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DEPARTMENT OF FISH AND GAME

Jerry M. Conley, Director

FEDERAL AID IN FISH RESTORATION
Job Performance Report
Project F-73-R-8

REGIONAL FISHERY M NAGEMENT INVESTIGTAIONS

Job No. VI-b. Region 6 Lowland Lake Investigations
Job No. VI-c. Region 6 Stream Investigations

_by

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January, 1986

TABLE OF CONTENTS

Page

Job No. VI-b. Region 6 Lake and Reservoir Investigations

LIST OF TABLES

LIST OF FIGURES

TABLE OF CONTENTS

Page

LIST OF TABLES

LIST OF FIGURES

JOB PERFORMANCE REPORT

STATE OF: Idaho NAME: Regional Fishery Management
PROJECT NO.: F-71-R-8 Investigation
JOB NO.: VI-b TITLE: Region 6 Lowland Lake Investigation

PERIOD COVERED: 1 January 1983 to 31 December 1983

ABSTRACT

Anglers fished an estimated 35,071 hours on Mackay Reservoir between 28 May and 30 September, harvesting 12,626 rainbow trout for a catch rate of .36 fish/hour. Catch rates were considerably higher during the 1984 winter season (.73 fish/hour) with 7,123 rainbow trout and 713 kokanee harvested during 10,769 hours of effort. Ice fishermen used an average of 1.9 lines.

An estimated 9,983 hours of fishing effort were expended by anglers during the 1984 winter fishery on Island Park Reservoir. Overall catch rate was .53 fish/hour for an estimated harvest of 5,253 salmonids. Species harvested included rainbow trout of both hatchery and wild origin (85%), coho salmon (12%), brook trout and kokanee (3% combined). One cutthroat was observed in the creel.

Gill nets set in Ririe Reservoir during May of 1983 and 1984 indicate lower relative abundance of Utah chubs than in 1982. Mature cutthroat were captured in the Meadow Creek arm indicating Meadow Creek may be a spawning tributary.

Gill nets set in Mud Lake in May of 1983 indicate that Utah chubs are the most abundant fish species in the lake followed by Utah suckers. Some yellow perch were also found. Electrofishing in June confirmed the presence of largemouth bass. Scales from bass captured by electro-fishing and angling show slow growth of these fish with 418 mm fish as old as 10+. Largemouth bass and bluegill were transplanted into Mud Lake from Twin Lakes.

Dissolved oxygen levels in Roberts Gravel Pond reached low levels in March resulting in a partial fish kill. Gill netting in April 1984 showed brown bullheads and yellow perch suryived, but largemouth bass and bluegill transplanted from Carey Lake and the Boise area in 1983 probably did not. Bluegill and redear sunfish were transplanted from a

Boise pond in April 1984. Christmas trees were again placed in Roberts Gravel Pond by the Jefferson County Sportsmen.

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RECOMMENDATIONS

Continue winter fisheries on Mackay and Island Park reservoirs.

Evaluate the potential for stocking smai l mouth bass in Ririe Reservoir with consideration for existing management programs.

Establish sel f—sustaining spiny ray fisheries in Mud Lake and Roberts Gravel Pond.

Investigate the feasibil ity of providing aeration for Roberts Gravel Pond during winter months.

Assess use of Christmas tree habitat by spiny ray fish in Roberts Gravel Pond.

OBJECTIVES

Monitor angler use and harvest of the Mackay Reservoir general season and winter fisheries and the Island Park winter fishery.

Monitor fish populations in Ririe Reservoir.

Assess the status of warmwater fisheries in Region 6 and work to enhance these fisheries.

TECHNIQUES USED

Mackay Reservoir

Creel census was conducted on Mackay Reservoir for the 1983 general season and for the 1984 winter season. Angler counts and interviews were conducted from 28 May through 30 September 1983, and from 1 January through 28 February 1984. Counts were stratified by month, day of week, and time of day. Two weekdays and two weekend days were randomly selected each month, and the number of anglers were counted in both the morning and afternoon. Morning and afternoon counts were spaced evenly apart and were generally made on the same day.

Angler counts were used to calculate the mean number of anglers for each day type (weekday, weekend, or holiday). The mean number of anglers for each day type was then multiplied by the mean number of daylight hours for each Interval to estimate effort by day type. Estimated effort for each day type was then summed to arrive at total estimated effort for each interval.

We interviewed as many anglers as possible to document residence, hours fished, number of fish caught, gear type, and number of lines used during the ice fishery. Lengths of fish were recorded when practical. Catch rate for each interval was determined from interviews and multiplied by estimated effort to give estimated harvest by species.

Island Park Reservoir

Creel census interviews and counts were conducted for the 1 January to 28 February winter fishing season on Island Park Reservoir. The counts were stratified by month, day of week, and time of day. Angler counts were made for morning and afternoon time periods, with two weekdays and two weekend days being counted each month. Morning and afternoon counts were spaced apart. Generally, both morning and afternoon counts were made on the sane day.

We used angler counts to calculate the mean number of anglers for each day type (weekday or weekend), and then multiplied this number by the mean number of daylight hours for the interval. The number of each day type was then factored in to provide an estimate for both weekday and weekend effort. Combining each day type for the interval gives the estimated angling effort for each interval. All counts were made from snowmachines.

We interviewed as many anglers as possible to document residence, gear and terminal tackle, number of hours fished, and number of fish caught. We also recorded lengths of fish when practical. Catch rate for each interval was determined from interviews and multiplied by estimated effort to give estimated harvest by species.

Ririe Reservoir

Gill nets were set on 18 May 1983 and 19 May 1984 in order to assess species composition. Two nets were set on both dates at identical locations to the 1982 sets (Moore et al. 1983). A third net was set in 1983 at the mouth of Meadow Creek arm. In 1984, we duplicated the 1983 sets and also netted at the mouth of Willow Creek and at the mouth of Meadow Creek (Fig. 1). The reservoir was at full pool during both sampling dates. Nets were set overnight and removed the following day.

Mud Lake,

Fish populations i n Mud Lake were assessed with gill nets and by electrofishing in 1983. Additionally, Department personnel made angler contacts to obtain information on the fishery. Dissolved oxygen levels were also monitored.

Three horizontal gill nets were set at separate locations (Fig. 2) on 20 May to assess species composition and distribution. Nets were pulled the following day after fishing for approximately 24 hours, and fish were identified, counted, and measured to the nearest millimeter (total length).

Shoreline areas of the lake were el electrofished on the night of 2 June, with most of the effort occurring in Sportsmans Bay on the north end of the lake (Fig. 2). The primary objective of this sampling was to obtain information on the largemouth bass (Micropterus salmoides) present in the lake.

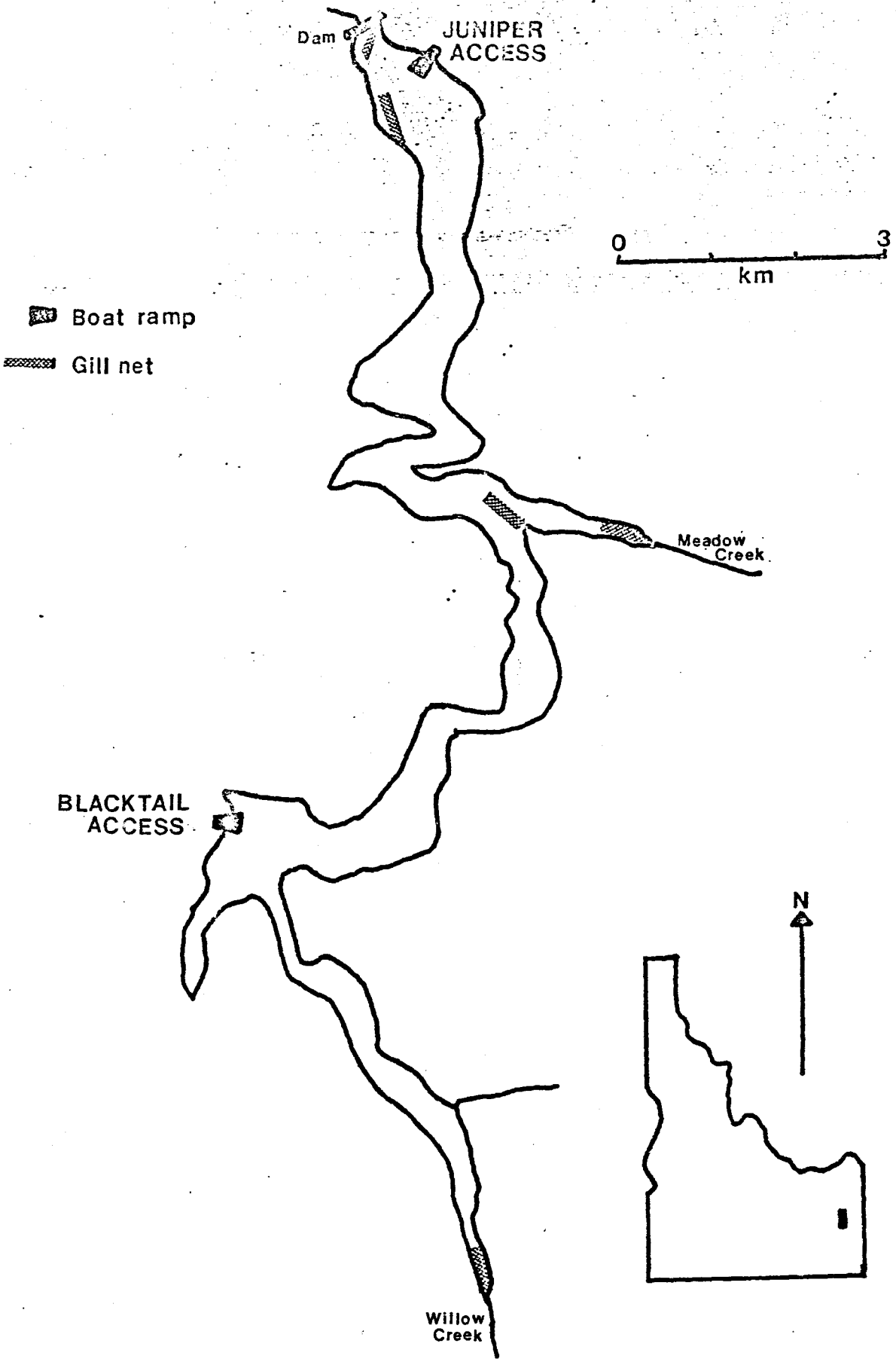

Figure 1. Map of Ririe Reservoir showing approximate gill netting sites in 1983 and 1984. Willow Creek and Meadow Creek arms not sampled in 1983.

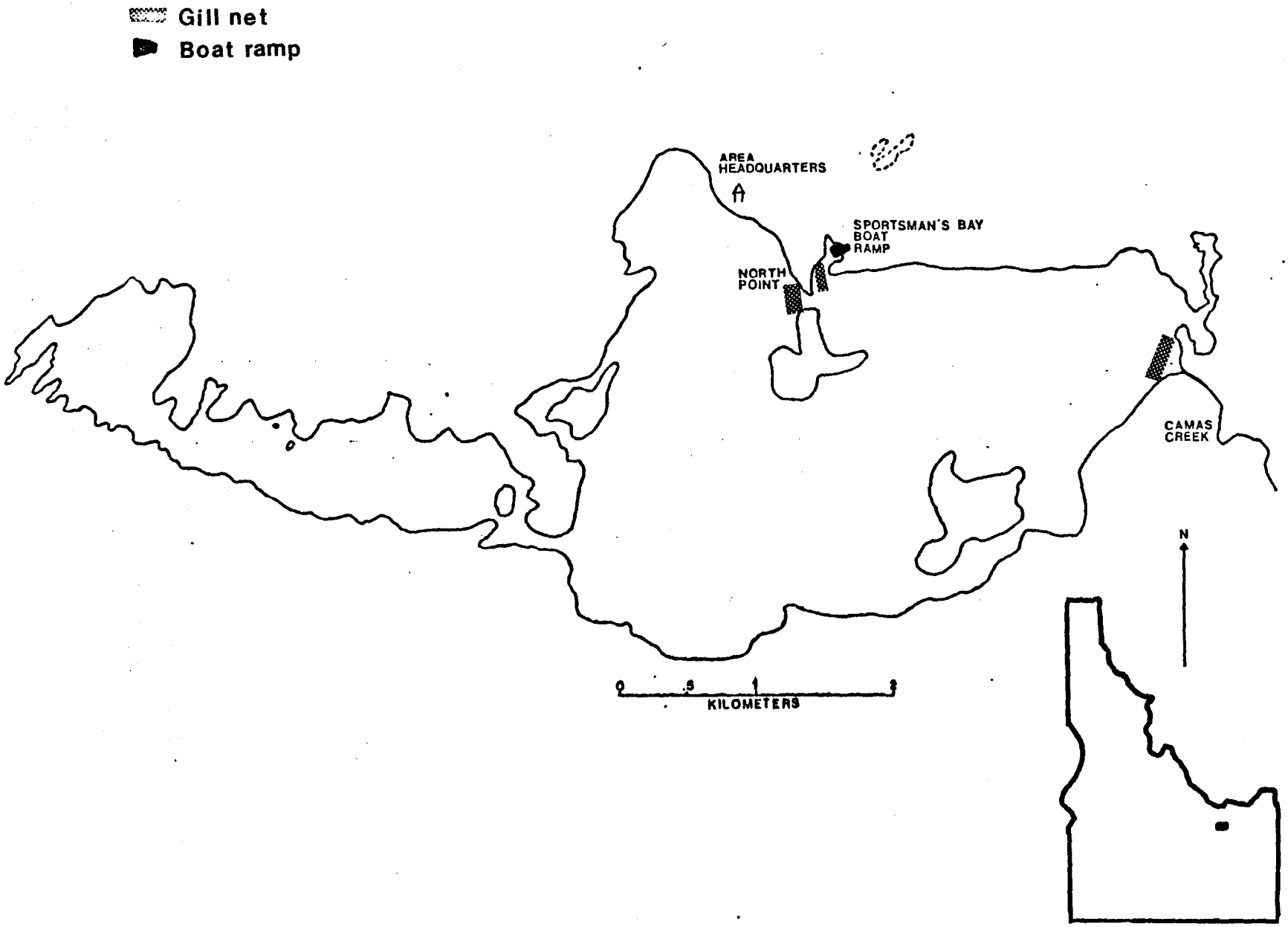

Figure 2. Map of Mud Lake showing approximate sites of gill netting in 1983.

Scales were taken from largemouth bass from electrofishing samples and from fish creeled by anglers for the purpose of aging these fish and determining growth rates. The Fraser—Lee method described by Carlander (1982) was used.

On the night of 30 June to 1 July, regional personnel traveled to Twin Lakes near Downey, Idaho, to capture largemouth bass and bluegill (Lepomis macrochirus) for transplanting into Mud Lake. Angling, electrofishing, and trapnetting were used to collect fish.

Roberts Gravel Pond

We snorkeled Roberts Gravel Pond in August 1984 to qualitatively assess the fishery there, and to ascertain whether spiny ray fishes were utilizing Christmas tree habitat placed in the pond in 1982. Horizontal gill nets were set in April 1984 to determine whether fish populations survived severe winter conditions. One net was set in each of the bays on the south end of the pond and then fished overnight.

Dissolved oxygen levels were checked in March 1984 while the ice was still about 61 cm thick. Christmas trees were again collected by the Jefferson County Sportsman's group and placed in the pond in April 1984 following ice out.

Fish were collected from Carey Lake in June 1983, the New York Canal in October 1983, and from a Boise area pond i n May 1984 for transplant into Roberts Gravel Pond.

FINDINGS

Mackay Reservoir

General Season

Anglers fished an estimated 35,071 hours (10,315 angler days) from 26 May through 30 September 1983 on Mackay Reservoir, with peak use occurring in August (Table 1). Overall catch rate was .36 fish/hour, resulting in an estimated harvest of 12,626 fish. The estimated effort of 30,296 hours through 31 August was considerably higher than found in 1974 by Jeppson (1975) and in 1960 by Gebhards (1961), but catch rates were lower (Table 2). Boat fishermen expended 62% of the effort in 1983, and had higher catch rates (.43 fish/hour) than bank anglers (.23 fish/hour). Catch rates increased throughout the summer with the exception of that by bank anglers in July. A similar trend was documented by both Jeppson (Region 6 file data) in 1974 and Gebhards (1961) in 1960. The average angler day lasted 3.4 hours based on interviews of boat anglers who had completed fishing. Boats had an average of 3.0 anglers/boat.

Hatchery rainbow trout (Salmo gairdneri) made up the largest portion of the harvest (83%) during the general season. Wild rainbow trout comprised the remainder of the catch with the exception of one kokanee (Oncorhynchus nerka) creeled in July (Table 1). The large percentage of hatchery rainbow found in the creel indicates an increasing

Table 1. Estimated angler use and harvest for Mackay Reservoir during 1983 and the winter season of 1984.

Date	Effort (hour)	Fish caught WRB[1]	HRB	KOK	Catch rate (fish/hour)
Bank and Boat Anglers					
5/28-5/31	2,130	54	403		.21
June	7,330	340	1,219		.22
July	8,113	640	1,742		.29
August	12,723	925	4,906		.46
September	4,775	177	2094		.48
Total	35,071	2,136	10,364	0	.36
Bank Anglers					
5/28-5/31	1,050	32	252		.27
June	3,865	271	734		.26
July	2,780	0	89		.03
August	4,347	87	1,304		.32
September	1,456	44	335		.26
Total	13,489	434	2,714	0	.23
Boat Anglers					
5/28-5/31	1,080	22	151		.16
June	3,465	69	485		.16
July	5,333	640	1,653		.43
August	8,376	838	3,602		.53
September	3,319	133	1,759		.57
Total	21,573	1,702	2,650	0	.43
Winter Season 1984					
January	5,124	21	2,869	205	.60
February	5,645	677	3,556	508	.84
Total	10,769	698	6,425	713	.73

[1] Includes all fish without deformed fins - portion that is of hatchery or wild origin is unknown.

[2] One kokanee caught, no estimate made.

Table 2. Creel census data for Mackay Reservoir.

Year	Effort	Harvest				
		WI	HRB	KOK	BRK	(fish/hour)
6/1-8/31/60	22,932	8,038	7,961		895	.70
5/25-11/31/74	27,178	9,217	6,144	308	985	.61
	(20,074)[1]					(.48)
5/28-9/30/83	35,071	2,136	10,364	[2]		.36
	(30,296)[1]					(.34)
1/1-2/28/84	10,769	698	6,425	713		.73

[1] Numbers in () represent data for comparable time periods, opener to 8/31.
[2] One kokanee checked.

dependence of the fishery on hatchery introductions. Jeppson (1975) and Gebhards (1961) found the percentage of hatchery fish in the creel to be 60% and 48%, respectively. Brook trout (Salve)inus fontinalis) were also present in angler creels in 1960 and 1974, making up approximately 5% of the catch. Kokanee were previously found in 1974.

Wild rainbow measured from angler creels in 1983 had a mean length of 323 mm compared with a mean length of 300 mm for hatchery fish. Most of the harvested wild fish (61%) were longer than 310 mm, while only 33% of the creeled hatchery fish were in this size category.

Winter Season

A winter fishing season was implemented on Mackay Reservoir for the first time in 1984 lasting from 1 January through 28 February. Anglers fished an estimated 10,769 hours to catch 7,123 rainbow trout and 713 kokanee for a catch rate of .73 fish/hour. Estimated effort was nearly the same in both months with a slight increase in February. Catch rates also increased in February (Table 1). Ice anglers averaged 1.9 lines/angler for the winter season, perhaps partially explaining the increased catch rate.

As in the summer fishery, hatchery rainbow comprised over 80% of the fish creeled. Wild rainbow (9%) and kokanee (9%) were equally represented in the creel, and were the only other fish harvested. The reason for the increased recruitment to the winter fishery by the kokanee is presently not understood, but may be a function of the different angling methods or an increase in the size of the fish.

Wild rainbow had the greatest mean length (323 mm) of fish measured in the creel, foliated by hatchery rainbow (279 mm) and kokanee (277 mm). Seventy percent of the wild rainbow measured exceeded 310 m in length (Table 3). Only 15% of the hatchery fish exceeded 310 mm I n length as compared with 33% for the summer fishery. This is probably the result of the introduction of 43,000 subcatchable-sized fish (length=140 mm) in August (Table 4). These fish were subsequently captured as 230 mm to 270 mm long fish during the winter fishery (Table 3). A 450 mm long kokanee was the largest fish observed in the creel, but was the only member of this species measured which exceeded 310 mm in length (Table 3).

Angler Residency

Anglers from Butte County (Arco) comprised the largest portion of the anglers for both the general season (22%) and the winter season (41%) (Table 5). Bingham County (Blackfoot) accounted for 22% of the anglers during the general season, but only 15% during the winter season. Nonresidents were checked from five states totaling 6% of anglers interviewed. No nonresidents were checked during the winter season.

Table 3. Length frequency of salmonids measured from anglers' creels at Mackay Reservoir.

Total length (nm)	5/28 to 9/30/83 WRB	HRB	KOK	1/1 to 2/28/84 WRB		HRB
200		3	1		3	
210	1	1			3	
220		4				
230		5			24	
240	1	14		3	28	3
250	1	22		4	52	7
260	9	18		2	37	9
270	5	25		1	2	2
280		20			26	17
290		10		2	28	3
300	9	32		1	61	4
310	3	8		3	12	
320	5	12		1	3	
330	3	12		8	19	
3 40	2	7		4	5	
350	5	21		10	2	
360	1			2	1	
370		5		1	1	
380	4	5		1	2	
390	1	2				
400	3	5				
410	1	2				
420						
430	4					
440						
450	3	1				1
460	2					
470						
480	2					
490	1					
Mean Length	323 n=66	300 n=236		323 n=44	279 n=304	277 n=44

Table 4. Fish planted in Mackay Reservoir for 1982 and 1983.

	Number	Weight (lbs)	Number/pound
		1982	
Catchables	23,078	5,150	4.5
Fry	113,046	787	144.0
		1983	
5/18	9,020	2,200	4.1
6/27	10,120	2,200	4.6
7/20	14,310	2,700	6.3
8/8	43,369	2,800	15.5
8/30	3,150	500	6.3

Normal hatchery request:

100,000 fingerlings - April-May

30,000 catchable - May-August

Table 5. Residency of anglers interviewed (percent) at Mackay Reservoir 28 May-30 September 1983 and 1 January-29 February 1984.

County	General season	Winter season
	Residents	
Butte	22	41
Bingham	22	15
Custer	17	27
Bonneville	11	3
Bannock	9	9
Canyon	3	.5
Twin Falls	3	-
Gooding	2	1
Jerome	1	2
Ada	1	-
Madison	1	.5
Minidoka	1	.5
Cassia	.5	-
Blaine	.5	-
Lemh i	.5	.5
Elmore	-	1
Resident	94	100
	Nonresidents	
Utah	3	
Arizona	1	
Michigan	1	
Nebraska	.5	
Oregon	.5	
Nonresident	6	0

Island Park Reservoir Winter Season

Island Park Reservoir was opened to winter fishing for the first time in 1984 (1 January-28 February), providing increased angling opportunity for local anglers. Angler effort was greatest during January (6,029 hours) and declined in February (3,954 hours) due to several winter storms and poor ice conditions. A slush layer between the ice and snow made snowmobiling difficult on warmer days. Angler effort was concentrated near the dam, at Trude's Bay, near the cabins on IP Bill's Island, and in the "fingers" near the Green Canyon Road (Fig. 3). Angling also occurred in the open water near McCrea's Bridge, but catch rates were generally lower than through the ice.

All anglers interviewed were from the upper Snake. River area. Most (41%) were from Bonneville County, followed by residents of Madison (23%), Fremont (21%), Teton (9%), and Jefferson (5%) counties (Table 6). The reason for the low proportion of anglers from Jefferson County is unknown, but may be related to the availability of year-round fishing in that county.

An estimated 5,253 salmonids were harvested during the 1984 winter season at Island Park Reservoir (catch rate .53 fish/hour). Hatchery rainbow trout comprised 71% of catch with 13% coho salmon (Oncorhynchus kisutch), 10% wild rainbow, 3% brook trout, 3% kokanee, and <1% cutthroat (Salmo clarki) (Table 7). Mean lengths of fish harvested were: hatchery rainbow 328 mm, coho 342 mm, wild rainbow 392 mm, brook trout 330 mm, and kokanee 330 mm (Table 8).

Two size classes of hatchery rainbow (256 no and 400-450 mm) occurred in the catch. The 250 mm fish were probably frail the September 1983 plant of domestic kamloops, and the 400-450 mm fish were from the 1982 and 1983 fingerling and catchable plants (Table 9). Wild rainbow were larger than hatchery fish, and the largest trout checked during the 1984 winter season was a mature 610 mm wild rainbow. Coho salmon had grown an average of 270 mm since the June 1983 fingerling plant (Table 9). Most male coho checked were mature with milt easily extruded. No mature female coho were seen.

Many mature wild rainbow were checked, and other mature fish were reported caught at the inflow of the Henry's Fork above McCrea's Bridge. We observed numerous (50-200) trout redds below the Mack's Inn Bridge on 4 March, but did not see spawners. Jim Smith, Targhee National Forest Biologist (personal communication), reported seeing several hundred rainbow spawning at Big Springs in early February. Since trout from Island Park are spawning in the Henry's Fork during January and February, McCrea's arm should be closed during future winter seasons to protect these fish. If all rainbow are spawning at this time, consideration should be given to opening Island Park to year-round fishing with a December through February closure of McCrea's arm to protect pre- and post-spawners.

Table 6. Residency of anglers interviewed at Island Park Reservoir 1 January to 29 February, 1984.

County	
Bonneville	43%
Madison	23%
Fremont	21%
Teton	9%
Jefferson	5%
n=105	

Table 7. Estimated angler use and harvest for Island Park Reservoir during winter season, 1984.

Date	Effort	Sal moni ds cauaht							Catch
(fish/hour)	(hour)	WRB	HRB	BRK	KOK	COHO	CT	Total	rate
January	6,029	543	2,110	121	-	482	18	3,274	.54
February	3,954	-	1,621	40	158	-		1,977	.50
TOTAL	9,983	543	3,731	161	158	640	18	5,253	.53
Catch composition		10%	71%	3%	3%	12%	>1%		

[1] Includes all fish without deformed fins, hatchery or wild origin is unknown.

Table 8. Length frequency of salmonids measured from anglers' creels at Island Park Reservoir 1 January to 29 February 1984.

Total length (mm)	WRB	HRB	BRK	KOK	COHO
175		1			
200		4			
225	1	8			
250	1	21			
275	2	5			
3 00	3	2			1
325	1	2	1	1	9
350	3	1			14
375	-	5			4
400	2	8			
425	2	8			1
450	1	3			
475	1	3			
500	2				
525	1	1			
550					
575					
600					
Mean Length	392	328	330	330	342
n=	21	69	1	1	29

Table 9. Hatchery plantings in Island Park Reservoir, 1982-1983.

1982	Number	Weight (lbs)	Number per pound	Length (mm)	Strain
Fry	253,050	3,500	72.3	83	R1
Fingerlings	381,625	14,500	26.3	114	R1
Catchables	100,980	28,800	3.5	224	R1
Fry	502,499	4,272	118	70	Coho
1983					
5/12	25,200	6,300	4.0	216	R1
7/25	18,090	2,700	6.7	183	R1
9/21	34,160	5,600	6.1	185	K1
9/27	16,470	2,700	6.1	185	K1

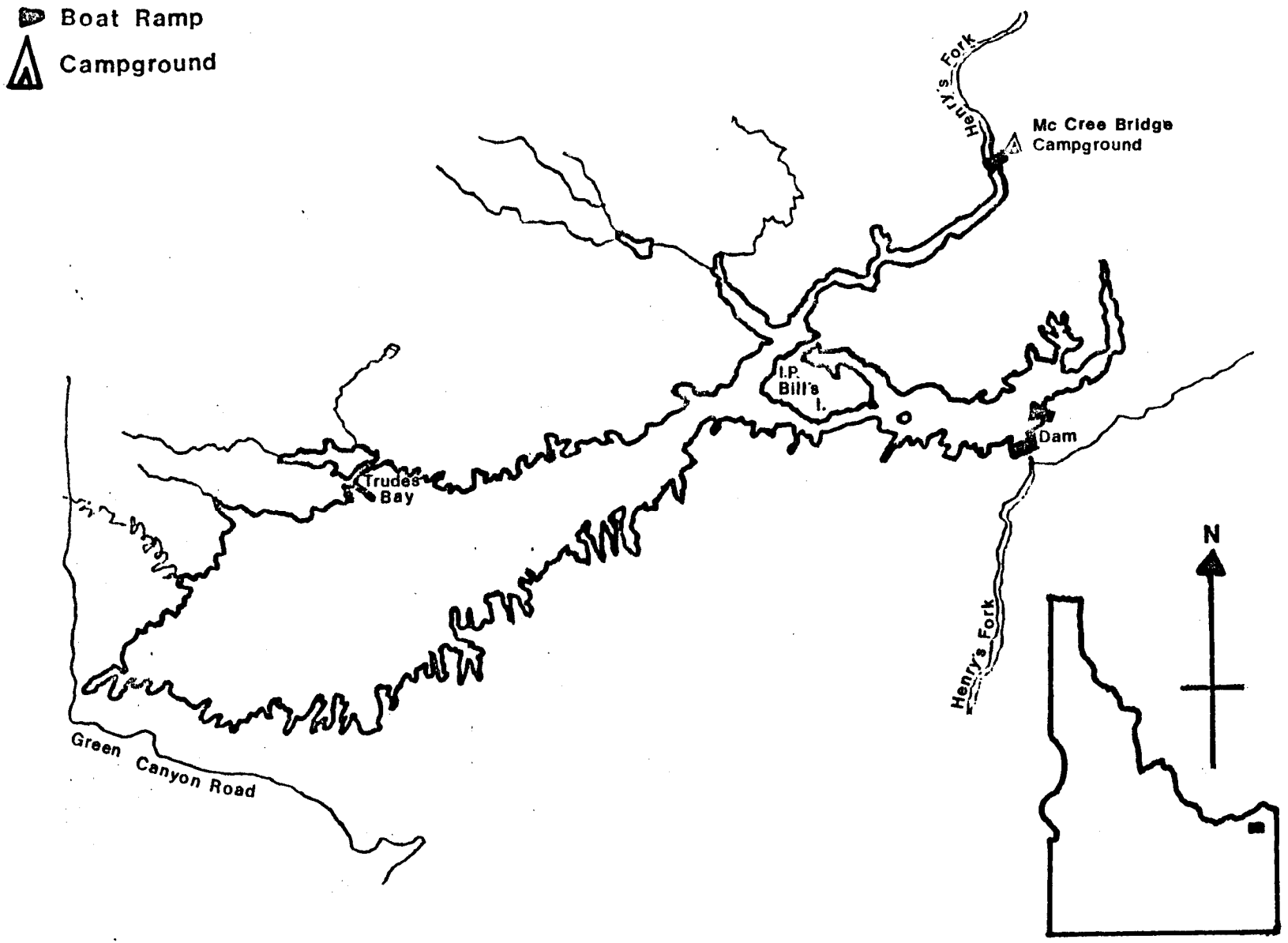

Figure 3. Map of Island Park Reservoir. Insert shows approximate location.

The winter catch rate of .53 fish/hour was twice as high as observed during the 1982 general season (.23 fish/hour) (Moore et al. 1982). However, length frequency distributions and mean lengths of trout and salmon harvested during the winter season were similar to those for general season harvest of previous years, and overharvest of large fish does not occur during the winter fishery. The winter harvest of 5,000 salmonids from Island Park Reservoir should have little impact on the general season fishery, and modest increases in numbers of fish stocked should compensate for winter harvest.

Ririe Reservoir

Game fish comprised 18% of the fish captured by the vertical gill net set across from the Juniper access in both 1983 and 1984. However, the 1984 total catch was considerably lower (17 compared with 92) with fewer species represented (Table 10). A different situation occurred with the dam set. In 1983, five species of fish were captured at the dam, of which 28% were game fish. The 1984 set captured only two species, of which 96% were game fish. Use of an experimental net (3 mm to 12 mm) in 1983, and uniform mesh (19 mm) in 1984 probably accounts for some of the disparity; however, all of the game fish taken in 1984 were coho salmon from a recent introduction which apparently were part of a single, large aggregation. The Meadow Creek point net captured mostly Utah suckers (Catastomus ardens) in both years.

Gill nets set at the mouths of Meadow and Willow creeks in 1984 captured mostly suckers. No game fish were captured in the Willow Creek net, but five cutthroat and two rainbow trout were take in the Meadow Creek net (Table 10). Both nets were large mesh (25 mm to 50 mm) experimental nets.

Rainbow trout comprised 68% of the game fish captured in gill nets in 1983, followed by cutthroat trout (14%), coho salmon (10%), brown trout (Salmo trutta) and chinook salmon (each 1%). Rainbow trout ranged in length from 260 mm to 325 mm, and represented fish from both fingerling plants (70%) and catchable plants (30%). All of the cutthroat captured were adult fish measuring from 305 mm to 440 mm in length. Coho and chinook salmon were all between 295 mm and 310 mm long. The largest fish captured was a 618 mm long female brown trout weighing 2,950 g.

Only two (3%) rainbow trout were captured in 1984, one from a fingerling plant and the other a holdover catchable. Coho comprised 85% of the game fish captured, but this is somewhat misleading because nearly all of these were caught in one net and had Just been stocked. Cutthroat trout (9%) and brown trout (3%) were also present in the samples. The length of the two rainbow trout were 256 mm and 415 mm for the fingerling and catchable size stocked fish, respectively. All but one of the coho salmon captured were from the 1984 introductions

Table 10. Gill net catches in Ririe Reservoir in 1983 and 1984 by location.

Location	Year	Species							
		Rb	Ct	Brn	Co	Ch	Ut. Su.	Ut. Ch.	Rss
Dam:	1983	5	2	0	3	1	0	0	28
Horizontal net	1984	0	0	0	64	0	0	3	0
Across from Juniper:	1983	14	1	1	0	0	52	24	0
Vertical net	1984	0	0	1	2	0	14	0	0
Meadow Creek Point:	1983	1	1	0	0	0	6	0	0
Horizontal net	1984	0	2	1	0	0	21	7	0
Mouth of Meadow Creek: Horizontal net	1984	2	5	0	0	0	16	3	0
Mouth of Willow Creek: Horizontal net	1984	0	0	0	0	0	23	5	0
Total	1983	18	4	1	3	1	58	24	28
	1984	2	7	2	66	0	74	18	0

and ranged from 178 mm to 220 mm. The holdover measured 412 mm. A 498 mm long male cutthroat trout was the largest fish observed. Cutthroat ranged in length from 285 mm to 498 mm, and all of these were mature males in prespawning condition. The two brown trout captured were 330 mm and 356 mm long.

Reservoir conditions in 1984 were considerably more turbid than in 1983 due to the record high runoff from Willow Creek and may have affected the catch. The apparent concentration of mature cutthroat trout in the Meadow Creek arm suggests that Meadow Creek may be a spawning tributary for these fish. Suckers out-numbered chubs (Gila atraria) by an increasing margin in 1983 and 1984 (Table 10), and the overall percentage of composition of chubs is down considerably from that observed in 1982 (Moore et al. 1983).

Mud Lake

Gill netting in Mud Lake indicated large numbers of Utah chubs and Utah suckers present. Yellow perch (Perca flavescens) were the only other species captured.

The Camas Creek net had small mesh size (3 mm through 12 mm), and captured 13 chubs and one perch (79 mm). In June of 1980, Department personnel set two experimental nets in the mouth of Camas Creek and found Utah chubs to be the dominant species, comprising 88% of the catch (Ball and Jeppson 1981), similar to the 93% we found. These results are not entirely comparable since two nets were set in 1980 and, presumably, at least one had larger mesh sizes.

The second net (up to 50 mm mesh size) was set at North Point across the channel to the island. Forty-three suckers (56%) and 34 chubs (44%) were taken in this net. Mean length of suckers taken was 383 mm, while that for chubs was 220 mm. Possibly a smaller meshed net would have taken proportionately more chubs. No perch were captured in this net.

The Sportsman's Bay net captured 27 chubs (75%), seven suckers (19%), and two perch (6%). Mesh size on this net was 25 mm. Mean lengths of fish caught by this net were 203 mm for Utah chubs, 250 mm for Utah suckers, and 224 mm for the perch.

For all nets, the total length of chubs captured ranged from 105 mm to 334 mm while suckers ranged from 190 mm to 540 mm. Only Utah chubs were captured in all three nets and comprised 58% of all the fish captured (suckers = 40%, perch = 2%).

Two largemouth bass were captured by el electrofishing, both in Sportsman's Bay. Both fish were large, presumably mature fish (340 mm and 370 mm total length). We also captured a few yellow perch as well as chubs and suckers. Apparently, the bass population in Mud Lake is at a low level. Aside from the two captured by el electrofishing, anglers reported taking nine other bass in 1983.

We analyzed scales from the 11 largemouth bass taken by electrofishing and angling. Fish ranged in length from 330 mm to 418 mm, and were between 7 and 11 (7+ to 10+) years old. Growth rates were slower than those found in North Idaho waters (Table 11).

Dissolved oxygen levels in Mud Lake were recorded on 20 March in the main lake and on 22 March at the mouth of Camas Creek and at Sportsman's Bay (Fig. 2). Dissolved oxygen levels were lowest in the main lake and ranged from one to three mg/l. Levels were higher at the mouth of Camas Creek (3-4 mg/I) and Sportsman's Bay (8-9 mg/I).

Ninety-eight largemouth bass and 367 bluegill were stocked in Mud Lake following transport from Twin Lakes. These fish represented several age classes, and mature bluegill were still in prespawning condition.

Roberts Gravel Pond

Yellow perch were the only species of fish which we observed while snorkeling in Roberts Gravel Pond. Several adults were observed in shallow water areas where macrophytes provided cover. Several aggregations of yearling perch were observed in open water. We estimated the size of these aggregations to be in the hundreds. There was no observable use of the existing Christmas tree habitat by fish. However, most of the trees were lying horizontally and were not creating overhanging shelter.

Gillnetting revealed that at least two species of fish, yellow perch and brown bullhead (Ictalurus nebulosus), survived the reported fish kill which occurred in late winter. We presently do not know if other species survived.

A dissolved oxygen level of 0 mg/ l was recorded 20 March at the same time that the fish kill was observed. Cold weather in November, causing the pond to freeze, and subsequent heavy snowfall in late November and early December resulted in oxygen depletion. Future management of the pond should give consideration to providing aeration during severe winters.

The Jefferson County Sportsman's group collected additional Christmas trees in 1983 and 1984 for placement in the pond. Trees collected in 1983 were weighed and placed on the ice; however, ice fishermen used them for firewood. Consequently, in 1984, trees were placed with the use of boats following ice-out. All trees were tied to weights such that they would rest vertical ly in the water column. Utilization of Christmas trees by spiny ray fishes will be assessed with the aid of scuba gear in 1984.

Fish species introduced into Roberts Gravel Pond in 1983 included bluegill, largemouth bass, yellow perch, brown bullheads, and black crappie (Pomoxis niaromaculatus). Bluegills and redear sunfish (Lepomis microlophus) were also introduced in the spring of 1984. It is presently unknown whether the fish introduced in 1983 survived the low oxygen conditions which occurred this past winter.

Table 11. Comparison of size at annulus for largemouth bass from Mud Lake with largemouth bass from selected North Idaho waters (Rieman 1983).

Location	Annulus												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Mud Lake[1]	63	104	169	229	260	290	318	346	376	411			
Round Lake	61	123	189	256	307	354	387	403	423	447	466	462	467
Fernan Lake	63	101	182	230	276	341	374	404	432	460	496	519	531
Thanpson Lake	69	139	212	277	325	372	408	440	466	482	509	525	530

[1]Back calculated lengths derived from the Fraser-Lee method with a Standard intercept of 20 mm used for correction (Carlander 1982).

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ACKNOWLEDGMENTS

Conservation Officers Joe Curry, John Hanson, and Bruce Penske assisted with interviews and counts on island Park Reservoir. Wildlife Land Manager II Dave Wagner assisted with the Mud Lake sampling and fish transplants, as did Officers Dan Duggan, Lynn Merril, Bob Sellers, and Bruce Penske. Ed Jochum, Roberts area conservation officer, assisted with the Christmas tree placement and sampling in Roberts Gravel Pond.

Summer biological aides Bill Harryman and Kurtis Plaster provided considerable field assistance.

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JOB PERFORMANCE REPORT

STATE OF: Idaho **NAME:** Regional Fishery Management

PROJECT NO.: F-71-R-8 Investigation

JOB NO.: VI-c **TITLE:** Region 6 Stream Investigations

PERIOD COVERED: 1 January 1983 to 31 December 1983

ABSTRACT

Little Lost River and Tributaries

Electrofishing surveys were conducted at transects on the Little Lost River, Sawmill Creek, and Summit Creek. Population densities of age 1+ and older trout were moderate in the Little Lost River (117-355/km) and Sawmill Creek (280/km). Trout densities were high in Summit Creek--446/km in a grazed area and 875/km in an area fenced by the BLM in 1975 to exclude cattle from the riparian area. Wild rainbow trout are the most abundant species with lesser numbers of brook trout and bull trout. Few trout larger than 300 mm were collected. Scale analysis indicated a maximum longevity of IV+ and slow growth after age I+.

,Birch Creek,

Population estimates of wild rainbow were 146 and 232 fish/km at the site of a proposed hydro diversion, and 187 and 194 fish/km above the existing Reno Diversion on 10/1/82 and 7/20/83. Mean lengths of wild rainbow trout were 213-228 mm, and hatchery rainbow averaged 183 mm.

South Fork Snake River User Survey

Angler interviews conducted on the South Fork Snake River in 1983 Indicated a willingness by anglers to support restrictive regulations in order to restore the cutthroat trout fishery. The proposed 10-inch (254 mm) to 16-inch (406 mm) slot limit with a bag limit of two cut-throat outside of this slot was favorably received by anglers at public meetings, and accepted by the Commission in the fal I of 1983.

Habitat Imcrovement Projects

Fish screens were constructed on Targhee Creek, and a gabion dam was built to back water into the Highway 87 culvert to facilitate fish passage.

Log structures were constructed to improve trout habitat in Palisades Creek. Willows were planted on the banks of the upper Teton River.

Fish Salvias

Fish were salvaged fran below Island Park Dam and from the stilling basin below Pal isades Dam while flows were shut off for dam repairs.

Moose Creek Kokanee Eqa Plants

Seven hundred-fifty thousand kokanee eggs were planted in the gravel in Moose and Lucky Dog creeks to restore kokanee populations in island Park Reservoir.

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RECOMMENDATIONS

Little Lost River and Tributaries

Manage the Little Lost River drainage as a wild trout fishery.

Monitor angler use and harvest in 1986.

Birch Creek

Continue to stock hatchery rainbow to maintain catch rate of 1.0 fish/hour.

Tag fish for movement, growth, and rate of exploitation studies.

South Fork Snake River

Monitor game fish populations to assess their response to special regulations.

OBJECTIVES

Little Lost River and Tributaries, Birch Creek

Assess species composition, population densities, and growth rates of trout.

South Fork Snake River User Survey

Assess recreational use of the South Fork Snake River.

Survey angler opinion of proposed special fishing regulations.

Habitat Improvement Projects

Increase natural recruitment to Henry's Lake by screening irrigation diversions and improving fish passage to upstream spawning areas.

Improve fish habitat in Palisades Creek.

Restore growth of willows in riparian zones of the Teton River.

Moose Creek Kokanee Eag Plants

Enhance kokanee populations in Island Park Reservoir and re-establish spawning runs in Moose and Lucky Dog creeks.

TECHNIQUES USED

Little Lost River and Tributaries

Electrofishing surveys of trout abundance were conducted at three locations on the Little Lost River (near the first road culvert north of Have, at the US Geological Survey gauging station north of Have, upstream from Fallert), at two locations on Summit Creek (within the BLM grazing exclosure - Section 2V, upstream from the BLM exclosure - Section 1G), and at one location on Sawmill Creek (8 km upstream from the US Geological Survey gauging station) in 1983 (Fig. 4). A Coffelt BP-1C backpack electroshocker was used on all transects. Two or three passes were made through each transect, and fish were held in buckets until the final pass was completed.

Captured fish were anesthetized and species and total length were recorded. Additionally, on 6-7 September, fish were weighed and scale samples were obtained from representative samples of each species for age and growth studies.

Fish abundance was estimated by the Seber and LeCren (1967) formula (corrected for sampling bias) for two-removal samples, and by the Zippin (1958) formula for three-removal samples. Since young-of-the-year (YOY) trout were not adequately sampled, estimates were calculated for age 1+ and older fish (usually > 100 mm) only.

Scale samples were viewed at 93x magnification, and distances to each annulus and scale radius were recorded. Body-scale regressions were computed for brook and rainbow trout. The intercepts of the body-scale regressions were used as correction factors of back-calculating lengths at annuli (Everhart et al. 1975). Since only six scale samples were obtained from bull trout, the intercept of the brook trout body-scale regression was used for back-calculating bull trout lengths at annuli.

Birch Creek,

Electrofishing surveys were calculated on Birch Creek Just upstream from the Reno Diversion and 900 mm upstream from the Reno Diversion at the location of a proposed hydro diversion on 1 October 1982 (Corsi et al. 1983) and on 20 July 1983. Fish abundance was estimated by the three-step removal method (Zippin 1958) on 1 October 1982 and by the two-step removal method (Seber and LeCren 1967) on 20 July 1983.

South Fork Snake River

In 1983, regional fisheries personnel cooperated with BLM (Idaho Falls District) and Targhee National Forest personnel in conducting a recreational use survey on the South Fork Snake River between Heise and Conant Valley. The survey was used to evaluate the entire scope of recreational activities for this section of the river, including the fishery. Five of the 23 questions asked during the interview pertained

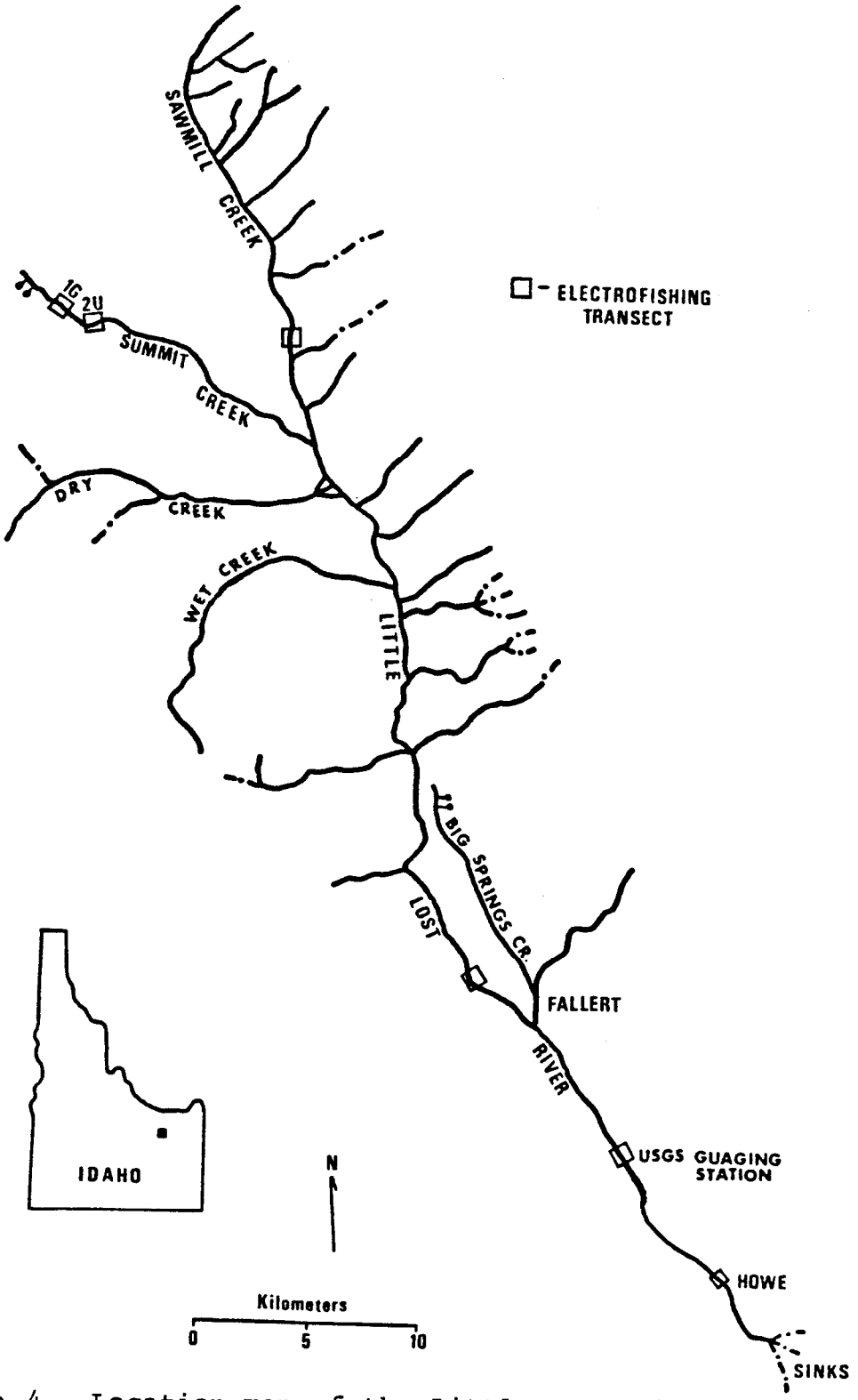

Figure 4. Location map of the Little Lost River drainage, showing areas sampled by electrofishing in 1983.

directly to the recently completed fishery research project (Moore and Schill 1984), and were designed to provide anglers with an opportunity to comment on a number of proposed management options. The following questions were asked:

1. Would you favor length restrictions on cutthroat trout; i.e., minimum 16-inch limit? (The interviewer explained the expected benefits of a length restriction, and provided examples of possible restrictions). Yes or No.

2. Would you favor bait restrictions if length restrictions were adopted? (The Interviewer explained the benefits of bait restrict-tions). Yes or No.

3. How important is keeping your catch?

Very Important		Moderately Important		Not Important	No Opinion
5	4	3	2	1	0

4. Would you continue to fish the South Fork if there were a: Yes or No.

   a. length restriction?
   b. bait restriction?
   c. catch-and-release?

5. Would you keep fish under 10 inches in length? Yes or No.

All interviewees were also questioned as to what they felt were the areas most important values.

Angler's responses to these questions were compiled and used in con-junction with the data base from the South Fork research project (Moore 1980, Moore et al. 1981, Moore and Schill 1984) to select regulations which would benefit the cutthroat fishery and still be acceptable to the angling public. In order to do this, we established several al-ternatives and modeled the response of the fishery to each one. The model we used took into account various factors including mortality rates (Ricker 1975). The alternative which most benefited the cut-throat fishery, but was still acceptable to anglers based on our survey, was then presented to the public at open meetings in Idaho Falls, Rigby, and Swan Valley as the proposed regulation. We also pre-sented the other alternatives for public comment to determine which was most acceptable. Final presentation of the material including the input from the public meetings was made to the Fish and Game Commission following review by Department personnel.

On 1 November 1983, the Palisades Dam stilling basin was pumped dry to facilitate repairs by the Bureau of Reclamation. Regional personnel, assisted by Bonneville County Sheriff's deputies and local residents,

salvaged trout from the area using backpack electrofishing gear. Twenty-three Jaw tags were placed on brown trout (Salmo trutta) from the stilling basin to assess their movement.

Henry's Fork Snake River

Bureau of Reclamation personnel curtailed flows from Island Park Dam during the week of 2 . October to conduct repairs on the dam. We conducted a salvage operation in the stilling basin below the dam to lower the density of trout and reduce susceptibility to illegal harvest. We also salvaged fish from small channels and pools between the dam and the mouth of the Buffalo River, some 500m downstream. All fish were captured with el electrofishing gear and transported downstream to the mouth of the Buffalo River. Local citizens assisted with the salvage operation.

Habitat Improvement Protects

Targhee Creek

Targhee Creek is a major spawning tributary for cutthroat and brook trout from Henry's Lake and historically supported 49% of the spawning runs. The lower 5 km of the creek (below the Highway 87 culvert) are on private land, and spawning habitat has been degraded by overgrazing. There are three irrigation diversions, and total dewatering occurred in 1979 (Rohrer 1980). Most of the upper 15 km of the creek is on the Targhee National Forest and has excellent spawning habitat. However, the water velocity through the Highway 87 culvert exceeded 3 m/sec during high flows (Rohrer 1983) preventing upstream migration of cutthroat spawners from the lake.

The Henry's Lake Enhancement Plan (Moore 1982) rates Targhee Creek as the first priority stream for habitat improvement of Henry's Lake tributaries, with the following program priorities: (1) screen irrigation diversions; (2) improve fish passage through Highway 87 culvert; (3) obtain water rights; and (4) build fish trap facilities to monitor runs and fry recruitment. Program priorities 1 and 2 were nearly completed in 1983.

Two rotating drum screens were constructed on the largest diversions on Targhee Creek by the Salmon engineering crew. The foundations for the screens were poured November 1983, and the screen drums will be installed in June 1984. The Henry's Lake Foundation provided $5,000 as partial funding for the project.

A gabion structure was constructed across Targhee Creek in October 1983 to back water into the Highway 87 culvert to allow fish passage during high flows. A row of eight rock-filled wire gabion baskets were placed across the creek at the tail of the pool. A second layer of gabions were added with a half-high basket in the center to allow passage at low flows. The stream banks upstream and downstream from the gabion dam were rip-rapped with cobble rocks to prevent bank erosion during high flows.

Palisades

Stream habitat improvement work was performed in Palisades Creek on 27 August. Members from the Idaho Falls Trout Unlimited Chapter assisted in placing two log structures in the stream to increase holding water and provide cover for fish. The structures were placed approximately 100m apart a short distance below the Targhee National Forest boundary on the Holden property.

Teton River

In cooperation with the Idaho Falls Trout Unlimited Chapter, we placed several hundred willow cuttings along the east bank of the Teton River near Driggs on 9 July. The objectives of this project were bank stabilization and to establish overhanging cover.

Moose Creek Kokanee Egg Plant

Approximately 750,000 eyed kokanee eggs from Mackay Hatchery (Anderson Ranch Reservoir brood stock) were planted in the gravel in Moose and Lucky Dog creeks on 24 October 1983 to enhance the kokanee population in Island Park Reservoir, which had been treated with rotenone in 1979. Depressions 10-20 cm deep were dug in gravel bars in water 20-40 an deep. A 15 an diameter stovepipe was held upright in the depression to stall the flow. A 10 cm plastic pipe was placed inside the stovepipe, and gravel was placed between the pipes and back-filled around the outside edge of the stovepipe. Eggs (10-15,000) were then poured into the center pipe and allowed to settle to the bottom of the depression. After the eggs settled, the plastic pipe was slowly lifted out, allowing the gravel to cover the eggs. The outer pipe was then removed, allowing the back-filled gravel to cover the artificial redd.

FINDINGS

Little Lost River and Tributaries

Little Lost River

Population estimates of 1+ and older trout in the Little Lost River indicate moderate densities ranging from 117 trout/Ian upstream from Howe in January to 355/km near Fallert in September (Table 12). Wild rainbow trout were the dominant species at all transects, with lesser numbers of bull trout and brook trout. Sculpins were numerous, but no whitefish, minnows or suckers were collected.

Mean lengths of wild rainbow ranged from 145 mm at the U.S. Geological Survey gauging station transact on 7 September 1983, to 226 mm below the culvert north of Howe on 7 September 1983. One brook trout, sampled on 7 September 1983, downstream of the culvert north of Howe, was 250 mm long and weighed 172 gm (k factor = 1.10). Mean lengths of bull trout were 209 mm and 313 mm at the Fallert and Howe transects,

Table 12. Summary of population estimates of age 1+ and older (total Length 100mm) trout for transacts of Little Lost River, Sawmill Creek, Summit Creek, 1983.

Stream	Transacts	Location T	R	Sec	Date	Transacts Length (m)	1 and older Trout collected 1	U 2	a 3	Population estimate Transacts	#per km	Comments
Little Lost River	Downstream from 1st rd culvert north of Howe	5N	29E	4	09/07/83	100	10	6	0	16+2	160+20	88% WR8, 6% 8RK, 6% BuLL
	Upstream from 1 et rd culvert north of Hare	5N	29E	4	01/25/83	128	12	3	—	15+4	117+81	100% WRd, Walter Tamp 2°C
					09/19/83	186	17	7	—	26+8	140+43	100% WRB
	AT U9GS Gauging Station north of Howe	6N	28E	11	01/25/83	221	33	8	—	43+5	196+23	100% W83, YOY Present
					09/07/83	200	18	—	—	—	—	100% W83, YOY present, no estimate possible due to high, turbid water
					09/19/839	182	12	8	5	31+14	170+77	92% WR3, 8% Bull, YDY WRB present
	Upstream from	7N	27E	12	09/19/83	155	34	14	—	55+10	355+65	98% WRB, 2% Bull, YOY WRB Present

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Table 12. Continued.

Stream	Transacts	Location T	R	Se	Date	Transacts length [m]	1 and older Trout collected 1	C 2	C 3	Population estimate Transacts	'per km	Comments
Sawmill Creek	8km upstream USSS Gauging Station within BLN exclosure	11	26E	12	09/07/83	275Approx.	41	21	—	77+33	280+120	85% WFB, 1 0% Bull, 5% BRK
Summit Creek	Transact U2	11N	25E	22	09/(3/83	112	82	23	9	9846	875+53	87% WFB, 13% BRK, YOY BRK, and WRB abundant
	Upstream from	11N	25E	16	09/08/83	130	51	6	—	58+2	448+15	51% BRK, 49% WM, YOY BRK, and WFE abundant

respectively. The percentage of rainbow trout sampled larger than 200 mm (catchable size) ranged from 17% at the gauging station on 7 September 1983, to 75% above the Howe culvert on 19 September 1983, and all brook and bull trout shocked from the Little Lost River were larger than 200 mm (Table 13) (Fig. 5). Few fish larger than 300 mm were collected.

Scale analysis indicated a maximum age of only 4+ years for wild rainbow and 3+ for brook and bull trout. The body-scale regressions for wild rainbow (n=103, r^2=0.84) and brook trout (n=36, r^2=0.63) had moderately good fits with intercepts (size at scale formation of 37.5 mm for wild rainbow and 27.2 mm for brook trout (Fig. 6). Too few trout scales were available (n=6) to perform a body-scale regression. Since the intercepts of the regressions for rainbow and brook trout were within the range of values reported in Carlander (1969), they were used as correction factors for back-calculating lengths at annuli. The intercept of the brook trout body-scale regression (27.2 mm) was used as the correction factor for back-calculating bull trout lengths at annuli.

Back-calculated lengths of Little Lost River wild rainbow were about 100 mm at annulus 1, 150-170 mm at annul us 2, 200-230 mm at annulus 3, and 270 mm at annulus 4. The one brook trout sampled was 142, 188, and 213 mm at annuli 1, 2, and 3. The one bull trout sampled was 130 mm at annulus 1, 191 mm at annulus 2, and 276 m at annulus 3 (Table 14). Slow growth and short lifespans apparently limit the maximum size of trout in the Little Lost River.

Sawmill Creek

The population density of age 1+ and older trout in Sawmill Creek was estimated to be 280/km. Wild rainbow trout comprised 85% of the sample of age 1+ and older fish, with 10% bull trout and 5% brook trout (Table 12). Mean lengths of wild rainbow, brook, and bull trout were 145 mm, 177 mm, and 209 mm; and 13%, 14%, and 50% of rainbow, brook, and bull trout were larger than 200 mm (Table 13) (Fig. 5). Back-calculated lengths at annuli for wild rainbow were 79 mm, 138 mm, and 202 mm at annuli 1, 2, and 3. Back-calculated lengths for brook trout were 130 mm at annulus 1, 213 mm at annulus 2, and 253 mm at annulus 3. Bull trout had 93 mm, 144 mm, and 193 mm at annuli 1, 2, and 3 (Table 14).

Summit Creek

A 3.2km section of Summit Creek was fenced by the BLM in 1975 to exclude livestock from riparian areas. Keller and Burnham (1982) found abundance and average size of trout within the closure to be greater than in transects outside the exclosure in 1979. Transect 2V within the exclosure and transect 1G immediately upstream from the exclosure were shocked on 6 September 1983, and results were similar.

Table 13. Summery of lengths, weights, and condition factors of trout collected by electrofishing from the Little Lost River, Sawmill Creek, Summit Creek, 1983.

Stream	Transact	Date	Species	Number of fish	Range length [mm]	Mean length (mm)	Mean weight (gm)	K factor	Percent larger than 200mm
Little Lost River	Downstream from 1st road culvert north of Home	09/07/83	WRB	14	150-305	228	146	1.26	71
			BRK	1	250	250	172	1.10	100
			BULL	1	313	313	313	1.02	100
	Upstream from 1st road culvert north of How e	01/25/83	WRB	13	153-310	204	-	-	47
		09/18/83	WI	24	149-306	235	-	-	75
	U9GS Gauging Station North of Howe	01/28/83	WRB	43	73-338	119	-	-	42
		09/07/83	Wf6	24	48-243	145	69	1.22	17
		09/19/83	WRB	27	55-308	177	-	-	26
			BULL	2	199-218	209	-	-	50
	Upstream	09/19/83	WRB	55	64-246	150	-	-	16
			BULL	1	223	223	-	-	100
Sawmill Creek	8km upstream from USGS Gauging Station	09/07/83	WRB	55	37-285	145	104	1.49	13
			BRK	7	68-287	127	107	1.40	14
			BULL	6	161-285	198	81	1.17	50
Summit Creek	Within BLM exclosure transact 2U	09/06/83	WRB	106	55-276	165	95	1.34	38
			BRK	16	97-245	183	121	1.47	50
	Upstream frail BLM transact 16	09/06/83	WRB	65	51-260	112	131	1.30	19
			BRK	57	82-270	163	127	1.28	40

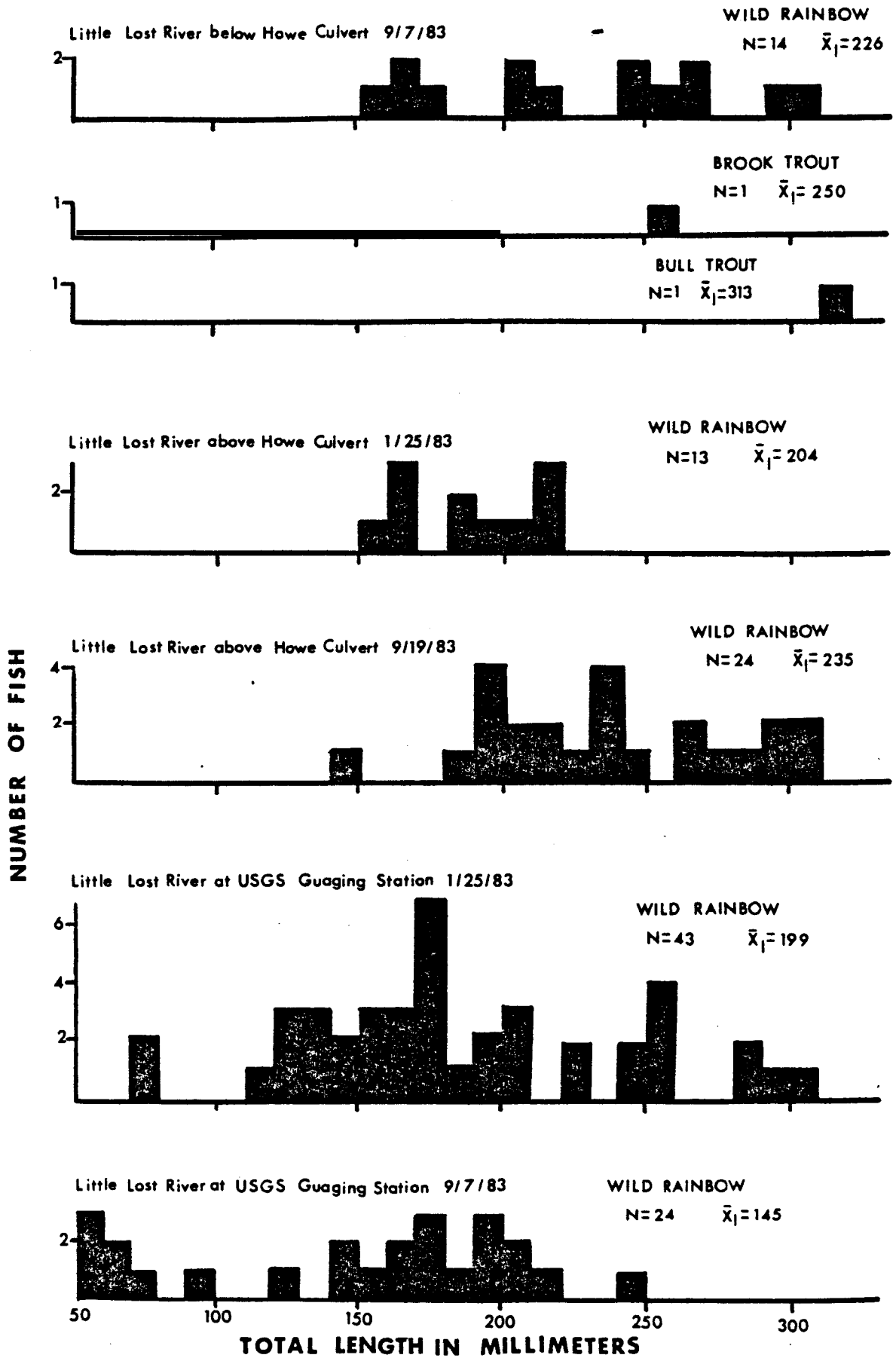
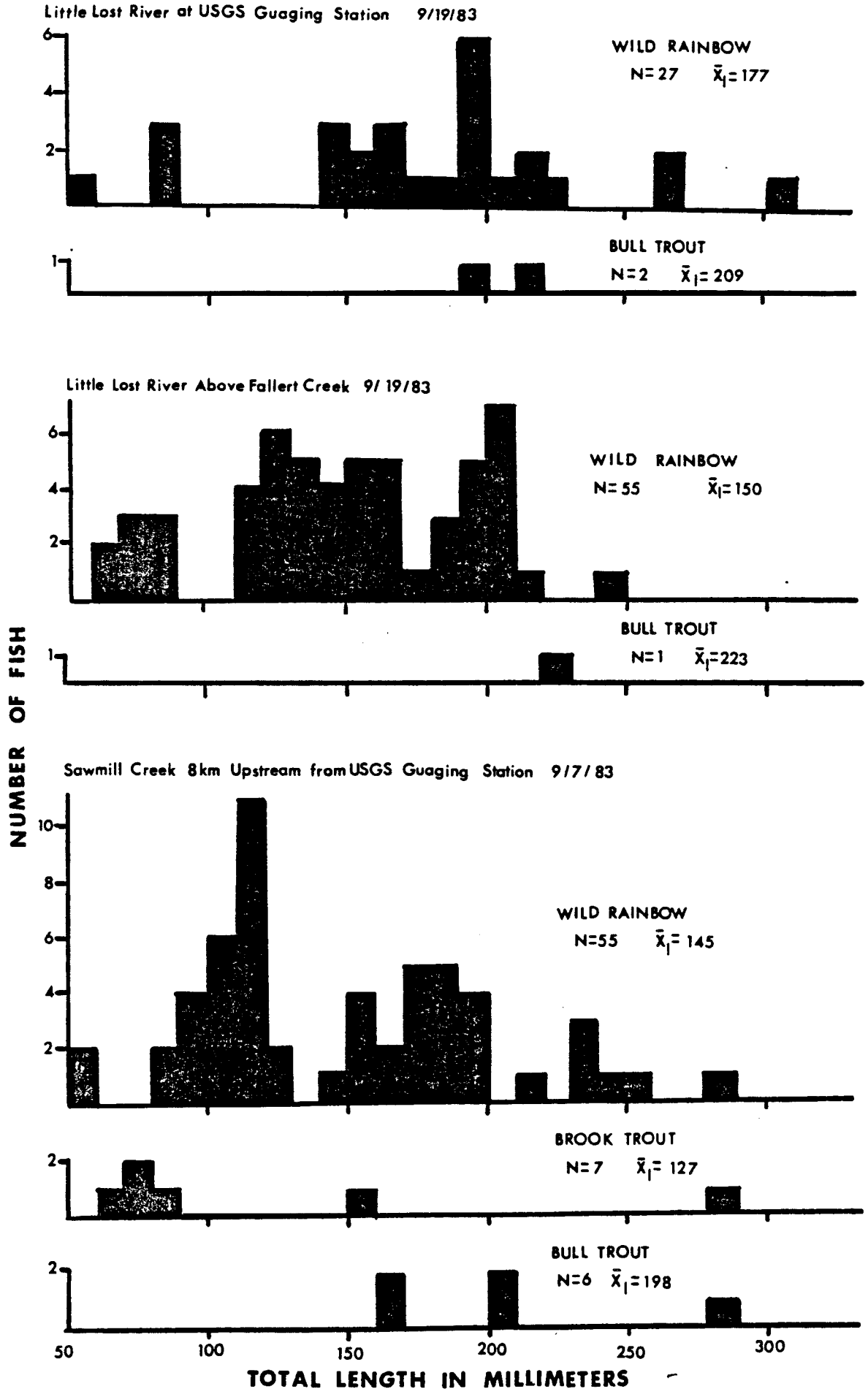


Figure 5. Length frequency distributions of trout sampled by electrofishing from Little Lost River, Sawmill Creek and Summit Creek, 1983.



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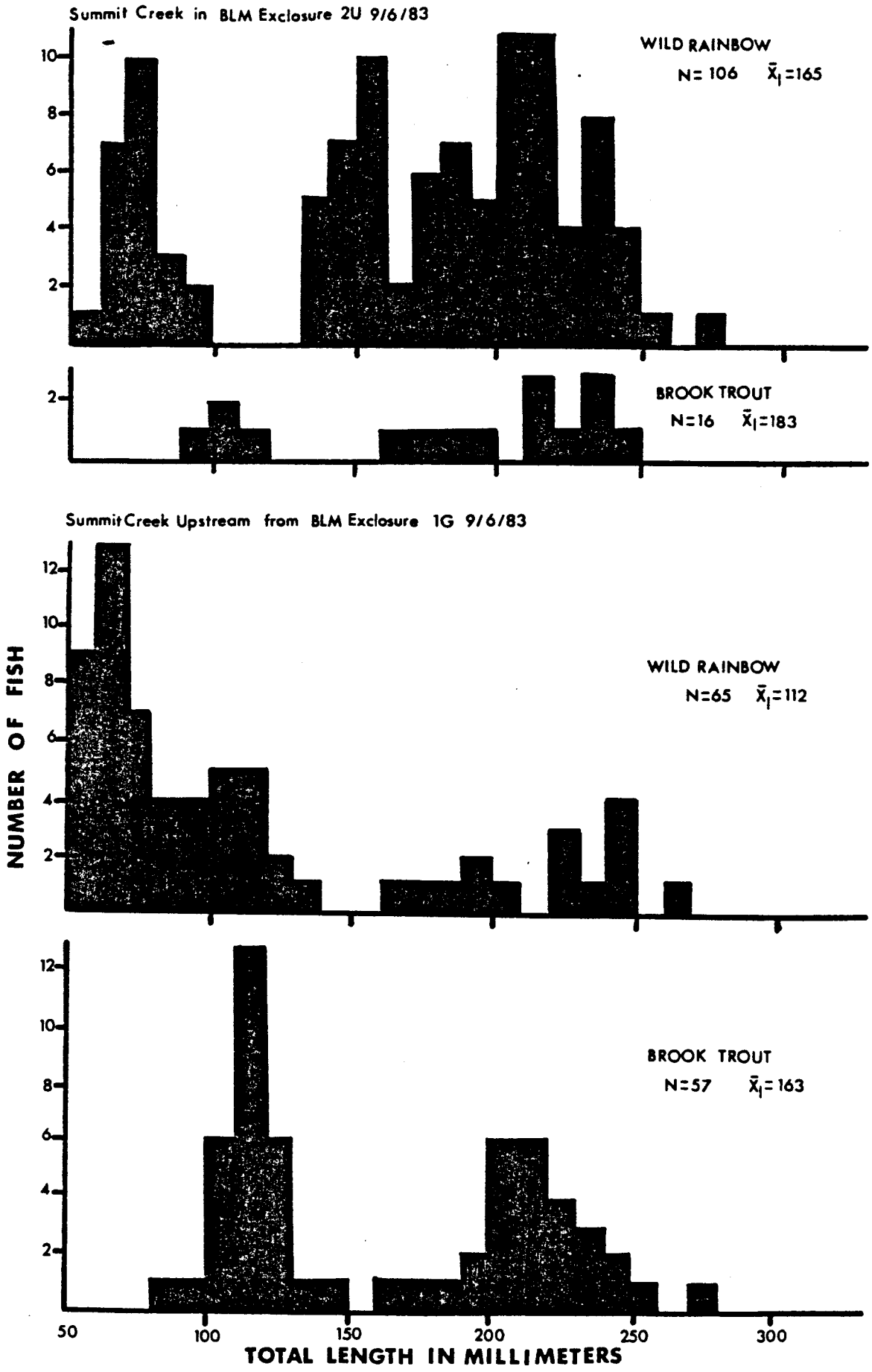

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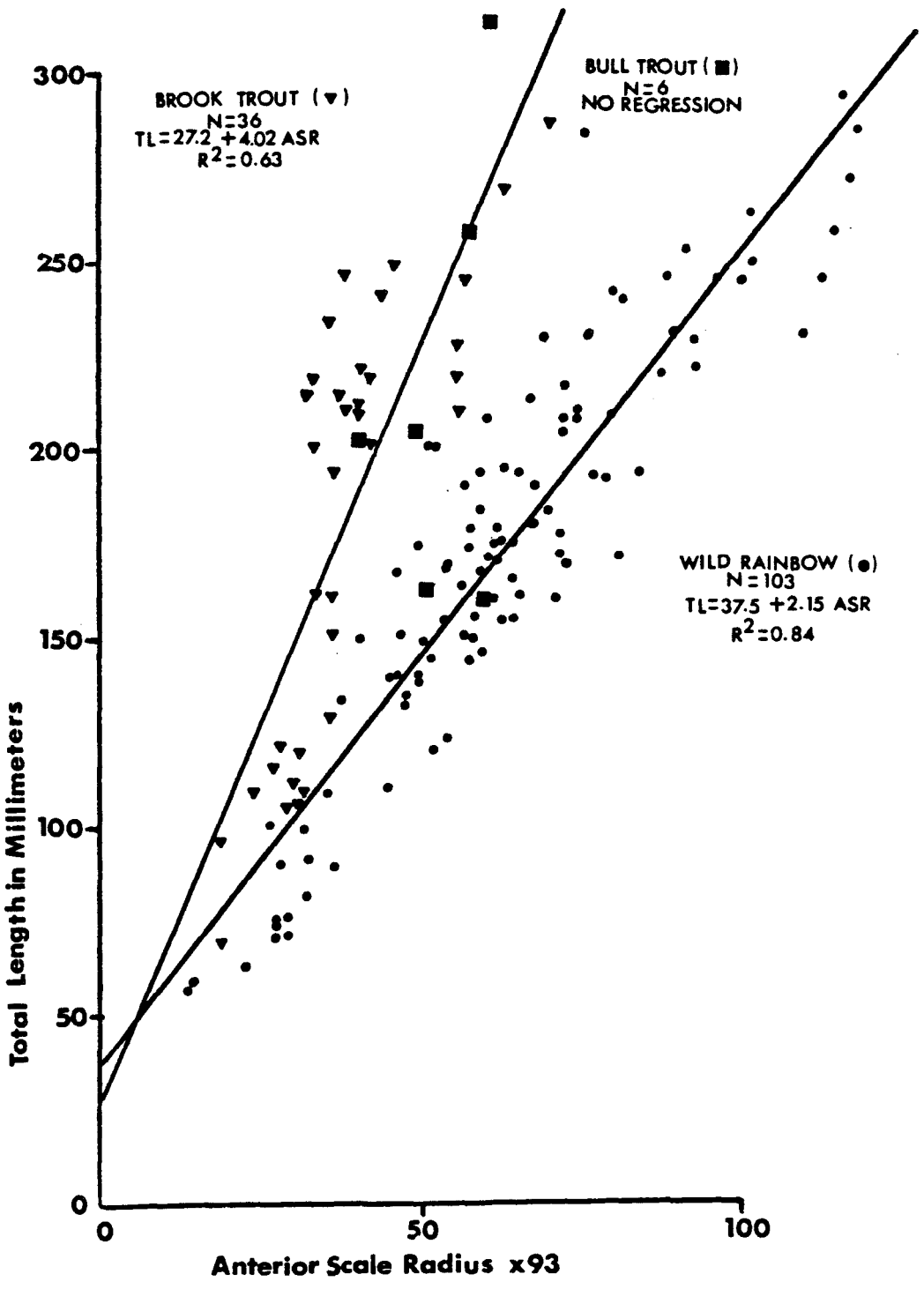

Figure 6. Body-scale regressions for brook and rainbow trout sampled from Little Lost River, Sawmill Creek and Summit Creek, September 6-7, 1983.

Table 14. Summery of back¯calculated lengths at annuli of trout sampled from Little Lost River, Summit Creek, and Sawmill Creek, 8 September 1983.

Stream	Sampling area	Species	Number of fish	Mean back calculated length at annuli I	II	III	IV
Little Lost River	Below Hare culvert	wild rainbow	15	97	171	229	271
		brook trout	1	142	188	223	—
		bull trout	1	130	191	276	—
	At USGS gauging station	wild rainbow	21	103	161	223	—
Sawmill Creek	8 Im upstream from USGS Gauge	wild rainbow	27	79	138	—	—
		brook trout	3	130	213	253	
		bull trout	5	93	144	193	—
Summmit Creek	G1	brook trout	22	158	218	247	—
Summit Creek	V2	wild rainbow	40	104	158	197	—
		brook trout	10	126	179	217	—

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Population density of age 1+ and older trout was nearly two times higher in transect 2V (875/km) than 1G (446/km) (Table 1), and average lengths of wild rainbow and brook trout in transect 2V (165 mm and 185 mm) were greater than in transect 1G (112 mm and 163 mm). The percentages of rainbow and brook trout larger than 200 mm were also higher within the exclosure (38% and 50%) than in the grazed area (19% and 40%) (Fig. 5) (Table 13). Densities of catchable-size trout (>200 mm) were nearly three times as high in the exclosure (346/km) than in the grazed area (133/km).

Scale analysis was difficult because a high percentage of the scales from fish larger than 200 mm were regenerated. The maximum age of wild rainbow in Section 2V was 3+, with mean back-calculated lengths of 104 mm at annulus 1, 158 mm at annulus 2, and 197 mm at annulus 3. All scales from wild rainbow sampled from the transect 1G were re-generated. Growth of brook trout was more rapid in the grazed area (156 mm at annulus 1, 218 mm at annulus 2, 247 mm at annulus 3) than in the ungrazed area (126 mm at annul us 1, 179 mm at annulus 2, and 271 mm at annulus 3) (Table 14). It is possible that the high population densities of brook trout in the exclosure have stunted growth.

Birch Creek

Population estimates of trout in Birch Creek near the Reno Diversion and at the proposed hydro diversion 900m upstream indicate moderate densities of rainbow trout (146-232/km) (Table 15). Mean lengths of wild rainbow sampled at the proposed diversion were 213 mm on 1 October 1982, and 215 mm on 20 July 1983. Mean lengths of wild rainbow above the Reno Diversion headgate were 224 mm on 1 October 1982, and 220 mm on 20 J u l y 1983. Nine hatchery rainbow trout were also collected at the Reno Diversion transect on 20 July 1983. *They* ranged in size from 140-270 mm, with a mean length of 183 mm (Table 16) (Fig. 7).

South Fork Snake River

A majority of the anglers interviewed (61%) were found to favor a length restriction on cutthroat trout which would allow than to keep only two fish over 16 inches in length. In comparison, Moore and Schill (1984) found 69% of the anglers they interviewed in 1982 favored some form of length restriction on cutthroat. Some disparity was found to occur among bank anglers, power boat anglers, and drift boat anglers in their willingness to support a length restriction, but in each case, a majority supported that type of regulation (Table 17).

Only 29% of the anglers questioned were in favor of restricting the use of bait on the South Fork, although nearly half (45%) of the drift boat anglers supported this (Table 17). Many anglers enjoy fishing for the trophy brown trout in the river, and feel that bait is necessary to catch these fish.

Table 15. Summary of population estimates of age 1+ and older trout for transects on Birch Creek, 1983.

Stream	Transacts	Location T	R	Sec	Date	Transacts length (m)	1 and older trout collected C1	C2	C3	Population estimate Transacts	#per km	Comments
Birch Creek	At fence line 900m upstream Reno Diversion	9N	34E	9	10/01/82	185	13	10	2	27+4	18+22	100% WFB
					07/20/93	185	29	10	—	43+7	232438	100% WIB, C2 estimated from efficiency above Reno Diversion
	Upstream from Reno Diversion	9N	34E	34	10/01/82	155	14	11	2	2945	187482	100% WFB
					07/20/®	155	21	7	—	3048	194489	68% WFB, 32% HRB

Table 18. Summery of Lengths, weights, and condition factors of trout collected by electrofishing from Birch Creek, 1983.

Stream	Transact	Date	Species	Number of Fish	Range Length (mm)	Mean Length (mm)	Mean weight (gm)	K factor[1]	Percent larger than 200mm
Birch Creek	At fench Line	10/01/82	WRB	25	150-310	215			52
	900w from Reno Diversion	07/20/83	WFS	29	155-310	213			52
	Upstream from Reno Diversion	10/01/82	WRB	28	80-330	224			85
		07/20/83	WFB	19	185-305	228			54
			HFB	9	140-270	183			33

[1]Computed for weighed fish only.

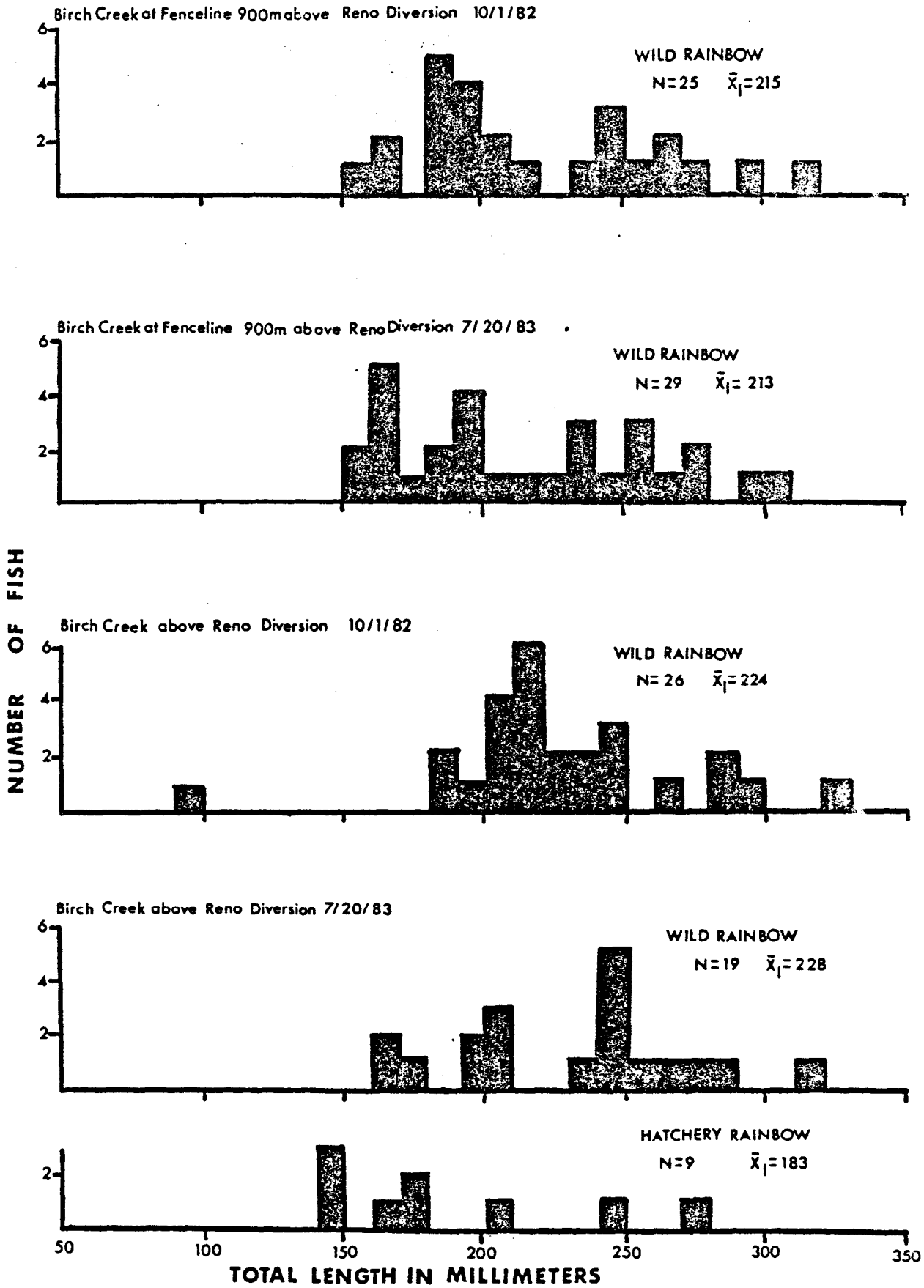

Figure . Length frequency distributions of trout sampled by electrofishing from Birch Creek, October 1, 1982 and July 20, 1983.

Table 17. Angler opinion survey for the South Fork Snake River, 1983.

Question	Bank			Power			Drift			Total		
	Yes	No	No Op.	Yes	No	No Op.	Yes	No	No Op.	Yes	No	No Op.
Favor a length restriction on cutthroat (2>18")?	5 4	4 4 1P137	2%	59%	41% N=78	0%	71%	28% N 4 8	1%	61%	38%	1% N=283
Favor no bait?	22% n=135		1%	20%	79% rF78	1%	45%	54% r=69	1%	27%	79%	1% r=282
Would you continue to fish with a length restriction?	91% n=135		1%	95%	5% rF80	9%	97%	2% n=69	9%	94%	5%	1% rr=284
and a bait restriction? (no bait)	65%	34% n=l 22	1%	79%	21% n=77	0%	87%	12% n 4 9	1%	78%	21%	1% n=26 8
Catch and release	52%	47% n=13 9	1%	54%	46% n=77		63%	36% n 4 9	1%	56%	43%	1% n=284
Would you keep fish under 10" long?	44% rr=137		1%	17%	83% n=77	0%	30%	69% n=70	1%	29%	79%	1% n=284
How important to keep your catch?	3.2 r P136			2.8 n=79			2.2 n=68			2.7		rt=283

Anglers indicated. that keeping fish was of some importance to them on a particular fishing trip. A mean rating for all groups of 2.7 (out of 5) was found when all groups were combined, but again, different groups did not agree. Bank anglers felt that keeping fish was more important than power boaters or drift boaters (Table 17).

A majority of the anglers questioned from all groups stated that they would continue to fish the South Fork even if any of the three types of restrictions (length, bait, total catch-and-release) were imposed (Table 17). Of the three, the fewest number (56%) of people said they would continue to fish the South Fork if catch-and-release regulations were imposed.

Most anglers questioned (70%) indicated they would not keep fish under 10 inches (254 mm) in length from the South Fork (Table 17). Bank anglers (44%) were the group most likely to keep fish in this size group, but the fact that this was not a majority is Indicative of the predisposition of South Fork fishermen to release smaller fish.

More people (29%) rated the fish in the South Fork as its most important value over any other single resource value they could think of. This is indicative of the importance of this fishery. These results were integrated with the existing biological data and previous angler surveys (Moore 1980, Moore et al. 1981, Moore and Schill 1984) to develop the following management alternatives:

1. Maintain present regulations (general season and bag limit).

2. Impose a slot limit for cutthroat (release all fish between 10 inches and 14 inches; 10 and 16 inches; or 10 and 18 inches).

3. Catch-and-release fishing only (either to July 15 or for the entire season).

Model ing indicated that catch-and-release fishing for the entire season would provide the greatest benefit to the cutthroat trout population, followed by the two wider slot limits (10 inches through 18 inches and 16 inches, respectively) (Appendix I). Each of these alternatives would result in a fishery sustaining catch rates in excess of 0.7 fish per hour designated in the Department's five-year management plan (Idaho Department of Fish and Game 1983) and increase numbers of both spawning cutthroat and cutthroat longer than 16 inches. Catch-and-release fishing through the stonefly hatch to 15 July would result in meeting the desired catch rate, but would fail to provide as many large fish. The 10-inch to 14-inch slot limit would provide more spawners, but would not significantly increase the catch rate (Fig. 8).

Because only a slight majority of the anglers (56%) said they would continue to fish the South Fork if a total catch-and-release regulations was imposed, we did not consider this an appropriate alternative to propose as a regulation. However, since 94% of the anglers said

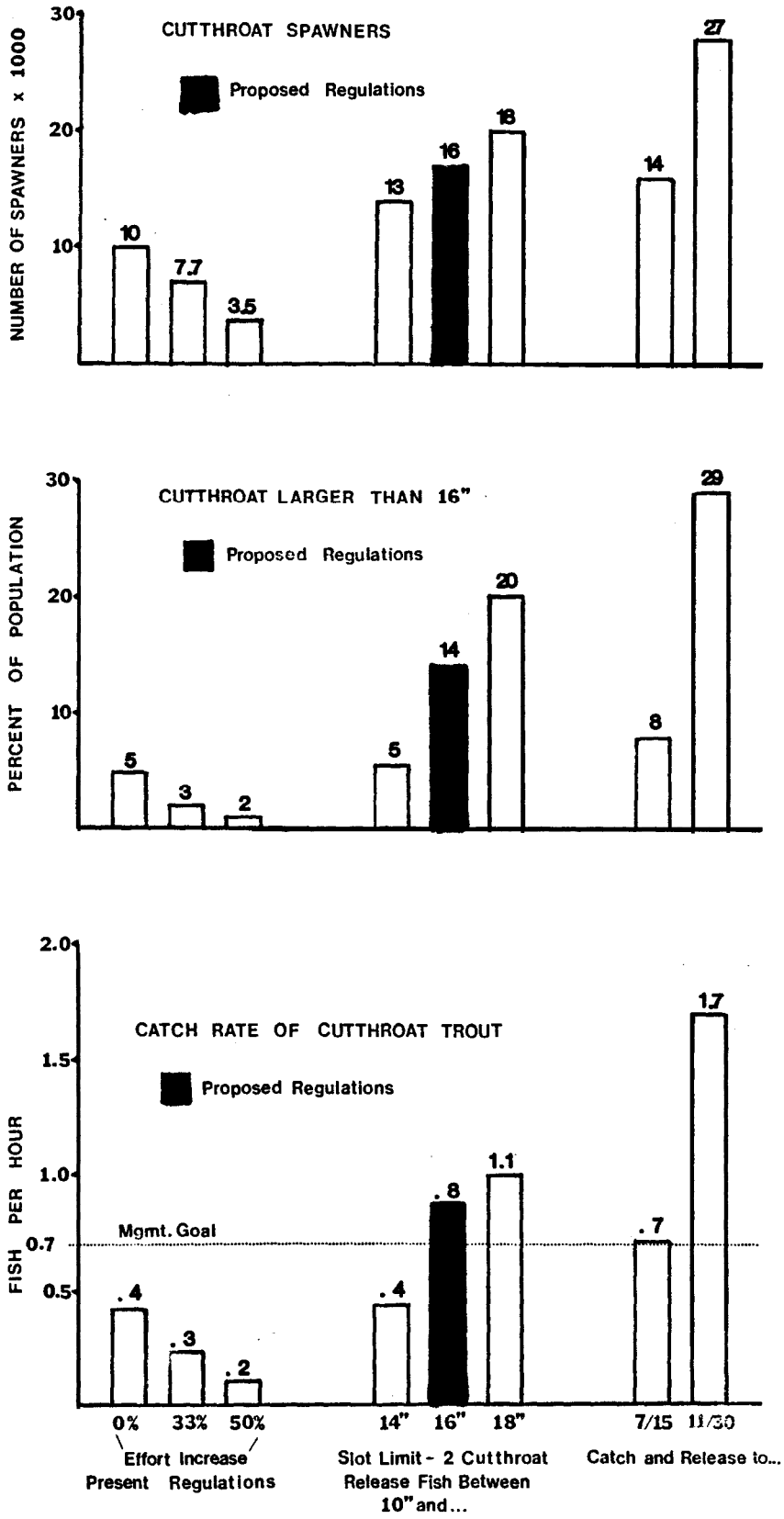

Figure 8. Predicted responses of the South Fork Snake River cutthroat fishery with various management alternatives.

they would continue to fish with a 16-inch minimum size limit and only 29% said they would keep fish under 10 inches, the two fish, 10-inch to 16-inch slot I imit was selected.

Over 100 people attended the three public meetings which were held in late September and early October. Public opinion was strongly in favor of affording protection or enhancement for the South Fork cutthroat population. Most of those attending agreed that the proposed regulations were acceptable provided they still be allowed to fish with bait.

Following review of the proposed regulation and public testimony in mid-October, the Fish and Game Commission adopted the following regulations beginning in 1984.

> South Fork Snake River from the water measuring cable near Heise upstream to the foot bridge abutments at Irwin (except waters within 100 yards of the mouth of Burns Creek) - General season. Trout limit - 6 fish, only 2 over 16 inches, no more than 2 cutthroat. Cutthroat between 10 inches and 16 inches must be immediately released. Barbless hooks required.

We salvaged 423 trout from the Palisades Dam stilling basin, of which 314 (75%) were brown trout with approximately equal numbers of cutthroat trout and lake trout (Salvelinus namaychus) present. One brown trout had an estimated weight of nearly 7 kg with numerous fish weighing over 2.5 kg. The largest cutthroat captured was estimated to weigh nearly 3 kg. Two tags have been returned from the 23 put out during the salvage operation. One fish was captured nearly 8 km downstream on 1 April, and the other some 13 km downstream on 3 June. Both fish were captured by anglers.

Henry's Fork Snake River

Several hundred rainbow trout and sane brook trout were transported to the mouth of the Buffalo River during salvage operations. Illegal harvest of fish was noted but not prevalent, despite the fact the low water conditions provided a locally popular fishery. Movement of trout was Judged to be unneeded because of seepage.

Habitat Improvement Project

Targhee Creek

During low flaws throughout the winter of 1983-84, water percolated through the coarse rock structure of the gabion dam on Targhee Creek below the Highway 87 culvert. As flows increased during the spring runoff, the water level in the pool increased, and water was backed about half way into the culvert. Water flowing over the gabion cut a plunge pool, and cutthroat spawners were observed successfully leaping over the gabion. Fish passage through the culvert is now successful as

spawners were observed above the culvert. Counts of spawners and redds above the culvert will be made when water clarity in Targhee Creek improves.

Palisades Creek

The habitat improvement structures failed during high spring flows of 1984. No plans have been made to repair these structures.

Teton River

Only eleven willows survived transplanting to the spring of 1984 (Ken Nielsen, Area Conservation Officer, personal communication). Water levels were high at the time of transplanting, consequently, many of the shoots were planted away from the normal base flow stream channel and probably did not have an ample water supply later in the year.

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The Henry's Lake Foundation provided $5,000 in funding for construction of screens on Targhee Creek. Dave Cole, Fishery Technician, assisted with Targhee Creek gabion construction. Several members of the Idaho Falls Chapter-of Trout Unlimited assisted on the Palisades Creek stream improvement project.

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