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Jerry M. Conley, Director

FEDERAL AID IN FISH RESTORATION

Job Performance Report

Project F-71-R-17

REGIONAL FISHERIES MANAGEMENT INVESTIGATIONS

Job No. 6-a.	Region 6 Mountain Lakes Investigations
Job No. 6-b.	Region 6 Lowland Lakes Investigations
Job No. 6-c.	Region 6 Rivers and Streams Investigations
Job No. 6-d.	Region 6 Technical Guidance

By

Mark Gamblin, Regional Fishery Manager

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TABLE OF CONTENTS

Page

Job No. 6-a. Region 6 Mountain Lakes Investigations

ABSTRACT 1

OBJECTIVES 2

METHODS 2

RECOMMENDATIONS 2

LIST OF TABLES

Table 1. High mountain lakes locations and number of trout fry stocked, 1992 2

Job No. 6-b. Region 6 Lowland Lakes Investigations

ABSTRACT 3

Henrys Lake 3
Island Park Reservoir 3
Palisades Reservoir 3
Mackay Reservoir 3
Ririe Reservoir 4
Mud Lake 4

OBJECTIVES 5

METHODS 5
Henrys Lake 5
Creel Survey 5
Dissolved Oxygen Monitoring 5
Surface Aeration 6
Island Park Reservoir 6
Palisades Reservoir 6
Mackay Reservoir 7
Ririe Reservoir 7
Lowland Lake Survey 7
Bass Tournaments 7
Mud Lake 7
Lowland Lake Survey 7
Bass Tournaments 7
Warmwater Introductions 8

FINDINGS 8

Henrys Lake 8

TABLE OF CONTENTS (Cont.)

Page

Creel Survey 8
Dissolved Oxygen Monitoring and Surface Aeration 8
Island Park Reservoir 13
Palisades Reservoir 13
Mackay Reservoir 16
Ririe Reservoir 17
Mud Lake 17
Bass Tournaments 20
Ririe Reservoir 20
Mud Lake 20
RECOMMENDATIONS 22

APPENDICES 23

LIST OF TABLES

Table 1. Analysis of variance for three replicated Henrys Lake creel survey angler estimates (P=0.05) 8

Table 2. Summary statistics for Mackay Reservoir creel survey, May 23 to September 9, 1992 16

Table 3. Summary statistics for Ririe Reservoir bass tournament anglers, 1992 21

Table 4. Summary statistics for Mud Lake bass tournaments, 1992 21

LIST OF FIGURES

Figure 1. Dissolved oxygen levels were monitored at four standard locations from early Decemer until the ice became too dangerous to travel on in mid-March. Mean dissolved oxygen volumes were calculated and depletion rates were graphed (Barica and Mathias 1987) 12

Figure 2. Floating gill nets, Island Park Reservoir, 1992 14

Figure 3. Sinking gill nets, Island Park Reservoir, 1992 14

Figure 4. Vertical nets, Island Park Reservoir, 1992 15

Figure 5. Trap nets, Island Park Reservoir, 1992 15

Figure 6. All nets, Island Park Reservoir, 1992 16

Figure 7. Smallmouth bass length frequencies, Ririe Reservoir, 1992 18

LIST OF FIGURES (Cont.)

Page

Figure 8. Yellow perch length frequencies, Ririe Reservoir, 1992 18

Figure 9. Fingerling rainbow trout length frequencies, Ririe Reservoir, 1992 19

Figure 10. Wild rainbow trout length frequencies, Ririe Reservoir, 1992 19

Figure 11. Mud Lake survey samples, 1992 20

Job No. 6-c. Region 6 Rivers and Streams Investigations

ABSTRACT 43

OBJECTIVES 44

METHODS 44

Fall River 44
Impacts on Young-of-the-Year Trout 44
Impacts on Age 1 and Older Fish 44
Direct Mortality and Physical Injury 44
Age 1+ Population Comparisons 44
Natural Variation in Population 45
South Fork Snake River 45
Annual Population Estimate 45

FINDINGS 45

Fall River 45
Impacts on Young-of-the-Year 45
Age 1+ Population Comparisons 47
Impacts on Age 1 and Older Fish 47
Natural Variation in Population 49

RECOMMENDATIONS 50

LIST OF TABLES

Table 1. Fall River trout fry estimates for the river section above Marysville Hydro project sediment introduction, 1992 46

Table 2. Fall River trout fry estimates for the river section affected by Marysville Hydro project sediment, 1992 46

Table 3. Age 1+ and older rainbow trout population estimates for Fall River, Kirkham Bridge to Enterprise Canal diversion, 1989 and **1992** 47

CONTENTS

LIST OF TABLES (Cont.)

Page

Table 4. Fall River trout snorkel estimates. Upper section: Marysville Canal diversion to Squirrel Bridge, 1978 through 1992 49

Table 5. Fall River snorkel estimates. Middle section: river mile 17.0 through river mile 18.0, 1987 and 1992 . . . 49

Table 6. Fall River snorkel estimates. Lower section: Farmer's Own Canal diversion to point of sediment introduction, 1987 and 1992 49

LIST OF FIGURES

Figure 1.

. 48

Job No. 6-d. Region 6 Technical Guidance

ABSTRACT 51

OBJECTIVES 52

METHODS 52

FINDINGS 52

JOB PERFORMANCE REPORT

State of: Idaho

Name: Regional Fishery Management Investigations

Project No.: F-71-R-17

Title: Region 6 Mountain Lakes Investigations

Job No.: 6-a

Period Covered: July 1, 1992 to June 30, 1993

ABSTRACT

We did not conduct mountain lake investigations in Region 6 during 1992. Supplemental stocking of rainbow and cutthroat trout was conducted for Region 6 mountain lakes according to the three-year rotation stocking schedule. The Challis National Forest provided a helicopter from stand-by fire control for most of the fish stocking.

Authors:

Mark Gamblin
Regional Fishery Manager

OBJECTIVES

1. To stock scheduled Region 6 mountain lakes according to the three-year rotation schedule.

METHODS

Nine mountain lakes in the Big Lost River drainage were stocked by helicopter on September 3, 1992 (Table 1).

RECOMMENDATIONS

1. Continue the stocking rotation described by Gamblin et al. (1995).

Table 1. High mountain lakes locations and number of trout fry stocked, 1992.

	Species	Number	Drainage
Big Fall Creek Lake	cutthroat	500	Summit Creek
Round Lake	cutthroat	1,000	North Fork Big Lost River
Long Lake	cutthroat	1,500	Lake Creek
Rough Lake	cutthroat	1,000	Lake Creek
Big Lake	cutthroat	3,000	Lake Creek
Green Lake	cutthroat	1,500	Muldoon Creek
Brockie Lake	cutthroat	1,000	Right Fork Iron Bog Creek
Iron Bog Lake #1	cutthroat	2,000	Left Fork Iron Bog Creek
Fish Pole Lake	cutthroat	2,000	Left Fork Iron Bog Creek
Pass Creek Lake	cutthroat	1,000	Pass Creek
Aldous Lake	cutthroat	1,500	China Creek
Hancock Lake	cutthroat	500	China Creek

JOB PERFORMANCE REPORT

State of: Idaho | Name: Regional Fishery Management Investigations

Project No.: F-71-R-17 | Title: Region 6 Lowland Lakes Investigations

Job No.: 6-b

Period Covered: July 1, 1992 to June 30, 1993

ABSTRACT

Henrys Lake

A comparison of simultaneous boat, float tube, and bank anglers on Henrys Lake by the current and two prior creel survey leaders did not find significant differences among the three data sets. This indicates that the creel survey data collected under these three different survey leaders is uniform and comparable.

Dissolved oxygen monitoring in 1993 again documented a sharp decline in dissolved oxygen volume in the lake. Measured dissolved oxygen levels and calculated dissolved oxygen volumes suggest that the lake approached lethal dissolved oxygen limits by early March. However, we found no evidence of a significant winter fish kill in 1993. Artificial surface aeration of several locations on the north shore of the lake created open water areas with higher than ambient levels of dissolved oxygen.

Island Park Reservoir

Drought conditions and strong demand for Island Park Reservoir water in 1992 caused the reservoir to be drafted to its lowest volume since 1979. Trap net and gill net samples from Island Park Reservoir were dominated by Utah chubs *Gila atraria* and Utah suckers *Catostomus ardens* (96% of total sample). The reservoir was successfully treated with rotenone at low pool to reduce the number of Utah chubs and Utah suckers in the reservoir and its tributaries.

Palisades Reservoir

A year-long structured creel survey was begun in November 1992 to evaluate the performance of Jackson National Fish Hatchery fine-spotted cutthroat *Oncorhynchus clarki ssp*. relative in the Palisades Reservoir fishery. Winter catch statistics showed good catch rates (1.57 trout/h) dominated by cutthroat trout. Wild cutthroat and hatchery cutthroat were not differentiated by scale analysis at this stage of the creel survey.

Mackay Reservoir

An unstructured creel survey on Mackay Reservoir found good catch rates (1.08 fish/h) supported primarily by hatchery "catchable" rainbow trout *O. mykiss*. Hatchery fingerling rainbow trout comprised only 11% of the catch.

Ririe Reservoir

A standardized fish population of Ririe Reservoir found predominantly Utah chubs (69%) and Utah suckers (21%) in addition to rainbow trout (6%), yellow perch *Perca flavescens* (3%), and smallmouth bass *Micropterus dolomieu* (1%). Yellow perch (illegally introduced) are increasing in density and average size. Smallmouth bass were likely underrepresented in the samples. The rainbow trout fishery appears to be dependent on hatchery fingerling stockings.

Mud Lake

The Mud Lake population was estimated to be comprised almost entirely of Utah suckers (91%) and Utah chubs (9%). Although we did capture tiger muskies *Esox lucius* x *E. masquinongy*, Lahontan cutthroat trout *O. clarki henshawi*, largemouth bass *M. salmoides*, yellow perch, and black bullhead catfish *Ictalurus melas*, those species accounted for less than 1% of the total catch.

Author:

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OBJECTIVES

1. To evaluate the uniformity of Henrys Lake creel survey angler count data base.

2. To monitor Henrys Lake winter dissolved oxygen conditions and supplementally aerate critical winter staging areas for Henrys Lake trout.

3. To reduce the abundance (number) of Utah suckers Catostomus ardens and Utah chubs Gila atraria in Island Park Reservoir to improve trout and kokanee Oncorhynchus nerka kennerlyi survival and growth.

4. To evaluate the Palisades Reservoir hatchery cutthroat trout O. clarki fishery.

5. To evaluate the Mackay Reservoir hatchery fingerling rainbow trout O. mykiss fishery.

6. To characterize the species composition and relative abundance of the Ririe Reservoir fish population.

7. To characterize the species composition and relative abundance of the Mud Lake fish population.

8. To reduce redside shiner Richardsonius balteatus densities in Rainbow Lake with introduced smallmouth bass Micropterus dolomieu.

METHODS

Henrys Lake

Creel Survey

The Henrys Lake creel survey is conducted season-long annually. To ensure that angler counts have remained consistent and comparable as creel survey supervisors and crews have changed, we compared angler counts made by the three most recent Henrys lake creel survey supervisors. Each supervisor (Jody Brostrom, Brad George, and Tom Herron) conducted angler counts for three continuous days (June 20, 21, 22, 1992) on identical schedules, duplicating as closely as possible the methods used currently (Tom Herron) and in the past (Jody Brostrom, Brad George). Angler counts were conducted four times per day for a total of 12 angler counts per survey checker. Anglers were categorized by method (boat, float tube, or bank). Each checker conducted his or her counts separately, without communicating among themselves. Angler counts were contrasted between survey checkers and by analysis of variance.

Dissolved Oxygen Monitoring

Subsequent to the 1991 winter fish kill at Henrys Lake, we annually monitor winter dissolved oxygen levels to track the rate of depletion of available dissolved oxygen in the lake.

Surface Aeration

To minimize the impact of a potential 1992 winter kill on Henrys Lake, portable surface aerators were installed off Pittsburgh Creek, the Henrys Lake Hatchery, Wild Rose Resort, and Staley Springs. We also utilized two large volume air blowers to supplement surface aeration off shore from Hatchery Creek.

Island Park Reservoir

Irrigation demand depleted water supplies in the upper Snake River reservoir system and influenced an early decision by the Bureau of Reclamation for Island Park Reservoir to be emptied by late summer. Gillnetting and trapnetting surveys were conducted on Island Park Reservoir, Trudes Reservoir, Sheridan Reservoir, and the Ice House Creek impoundment in preparation for a fishery renovation project. The eradication of fish populations in the Island Park Reservoir basin, Sheridan Creek, and Sheridan Reservoir, by rotenone application, was planned to coincide with the emptying of Island Park Reservoir.

The Island Park Reservoir renovation project was conducted between September 18 and October 30. The project included treatment of the Island Park Reservoir basin (Shotgun Creek, the isolated Hotel Creek impoundment {Cecilia Reservoir}, and the Henrys Fork river channel from McCrea's Bridge to the remnant reservoir pool at the dam), Sheridan Creek, Sheridan Reservoir, the Sheep Creek impoundment, lower Sheep Creek, Hotel Creek below the Sheep Creek confluence and Trude's Reservoir (Algenia Reservoir). Sheridan Creek from 1.5 miles above Sheridan Reservoir and below the reservoir was treated on September 18. Sheridan Reservoir was treated on September 25. The Island Park Reservoir basin and Sheep Creek impoundment were treated on September 26. Trude's Reservoir was treated on October 30 at the request of the owner, Ken Wright.

We used a 2.5%synergized liquid rotenone formulation exclusively. Sheridan Creek, Sheridan Reservoir, and Sheep Creek Reservoir downstream to and including the Hotel Creek impoundment were treated at 1.5 parts per million (ppm). The Island Park Reservoir basin and Trude's Reservoir were treated at 3.0 ppm.

Palisades Reservoir

The Palisades Reservoir fishery management program, supported by stockings of fingerling Jackson National Fish Hatchery spotted cutthroat, has lagged behind management goals (0.6 fish/year) for more than ten years (<0.4 fish/h). In November 1992, we initiated a year-long randomized, stratified creel survey to evaluate the effectiveness of stocking these cutthroat at a larger size (>6 inches) to increase overall fishery catch rates and return-to-the-creel. Typically, the Jackson National Hatchery cutthroat have very little fin deformation or other common "hatchery" physical artifacts to aid differentiation from wild cutthroat stocks in the reservoir fishery. The cutthroat stocked in 1992 were marked with a starvation stress check to allow identification by scale analysis. Scales samples were taken from a representative sample of fish prior to stocking, and scale samples are taken from creeled cutthroat during angler interviews. Hatchery growth patterns, including the starvation stress check, will be compared to growth patterns on field collected scale samples to help distinguish between hatchery and wild cutthroat in the catch. This creel survey will continue until November 1993.

Mackay Reservoir

Fall stockings of Mackay Hatchery fingerling rainbow trout have not been well accounted for in the Mackay Reservoir fishery in recent years. An unstructured creel survey (no angler counts, effort, or harvest estimates) was conducted during the 1992 fishing season (May 23 through September 9) by Region 6 and Mackay Hatchery personnel to evaluate the relative contribution of fingerlings vs catchable hatchery rainbow trout in Mackay Reservoir fishery. Hatchery catchable rainbows were marked with an adipose fin clip for identification. Hatchery fingerling rainbows were identified by fin deformation.

Ririe Reservoir

Lowland Lake Survey

On the night of electrofishing (approximately two hours of effort), two trap net, two sinking gill net, and two floating gill net overnight sets were carried out as part of the Region 6 lowland lake and reservoir database. These data provide catch per unit effort (CPUE), species composition, relative abundance, and size structure perspective on the Ririe Reservoir fish population.

Bass Tournaments

Local bass clubs held 14 tournaments on Ririe Reservoir in 1992. A record of angler effort and catch was recorded for each boat through the Region 6 bass angler scorecard and survey. Tournament participants were requested to report the number of legal (>305 mm) and sublegal (<305 mm) smallmouth bass caught and hours fished. The overall season catch rates for legal and sublegal bass were calculated for smallmouth bass population trend information.

Mud Lake

Lowland Lake Survey

One night of electrofishing (approximately four hours of effort), two trap net, two sinking gill net, and two floating gill net overnight sets were conducted for the regional lowland lake and reservoir database.

Bass Tournaments

Local bass clubs held four tournaments on Mud Lake in 1992. Anglers collected the same data described for Ririe Reservoir bass tournaments through the bass angler scorecard survey. Season catch rates for legal and sublegal bass were calculated for the Mud Lake largemouth bass fishery.

Warmwater Introductions

Two hundred smallmouth bass were moved from western Idaho to Rainbow Lake. High densities of redside shiners appear to limit survival and growth of hatchery rainbow trout. The smallmouth bass introduction is intended to reduce and control redside shiner numbers, improve survival, growth, and catch rates of hatchery rainbow trout, and provide additional angling opportunity.

FINDINGS

Henrys Lake

Creel Survey

Angler counts did not differ significantly between survey checkers, either by angler type (boat, float tube, bank) or for total angler counts (Table 1).

Table 1. Analysis of variance for three replicated Henrys Lake creel survey angler estimates (P=0.05).

	Angler Counts			
	Boat	Float Tube	Bank	Total
F-ratio	0.266	0.280	1.998	0.258
Probability of greater F-ratio	0.765	0.751	0.152	0.773
Significant	No	No	No	No

With these results we can assume homogeneous variances among the data sets, making our database (for at least the three most recent survey supervisors) uniform and comparable. We will continue to conduct angler counts by the standardized method currently being used.

Dissolved Oxygen Monitoring and Surface Aeration

Aeration activities began on January 6, 1993 and dissolved oxygen monitoring was begun immediately upon ice formation (2 inches thickness) off the hatchery ladder on December 3, 1992. A chronology of dissolved oxygen monitoring, aeration activities and hatchery run observations follows.

HENRYS LAKE AERATION AND DISSOLVED OXYGEN MONITORING
DECEMBER 1992 TO APRIL 15, 1993
ORDER OF EVENTS

December 3 — Checked dissolved oxygen 25 yards off hatchery cabin. Unable to check additional sites due to quality of ice.

Ice	8.0 mg/1
lm	7.2 mg/l
2m	6.4 mg/1

January 6 — Installed three powerhouse aerators off fish ladder. Checked dissolved oxygen at 300 yards off hatchery cabin.

Ice	8.8 mg/1
im	7.2 mg/1
2m	5.5 mg/i
3m	1.6 mg/1

January 12 — Wheeler Electric on site to bid electrical hook-up of blowers. Original B.A.-i submitted on November 18th. Notified on 1/4 that B.A.-1 was lost at headquarters in Boise. Had to resubmit B.A.-i for elec. work.

January 15 — Superior Electric on site to bid electrical hook-up of blowers.

January 25 — Set out one tornado aerator at fish ladder. Constructed aeration weights. Tested water chemistry from Hatchery site.

1 mile south of Pittsburgh Creek

Ice	12.5
lm	6.4
2m	4.2
3m	1.5
4m	1.1

0.2 miles north of county boat dock

Ice	5.7
lm	3.2
2m	0.3
3m	0.0

300 yards south of hatchery

Ice	6.5
lm	4.7
2m	4.9
3m	0.5

January 29 — Checked inflow at Targhee Creek because we suspected water was flowing on top of ice. Unable to determine due to low flow and diffusion into snow.

February 1 — Dug trench through snow at Staley Springs for electrical installation. Installed additional tornado at hatchery ladder. Checked outlet; strong hydrogen sulfide odor and no fish noted.

February 2 — Assembled additional aerators and weights. Installed three powerhouse aerators at Staley Spring.

February 3 — Fish beginning to appear at ladder. Checked 20 fish - in good condition (only 1 female). Estimate 75-100 fish at most.

February 4 Picked up additional 110 cord, eye bolts, and cable clamps. Discussed aeration progress with Region 6 and fisheries Bureau.

February 5Compiled aeration cost data.

February 8Construct aeration weights/wired aerators.

February 9 Set two tornados up at Staley Spring.

February 10 Set out power house at Pittsburgh Creek.

February 11 Set with 1st Street Welding RE: Manifold Design.

February 12 Placed tornado in front of temporary cabin at hatchery. Placed additional powerhouse off Pittsburgh Creek.

February 14 Installed power house off Wild Rose Resort. Checked dissolved oxygen.

1 mile south of Pittsburgh Creek.

Ice	8.5
lm	4.7
2m	2.6
3m	1.3
4m	0.0

300 yards south of hatchery

Ice	4.4
lm	2.7
2m	1.5
3m	0.25

0.2 miles north of county boat dock

Ice	2.4
1m	1.2
2m	0.1

February 16 35°F below zero overnight. Plugged in tornados at hatchery temporary cabin and Staleys.

February 18 Dug trench from transformer to helixing shed with backhoe, began electrical hook up for blower. Installed two tornados off Pittsburgh Creek.

February 19 Installed additional powerhouse off Wild Rose.

February 22 Installed 20 amp service at Pittsburgh Creek and temp cabin.

February 24 Rewired tornado at Pittsburgh Creek, finished electrical hook up on first blower.

February 27 Checked dissolved oxygen.

1 mile south of Pittsburgh Creek.

Ice	5.7
lm	3.25
2m	2.2
3m	0.0
4m	0.0

February 27 (cont.)

300 yards south of hatchery.

Ice	3.9
lm	2.8
2m	0.7
3m	0.1

300 yards south of Wild Rose Resort

Ice	3.5
lm	2.8
2m	1.3
3m	0.0

March 3, 1993 Installed four blower lines in front on fish ladder.

March 5 Set additional tornado out in front of temporary cabin.

March 8 Set tornado out at Wild Rose Resort.

March 9 Checked dissolved oxygen around blower outlets. high - 4.7 low - 3.25

March 10 Checked dissolved oxygen at 250 yards south of hatchery.

Ice	3.6
1m	2.5
2m	1.2
3m	0.25

March 18 Replaced aeration weights on tornado at Staley's (broken cable - no damage to unit).

March 22 Interview with Channel 8 news: "Hybrid Production" and "Effects of Lake Drawdown/Low Dissolved Oxygen."

March 24 Changed oil in blower 1, started blower 2.

March 25 Blower 2 starter coil defective, electrician notified, parts ordered, back to blower 1.

April 5 Significant increase in cutthroat and hybrid run numbers. Fish appear in good health and eggs in good condition.

April 12 Produced additional hybrid eggs (624, 742 green eggs).

April 15 Run sustaining well, aerators working well. Approximately 20 acres of open water from Pittsburgh Creek to west of hatchery.

Dissolved oxygen depletion rates for 1992 and 1993 on Henrys Lake are contrasted in Figure 1. The rate of depletion was very similar to 1992 in 1993. However, the total volume of dissolved oxygen available in 1993 was substantially less than 1992, and by early March, approached the critical threshold of 3 g/m^2. Although we did not observe dead or stressed trout subsequent to our last dissolved oxygen measurements on March 10, we believe that the trout population was critically close to lethal dissolved oxygen levels. Dissolved oxygen levels remained higher than ambient levels within the open water areas created by surface aeration. This may have played an unknown role in preventing fish mortality in that part of the lake.

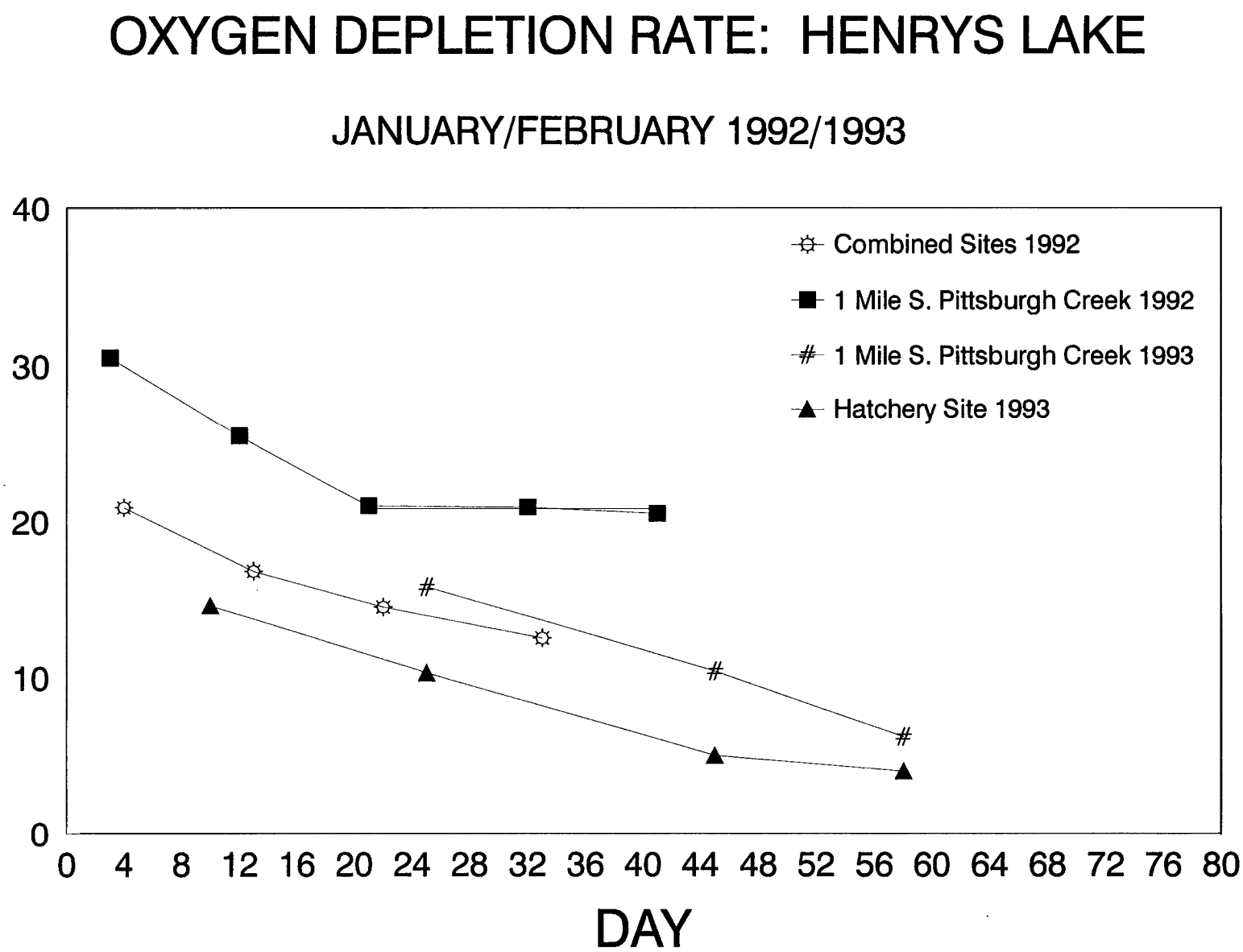


Figure 1. Dissolved oxygen levels were monitored at four standard locations from early December until the ice became too dangerous to travel on in mid-March. Mean dissolved oxygen volumes were calculated and depletion rates were graphed (Barica and Mathias 1987).

Island Park Reservoir

Preliminary gill net and trap net samples on Island Park Reservoir documented very low numbers of trout in the reservoir fish population (Figures 2-6; Appendix D). The highest percentage of catch comprised by trout we found were in our floating gill net sets at 17%. The overall percentage catch from all methods combined was 4% for trout. Utah chubs were consistently the most numerous species captured among the different net sets, but were almost equally frequent when all methods were combined. Chubs comprised 88% (and hatchery rainbow trout accounted for the remaining 12%) of our net samples from Sheridan Reservoir. Trude's Reservoir net samples were 79% Utah chubs, 10% coho salmon, 9% rainbow trout, and 2% Utah suckers.

We did not find Utah suckers or Utah chubs in Icehouse Creek, the Icehouse Creek impoundment, the Sheep Creek impoundment, or Hotel Creek below that impoundment.

Based on the above net surveys, the target species were Utah chubs and Utah suckers, incidental target species included redside.shiners, dace, sculpins, and residual game fish not salvaged prior to the renovation. Utah chubs were the most prevalent of the target species. Because of the lateness in the year, we did not have an opportunity to perform follow-up net surveys. We will conduct gill and trap net surveys on Island Park Reservoir, Sheridan Reservoir, and Trude's Reservoir next spring prior to the general fishing season opener. In the absence of net surveys, however, we believe that the 1992 treatment may be the best yet conducted on Island Park Reservoir due to the use of aerial helicopter application in areas inaccessible to boat or land crews. The Island Park Reservoir basin was at zero pool level which, combined with a well coordinated application of chemical, should have resulted in a very good kill of all fish species in the basin.

We did not experience serious logistical or mechanical problems during this renovation project. We were able to forego detoxifying the reservoir outflow below Island Park Reservoir because the dam was completely shut off during and after the treatment until the reservoir pool detoxified naturally. This considerably reduced manpower requirements and eliminated a potentially dangerous possibility for a failure of that safeguard procedure. We had no incidents of fish kill due to the escape or release of toxic water from the reservoir pool before detoxification.

During the salvage operation below the dam, an estimated 10,000 to 12,000 trout were moved to the confluence of the Buffalo River.

Palisades Reservoir

To date, we have conducted 36 survey days. For this five-month period, the average catch rate has been 1.57 fish/h. This is excellent compared to the average yearly catch (approximately 0.4 fish/h), but this only represents the best part of the year for Palisades Reservoir fishing. Of the fish that we checked, 92% were identified as wild cutthroat and less than 1% hatchery cutthroat. This emphasized the difficulty of identifying hatchery cutthroat. It is doubtful that 90% of the catch is supported by wild cutthroat. The remainder of the catch was comprised of brown trout (7%), lake trout, and kokanee, in that order or occupance. Only three lake trout and one kokanee were checked. The average length of cutthroat was 396 mm (16 in); brown trout 518 mm (20 in).

This survey will be fully summarized in the 1993 Region 6 annual report.

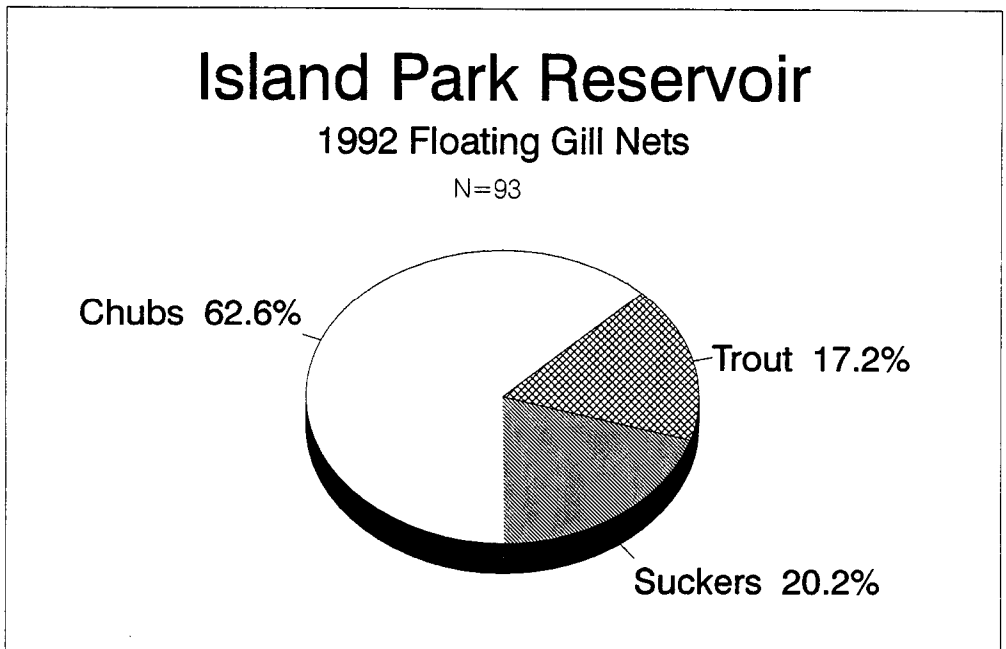


Figure 2. Floating gill nets, Island Park Reservoir, 1992.

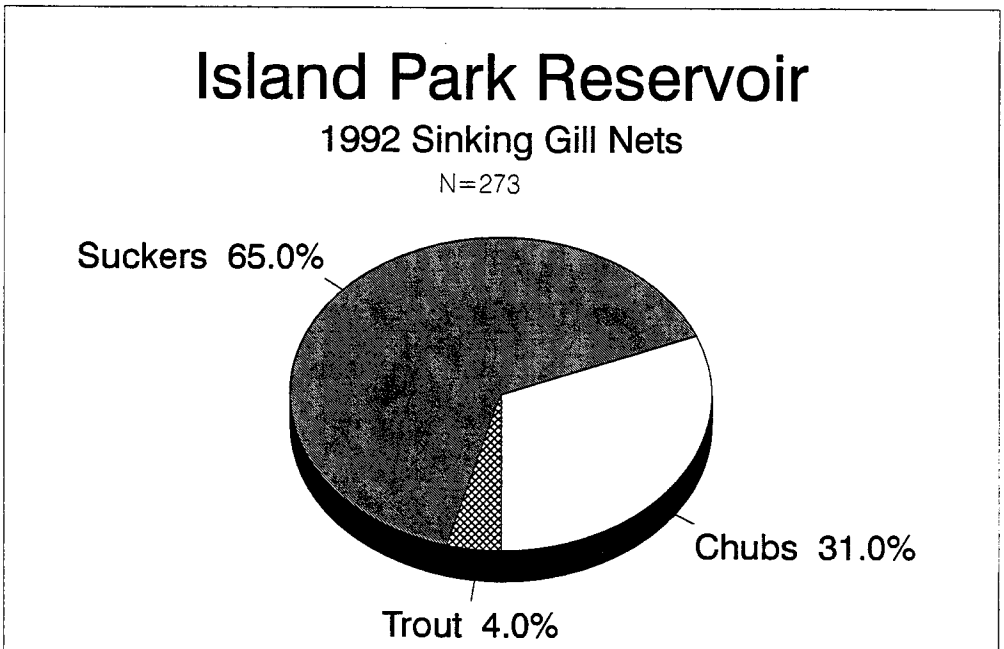


Figure 3. Sinking gill nets, Island Park Reservoir, 1992.

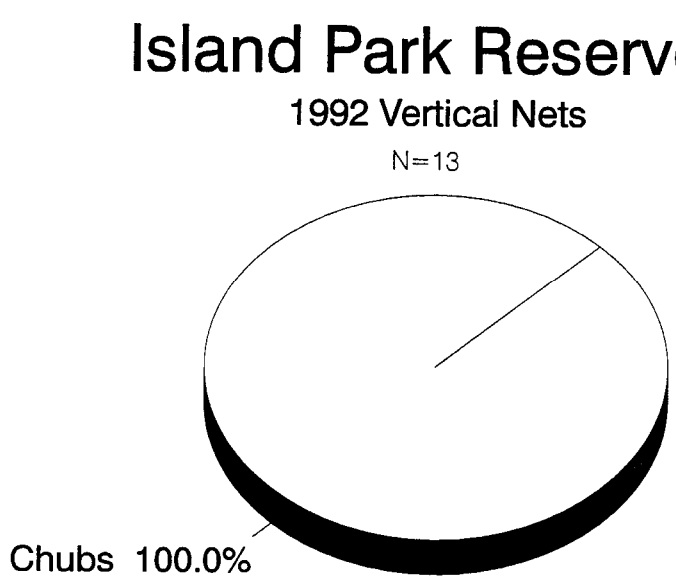


Figure 4. Vertical nets, Island Park Reservoir, 1992.

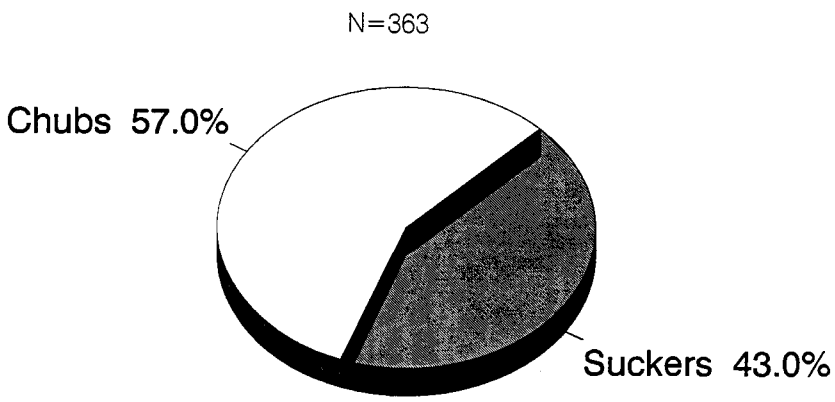


Figure 5. Trap nets, Island Park Reservoir, 1992.

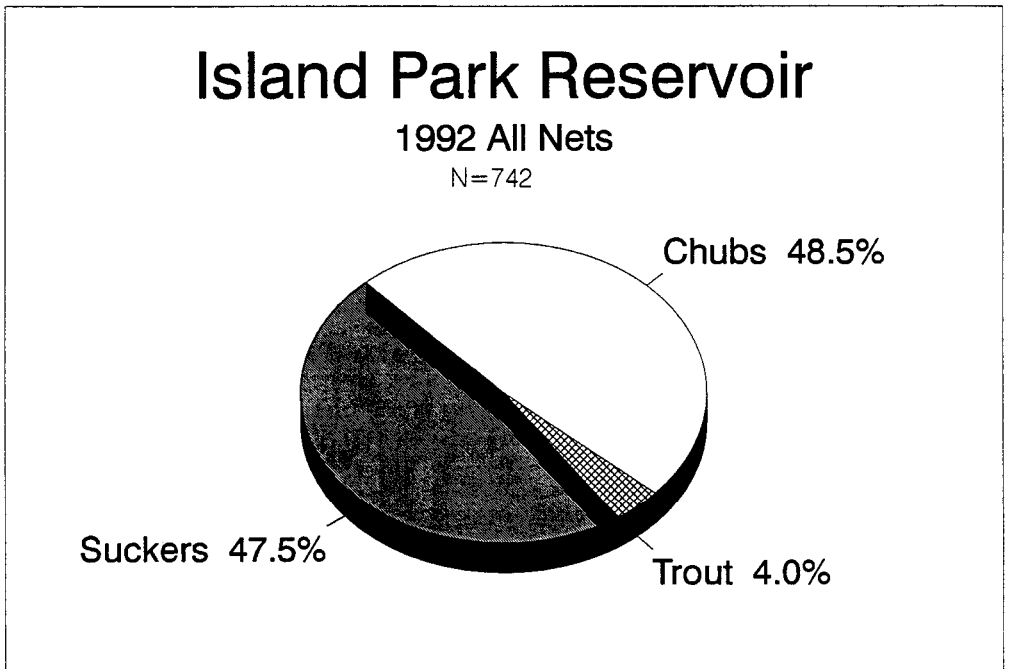


Figure 6. All nets, Island Park Reservoir, 1992.

Mackay Reservoir

A total of 661 Mackay Reservoir anglers were interviewed who fished 1,553 hours, catching 1,680 trout. The total catch rate, 1.08 fish/h, was characteristic of Mackay Reservoir angling success in recent years. Of the harvest accounted for during the survey, 1,205 (78%) were hatchery fish. Catchables stocked in 1992 accounted for 7.3% of the hatchery contribution to the 1992 harvest. Catchables stocked in 1991 made up 11.3% and 1991 fingerlings contributed 11.4% to that harvest (Table 2).

Table 2. Summary statistics for Mackay Reservoir creel survey, May 23 to September 9, 1992.

Tota sample days:		24
Tota angler contacts:		661
Tota hours fished:		1,55
Tota fish caught:		1,68
Tota fish harvested:		1,35
Tota catch rate (fish/h):		1.08
Total hatchery rainbow trout checked:		1,20
1992 Catchables:	77.3%	932
1991 Catchables:	11.3%	136
1991 Fingerlings:	11.4%	137
Season hatchery rainbow trout catch rate (fish/h):		0.78
Other species harvested:		
Wild rainbow trout		62
Kokanee salmon		83

Some indications that wild rainbow trout in the catch were confused with hatchery fingerling rainbow trout should be noted. Creeled fingerlings averaged 300 mm in length in May and June, but only averaged 236 mm to 256 mm in length from July through September. It is possible but unlikely that the average size of the 1991 fingerling cohort in the catch truly decreased in the course of 3 to 4 months. Wild rainbow trout (average length 290 mm to 390 mm) were identified in the catch during June and July, but were not during May and August. This also seems unlikely. Creel survey personnel, however, felt confident in distinguishing hatchery fingerlings from wild rainbow on the basis of dorsal fin deformation. In any case, if wild rainbow trout were misidentified as hatchery fingerling rainbow trout, that would only serve to further diminish the return and contribution of fingerlings to the fishery which appears to be unacceptably low. The excellent catch rate on Mackay Reservoir is predominantly supported by hatchery catchable rainbow trout released the year of the fishery. This is not unexpected, given the annual drawdown of Mackay Reservoir to its administrative pool level for more than the last ten years. Under these circumstances, the reservoir should be managed entirely with catchable rainbow trout, at least until water supplies in the Big Lost River drainage are sufficient to provide for carry-over water.

Ririe Reservoir

Utah chubs continue to dominate fish samples from Ririe Reservoir. Utah suckers were the next most abundant fish followed by fingerling rainbow trout, yellow perch, wild trout (rainbow and cutthroat), smallmouth bass, and catchable rainbow trout. Relative composition of the fish population, by sampling techniques indicated in Figures 7 through 9. For the total number of fish samples, Utah chubs accounted for 69% of the sample, Utah suckers 21%, fingerling rainbow trout 4%, yellow perch 3%, wild trout 2%, smallmouth bass 1%, and catchable rainbow trout comprised less than 1% of our sample (Appendix E).

Smallmouth bass ranged in length from 80 mm to greater than 350 mm (14 in). We sampled yellow perch up to 350 mm (12 in).

Length frequencies for smailmouth bass are incomplete, and may indicate incomplete recruitment from year to year or poor survival of individual year classes three years old or older (Figure 7). However, it is likely that conclusions cannot be drawn from the small sample size (21). It was evident however, that smailmouth bass are achieving respectable size. Four of the 21 examined were over 350 mm (14 in) in length. Yellow perch continue to prosper in Ririe Reservoir since being illegally introduced three years ago. Length frequencies of yellow perch (Figure 8) were well represented out to 300 mm (12 in). Likewise, fingerling rainbow trout were strongly represented to 300 mm. All age groups to 3+ are present (Figure 9). Wild rainbow were only identified as young of the year (Figure 10). This suggests that we may have misidentified some wild rainbow trout as fingerling trout. However, again, the scarcity of hatchery catchable rainbow trout in the sample, in this case, would only be increased relative to fingerling rainbow trout.

The disproportionate abundance of fingerling hatchery rainbow to catchable hatchery rainbow corroborates the previous speculation that catchable rainbow trout are contributing little to the Ririe Reservoir fishery.

Mud Lake

Mud lake survey samples were overwhelmingly dominated by Utah suckers and Utah chubs, in that order. In terms of percent composition by biomass, Utah suckers represented 91% and Utah chubs 9% of the total fish population (Figure 11; Appendix F). Game fish, largemouth bass, yellow perch, black bullhead, Lahontan cutthroat trout, and tiger muskies comprised less than 1% of the total biomass of fish sampled on Mud Lake.

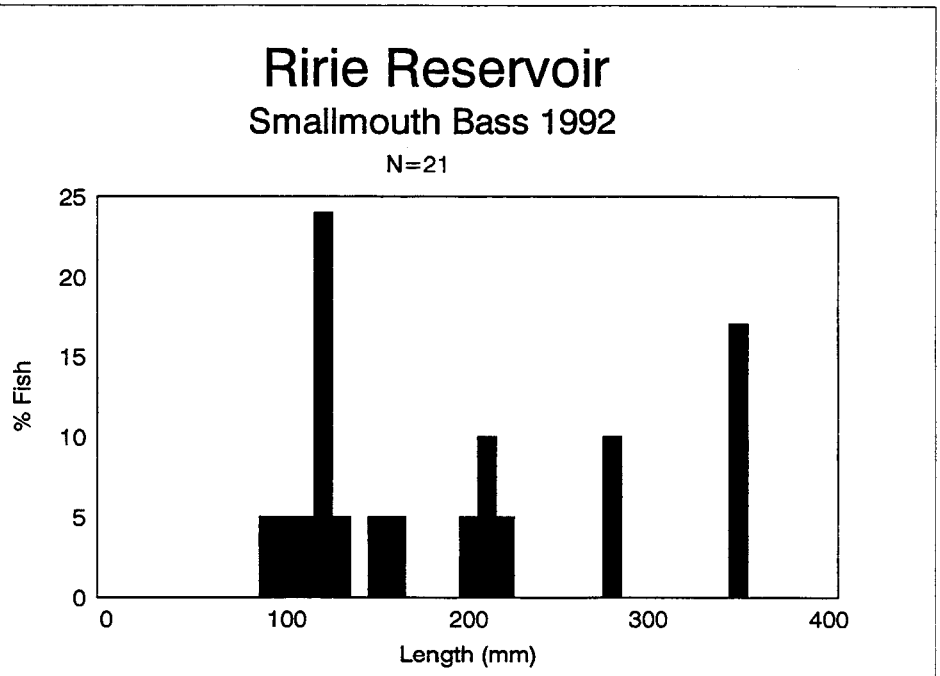


Figure 7. Smallmouth bass length frequencies, Ririe Reservoir, 1992.

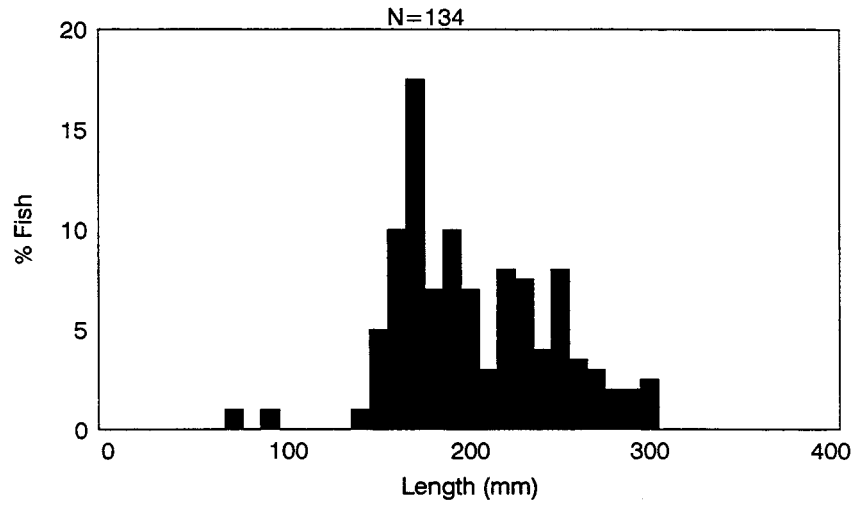


Figure 8. Yellow perch length frequencies, Ririe Reservoir, 1992.

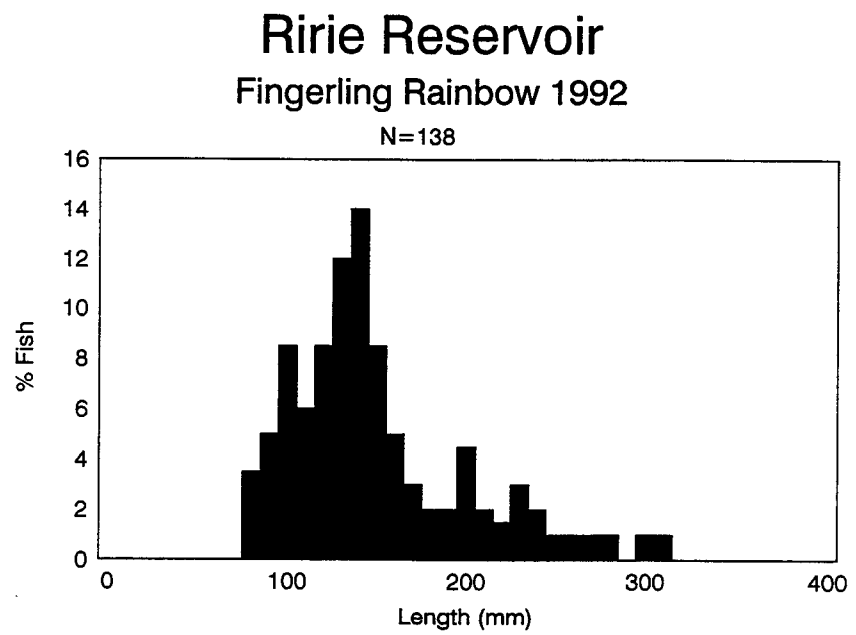


Figure 9. Fingerling rainbow trout length frequencies, Ririe Reservoir, 1992.

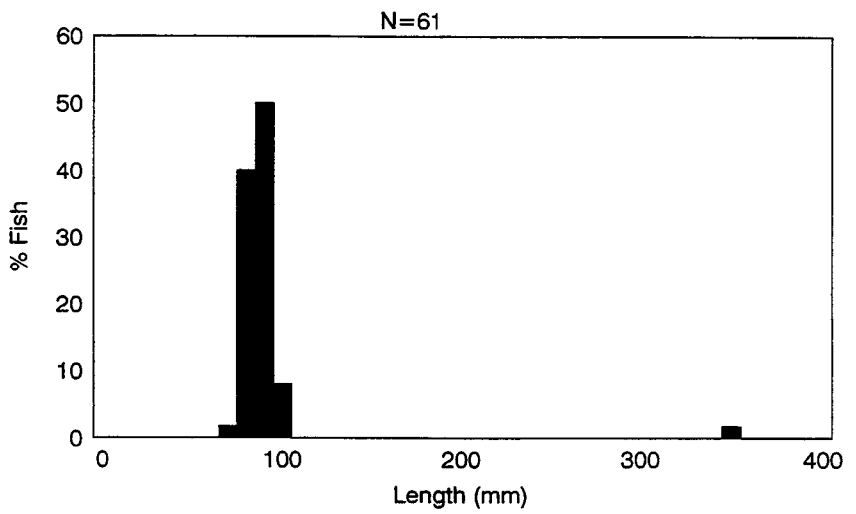


Figure 10. Wild rainbow trout length frequencies, Ririe Reservoir, 1992.

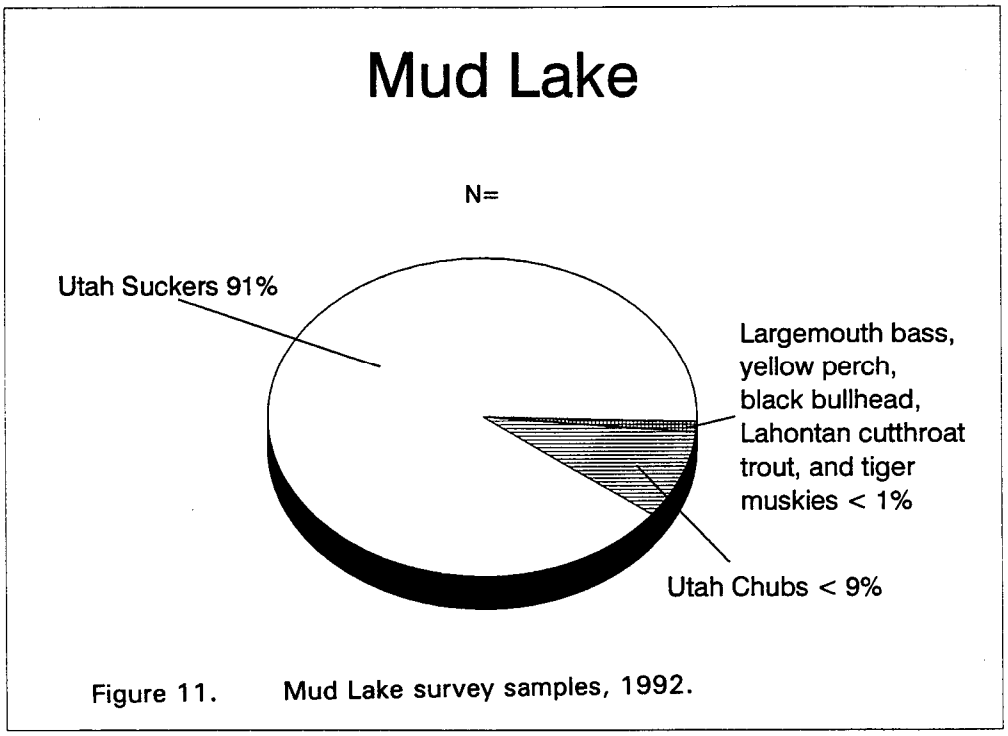


Figure 11. Mud Lake survey samples, 1992.

The difficulty of capturing tiger muskies (2 fish in separate gill net sets), attributable to behavior, likely influenced our poor success. Also, the extreme abundance of Utah suckers and Utah chubs may have increased the difficulty of sampling the other game fish species. However, it is clear that game fish densities are, by themselves, very low.

Considering the extreme abundance of forage fish in Mud Lake (Utah suckers and Utah chubs), stocking densities of game fish predators, Lahonton cutthroat and tiger muskies could be substantially increased with little impact to other game fish or wildlife values.

Bass Tournaments

Ririe Reservoir

Catch rates for legal size smallmouth bass (>305 mm) were 0.2 fish/h, and for sublegal size bass, were 0.72 fish/h (Table 3). The excellent success of smallmouth bass anglers on Ririe Reservoir in 1992 continued the trend observed the past several years. Despite the severe drawdown of Ririe Reservoir by the end of the 1992 irrigation season, we believe that adequate water was left in the pool to carry over the smallmouth bass population and sustain these catch rates in the coming season.

Mud Lake

Catch rates varied from 17.0 h/fish to 6.6 h/fish for legal bass and from 90 h/fish to 25.2 h/fish for sublegal bass. These catch rates are consistent with observations from previous years bass tournaments (Table 4).

Largemouth bass in Mud Lake are slow growing, and experience poor recruitment, likely due to cold temperatures and slow growth. No improvements in Mud Lake largemouth bass fishing should be expected.

Table 3. Summary statistics for Ririe Reservoir bass tournament anglers, 1992.

Date	Number of Anglers	Hours fished	Legal bass	Sublegal bass	Catch rate legal	Catch rate sublegal
06/06/92	12	136	30	78	0.22	0.57
06/14/92	16	138.5	22	158	0.16	1.14
06/20/92	No results turned in.					
07/11/92	10	98	8	58	0.08	0.59
07/18/92	86	814	168	579	0.21	0.71
07/19/92	46	455	84	322	0.18	0.71
07/25/92	17	156	37	100	0.24	0.64
07/28/92	4	32	3	50	0.09	1.56
07/29/92	7	53	2	66	0.04	1.25
08/02/92	12	92	47	65.5	0.51	0.72
08/05/92	8	95	5	39	0.05	0.41
08/22/92	14	126	33	100	0.26	0.79
08/23/92	7	68	8	33	0.12	0.49
08/29/92	9	81	31	50	0.38	0.62
Totals	248	2,345	478	1,699	0.20	0.72

Table 4. Summary statistics for Mud Lake bass tournaments, 1992.

Date	Number of anglers	Hours fished	Legal bass	Sublegal bass	Catch rate legal	Catch rate sublegal
04/20/91	8	72	0	0	--	--
04/21/91	18	146	0	0	--	--
05/30/92	28	221	13	7	0.06	0.03
05/31/92	24	199	4	5	0.02	0.02
06/27/92	14	126	19	5	0.15	0.04
07/05/92	10	90	5	1	0.06	0.01
Totals	102	854	41	17	0.05	0.02

RECOMMENDATIONS

1. Continue the Henrys Lake creel survey under the standardized method currently used. Develop a standard creel survey manual for Henrys Lake to ensure uniformity in survey methods for the future.

2. continue annual monitoring of winter dissolved oxygen depletion in Henrys Lake.

3. Evaluate winter trout distribution and migration patterns in Henrys Lake with radio telemetry.

4. Evaluate success of Island Park Reservoir rotenone treatment with standardized gill net and trap netting procedures.

5. Monitor and evaluate the recovery of the Island Park Reservoir fishery. Continue to monitor zoo plankton and sucker and chub populations.

6. Drop hatchery rainbow fingerlings from the Mackay Reservoir fish management program.

7. Evaluate the return-to-the-creel of jumbo catchable rainbow trout in Ririe Reservoir before dropping "catchable" rainbow from the fish management plan.

8. Consider restricted winter ice fishery on Ririe Reservoir.

A P P E N D I C E S

Appendix A. Boat counts by three independent census clerks for three days on Henrys Lake, Idaho.

Clerk one	Clerk two	Clerk three
91	134	95
158	201	175
74	92	74
81	106	81
100	93	110
104	93	116
44	61	47
32	51	41
10	9	5
98	100	91
34	42	37
47	50	51

Appendix B. Float tube angler counts by three independent census clerks for three days on Henrys Lake, Idaho.

Clerk one	Clerk two	Clerk three
28	16	25
35	87	98
51	**66**	44
30	42	26
33	25	36
44	40	44
13	18	16
10	9	12
5	5	6
25	29	29
15	19	18
26	28	28

Appendix C. Bank angler counts by three independent census clerks for three days on Henrys Lake, Idaho.

Clerk one	Clerk two	Clerk
8	4	12
5	20	46
3	5	9
9	4	12
7	5	17
11	9	22
3	3	3
5	8	3
0	0	0
1	4	4
0	0	0
0	1	1

Appendix D. Island Park Reservoir standardized fish survey data.

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
COVER SHEET

LAKE/RESERVOIR NAME: Island Park Reservoir **REGION:** 6

DATE: 6-18-92 **SAMPLE CREW:** Gamblin

SCALE ENVELOPE NUMBERS: _____ **TO** _____

SAMPLING CONDITIONS:

Water Temp. (°C @ .5 m): _____ Air Temp. Range (°C): _____ to _____

Secchi Range (m): _____ to _____

Wind (may circle more than one): 0-10 10-20 20+ mph

N NE E SE S SW W NW

SAMPLING EFFORT:

Combined floating and sinking gill net: 2 nights

Electrofishing: _____ hours; trap net: 2 nights

Other (including add'l size selective sampling): _____

_____

SAMPLING LOCATIONS:
Draw or attach a lake/reservoir map and indicate fisheries and limnological sampling locations; footnoting with narrative if necessary.

KEY:

Trap Net

S-X Secchi reading

Gill Net (F,S,FS)

TDO-X Surface/bottom and profile readings

Electrofishing

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
DATA SHEET (_____ of _____)

LAKE/RESERVOIR NAME: Island Park Reservoir **REGION:** 6
DATE: 6-18-92 **SAMPLE CREW LEADER:** Gamblin

Length range	Species WRB				Species CRB			
(mm)	G.N.	T.N.	E.F.	Add'l	G.N.	T.N.	E.F.	Add'l
> 360	3							
110-119								
120-129								
130-139								
140-149								
150-159								
160-169								
170-179					1			
180-189					2			
190-199								
200-209								
210-219								
220-229					1			
230-239								
240-249								
250-259					3			
260-269					1			
270-279					1			
280-289					2			
290-299					1			
300-309								
310-319								
320-329								
330-339								
340-349								
Batch Samples:								
Size Range	all >360				170-299			
Numbers	3	0			12	0		
Total Weight								

LOWLAND LAKES AND RESERVOIRS FISH SURVEY

DATA SHEET (_____ of _____)

LAKE/RESERVOIR NAME: Island Park Reservoir **REGION:** 6

DATE: 6-18-92 **SAMPLE CREW LEADER:** Gamblin

Length range	Species FRB				Species Coho			
(mm)	G.N.	T.N.	E.F.	Add'l	G.N.	T.N.	E.F.	Add'l
>360	2				1			
110-119								
120-129								
130-139								
140-149								
150-159								
160-169								
170-179	1							
180-189								
190-199	1							
200-209								
210-219								
220-229								
230-239								
240-249								
250-259								
260-269	1							
270-279								
280-289	1							
290-299	1							
300-309								
310-319								
320-329								
330-339								
340-349								
Batch Samples:								
Size Range	170-360				>360			
Numbers	7	0			1			
Total Weight								

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
DATA SHEET (_____ of _____)

LAKE/RESERVOIR NAME: Island Park Reservoir **REGION:** 6
DATE: 6/18-92 **SAMPLE CREW LEADER:** Gamblin

Length range	Species Chub				Species Sucker			
(mm)	G.N.	T.N.	E.F.	Add'l	G.N.	T.N.	E.F.	Add'l
>360	1				10	35		
110-119								
120-129								
130-139								
140-149		9						
150-159	2	3				2		
160-169	1	2						
170-179	1	2				7		
180-189		1				5		
190-199						7		
200-209		1				8		
210-219		2				4		
220-229						3		
230-239						2		
240-249		4				3		
250-259		1			1	3		
260-269						6		
270-279	1					4		
280-289						1		
290-299	1	2				1		
300-309	5	5						
310-319	2	2						
320-329	2							
330-339	2	1						
340-349	1					1		
Batch Samples:								
Size Range	150-360	140-339			250-360	150-360		
Numbers	19	35			11	92		
Total Weight								

Appendix E. Ririe Reservoir standardized fish survey data.

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
COVER SHEET

LAKE/RESERVOIR NAME: Ririe Reservoir **REGION:** 6

DATE: 6-3/6-4-1992 **SAMPLE CREW:** Gamblin (Rasmussen/Ethridge)

SCALE ENVELOPE NUMBERS: _____ **TO** _____

SAMPLING CONDITIONS:

Water Temp. (°C @ .5 m): _____ Air Temp. Range (°C): _____ to _____

Secchi Range (m): _____ to _____

Wind (may circle more than one): 0-10 10-20 20+ mph

N NE E SE S SW W NW

SAMPLING EFFORT:

Combined floating and sinking gill net: 2 nights

Electrofishing: _____ hours; trap net: 2 nights

Other (including add'l size selective sampling): _____

_____

SAMPLING LOCATIONS:
Draw or attach a lake/reservoir map and indicate fisheries and limnological sampling locations; footnoting with narrative if necessary.

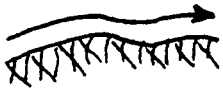
KEY:

Trap Net

S-X Secchi reading

Gill Net (F,S,FS)

TDO-X Surface/bottom and profile readings


Electrofishing

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
DATA SHEET (_____ of _____)

LAKE/RESERVOIR NAME: Ririe Reservoir **REGION:** 6
DATE: 6-3/6-4-1992 **SAMPLE CREW LEADER:** Gamblin

Length range	Species CRB				Species WRB& WCT			
(mm)	G.N.	T.N.	E.F.	Add'l	G.N.	T.N.	E.F.	Add'l
> 350mm					1 WCT		1	
80-89							1	
90-99							23	
100-109							31	
110-119							5	
120-129								
130-139								
140-149								
150-159								
160-169								
170-179								
180-189								
190-199								
200-209								
210-219			1					
220-229								
230-239								
240-249	1		2					
250-259								
260-269	1							
270-279			1					
280-289								
290-299								
300-309					1			
310-319								
320-329								
330-339								
340-349								
Batch Samples:								
Size Range								
Numbers	2	0	4		2 WCT	0	61 WRB	
Total Weight								

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
DATA SHEET (_____ of _____)

LAKE/RESERVOIR NAME: Ririe Reservoir **REGION:** 6
DATE: 6-3/6-4-92 **SAMPLE CREW LEADER:** Gamblin

Length range	Species FRB				Species SMB			
(mm)	G.N.	T.N.	E.F.	Add'l	G.N.	T.N.	E.F.	Add'l
>350					2		2	
80-89			5					
90-99			7				1	
100-109			7				1	
110-119			12				1	
120-129			8				5	
130-139			12				1	
140-149			16					
150-159			19				1	
160-169	1		11				1	
170-179		3	4					
180-189	1		3					
190-199			3					
200-209			3				1	
210-219	1		5				2	
220-229	1		2				1	
230-239			2					
240-249	1		3					
250-259	2		1					
260-269			1					
270-279	1							
280-289			1				2	
290-299								
300-309	1							
310-319	1							
320-329								
330-339								
340-349								
Batch Samples:			37/5.25		2/2.26		16/5.27	
Size Range								
Numbers	10	3	130		2	0	19	
Total Weight								

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
DATA SHEET (_____ of _____)

LAKE/RESERVOIR NAME: Ririe Reservoir REGION: 6

DATE: 6-3/6-4-92 SAMPLE CREW LEADER: Gamblin

Length range	Species Y.P.				Species _____			
(mm)	G.N.	T.N.	E.F.	Add'l	G.N.	T.N.	E.F.	Add'l
72			1					
90-99			1					
110-119								
120-129								
130-139		1						
140-149	7							
150-159	7	5						
160-169	14	9						
170-179	6	3						
180-189	6	7						
190-199	5	4						
200-209	2	2						
210-219	8	3						
220-229	7	3						
230-239	5	1						
240-249	9	2						
250-259	4	1						
260-269	4							
270-279	2							
280-289	2							
290-299	3							
300-309								
310-319								
320-329								
330-339								
340-349								
Batch Samples:	61/15kg	41/4.5kg						
Size Range								
Numbers	89	41	2					
Total Weight								

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
DATA SHEET (_____ of _____)

LAKE/RESERVOIR NAME: Ririe Reservoir **REGION:** 6
DATE: 6-3/6-4-92 **SAMPLE CREW LEADER:** Gamblin

Length range	Species U. Sucker				Species U. Chub			
(mm)	G.N.	T.N.	E.F.	Add'l	G.N.	T.N.	E.F.	Add'l
	30/28	49/36	7/0.775		60/23	20/4	5/0.75	
	30/34	9/5.5	13/3		60/25	87/19	10/0.5	
	21/27		2/0.2		52/23.5	106/20	4/0.6	
	50/22.5		72/10		100/28	101/17.5	11/2.25	
110-119	18/13		2/1.1		100/33.5	15/3	16/3.25	
120-129	30/27.5				34/13.5		8/2	
130-139	30/32				116/20.5			
140-149	22/21.5				70/31			
150-159	10/2.5				70/32			
160-169					40/19			
170-179					80/30.5			
180-189					80/30			
190-199					80/31			
200-209					35/14.5			
210-219								
220-229								
230-239								
240-249								
250-259								
260-269								
270-279								
280-289								
290-299								
300-309								
310-319								
320-329								
330-339								
340-349								
Batch Samples:	241/208	58/41.5	96/15.07		977/355	329/63.5	54/9.4	
Size Range								
Numbers	241	508	96		977	1703	54	
Total Weight								

Appendix F. Mud Lake standardized fish survey data.

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
COVER SHEET

LAKE/RESERVOIR NAME: Mud Lake **REGION:** 6

DATE: 4-28-92 **SAMPLE CREW:** Gamblin

SCALE ENVELOPE NUMBERS: _____ **TO** _____

SAMPLING CONDITIONS:

Water Temp. (°C @ .5 m): 15°C Air Temp. Range (°C): 45 to 75

Secchi Range (m): 0.3 to 0.6m

Wind (may circle more than one): XX0-10 XX10-20 20+XX mph

N NE E SE S XSWX XWXX NW

SAMPLING EFFORT:

Combined floating and sinking gill net: 4 nights

Electrofishing: 1.25 hours; trap net: 4 nights

Other (including add'l size selective sampling): _____

SAMPLING LOCATIONS:
Draw or attach a lake/reservoir map and indicate fisheries and limnological sampling locations; footnoting with narrative if necessary.

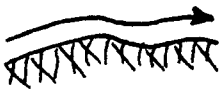
KEY:

Trap Net

S-X Secchi reading

Gill Net (F,S,FS)

TDO-X Surface/bottom and profile readings


Electrofishing

LOWLAND LAKES AND RESERVOIRS FISH SURVEY

DATA SHEET (_____ of _____)

LAKE/RESERVOIR NAME: Mud Lake **REGION:** 6

DATE: 4-28-92 **SAMPLE CREW LEADER:** _____

Length range	Species LMB				Species ~~Tiger Mucky~~			
(mm)	G.N.	T.N.	E.F.	Add'l	G.N.	T.N.	E.F.	Add'l
	400 mm / 1675 gm				518mm			
					525mm			
					742 mm / 5.25 lb			
110-119								
120-129								
130-139								
140-149						31"-32" missed		
150-159								
160-169								
170-179								
180-189								
190-199								
200-209								
210-219								
220-229								
230-239								
240-249								
250-259								
260-269								
270-279								
280-289	1 @ 370gms							
290-299								
300-309								
310-319	1 @ 600gms							
320-329								
330-339								
340-349								
Batch Samples:								
Size Range								
Numbers								
Total Weight								

LOWLAND LAKES AND RESERVOIRS FISH SURVEY

DATA SHEET (_____ of _____)

LAKE/RESERVOIR NAME: Mud Lake REGION: 6

DATE: 4-28-92 SAMPLE CREW LEADER: _____

Length range	Species Bluegill				Species Crappie			
(mm)	G.N.	T.N.	E.F.	Add'l	G.N.	T.N.	E.F.	Add'l
110-119								
120-129								
130-139								
140-149								
150-159								
160-169								
170-179		1						
180-189								
190-199								
200-209						1		
210-219								
220-229								
230-239								
240-249								
250-259								
260-269								
270-279								
280-289								
290-299								
300-309								
310-319								
320-329								
330-339								
340-349								
Batch Samples:								
Size Range								
Numbers								
Total Weight								

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
DATA SHEET (_____ of _____)

LAKE/RESERVOIR NAME: Mud Lake **REGION:** 6
DATE: 4-28-92 **SAMPLE CREW LEADER:** Gamblin

Length range	Species Lahontan Cutthroat				Species _____			
(mm)	G.N.	T.N.	E.F.	Add'l	G.N.	T.N.	E.F.	Add'l
110-119								
120-129								
130-139								
140-149								
150-159								
160-169								
170-179								
180-189								
190-199								
200-209								
210-219								
220-229								
230-239								
240-249								
250-259								
260-269								
270-279								
280-289								
290-299								
300-309								
310-319								
320-329								
330-339	1							
340-349								
Batch Samples:								
Size Range								
Numbers	1							
Total Weight								

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
DATA SHEET (_____ of _____)

LAKE/RESERVOIR NAME: Mud Lake **REGION:** 6
DATE: 4-28-95 **SAMPLE CREW LEADER:** _____

Length range	Species YEP				Species Black Bullhead			
(mm)	G.N..	T.N.	E.F.	Add'l	G.N.	T.N.	E.F.	Add'l
<79mm			33					
80-89			6					
90-99			3					
100-109			3					
110-119			11					
120-129			2					
130-139	1	1	2					
140-149	1	1	1			1		
150-159	6		2					
160-169	2		2					
170-179	2							
180-189	6	1	1		1	1		
190-199	2				1	1		
200-209	3	1	2		1			
210-219	1				4	1		
220-229	4		1		9		1	
230-239	1				5			
240-249	1				3			
250-259	3				2			
260-269								
270-279					2			
280-289								
290-299								
300-309			1					
310-319	1							
320-329								
330-339								
340-349	1 @352							
Batch Samples:								
Size Range								
Numbers	440gms		614gms		10#			
Total Weight								

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
DATA SHEET (_____ of _____)

LAKE/RESERVOIR NAME: Mud Lake **REGION:** 6
DATE: 4-28-92 **SAMPLE CREW LEADER:** _____

Length range	Species Suckers				Species Chubs			
(mm)	G.N.	T.N.	E.F.	Add'l	G.N.	T.N.	E.F.	Add'l
110-119								
120-129								
130-139								
140-149						5		
150-159						10		
160-169		3				3		
170-179		1				5		
180-189						6		
190-199						1		
200-209						2		
210-219		1				1		
220-229						6		
230-239						4		
240-249						2		
250-259						5		
260-269						2		
270-279						1		
280-289						1		
290-299						2		
300-309						2		
310-319						3		
320-329						2		
330-339						4		
340-349						8		
Batch Samples:	470-610	160-610				70-150		
Size Range								
Numbers	205	494	62		330	38	67	
Total Weight	738#	1637#	195#		103#	160 gm	41#	

JOB PERFORMANCE REPORT

State of: Idaho

Name: Regional Fishery Management Investigations

Project No.: F-71-R-17

Title: Rivers and Streams Investigations

Job No.: 6-c

Period Covered: July 1, 1992 to June 30, 1993

ABSTRACT

A canal bank failure on the Fall River Marysville Hydro project released an estimated 20,000 tons of soil into the Fall River. Trout *Oncorhynchus sp.* fry densities were 83% lower in the reach of river affected by the sediment release than above the affected reach. Specimens of several fish species were collected and examined for evidence of physical injury due to high concentrations of suspended sediment. Evidence indicates that water-born sediment did not cause direct mortality to either trout or whitefish *Prosopium williamsoni.*

The estimated adult rainbow trout O. *mykiss* population in 1992 was larger than the 1989 population estimate.

Authors:

Mark Gamblin
Regional Fishery Manager

OBJECTIVES

1. To evaluate the effects of the Marysville Canal Hydropower project canal failure on the Fall River fishery.

2. To monitor the status of the South Fork Snake River fishery in response to winter flow reductions and special regulations.

METHODS

Fall River

Impacts on Young-of-the-Year Trout

We collected young-of-the-year (YOY) trout Oncorhynchus sp. fry and estimated total numbers at 10 locations above the sediment introduction and 13 locations below the point of introduction to determine if the sedimentation affected alevin emergency and fry survival. The control (upper) fry transects were selected from the Marysville Canal diversion downstream to the Farmers Own Canal diversion. The treatment (lower) fry transects were selected from the Kirkham Bridge downstream to the Chester Bridge. The average length of control transects was 41 m and treatment transects was 39 m.

Total trout fry numbers were estimated by depletion removal methods (Leslie estimator) using backpack-mounted DC pulsed electrofishing equipment. A .minimum of three passes were made through each transect. Transects were streambank margins, 3 m to 5 m wide in habitat typical of fry holding and security requirements. Each transect was blocked at the upstream end.

Impacts on Age 1 and Older Fish

Direct Mortality and Physical Injury-Possible effects of the Marysville Hydro sediment spill on the Fall River fishery included direct mortality and physical injury to age 1 and older trout and mountain whitefish Prosopium williamsoni in the stream at the time of the event. Gill tissue samples were collected from 6 rainbow trout O. mykiss, 5 mountain whitefish, 1 speckled dace Rhinichthys osculus, and 1 redside shiner Richardsonius balteatus on July 2, 1992. All samples were taken by killing and bleeding the fish, then removing and fixing an intact gill arch in 10% formalin. The gill tissue samples were analyzed by microscopic examination at the Idaho Department of Fish and Game Eagle Fish Health Laboratory.

Age 1+ Population Comparisons

Population estimates for trout and whitefish were calculated for the river reach from the Kirkham Bridge to Enterprise Canal Diversion (15 km, 9 mi) on July 10, 1992 and compared with 1989 estimates derived identically for the same river reach. Peterson mark-recapture methods using the Bailey estimator were employed for all calculations. Length frequencies for rainbow trout are also compared between 1989 and 1992.

Natural Variation in Population

We repeated direct-observation snorkel estimates (conducted in 1987) for three sections of river unimpacted by the sediment introduction to determine if differences in age 1+ and older trout (1989-1992) might be explained by natural variation alone. The upper section (1,290 meters) is from the Marysville Canal diversion to the Squirrel Bridge. The middle section (1,129 meters) is bounded by river mile 17.0 and river section (1,450 meters) runs from the Farmers Own Canal diversion to the Marysville Hydro Project powerhouse site. We stopped our observations at the point of sediment introduction, shortening this reach to 927 meters in length.

We used a team of six divers, counting trout by size group: less than 12 in (30 cm), 12-16 in (30-40 cm), 16-20 in (40-50 cm) and greater than 20 in (50 cm). Two divers counted trout in the shoreline margins, and the remaining four divers divided the remainder of the river channel equally, counting all fish within the respective counting lane.

Our snorkel counts were conducted between 10 a.m. and 3 p.m. Our methods were identical to those of the licensee's consultant in 1987.

South Fork Snake River

Annual Population Estimate

We attempted to conduct our annual population estimate in the Conant Valley transect during October, 1992. One marking effort was successfully completed, but river flows were reduced by the Palisades Dam operation before we could conduct a recapture effort one week later. Consequently, we were unable to complete a population estimate.

FINDINGS

Fall River

Impacts on Young-of-the-Year

Our control estimates averaged 25 fry per transect. Densities averaged 0.69 fry per meter (Table 1).

Fry estimates in the reach of Fall River affected by sediment averaged five per transect, with density estimates of 0.12 per meter of streambank (Table 2).

Most tissues of the rainbow trout were normal overall, with minor to severe hyperplasia at the filament mid-level. Some leukocytes were noted in those hyperplastic tissues. In all tissue samples, most of the gill filament respiratory tissue was functional.

Hyperplasia was slightly more pronounced in the whitefish than in rainbow trout tissues. But most of the gill tissue was functional.

Table 1. Fall River trout fry estimates for the river section above Marysville Hydro project sediment introduction, 1992.

Fall River Fry Estimates Above Blowout				
Transect Number	Transect Length	Number	95% Confidence Interval	Number/ Meter
1	84.18m	3	3-3	0.03
2	37.82m	16	1-31	0.43
3	43.62	7	5-9	0.16
4	40.26	1	1-1	0.03
5	34.16	4	2-6	0.13
6	45.14	14	13-15	0.30
7	39.04	5	4-6	0.13
8	48.19	0	---	0.00
9	29.59	0	---	0.00
10	38.74	1	1-1	0.03

Table 2. Fall River trout fry estimates for the river section affected by Marysville Hydro project sediment, 1992.

Fall River Fry Estimates Below Blowout				
Transect Number	Transect Length	Number	95% Confidence Interval	Number/ Meter
1	38.43	9	7-11	0.23
2	30.20	2	2-2	0.07
3	43.62	7	5-9	0.16
4	40.26	1	1-1	0.03
5	34.16	4	2-6	0.13
6	45.14	14	13-15	0.30
7	39.04	5	4-6	0.13
8	48.19	0	---	0.00
9	29.59	0	---	0.00
10	38.74	1	1-1	0.03
11	43.31	1	1-1	0.03
12	32.64	13	12-14	0.39
13	38.74	4	2-6	0.10

Tissues of the speckled dace had very minor distal hyperplasia at the filament tips. Most of the gill tissue was functional.

The tissue sample of the redside shiner was the poorest quality of the Fall River samples. Hyperplasia, aneurysms, and hemorrhaging from the aneurysms were noted. Debris between filaments was also noted.

In conclusion, our examination of gill tissue samples from trout, whitefish, dace, and red shiners did indicate some gill tissue damage, probably a result of exposure to sediment-laden water. However, the observed physical injury was not extensive enough to cause direct mortality to age 1+ and older trout or whitefish, a conclusion corroborated by the population estimates of age 1+ and older trout and whitefish.

Age 1+ Population Comparisons

Rainbow trout numbers in 1989 and 1992 are contrasted in Table 3 for all rainbow trout over 100 mm in length; the 1992 density was 14% higher. The largest discrepancy between size groups appears to be between young fish 160-250 mm in length. The 1992 estimate for that size group was over three times greater than our 1989 estimates. These differences are easily seen in the respective length frequencies (Figure 1).

Table 3. Age 1+ and older rainbow trout population estimates for Fall River, Kirkham Bridge to Enterprise Canal diversion, 1989 and 1992.

	Size Group	Estimate	95% Confidence Interval
1989	l00	19,268	9,698-28,838
	x160	7,692	3,930-11,455
	x250	2,436	922-3,950
	160-249	5,086	1,659-8,514
	100-159	n/a	n/a
1992	2l00	22,980	18,496-27,465
	160	15,993	12,503-19,483
	2250	1,432	967-1,896
	160-249	16,364	11,768-20,960
	100-159	7,885	4,608-11,161

The control transects were characterized by higher stream gradient and water velocities. Generally, we considered fry holding and rearing habitat to be better in the affected (treatment) transects. All factors being equal, we would have expected higher numbers and densities in the treatment transects.

We found compelling evidence of sediment effects on trout fry production in the affected reach of Fall River. Comparing our trout fry estimates from sediment affected and unaffected river sections we found 80% fewer trout fry in the affected reach of river. Trout fry densities (fry/m of streambank) were 83% fewer in river habitat impacted by the Marysville sediment introduction.

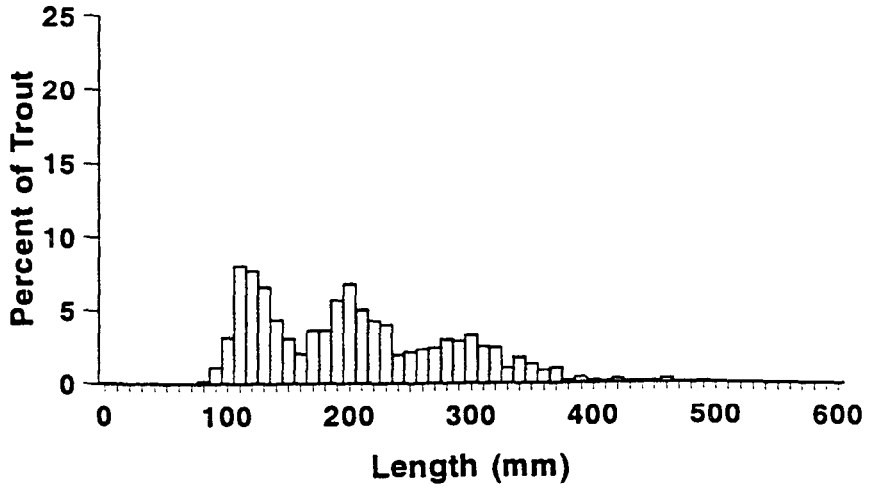
These differences are especially notable because we characterize the affected trout fry transects as having higher trout fry rearing potential than the unaffected transects. In the absence of a perturbation to trout embryo incubation and fry survival, such as the sediment spill, we would have expected higher trout fry densities, not lower. The introduction of Marysville Hydro sediment to this reach of river is the best explanation for discrepancy in fry abundance above and below the point of sediment introduction.

Impact on Age 1 and Older Fish

In 1992 we calculated an estimate of 13,498 (8,906-18,091) whitefish greater than 100 mm for this river reach. We were unable to estimate whitefish numbers in 1989. However, the size structure of the population in 1992 indicates a healthy population with three strong year classes.

Fall River 1989

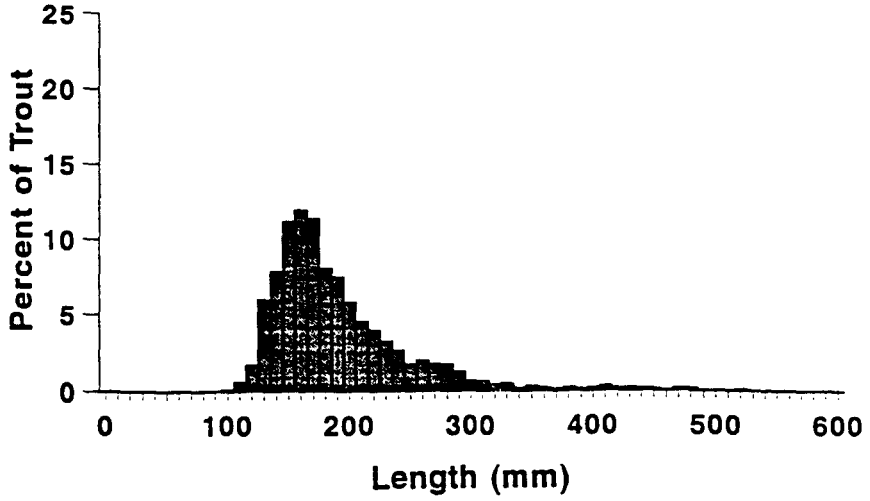
Kirkham - Enterprise
Wild Rainbow



n = 1075

Fall River 1992

All Sections
Wild Rainbow



n = 2838

Figure 1. Differences of 1989 and 1992 length frequencies.

Natural Variation in Population

In the upper section, we counted a total of 253 trout between the Marysville Canal diversion and the Squirrel Bridge. In 1987, the licensee reported a total of 472 trout observed. Size composition of the counts was similar (Table 4).

Table 4. Fall River trout snorkel estimates. Upper section: Marysville Canal diversion to Squirrel Bridge, 1978 through 1992.

	Fish total length			
Year	>30 cm	30-40 cm	40-50 cm	>50 cm
1987	454 (96%)	18 (4%)	--	--
1992	197 (78%)	53 (21%)	2	1

In the middle section, we counted a total of 1,200 trout between river mile 17.0 and 18.0 (Table 5).

Table 5. Fall River snorkel estimates. Middle section: river mile 17.0 through river mile 18.0, 1987 and 1992.

	Fish total length			
Year	>30 cm	30-40 cm	40-50 cm	>50
1987	411 (62%)	237 (36%)	10 (2%)	1 (0.2%)
1992	1,13 (94%)	61 (5%)	8	1

In the lower section, we counted a total of 1,353 trout from the Farmer's Own Canal diversion to the point of sediment introduction (Table 6).

Table 6. Fall River snorkel estimates. Lower section: Farmer's Own Canal diversion to point of sediment introduction, 1987 and 1992.

	Fish total length			
Year	>30 cm	30-40 cm	40-50 cm	>50 cm
1987	Not reported by consultant			
1992	1,291 (95%	56 (4%)	--	--

After replicating the licensee's methodology and completing our observations in the three sections established by the licensee in 1987, we concluded that the river channel morphology, gradient, and water visibility make reliable fish counts impossible with a one pass count. Because of discontinuous visibility between divers, deep holes that cannot be completely observed, and high gradient sections of the river which make diver safety marginal, both the licensee's and our counts probably underestimated total trout abundance. Consequently, the 1987 and 1992 snorkel estimates of trout above the point of sediment introduction should not be used to assess natural variation in Fall River trout abundance.

RECOMMENDATIONS

1. Repeat the Fall River trout population estimate in 1994.

2. Continue population estimates on Conant Valley and Lorenzo reaches of South Fork Snake River. Also, resume brown trout *Salmo trutta* aerial redd survey.

JOB PERFORMANCE REPORT

State of: Idaho

Name: Regional Fishery Management Investigations

Project No.: F-71-R-17

Title: Technical Guidance

Job No.: 6-d

Period Covered: July 1, 1992 to June 30, 1993

ABSTRACT

Technical assistance was provided to federal, state, and local agencies upon request. Technical assistance was also provided to sporting clubs on habitat enhancement projects and to private individuals for private fish ponds.

Author:

Mark Gamblin
Regional Fishery Manager

OBJECTIVES

1. To assist the Idaho Department of Water Resources, the Idaho Division of Environmental Quality, the Federal Energy Regulatory Commission, and the U.S. Army Corps of Engineers in evaluating the effects and minimizing the impacts of habitat alterations and diversion of natural flows on fish populations.

2. To provide information to private interests and government agencies on fisheries and aquatic habitat and to assist with habitat restoration efforts.

3. To assist the public with private fish pond inquiries.

4. To investigate all fish kills, to provide directives to prevent future fish kills and to provide precatory documentation when necessary.

5. To review land management activities by the U.S. Forest Service, Bureau of Land Management, and the Idaho Department of Lands, and to provide technical advice to protect and enhance fish and wildlife habitat.

METHODS

We responded to requests for data, project reviews, and recommendations from private interests, government agencies, and sporting clubs. Meetings were attended and field inspections were conducted. Verbal and written responses were provided when necessary. Many of these tasks were accomplished jointly with Bob Martin, Regional Environmental Staff Biologist.

FINDINGS

During 1992 and 1993, we responded to the following number of requests for technical assistance on water related issues:

Army Corps of Engineers
Bureau of Land Management
Bureau of Reclamation
U.S. Fish and Wildlife Service
U.S. Forest Service
U.S. Soil Conservation Service
Federal Energy Regulatory Commission
Environmental Projection Agency
Idaho Department of Health and Welfare, Division of Environment
Idaho Department of Lands
Idaho Department of Transportation
Idaho Department of Water Resources
Idaho Water Resource Board Idaho
Outfitters and Guides Board
Private Fish Ponds
Sporting Clubs
Private Development

Submitted by:

Mark Gamblin
Regional Fishery Manager

Approved by:

IDAHO DEPARTMENT OF FISH AND GAME

Steven M. Huffaker, Chief
Bureau of Fisheries

Dexter Pitman
State Fisheries Manager