9	0.8	3.2
Spring Creek	1.6	5.1	0.0	0.3	0.0	7.0
East Fork Spring Creek	12.1	0.9	0.0	0.0	0.5	13.5
Boulder Creek	0.0	0.0	0.0	3.7	0.0	3.7
Pine Creek	6.4	1.4	0.0	0.0	0.5	8.3
Owl Creek	0.7	0.0	0.0	0.0	0.0	0.7
East Fork Owl Creek	3.8	0.0	0.0	0.0	2.7	6.0
Colson Creek	7.7	0.8	0.0	0.0	11.1	19.7
Butts Creek	10.6	0.0	0.0	0.0	0.3	11.0
Corn Creek	14.1	0.0	0.0	0.0	0.6	14.7
Wheat Creek	9.4	0.0	0.0	0.0	0.0	9.4
Horse Creek	3.4	0.0	0.0	4.4	0.0	7.8
Carmen Creek	0.0	0.0	0.0	8.0	0.0	8.0
Freeman Creek	*	*	*	*	*	*
E. Boulder Creek	0.0	0.0	0.0	0.0	10.0	10.0
Woods Creek	9.0	0.0	0.0	4.0	0.0	13.0
Wagonhammer Creek	P	20.0	0.0	0.0	0.0	20.0
Fourth of July Creek	0.0	5.0	0.0	9.0	0.0	14.0
Fool Hen Gulch	P	0.0	0.0	0.0	0.0	0.0
Little Fourth of July Creek	P	0.0	0.0	0.0	0.0	0.0

[a] R1 = rainbow trout; C1 = westslope cutthroat trout.
[b] P indicates rainbow trout < 70 mm were only trout observed.
* Indicates no fish were found.

Appendix G. Combined trout species population estimates per $100m^2$ for the North Fork Salmon River and tributaries entering from the west side of Highway 93.

Name of Drainage[a]	Observed Trout	Estimated[b] Trout	Lower 95% Confidence Interval	Upper 95% Confidence Interval
Hull Creek, L	8.0	8.0	6.3	10.3
Hull Creek, M	19.0	19.0	17.6	20.5
Hull Creek, U	4.0	4.0	3.8	5.2
Hughes Creek, L	5.0	5.0	3.2	6.4
Hughes Creek, U	8.0	10.0	5.2	14.3
Ditch Creek, L	11.0	11.0	10.3	12.1
Ditch Creek, U	11.0	12.0	7.9	15.4
Salzer Creek, M	25.0	25.0	23.9	26.3
Salzer Creek, U	14.0	14.0	12.8	15.9
West Fork Hughes Creek	13.0	13.0	9.9	15.7
Johnson Gulch	24.0	24.0	11.0	11.7
Hammerean Creek	9.0	9.0	6.2	12.3
Deep Creek	23.0	23.0	11.0	13.5
Twin Creek, L	4.0	5.0	3.8	5.3
Twin Creek, U	8.0	8.0	6.3	10.5
Vine Creek, L	16.0	17.0	11.4	22.3
Vine Creek, U	19.0	19.0	17.8	20.4
West Fork North Fork Salmon River	5.0	5.0	3.2	6.3
Moose Creek, L	5.0	5.0	4.1	6.2
Moose Creek, U	21.0	21.0	18.6	23.0

[a] L = lower site, M = middle site, U = upper site.
[b] Only trout > 70 mm were used in estimates.

Appendix H. Combined trout species population estimates per $100m^2$ for tributaries of the North Fork Salmon River entering from the east side of Highway 93.

Name of Drainage[a]	Observed Trout/$100m^2$	Estimated[b] Trout/$100m^2$	Lower 95% Confidence Interval	Upper 95% Confidence Interval
Sheep Creek, U	4.0	4.0	3.0	4.4
South Fork Sheep Creek	3.0	3.0	2.4	3.6
Little Sheep Creek	9.0	9.0	6.3	11.5
North Fork Sheep, L	2.0	2.0	0.0	5.1
Dahlonega Creek	3.0	3.0	2.0	3.4
Smithy Creek	5.0	5.0	3.6	6.6
Threemile Creek, U	7.0	7.0	5.4	9.0
Threemile Creek, M	13.0	13.0	11.2	14.4
Nez Perce Creek	7.0	7.0	4.7	8.6
West Fork Nez Perce Creek	11.0	11.0	9.1	13.7
Pierce Creek, L	9.0	10.0	6.9	12.2
Pierce Creek, U	12.0	12.0	10.1	14.8
East Fork Pierce Creek	21.0	21.0	19.7	21.8
Moose Creek, L	5.0	5.0	4.1	6.2
Moose Creek, U	21.0	21.0	18.6	23.0

[a] L = lower site, M = middle site, U = upper site.
[b] Only trout >70 mm were used in estimates.

Appendix I. Combined trout species population estimates per $100m^2$ for tributaries of the Salmon River entering above Spring Creek.

Name of Drainage[a]	Observed Trout/$100m^2$	Estimated[b] Trout/$100m^2$	Lower 95% Confidence Interval	Upper 95% Confidence Interval
Sage Creek	32.0	32.0	27.9	35.6
Indian Creek, L	5.0	6.0	3.5	7.6
Indian Creek, U	5.0	5.0	3.3	6.3
West Fork Indian Creek	25.0	25.0	21.7	28.3
Corral Creek	10.0	10.0	5.2	15.7
Squaw Creek, L	8.0	8.0	6.3	8.9
Squaw Creek, LM	2.0	2.0	1.9	2.6
Squaw Creek, U	2.0	2.0	1.1	2.9
E. Boulder Creek	10.0	11.0	30.0	43.1
Boulder Creek	4.0	4.0	3.5	4.0
Wagonhammer Creek, L	5.0	5.0	5.0	8.3
Wagonhammer Creek, U	23.0	23.0	43.0	44.0
Fourth of July Creek, L	9.0	10.5	18.0	30.7
Fourth of July Creek, U	4.0	4.0	7.0	8.0
Carmen Creek, L	7.0	7.0	5.7	7.5
Carmen Creek, U	9.0	10.0	7.8	12.7

[a] L = lower site, M = middle site, U = upper site.
[b] Only trout > 70 mm were used in estimates.

Appendix J. Combined trout species population estimates 100m^2 for Salmon River tributaries entering at Spring Creek and below.

Name of Drainage[a]	Observed Trout/100m^2	Estimated[b] Trout/100m^2	Lower 95% Confidence Interval	Upper 95% Confidence Interval
Spring Creek, U	13.0	13.0	10.9	14.3
East Fork Spring Creek, L	14.0	14.0	12.2	16.4
East Fork Spring Creek, U	13.0	13.0	11.4	14.5
Boulder Creek	4.0	4.0	3.5	4.0
Pine Creek	8.0	9.0	6.6	10.9
Owl Creek	1.0	1.0	0.0	5.4
East Fork Owl Creek	6.0	6.0	5.3	6.8
Colson Creek, L	14.0	14.0	12.6	14.6
Colson Creek, U	31.0	31.0	28.4	34.5
Butts Creek, L	14.0	14.0	12.7	14.6
Butts Creek, U	8.0	8.0	7.3	8.3
Corn Creek	15.0	15.0	13.6	15.9
Wheat Creek	9.0	9.0	8.5	10.3
Horse Creek, U	6.0	6.0	4.1	8.5
Horse Creek, U2	14.0	14.0	12.3	16.0
Woods Creek	13.0	14.0	14.0	19.9

[a] L = lower site, M = middle site, U = upper site.
[b] Only trout >70 mm were used in estimates.

1997 ANNUAL PERFORMANCE REPORT

State of: Idaho Program: Fishery Management F-71-R-22

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

Contract Period: July 1, 1997 to June 30, 1998

ABSTRACT

In 1997, we provided technical assistance to all state and federal agencies upon request. Comments were submitted to several agencies and private entities concerning stream alterations, bank stabilization, mining operations and reclamation plans, fish rearing proposals, private ponds, water right applications, grazing allotments, timber sales, highway reconstruction, habitat improvements, bridge construction, and hydropower projects. We conducted on-site inspections of proposed, on-going, and completed projects.

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

Authors

Mark Liter
Regional Fishery Biologist

Tom Curet
Regional Fishery Biologist

Mike Larkin
Regional Fishery Manager

OBJECTIVES

1. Assist the Idaho Department of Water Resources, the Idaho 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 that minimize adverse effects of stream course alterations on aquatic habitat and fish.

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

METHODS

Project staff 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

In 1997, 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 and Guides Licensing Board	2
US Forest Service	11
Idaho Department of Water Resources	46
US Department of Transportation	2
Private and Miscellaneous	11
US Army Corps of Engineers	14
Custer/Lemhi County Commissioners	2
Shoshone-Bannock Tribe	1
US Bureau of Reclamation	1

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

conduct on-site inspections.

Staff 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.

Project biologists spent approximately 25 days helping to develop a memorandum of agreement in Custer County pertaining to river restoration projects. A habitat project on Hannah Slough made it clear that a unified plan for river restoration projects was needed. Custer County residents decided to write a restoration plan for the entire 12-mile section of the Salmon River near Challis, Idaho. To guide this process from a local level, the county formed the Custer County Watershed Group. We helped develop an overview plan and are now in the process of acquiring funding.

We acquired a $100,000 grant through the Idaho Fish and Wildlife Foundation for stream restoration work on Agency Creek, East Fork Salmon River and Hannah Slough. Work on Agency Creek and the East Fork Salmon River is in progress.

Fisheries personnel spent 40 days working on cooperative river restoration projects with the Lemhi Model Watershed Project. Most of the projects were on the East Fork Salmon River, with a few projects on the Lemhi and Pahsimeroi rivers.

The Salmon Region has no Information and Education or Regional Conservation Education personnel. During 1997 Salmon Region fisheries personnel conducted 33 presentations to approximately 375 students in four different schools.

RECOMMENDATIONS

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

2. Hire additional personnel to administer habitat issues and to meet information and education needs.

1997 ANNUAL PERFORMANCE REPORT

State of: Idaho

Program: Fishery Management F-71-R-22

Project III: Habitat Management

Subproject III-H: Salmon Region

Contract Period: July 1, 1997 to June 30, 1998

ABSTRACT

We initiated habitat projects on several rivers and streams in the Salmon Region. Project funding came from several sources (Blackbird Mine mitigation, National Fish and Wildlife Foundation, and Natural Resource Conservation Service). Fencing projects on the Lemhi, Pahsimeroi, and East Fork Salmon rivers will provide riparian protection for approximately 12 river miles. Stream bank restoration work on Agency Creek, a Lemhi River tributary, involved back-sloping vertical eroding banks and reseeding with grasses and willows. Modified irrigation diversions on Agency Creek and the Pahsimeroi River now allow fish passage.

Fishery biologists helped develop a restoration plan for 12 miles of the Salmon River near Challis, Idaho. The Department will use this overview plan to educate landowners and community leaders on how on to restore a healthy river corridor. It will form the basis for developing site-specific restoration plans. We are requesting funds from the Bonneville Power Administration and U.S. Corps of Engineers for fencing, dike renovation or removal, and bank stabilization work.

Authors:

Michael R. Larkin
Regional Fishery Manager

Mark Liter
Regional Fishery Biologist

Tom Curet
Regional Fishery Biologist

1997 ANNUAL PERFORMANCE REPORT

State Of: Idaho | Program: Fisheries Management F-71-R-22

Project IV: Population Management | Subproject IV-H: Salmon Region

Contract Period: July 1, 1997 to June 30, 1998

ABSTRACT

In summer of 1997, the Salmon Region stocked 80,400 fry in 129 mountain lakes in the Sawtooth National Recreation Area and Challis National Forest. Species stocked included 6,150 arctic grayling *Thymallus arcticus*, 7,750 rainbow trout *Oncorhynchus mykiss,* and 67,500 westslope cutthroat trout *O. clarki lewisi.* We used a Cessna-185 fixed-wing aircraft to stock 97 of the 129 Salmon Region lakes at a cost of $18.97 per lake.

Project personnel removed brook trout *Salvelinus fontinalis* from Carlson Lake during May 1997 to reduce the number of brook trout in the lake and increase growth in remaining fish. Gill netting removed 999 brook trout in 466.4 diel net hours (2.14 fish/hr). The estimated number of brook trout in Carlson Lake was 3,599 fish.

Authors:

Mark Liter
Regional Fishery Biologist

Tom Curet
Regional Fishery Biologist

Michael Jones
Regional Fisheries Technician

OBJECTIVE

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

METHODS

The Department contracted with McCall Air Taxi from McCall, Idaho to stock Salmon Region high mountain lakes with a Cessna-185 fixed-wing aircraft. The cost of stocking was $18.97 per lake.

RESULTS

In summer of 1997, the Salmon Region stocked 80,400 fry in 129 mountain lakes in Sawtooth National Recreation Area and Challis National Forest. Species stocked included 6,150 arctic grayling *Thymallus arcticus*, 7,750 rainbow trout *Oncorhynchus mykiss,* and 67,500 westslope cutthroat trout *O. clarki lewisi.* We stocked 97 of the 129 Salmon Region lakes by air. McCall Hatchery stocked 11 Salmon Region lakes. Volunteers stocked 21 lakes, donating an estimated 125 hours. Tables 1 and 2 summarize stocking records for each lake.

DISCUSSION

The Department has purchased Washoe Park, Montana westslope cutthroat trout for stocking in Idaho lakes. This stock performed very poorly this year. Of the 207,500 eyed eggs received, 151,400 (73%) hatched. Many of these fry failed to go on feed and died, leaving 67,500 survivors to be planted. Considering their poor performance at Sawtooth Hatchery, we assumed that most, if not all, Montana westslope cutthroat trout fry died after stocking. We are seeking an alternate westslope cutthroat source.

CARLSON LAKE

INTRODUCTION

Carlson Lake is a popular fishing lake accessible by an unmaintained road located in T11N, R23E, S17 at approximately 8,000 ft elevation. It drains into Double Spring Creek, a tributary of the Pahsimeroi River. The lake has one inlet and outlet that are active during high water years (Liter and Lukens 1994). Brook trout *Salvelinus fontinalis* is the only game species present in the lake.

Table 1. Sawtooth National Recreation Area mountain lake fry plants, 1997.

Lake name	Catalog number	Species*	Number Stocked
MacRae Lake	0700001450	C2	1,500
Elizabeth Lake	0700001570	C2	500
Hanson Lake #1	0700001555	C2	500
Hanson Lake #3	0700001558	C2	1,000
Hanson Lake #5	0700001561	C2	250
Iron Creek Lake #6	0700001547	C2	500
Goat Creek Lake #1	0700001530	C2	1,000
Goat Creek Lake #4	0700001535	C2	500
Goat Creek Lake #5	0700001536	C2	500
Goat Creek Lake #6	0700001537	C2	500
Marshall Lake #2	0700001525	C2	500
Iron Creek Lake #7	0700001548	K1	500
McGowen Lake #1	0700001563	K1	500
McGowen Lake #2	0700001564	K1	500
McGowen Lake #3	0700001565	K1	500
Hidden Lake	0700001573	C2	1,000
Thompson Cirque Lake	0700001604	C2	750
Fish Hook Creek Lake #2	0700001607	C2	250
Fish Hook Creek Lake #3	0700001610	C2	500
Stephens Lake	0700001609	C2	500
Saddleback Lake #1	0700001618	C2	500
Saddleback Lake #2	0700001619	C2	500
Upper Redfish Lake #1	0700001634	C2	1,000
Upper Redfish Lake #2	0700001635	C2	500
Upper Redfish Lake #3	0700001636	C2	1,000
Cramer Lake, Upper	0700001657	C2	1,000
Decker Lake #1	0700001659	C2	500
Hellroaring Lake	0700001686	C2	2,500
Hellroaring Lake	0700001686	GR	500
Hellroaring Lake #1	0700001687	C2	750
Hellroaring Lake #2	0700001688	C2	500
Profile Lake	0700001710	C2	750
Lucille Lake	0700001708	C2	750
McDonald Lake #2	0700001736	C2	500
Imogene Lake #1	0700001713	K1	3,000
Imogene Lake #2	0700001714	C2	500
Imogene Lake #3	0700001715	C2	750
Imogene Lake #4	0700001717	C2	500
Imogene Lake #5	0700001718	C2	500
Imogene Lake #6	0700001719	C2	500
Parks Peak Lake #1	0700001745	C2	750
Parks Peak Lake #2	0700001746	C2	500

Table 1. (Continued.)

Lake name	Catalog number	Species	Number Stocked
Alpine Creek Lake #15	0700001804	GR	300
Alpine Creek Lake #14	0700001802	GR	300
Alpine Creek Lake #13	0700001800	GR	300
Alpine Creek Lake #12	0700001798	C2	250
Alpine Creek Lake #11	0700001797	C2	500
Alpine Creek Lake #10	0700001795	GR	250
Alpine Creek Lake #9	0700001794	C2	250
Alpine Creek Lake #8	0700001793	C2	250
Alpine Creek Lake #6	0700001789	C2	500
Alpine Creek Lake #7	0700001790	C2	500
Alpine Creek Lake #5	0700001788	GR	250
Alpine Creek Lake #5	0700001788	C2	750
Alpine Creek Lake #4	0700001787	C2	1,500
Alpine Creek Lake #3	0700001785	C2	500
Alpine Creek Lake #2	0700001784	C2	500
Alpine Creek Lake #1	0700001783	C2	500

* C2 = westslope cutthroat trout; GR = grayling; K1 = rainbow trout, domestic Kamloops strain.

Table 2. Challis National Forest Mountain Lake Fry Plants, 1997.

Lake Name	Catalog Number	Species*	Number Stocked
Baldwin Lake	0700001007	C2	500
Vanity Lake #13	0700001027	GR	500
Vanity Lake #5	0700001015	C2	250
Vanity Lake #4	0700001014	C2	500
Vanity Lake #3	0700001013	C2	750
Vanity Lake #1	0700001009	C2	750
Seafoam Lake #2	0700000999	GR	500
Seafoam Lake #3	0700001001	GR	1,000
Seafoam Lake #4	0700001003	GR	500
Seafoam Lake #6	0700001005	GR	750
Lower Valley Creek Lake	0700001584	C2	500
Muskeg Lake #1	0700001043	K1	500
Muskeg Lake #2	0700001046	K1	500
Iris Lake #3	0700001077	K1	500
Kidney Lake	0700001033	K1	500
South Fork Fall Creek Lake #3	0700001088	K1	250
Cabin Creek Peak Lake #4	0700001493	C2	500
Cabin Creek Peak Lake #5	0700001494	C2	500
Crimson Lake	0700001503	C2	500
Tango Lake #6	0700000895	C2	750
Tango Lake #5	0700000894	C2	750
Tango Lake #4	0700000893	C2	750
Tango Lake #3	0700000890	C2	500
Fish Lake (Loon) #3	0700000904	C2	500
Loon Creek Lake #4	0700000905	C2	500
Loon Creek Lake #10	0700000915	C2	500
Loon Creek Lake #11	0700000917	C2	500
Rainbow Lake	0700001153	K1	500
P-38 (Nyborg) Lake	0700001160	C2	750
Knapp Creek Lake #14	0700001179	C2	500
Knapp Creek Lake #8	0700001170	C2	500
Knapp Creek Lake #7	0700001169	C2	500
Knapp Creek Lake #3	0700001164	C2	500
Horseshoe Lake	0700000910	C2	1,000
Loon Creek Lake #12	0700000918	C2	500
Loon Creek Lake #13	0700000919	C2	1,000
Loon Creek Lake #14	0700000920	C2	500
Loon Creek Lake #15	0700000923	C2	1,000
Harlan Lake #2	0700000983	C2	500
Harlan Lake #1	0700000980	C2	500
Lost Lake	0700000988	C2	500
Soldier Lake #2	0700001048	C2	500

Table 2. (Continued.)

Lake Name	Catalog Number	Species	Number Stocked
Soldier Lake #4	0700001050	C2	500
Soldier Lake #5	0700001053	C2	500
Soldier Lake #7	0700001055	C2	500
Soldier Lake #8	0700001057	C2	500
Soldier Lake #10	0700001059	C2	250
Soldier Lake #11	0700001060	C2	250
Iris Lake #1	0700001074	C2	500
Iris Lake #3	0700001077	C2	500
Finger Lake #2	0700001093	C2	500
Fall Creek Lake #3	0700001094	C2	500
Rocky Lake	0700001135	C2	1,000
Langer Lake	0700001133	C2	1,250
Lower Island Lake	0700001129	C2	500
Island Lake	0700001127	C2	1,000
Ruffneck Lake	0700001130	C2	1,000
Lola Creek Lake #2	0700001148	C2	500
Lola Creek Lake #3	0700001149	C2	500
Cabin Creek Peak Lake #1	0700001487	C2	250
Cabin Creek Peak Lake #3	0700001492	C2	500
Cliff Creek Lake #1	0700001144	C2	500
Cliff Creek Lake #4	0700001146	C2	500
Hindman Lake #1	0700001495	C2	750
Hindman Lake #2	0700001496	C2	1,000
Valley Creek Lake #1	0700001585	C2	750
Valley Creek Lake #2	0700001587	C2	750
F 82 Lake	0700001124	C2	1,000
Elk Lake	0700001163	C2	500
Rainbow Lake	0700001153	C2	500
Collie Lake	0700001111	C2	1,000

* C2 = westslope cutthroat trout; GR = grayling; K1 = rainbow trout, domestic Kamloops strain.

Historically, Carlson Lake produced 0.9 to 1.4 kg brook trout, but by 1975 anglers were concerned about the decline in numbers of these large fish (Kent Ball, intradepartmental memos 1975). Gill netting surveys show the average size of brook trout in Carlson Lake has declined from 224 mm in 1981 to 192 mm in 1997 (Figures 1-5).

OBJECTIVES

1. Reduce the number of brook trout to allow remaining fish to grow larger, enhancing angler interest in the fishery.

2. Obtain information on the current size and age structure of brook trout in Carlson Lake and document changes in size structure over time.

METHODS

During May 1997 project personnel used eleven 1.8 m X 38.1 m variable mesh gill nets to catch and remove brook trout from Carlson Lake. We set the nets with a rubber raft, spacing them evenly around the lake, perpendicular to the shore with the smallest mesh size towards shore. The first set was approximately 4.5 hours, while the remaining three were approximately 12 hours long. The first and third sets were daylight samples, the second and fourth sets were night samples.

We measured total lengths and collected otoliths from 33 brook trout and stored the otoliths in glycerin until processing them. At that time otoliths were heated, cracked and examined under a dissecting scope.

Microfish 3.0 software (Van Deventer and Platts 1989) calculated a population estimate. An ANOVA tested for differences in catch rates between all sets, and pair-wise comparisons tested for differences between the catch rate of two sets. A t-test determined if differences in catch rate existed between night and daytime sets. Statistica 5.0 software (Stat Soft, Inc. 1984) calculated all statistics.

RESULTS

We removed 999 brook trout from Carlson Lake during 466.4 net hours. Carlson Lake contained an estimated 3,599 brook trout (95% confidence intervals 1496 to 5701). Total lengths ranged from 118 to 240 mm with an average size of 192 mm (Figure 5).

Catch rates per set ranged from 0.81 to 3.2 fish/h. Catch rates varied significantly between sets ($p = 0.0083$) and between night and day sets (mean day = 1.5 fish/h, mean night = 2.5 fish/h ($p = 0.0217$). The catch rates of sets 1 and 2 differed significantly from

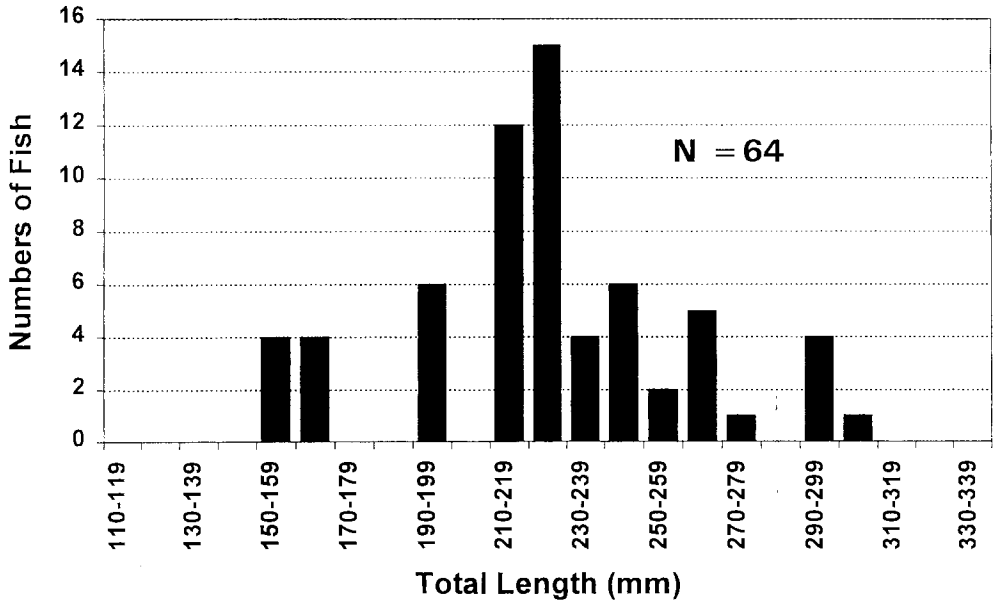

Figure 1. Length frequency of brook trout in Carlson Lake, 1981.

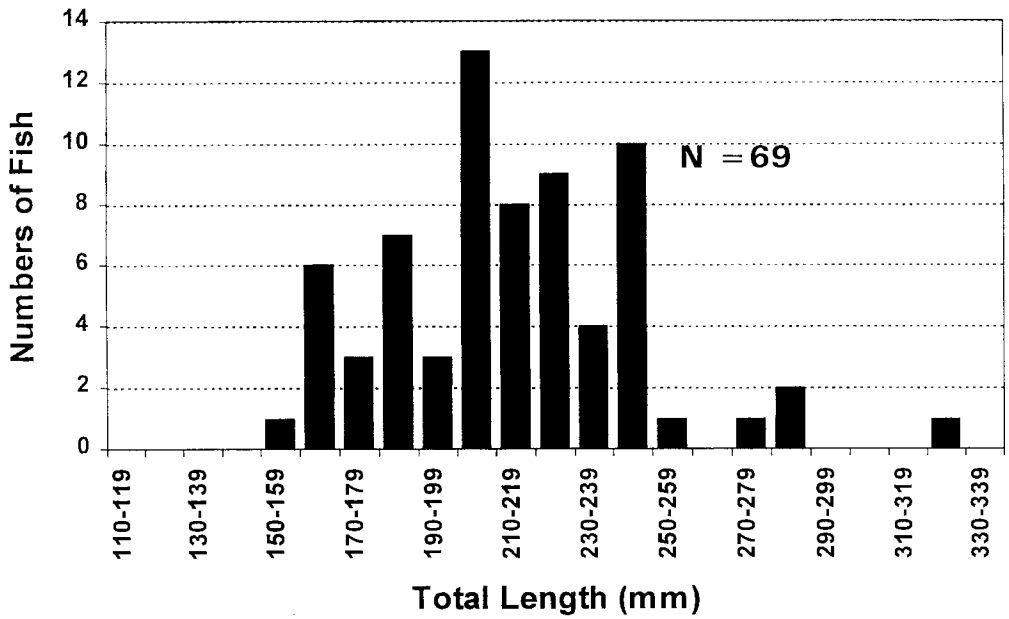

Figure 2. Length frequency of brook trout in Carlson Lake, 1992.

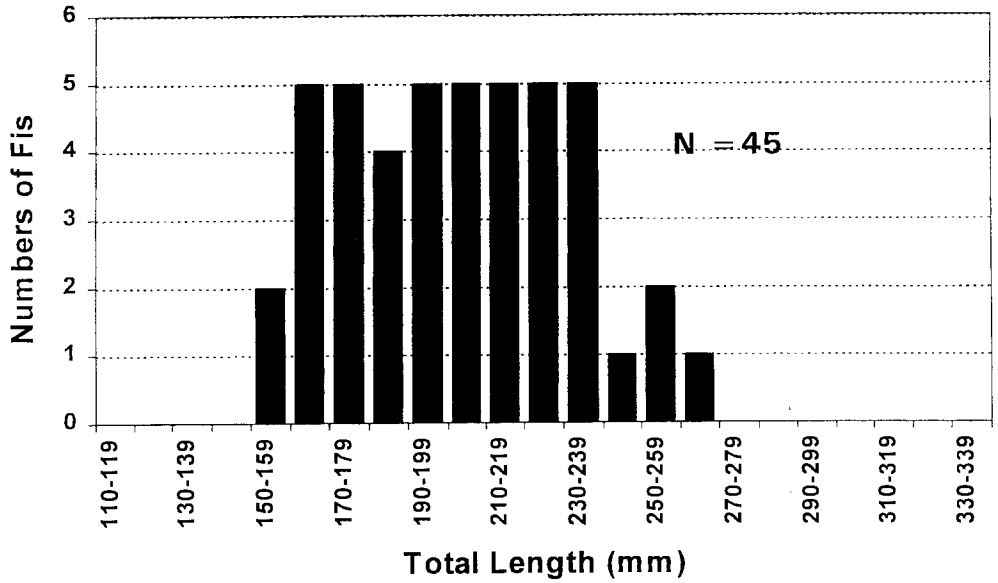

Figure 3. Length frequency of brook trout in Carlson Lake, 1993.

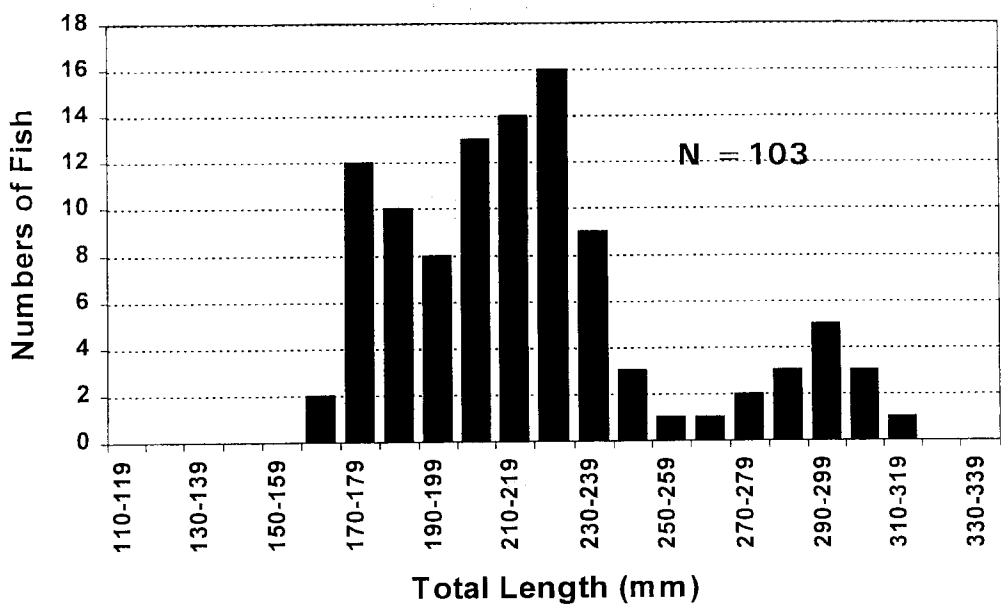

Figure 4. Length frequency of brook trout in Carlson Lake, 1996.

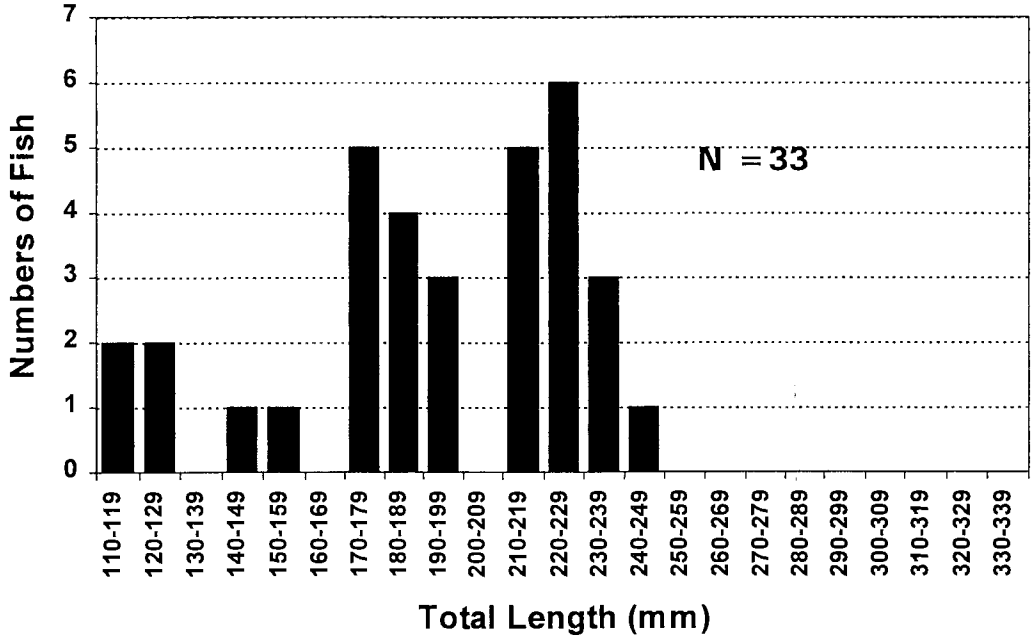

Figure 5. Length frequency of brook trout in Carlson Lake, 1997.

that of set 3 (p = 0.005) and (p= 0.003) respectively. Length frequency histograms had relatively similar length frequency distributions in most sample years (Figures 1-5). Otoliths could not be read with any confidence due to uneven breakage, and extremely tight banding of the annuli.

DISCUSSION

Catch rates between sets were highly variable (range 0.8 to 3.1 fish/h) (Figure 6). The population estimate for this lake is probably low due to the high variability in catch rates between gill net sets and inability of the technique to sample small fish. Statistical differences between day and night sets suggest that brook trout were more active at night in areas sampled by gill nets or they avoided gill nets during the day. We might obtain more precise population estimates by sampling only during dark hours and ensuring that all set periods are equally long.

The mean length of brook trout has decreased by 32 mm since 1981, presumably due to overpopulation and increased competition for food. Frequency of larger brook trout varies in sample years from 1981 to 1997, but no sample fish exceeded 329 mm (Figures 1-5). We have had mixed success with introducing predators into high mountain lakes to change the size structure of brook trout populations. In lakes where brown trout *Salmo trutta* were introduced, size structure did not improve, but the relative weight index and k factor both improved significantly (Janssen and Patterson 1993). In 1993, the Department stocked 702

Gerrard strain rainbow trout *Oncorhynchus mykiss* (average total length 254 mm) in Carlson Lake (Liter and Lukens 1996). This introduction apparently failed, as rainbow trout are no longer present in the lake and the brook trout population is still stunted.

The Idaho Fish and Game Commission recently increased the brook trout bag limit to 16 fish. This may help increase the average size fish. With the apparent failure of predator introductions to counteract stunting, the best approach may be to continue gillnetting efforts, employ an ichthyocide (piscicioe), maintain a high bag limit, and improve access for anglers. It will be some time before management strategies show results.

RECOMMENDATIONS

1. Continue intensive gillnetting efforts to increase average size.

2. Increase angler pressure by advertising the fishery and improving road access.

3. Continue the increased bag limit (16) on brook trout in Carlson Lake.

4. Investigate the feasibility of chemical treatment on at least the littoral areas of Carlson Lake to concentrate on young of year fish as these are not vulnerable to gill nets.

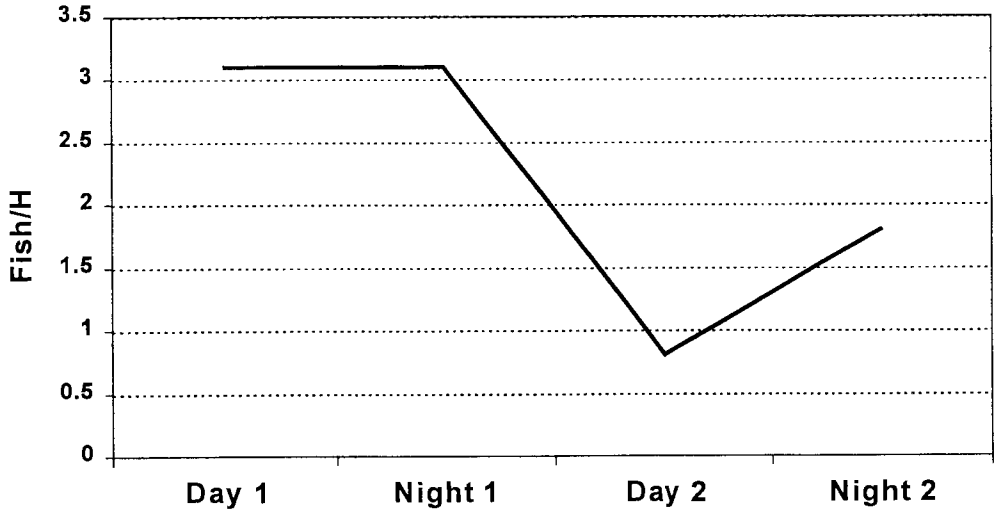

Figure 6. Catch rates (fish/h) captured in Carlson Lake during diel sampling, 1997.

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Submitted by:

Mark Liter
Regional Fishery Biologist

Tom Curet
Regional Fishery Biologist

Mike Larkin
Regional Fishery Manager

Approved by:

Idaho Department of Fish and Game

Bill Hutchinson
State Fisheries Manager