FISHERY MANAGEMENT INVESTIGATIONS

FEDERAL AID IN FISH RESTORATIONS
1998 JOB PERFORMANCE REPORT
PROGRAM F-71-R-23

Steven M. Huffaker, Director

REGIONAL FISHERIES MANAGEMENT INVESTIGATIONS
UPPER SNAKE REGION (Subprojects I-G, II-G, III-G, IV-G)

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Job a.	**Upper Snake Region Mountain Lakes Investigations**
Job b.	**Upper Snake Region Lowland Lakes Investigations**
Job c-1.	**Upper Snake Region Rivers and Streams Investigations-South Fork Snake River**
Job c-2.	**Upper Snake Region Rivers and Streams Investigations-Henrys Fork Snake River, Buffalo River, Willow Creek Drainage**
PROJECT II.	**TECHNICAL GUIDANCE**
PROJECT III.	**HABITAT MANAGEMENT**
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1998 ANNUAL PERFORMANCE REPORT

State of: Idaho

Program: Fisheries Management F-71-R-23

Project I: Surveys and Inventories

Subproject I-G: Upper Snake Region

Job: a

Title: Mountain Lakes Investigations

Contract Period: July 1, 1998 to June 30, 1999

ABSTRACT

Regional personnel used gillnetting and angling gear to sample fish in Big, Rough, Round, Long, and Golden lakes in the Lake Creek drainage of the Copper Basin, and Fishpole, Bobber, Brockie, Iron Bog, and Star Hope lakes in the Antelope Creek drainage. All had been stocked in 1995. Total catch in all lakes was low (0 to 12 fish).

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1998 ANNUAL PERFORMANCE REPORT

State of: Idaho

Program: Fisheries Management F-71-R-23

Project I: Surveys and Inventories

Subproject I-G: Upper Snake Region

Job: b

Title: Lowland Lakes Investigations

Contract Period: July 1 1998 to June 30 1999

ABSTRACT

Gill net catch composition on Island Park Reservoir in May consisted of 80% nongame fish (Utah chub *Gila atraria*, Utah sucker *Catostomus ardens*, and redside shiner *Richardsonius balteatus*). Hatchery and wild rainbow trout *Oncorhynchus mykiss* comprised 14% of the catch, the lowest proportion since the 1992 renovation.

A randomized creel survey was conducted on Ririe Reservoir from June 1 through October 8. Objectives included evaluating relative return of differentially marked hatchery rainbow trout catchables stocked from Nampa and Hagerman state hatcheries. Creel clerks contacted 381 anglers who fished 893 hours, caught 1,018 fish, and harvested 459 fish. Total catch rate was 1.14 fish/hour and harvest rate was 0.51 fish/h. Harvest composition was primarily hatchery rainbow trout (73%), yellow perch *Perca flavescens* (22%) and splake *Salvelinus fontinalis* X *S. namaycush* (3%). Nampa and Hagerman state hatchery catchables were stocked in equal proportions, and returned to the creel at similar rates. Mackay state hatchery "magnum" catchables (275-300 mm) returned to the creel at twice the rate of standard (225-250 mm) catchables.

Catch data for five bass tournaments on Ririe Reservoir were summarized. Average tournament catch rate for legal smallmouth *Mircropterus dolomieu* and largemouth bass *M. salmoides* was 0.25 fish/h.

The 1998 spawning operations at Henrys Lake produced 1,399,939 eyed cutthroat trout *O. clarki* eggs and 408,695 eyed rainbow x cutthroat hybrid trout (hybrid) eggs. Cutthroat trout in the Hatchery Creek run averaged 444 mm and hybrid trout averaged 445 mm. Brook trout *Salvelinus fontinalis* spawning and the supplemental stocking program were discontinued in 1998. Catch composition in six net nights of gillnetting at Henrys Lake was 62% cutthroat trout, 15% hybrid trout, 20% brook trout, and 3% Utah chub.

Pathology tests did not detect *Myxobolus cerebralis*, the causative agent in whirling disease, in Henrys Lake cutthroat trout in 1998.

Preliminary genetic analyses of the Hatchery Creek spawning run (one day, 60 fish sample in late April) indicate that most cutthroat trout are introgressed at some level with rainbow trout. Because many of the hybrid trout are F2 or greater backcrosses with cutthroat trout, phenotypic traits were not useful for distinguishing pure cutthroat trout from hybrid trout in the spawning run. Additional genetic samples taken throughout the run will be required to fully

describe the level of introgression and develop management strategies to enhance the genetic purity of the hatchery run. Genetic samples from naturally produced fry in three major spawning tributaries were not analyzed in time for inclusion in this report.

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OBJECTIVES

To obtain current information for fishery management decisions on lowland lakes and reservoirs, including angler use, success, harvest and opinions, fish population characteristics, stocking success, return-to-the-creel for hatchery trout, limnology and develop appropriate management recommendations.

METHODS

Island Park Reservoir

Since the 1992 drawdown and renovation of Island Park Reservoir, fisheries personel have used annual standardized gillnetting to monitor species composition, relative abundance, and size structure in the reservoir. On May 28-29, 1998, four sinking and three floating experimental gill nets were fished at standardized locations (seven net nights). Set and pull times were recorded for each net, and fish were identified, counted, and measured. Relative abundance data were compiled and compared to data from 1993 to 1997.

Ririe Reservoir

Spot Creel Checks and Catchable Evaluation

A randomized roving creel survey was conducted from June 1 through October 8. The primary objective of the survey was to describe relative return to creel of hatchery rainbow trout *Oncorhynchus mykiss* catchables from Hagerman and Nampa state hatcheries. Both hatcheries stocked approximately 4,000 fish monthly in May, June, and July at the Blacktail access. All Nampa hatchery catchables were given a left pelvic fin clip and Hagerman hatchery fish were given an adipose clip. These fish were in addition to 14,600 unmarked Mackay hatchery "magnum" (275-300 mm) catchables. Creel clerks were instructed to record angler effort and catch, record species and total lengths for harvested fish, and to examine hatchery rainbow trout for fin clips. Angler counts were not included in the creel survey. Comparative performance of Hagerman, Nampa, and Mackay hatchery catchables was assessed based on relative contribution to the fishery during the census period.

Bass Tournaments

Catch data from five bass tournaments were compiled from a combination of mail-in tournament report forms and Upper Snake Region bass angler scorecards. Catch rates for legal (weighed-in) smallmouth bass *Micropterus dolomieu* were summarized for each tournament. Most bass angler scorecard data did not differentiate between largemouth *M.*

salmoides and smallmouth bass captured; therefore summaries include catch data for both species combined.

Water Temperatures

Thermal regime is likely the limiting factor regulating smallmouth bass growth rates in Ririe Reservoir. Dillon (1992) used empirical water temperature data and climatic data to predict thermal regime in a variety of Idaho waters, including Ririe Reservoir. The model predicted that, on average, epilimnial water temperatures would approach a summer maximum of 22^{o}C and that the growing season for bass (water temperatures >10^{o}C) would extend from May 20 to October 31. Subsequent bioenergetics modeling indicated that smallmouth bass growth rates in Ririe Reservoir approached the physiological potential given the predicted thermal regime. Consequently, any management actions to improve smallmouth bass growth would likely be ineffective. However, no water temperature data has been collected since these modeling efforts. If observed water temperatures or growing season exceed model predictions, this would indicate that bass growth is sub-optimal and has potential for enhancement.

Thermographs were installed at three sites and at varying depths to describe maximum summer water temperatures in Ririe Reservoir during 1998. Thermographs were deployed June 24 and programmed to record maximum-minimum temperatures through early September. All were anchored to the shore with approximately 50 m of aircraft cable, and set on the bottom perpendicular to shore.

Henrys Lake

Spawning Operation

The Hatchery Creek fish ladder was opened on March 2 and remained in operation until May 4. Fish ascending the ladder were identified as cutthroat trout *Oncorhynchus clarki* or hybrid trout *O. mykiss x O. clarki* and enumerated. A subsample of approximately 10% of each group was measured (fork length). Hybrid trout were produced with cutthroat trout eggs and Kamloops rainbow trout sperm obtained from Hayspur state hatchery. Cutthroat trout males and females were spawned to produce cutthroat trout for supplemental stocking in Henrys Lake and other Idaho fisheries.

Disease samples were taken from the cutthroat trout spawning run. Ovarian fluid was collected from cutthroat trout (seven-fish pooled samples) during spawning at Henrys Lake Hatchery. All samples were sent to the Eagle Fish Health Laboratory for analysis.

The brook trout *Salvelinus fontinalus* spawning and supplemental stocking program was discontinued primarily due to budget constraints.

Genetic Analysis

Genetic status and purity of Henrys Lake Yellowstone cutthroat trout *O. clarki bouvieri* has not been assessed. The past history of nonnative trout introductions and the 30 years of viable hybrid stocking would suggest that Henrys Lake cutthroat trout are likely introgressed at some level. Regardless, phenotypically pure-looking cutthroat trout are still common, and the existing stock remains well-adapted to the system. In 1995, natural recruitment provided an estimated 70% of the cutthroat trout population in the lake. Describing the current genetic status of the hatchery and naturally-spawning components of the fishery will help define the population as a whole and its contribution to present Yellowstone cutthroat trout distribution. A comprehensive genetic inventory, including tributaries, will help identify and prioritize potential Yellowstone cutthroat trout conservation projects.

On April 23, 60 adult trout were sacrificed for genetic analysis to address concerns regarding visual identification of cutthroat trout. Hatchery personnel used phenotypic traits (e.g. coloration, spotting pattern, scale size) to select 20 putative pure Yellowstone cutthroat trout, 20 F1 hybrids (produced at the ladder in previous years), and 20 fish with intermediate characteristics. Each fish was euthanized and photographed. A variety of readily observable phenotypic traits (Appendix A) were recorded for each fish. Liver, heart, eye, and muscle tissue were removed from each fish, placed into labeled bags, and stored on dry ice. Additionally, one pelvic fin was clipped from each fish and placed in an individually labeled vial containing lysis buffer solution. Samples were analyzed by University of Idaho staff at the Aquaculture Research Institute. Tissue samples were used for protein electrophoresis, while fin clips were used to assess mitochondrial DNA (mDNA) patterns.

From mid-July through mid-September, naturally produced cutthroat trout fry emigrating from Howard, Targhee, and Duck creeks back to Henrys Lake were collected. Individual fry were placed in labeled vials containing lysis buffer, and transported to the Aquaculture Research Institute. Fry samples were not analyzed in time for inclusion in this report.

Gillnetting

As part of routine population monitoring, gill net samples were collected from six standardized locations (total six net nights) on May 19-20. Nets were set at dusk and retrieved the following morning. Captured fish were identified to species, measured, and weighed.

Tributary Fry Trapping

Efforts to quantify natural production from key tributaries to Henrys Lake began in 1998. Krey-Meekin fry traps were installed July 14 to 16 near the mouths of Targhee, Howard, Timber, and Duck creeks. Traps were monitored daily through early September (Howard, Timber, and Duck creeks) or early October (Targhee Creek). Captured fry were enumerated, and a subsample measured (total length). When catch rates were sufficient, trap efficiency was estimated by marking and releasing fry 100-200 m above the traps. Fry were marked by immersion in a solution of Bismark brown dye (0.75 g in 12-16 L water) for 20 min. Marked fry

were held in live cages overnight to assess mortality, then released above the trap. Recaptures were counted on subsequent days. Total fry emigration past the trap was estimated by dividing catch by efficiency.

Limnology

Late winter (January-February 1999) under-ice dissolved oxygen concentrations were assessed at three established sampling sites throughout Henrys Lake. Data from previous years were compared to 1999 data to describe trends in winter oxygen depletion and risks of winter kill.

Sterile Hybrid Trout

Research personnel heat shocked approximately 70,000 rainbow trout x cutthroat hybrid eggs to induce triploidy (Dillon and Alexander 1997) during March 1996. Another 30,000 hybrid trout eggs served as controls. All were reared at Ashton state hatchery. Blood work indicated 46% triploidy in treatment groups. Treatment and control fish were given left and right pelvic fin clips, respectively. Two thousand of each group were stocked into the East Harriman Pond in September 1996.

In March 1997, research personnel modified heat shock treatments and again attempted to produce triploid hybrids. These fish were reared along with controls at Grace Hatchery. One treatment (27^{o}C, 10 minutes after fertilization, 10 minute duration) provided a 70% triploidy rate. Treatment and control fish were given left and right pelvic clips, respectively, and stocked (2,000 each) into the East Harriman Pond in September 1997.

In March 1998 research personnel continued heat shock experiments, using six different treatments with a range of timing and temperatures. Fertilized eggs were separated into lots of 1,000 to 2,600 eggs and poured into small screen trays prior to heat shocking. For each timing variation (10, 20, 25, and 30 min after fertilization), one control egg lot was taken and subjected to the same handling, but was not heat shocked. One additional egg lot served as a handling control, and was fertilized, water hardened and incubated in a manner similar to normal production eggs. Eye-up rates were evaluated for each treatment, and test lots were hatched and reared at Grace Fish Hatchery. In late July, blood samples were taken from 30 fish in each treatment group and evaluated for ploidy level.

East Harriman Pond was sampled in August 1998 to assess relative performance of sterile triploid and control diploid hybrids from brood year 1996 and 1997. Drift boats with mounted electrofishing gear were used to collect fish. Data collection included recording total length and fin clip location of all hybrid trout, as well as taking blood samples from each fish to verify ploidy level.

RESULTS AND DISCUSSION

Island Park Reservoir

A total of 885 fish were captured with a combined gillnetting effort of seven net-nights (Appendix B). Catch composition included nine species of which gamefish (trout, char *Salvelinus spp*., mountain whitefish *Propsopium williamsoni*, and kokanee salmon *O. nerka*) comprised 20% of the total catch, compared to 46% in May 1997 samples. Utah chub *Gila atraria*, Utah sucker *Catostomus ardens*, and redside shiner *Richardsonius balteatus* comprised 81% of the catch, compared to 54% in 1997. Hatchery and wild rainbow trout comprised 14% of the catch, the lowest proportion since the 1992 reservoir treatment. No cutthroat trout and only 2 splake *S. fontinalis x S. naymaycush* were sampled.

Ririe Reservoir

Spot Creel Checks and Catchable Evaluation

From June 1 through October 8, creel clerks contacted 381 individual anglers in 172 interviews. Anglers fished a total of 893 hours and caught 1,018 fish, of which 459 were harvested. Mean catch rate was 1.14 fish/h with a corresponding harvest rate of 0.51 fish/h. Angling methods included bait (69%), lure (31%), and fly fishing (<1%). Harvest composition was 73% hatchery rainbow trout, 22% yellow perch *perca flavescens*, and 3% splake. Smallmouth bass, largemouth bass and kokanee salmon comprised less than 2% of harvest.

Of the 148 marked rainbow trout observed in the creel, 72 were from Hagerman state hatchery and 76 were from Nampa state hatchery. The difference was not statistically significant. Similar stocking comparisons in 1997 showed Nampa hatchery catchables returned to the creel at almost twice the rate of Hagerman hatchery fish. Unmarked Mackay state hatchery catchables stocked at larger sizes (275-300 mm) comprised 38% of the total stocking, and provided 55% of the total trout harvest.

Bass Tournaments

Bass angler scorecards and tournament report forms were summarized for five tournaments from June 27 through October 18 1998 (Table 1). Most anglers did not differentiate between largemouth and smallmouth bass on the bass angler scorecards; consequently analysis includes both species. Average tournament catch rate for legal (weighed-in) fish ranged from 0.11 to 0.30 fish/h and averaged 0.25 fish/h. Total bass catch rates (including sub-legal fish) averaged 1.24 fish/h.

Table 1. Summary of 1998 bass tournament effort and catch for Ririe Reservoir, Idaho.

Tournament dates	Number of anglers	Total hours fished	Number of sub-legal bass caught	Number of legal bass weighed in	Catch rate for legal bass (f/hr)
6/27-28	30	285	-	85	0.30
7/26	9	81	165	9	0.11
8/8	8	60	205	13	0.22
9/6	11	88	129	24	0.27
10/18	14	100	111	21	0.21
TOTALS	72	614	610	152	0.25

Water Temperatures

The mid-reservoir thermograph failed after July 15. Both the near-dam and Blacktail Bay thermographs recorded maximum temperatures of 21°C-22°C in mid-August (Figure 1). The near-dam thermograph was apparently below the thermocline through early August, remaining at 14°C-15°C. As the reservoir was drawn down and the thermograph was exposed to the epilimnion, maximum temperature readings were similar to the Blacktail Bay site.

Although these data do not describe the entire growing season, the maximum temperatures closely match those predicted by the water temperature model proposed by Dillon (1992). This suggests that conclusions drawn from the bioenergetics modeling are valid, and that no benefits to growth are likely to be realized with additional management activities. Additional temperature data throughout the May-October growing season would help further validate these conclusions and clarify management options for smallmouth bass in Ririe Reservoir.

Henrys Lake

Spawning Operation

A total of 4,677 cutthroat trout ascended the spawning ladder between March 3 and May 4, of which 51% were males and 49% were females. Hybrid trout totaled 5,418 fish, with 51% males and 49% females. Mean length for male and female cutthroat trout was 450 and 430 mm, respectively (Figure 2). Combined average cutthroat trout length was 444 mm. Hybrid trout males and females averaged 449 and 440 mm, respectively (Figure 3). Combined average hybrid trout length was 445 mm.

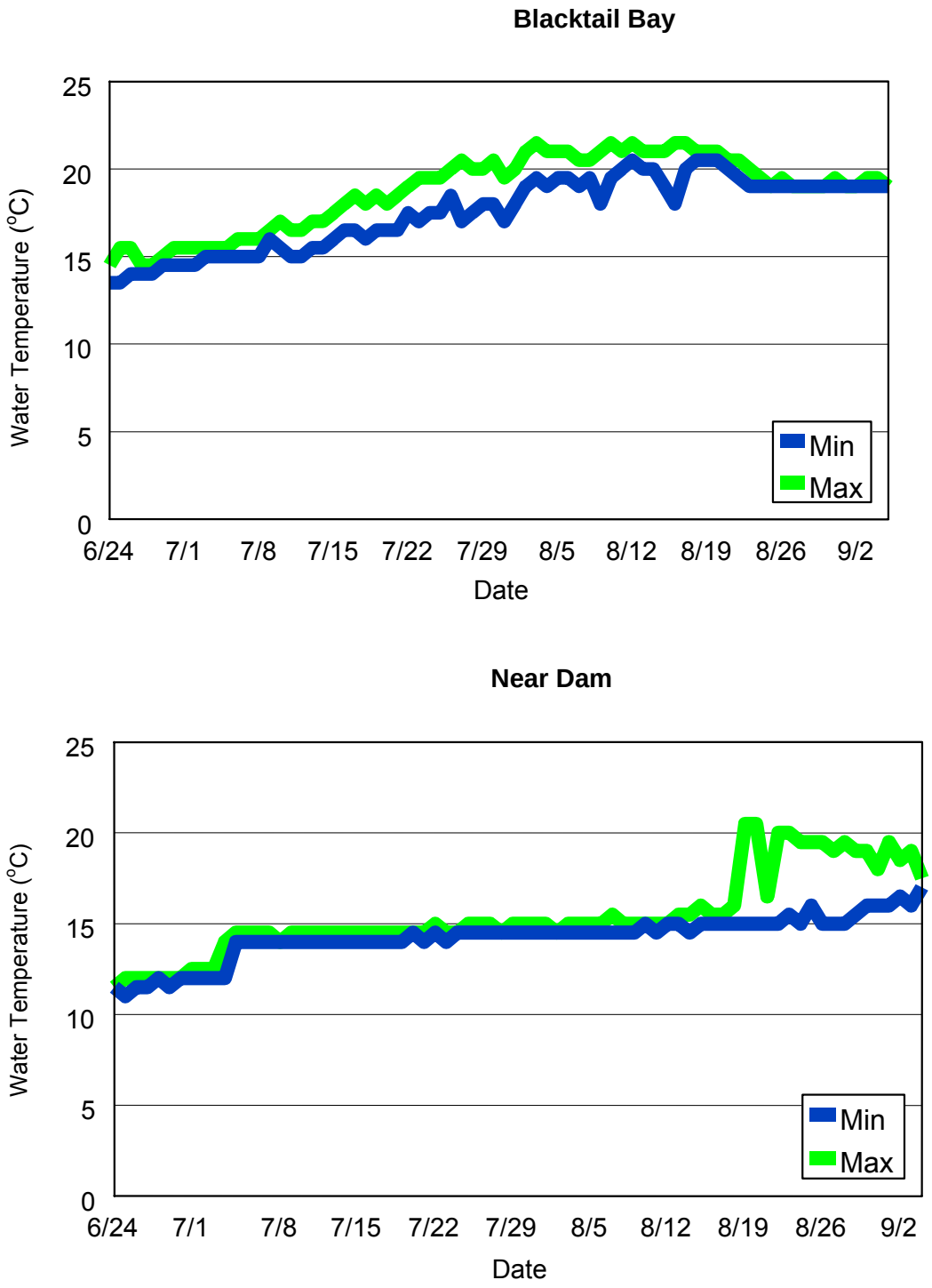

Figure 1. Summer water temperatures in two locations in Ririe Reservoir, Idaho, 1998.

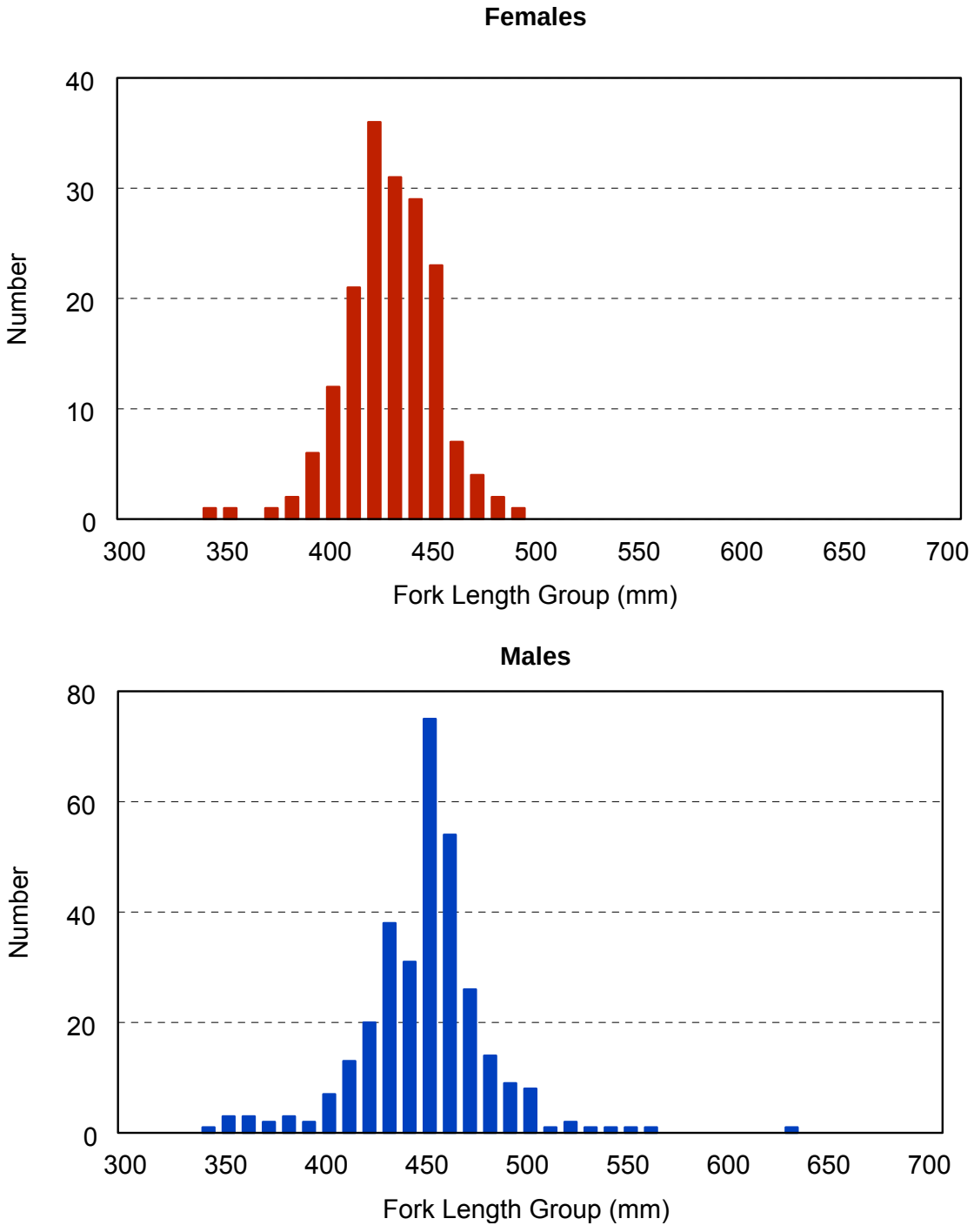

Figure 2. Length frequency distribution for male and female cutthroat trout in Henrys Lake, Idaho, 1998.

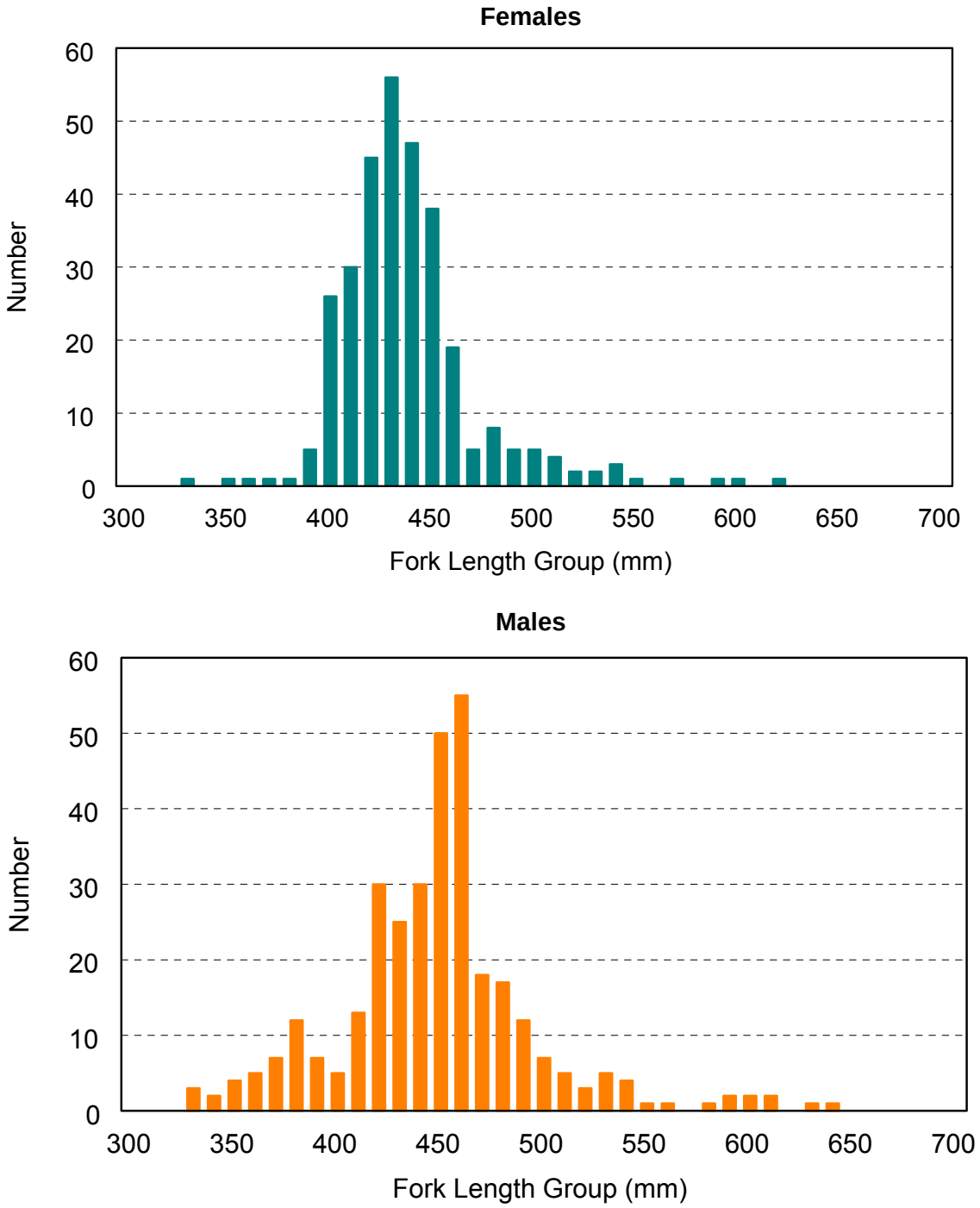

Figure 3. Length frequency distribution of male and female hybrid trout in Henrys Lake, Idaho, 1998.

Cutthroat trout green eggs totaled 2,321,690 from 1,094 females for an average fecundity of 2,122 eggs per female. Eyed cutthroat trout eggs totaled 1,399,939 for an overall eye-up rate of 62%.

Hybrid trout green eggs totaled 712,328 from 282 cutthroat trout females for an average fecundity of 2,526 eggs per female. Eyed hybrid trout eggs totaled 408,695 for an overall eye-up rate of 57%.

No brook trout eggs were taken in 1998.

Cutthroat trout ovarian fluid disease samples showed no viral pathogens, and a low level of potential bacterial pathogens. Three of 180 egg lots tested positive for viral pathogens and were culled.

Genetic Analysis

Protein electrophoresis results suggest a high occurrence of rainbow trout genetic material in the Hatchery Creek cutthroat trout spawning run. Of the 20 fish that were phenotypically classified as pure cutthroat trout, only three showed no evidence of introgression (Table 2). One of the 20 intermediate phenotypes was also genetically identified as a pure cutthroat trout. All of the 20 fish classified as hybrid trout were confirmed to be hybrids.

The readily observable phenotypic traits recorded could not be used to reliably identify pure cutthroat trout. The three fish classified as cutthroat trout in the field and confirmed to be pure by electrophoresis were phenotypically indistinguishable from many hybrids.

Although mDNA was also analyzed for each sampled fish, these data are not useful to describe the level of introgression or hybridization in Henrys Lake. Because mDNA is strictly maternally-inherited, and because the hybrid trout stocking program is maintained by crossing male rainbow trout and female cutthroat trout, almost all (59 of 60) of the sampled fish had cutthroat trout mDNA (Table 2). This suggests that any historic rainbow trout stocking in Henrys Lake did not result in a significant hybridization event with native cutthroat trout. Rather, the current level of introgression is likely the result of stocking fertile F1 hybrids, which have backcrossed with cutthroat trout in tributaries. Of the 56 hybrids identified, at least 37 were F2 or greater backcrosses produced either by natural tributary spawners or by inadvertently using hybridized fish in the egg-taking operation. This underscores the importance of developing a sterile hybrid trout stocking program to minimize the flow of rainbow trout genetic material.

Genetic analysis of naturally produced fry from Howard, Targhee, and Duck creeks was not completed in time for inclusion in this report.

Because only a small segment of the Hatchery Creek spawning run was sampled, the genetics data obtained does not represent the entire hatchery run or the lake population. The lake population is comprised of both hatchery and naturally produced fish, and may have discrete spawning populations in each tributary, which could vary in genetic integrity. To better describe the genetic status of cutthroat trout in Henrys Lake, future genetic analysis should include fish sampled throughout the hatchery spawning run plus additional representative fish (adult spawners and emigrating fry) from major tributaries.

Table 2. Field identification and results of genetic analysis from fish sampled at the Henrys Lake Hatchery spawning station April 22, 1998, Henrys Lake, Idaho.

ID number	Sex	Fork length (mm)	Field ID	Field notes	Allozyme loci	mDNA	Genetic ID
98-01	M	370	YCT	suspect pure YCT	RBT/YCT	YCT	F1
98-02	F	430	HYB	suspect pure YCT	RBT/YCT	YCT	F2
98-03	F	520	HYB	suspect F1	RBT/YCT	YCT	F1
98-04	F	450	YCT	suspect pure YCT	RBT/YCT	YCT	F1
98-05	M	505	HYB	suspect pure YCT	RBT/YCT	YCT	F2
98-06	M	435	YCT	suspect pure YCT	RBT/YCT	YCT	F2
98-07	M	425	HYB	suspect pure YCT	RBT/YCT	YCT	F1
98-08	M	450	HYB	suspect pure YCT	YCT	YCT	YCT
98-09	M	485	YCT	suspect pure YCT	YCT	YCT	YCT
98-10	F	620	HYB	suspect F1	RBT/YCT	YCT	F2
98-11	M	435	YCT	suspect pure YCT	RBT/YCT	YCT	F1
98-12	M	495	HYB	suspect pure YCT	RBT/YCT	YCT	F2
98-13	M	435	YCT	suspect pure YCT	RBT/YCT	YCT	F1
98-14	M	445	YCT	suspect pure YCT	RBT/YCT	YCT	F2
98-15	M	425	YCT	suspect pure YCT	RBT/YCT	YCT	F1
98-16	F	420	HYB	suspect pure YCT	RBT/YCT	YCT	F2
98-17	M	430	HYB	suspect pure YCT	RBT/YCT	YCT	F1
98-18	M	505	YCT	suspect pure YCT	RBT/YCT	YCT	F1
98-19	F	435	HYB	suspect F1 or F2	RBT/YCT	YCT	F2
98-20	M	455	YCT	suspect pure YCT	YCT	YCT	YCT
98-21	F	425	YCT	suspect pure YCT	RBT/YCT	YCT	F2
98-22	F	435	YCT	suspect pure YCT	RBT/YCT	YCT	F2
98-23	M	415	HYB	suspect pure YCT	RBT/YCT	YCT	F1
98-24	M	440	HYB	suspect pure YCT	RBY/YCT	YCT	F1
98-25	M	390	HYB	suspect pure YCT	RBT/YCT	YCT	F1
98-26	M	565	HYB	suspect F1	RBT/YCT	YCT	F2
98-27	M	480	HYB	suspect pure YCT	RBT/YCT	YCT	F2
98-28	F	465	HYB	suspect F1	RBT/YCT	YCT	F2
98-29	F	500	HYB	suspect F1	RBT/YCT	YCT	F2

Table 2. Continued.

ID number	Sex	Fork length (mm)	Field ID	Field notes	Allozyme loci	mDNA	Genetic ID
98-30	F	535	HYB	suspect F1	RBT/YCT	YCT	F2
98-31	F	445	HYB	suspect F1 or F2	RBT/YCT	RBT	F2
98-32	M	490	HYB	suspect pure YCT	RBT/YCT	YCT	F2
98-33	F	435	HYB	suspect pure YCT	RBT/YCT	YCT	F2
98-34	M	635	HYB	suspect F1	RBT/YCT	YCT	F2
98-35	F	430	YCT	suspect pure YCT	RBT/YCT	YCT	F2
98-36	M	465	YCT	suspect pure YCT	YCT	YCT	YCT
98-37	M	420	YCT	suspect F2 sure hybrid	RBT/YCT	YCT	F1
98-38	M	555	HYB	suspect F1	RBT/YCT	YCT	F2
98-39	M	460	HYB	suspect pure YCT	RBT/YCT	YCT	F2
98-40	F	415	YCT	suspect pure YCT	RBT/YCT	YCT	F1
98-41	F	600	HYB	suspect F1	RBT/YCT	YCT	F2
98-42	F	440	HYB	suspect pure YCT	RBT/YCT	YCT	F2
98-43	M	630	HYB	suspect F1	RBT/YCT	YCT	F2
98-44	F	-	HYB	suspect F1	RBT/YCT	YCT	F2
98-45	F	430	YCT	suspect pure YCT	RBT/YCT	YCT	F2
98-46	M	415	HYB	suspect F1	RBT/YCT	YCT	F1
98-47	F	430	YCT	suspect pure YCT	RBT/YCT	YCT	F1
98-48	F	460	YCT	suspect pure YCT	RBT/YCT	YCT	F2
98-49	F	480	YCT	suspect pure YCT	RBT/YCT	YCT	F2
98-50	F	430	HYB	suspect pure YCT	RBT/YCT	YCT	F2
98-51	F	510	HYB	suspect pure YCT	RBT/YCT	YCT	F2
98-52	F	425	HYB	suspect pure YCT	RBT/YCT	YCT	F2
98-53	F	415	HYB	suspect pure YCT	RBT/YCT	YCT	F2
98-54	F	465	HYB	suspect pure YCT	RBT/YCT	YCT	F2
98-55	M	610	HYB	suspect F1	RBT/YCT	YCT	F1
98-56	M	645	HYB	suspect F1	RBT/YCT	YCT	F1
98-57	M	410	HYB	suspect F1	RBT/YCT	YCT	F2
98-58	M	610	HYB	suspect F1	RBT/YCT	YCT	F1
98-59	F	500	HYB	suspect F1	RBT/YCT	YCT	F2
98-60	F	490	HYB	suspect F1	RBT/YCT	YCT	F2

Gillnetting

In the six net nights a total of 68 fish were collected, 62% of which were cutthroat trout, 15% hybrid trout, 20% brook trout, and 3% Utah chub (Appendix C). Cutthroat trout ranged from 215-427 mm total length, hybrid trout were 178-475 mm, and brook trout 220-505 mm. Brook trout contribution to gill net catches has increased from 3% in 1995 and 9% in 1996 to 20% in 1998 samples.

Tributary Fry Trapping

With the exception of the Howard Creek trap, catch rates for emigrating fry were low. Because of inadequate stream velocity, few trout fry were captured in the Timber Creek trap, although fry were observed immediately above the trap site. Early catch rates in Duck and Targhee creeks were low, but improved after the traps were moved to higher velocity locations. In Howard Creek, the declining catch rate through the trapping period suggest that substantial fry emigration had already taken place by the time the traps were installed in mid-July (Appendix D).

In Howard Creek, a total of 3,259 fry were trapped from July 14 to September 10 (Appendix D). Trap efficiency (three estimates) ranged from 11% to 21%. Total emigration during this period was estimated at 17,727 fry. Fry ranged in size from 25 to 40 mm TL.

In Targhee Creek, no fry were caught from July 15 to 29. A total of 1,109 fry were caught from July 30 to October 4 (Appendix D). Trap efficiency (one estimate) was 16%, and estimated total emigration was 7,100 fry. Fry ranged in size from 25 to 45 mm TL.

In Duck Creek, a total of 1,163 fry were sampled from July 15 to September 10 (Appendix D). Trap efficiency (one estimate) was 25%, and estimated total emigration was 5,483 fry. Fry sizes ranged from 25 to 50 mm TL.

As noted, these can only be considered partial estimates; considerable emigration likely occurred before the traps were in place. Because the traps were installed late, timing of emigration from the tributaries could not be characterized. Once traps were placed in areas with adequate velocity, trapping efficiencies were adequate to allow reasonable estimates of total emigration during the sampling period. Additional sampling with traps installed by June 1 would help describe timing and more closely estimate total fry production in each important spawning tributary.

Limnology

Dissolved oxygen data for January and February 1999 are presented in Appendix E. Oxygen levels were sufficient to provide adequate overwintering habitat in Henrys Lake; consequently the aeration system was not used.

Sterile Hybrid Trout

Six experimental treatments in 1998 produced a range of triploidy induction rates (Table 3). The best treatment was 27°C 10 min after fertilization, and lasting 20 min. This method provided an estimated 97% triploidy rate. Eye-up rates were poor for all treatment groups (20%-50%), but at least some of the mortality was apparently due to handling rather than heat shocking. Eye-up of eggs subjected to handling and heat shock was 35%-89% that of control eggs subjected to handling only. Average eye-up of control eggs that were handled was 69% of non-handled control eggs.

Table 3. Eye-up and triploidy induction rates for heat-shocked and control rainbow trout x cutthroat trout hybrid eggs. MAF = minutes after fertilization when heat shocks began; all treatments were for a duration of 20 min. Trout were collected from Henrys Lake, Idaho.

Treatment group	# Eyed	# Dead	Total eggs	% Eye-up	% Triploidy
Handling control	4,988	2,117	7,105	70.2	-
10MAF control*	807	593	1,400	57.6	-
20MAF control	418	710	1,128	37.1	-
25MAF control*	755	940	1,695	44.5	-
30MAF control	1,160	931	2,091	55.5	-
26C 20MAF	472	1,017	1,489	31.7	52
26C 25MAF	959	1,462	2,421	39.6	17
26C 30MAF	1,292	1,318	2,610	49.5	20
27C 10MAF	202	798	1,000	20.2	97
27C 20MAF	363	941	1,304	27.8	86
27C 25MAF	691	1,622	2,313	29.9	80

*incubated in egg shipping tubes rather than trays

Although the best treatment produced 97% triploidy rates, providing 250,000 eyed triploid hybrid trout eggs for the Henrys Lake program will require better egg survival than obtained from these experiments. Because cutthroat trout eggs and rainbow trout sperm are readily available, poor survival can be offset by increasing hybrid trout egg take. Until egg survival is assessed in mass production lots of triploid fish, doubling the normal egg take for hybrid trout is recommended. Additionally, large-scale production techniques should include

methods that minimize handling stress. As survival data become available, future hybrid egg take can be adjusted accordingly.

Only two hybrid trout were caught in East Harriman Pond in 1998, one 424 mm fish from the 1996 stocking and one 229 mm fish from the 1997 stocking. The remaining catch was comprised of hatchery and wild rainbow trout (n=118) and one brook trout. Both hybrids were from heat shock treatment groups. Because of the low sample size ploidy level was not confirmed.

The low catch of hybrid trout does not necessarily indicate poor survival. Because we sampled few fish from either the triploid or the control groups, we could not assess relative survival between groups. Several other factors may have influenced the low catch of stocked fish, including emigration, predation or angling mortality.

Given the apparent level of introgression that has occurred in Henrys Lake cutthroat trout, moving forward with the sterile hybrid trout program is important. Stocking only sterile hybrid trout will reduce the flow of rainbow trout genetic material into the cutthroat trout population. Beginning in 1999, all hybrid trout eggs will be heat shocked using a treatment that gives the best triploidy and survival rates. Additional eggs will be taken to compensate for the lower survival associated with heat shock. Assessment of triploidy induction rates and rearing performance will be coordinated with research personnel. Finally, evaluation methods to assess triploid hybrid trout performance will be developed and incorporated into the Henrys Lake management program.

RECOMMENDATIONS

Island Park Reservoir

1. Continue spring gill net surveys to monitor species composition.

2. Continue creel surveys to monitor catch composition and catch and harvest rates.

3. Assess zooplankton size structure as an index of forage availability for game fish.

Ririe Reservoir

1. Continue using large (275-300 mm) catchables to provide a yield fishery for hatchery trout.

2. Compare cost-to-creel and cost:benefit of large and regular catchable trout.

Henrys Lake

1. Continue annual standard gill net surveys to describe population trends. Use additional gillnetting and/or trapnetting to monitor distribution and status of Utah chub population.

2. Develop techniques to heat shock hybrid trout eggs to induce high rates of triploidy; develop evaluation plans to assess triploid hybrid performance in Henrys Lake.

3. Continue genetic assessment of Yellowstone cutthroat trout in the hatchery run and in tributaries.

4. Develop a winter aeration operations manual for aeration system use.

5. Continue assessments of natural recruitment from key tributaries; begin fry trapping by June 1.

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APPENDICES

Appendix A. Sample data sheet used to record phenotypic traits of Henrys Lake fish used for genetic analyses, Henrys Lake, Idaho.

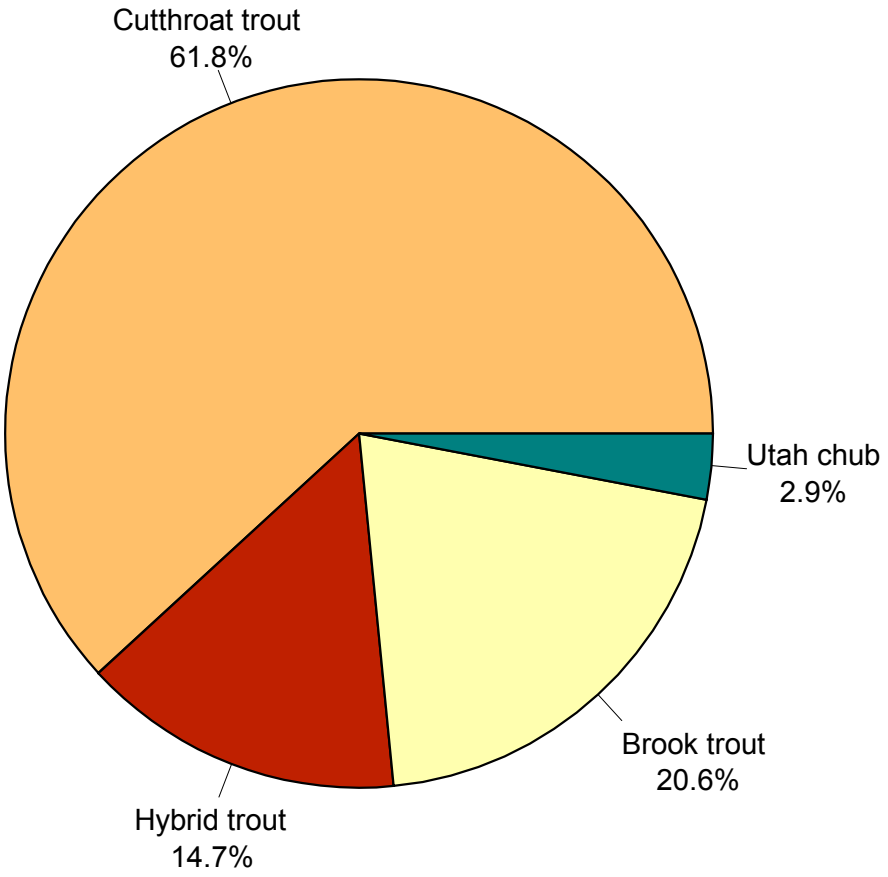
Date:	Location:	Observer:
Fish ID #:	Fish Length:	Fish Sex:
Field ID:	Leaning:	Genetics ID:

	Yes	No	Strong	Moderate	Weak
Spots on head absent					
Round shaped spots					
Spot halo					
Red lateral band absent					
White tip fins absent					
Throat slash					
Jaw extends past eye					
Spots mostly above lateral line					
Spots concentrated near caudal ped.					
Mid to large spots					
Few spots					
Flat, bronze to olive gray body color					
Smaller, less visible scales					
Streamlined body shape					
Elongated head					

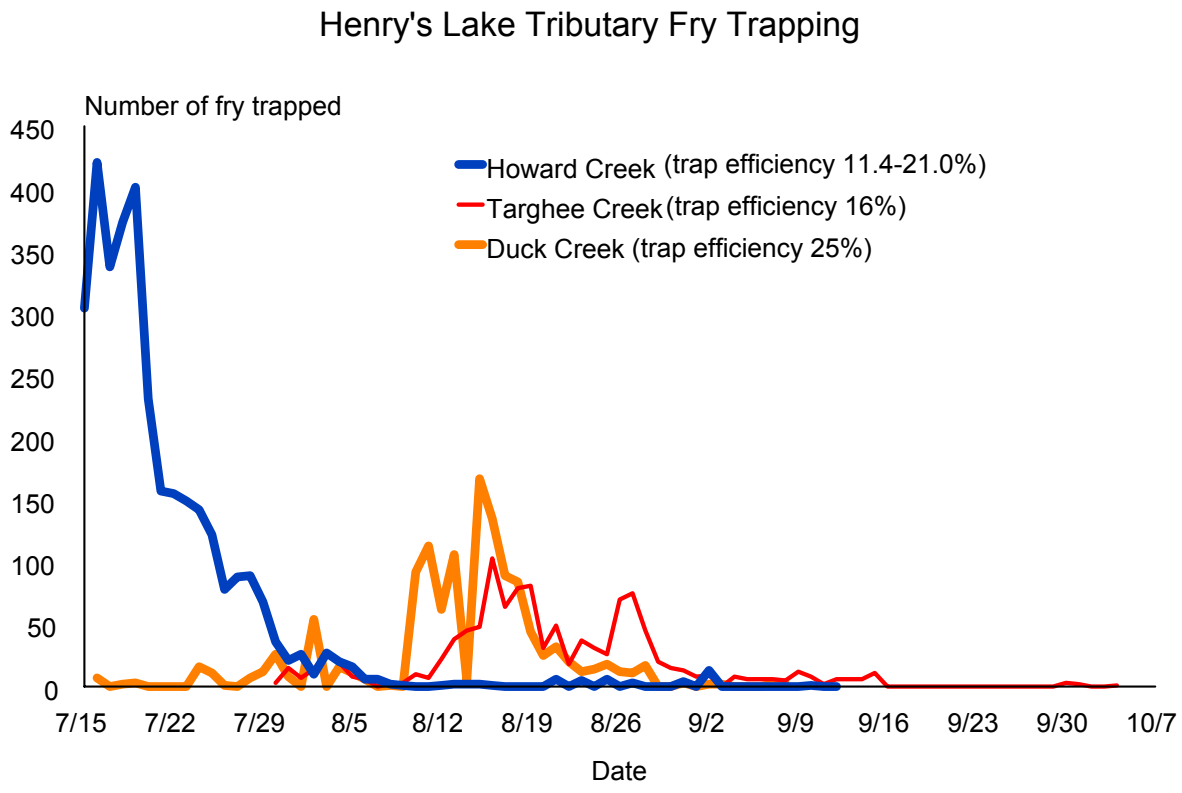
Appendix B. Gill net catch composition in Island Park Reservoir, Idaho, May 1998.

Location	Soak time (hrs)	Utah Chub	Rainbow trout	Brook trout	Kokanee	Mountain whitefish	Utah sucker	Redside shiner	Splake	Total
Brush Pile	17.25	160	13	1	5	0	2	0	0	180
Bill's Island	18.5	68	23	10	2	1	28	9	0	141
Mill Creek	19.25	15	6	5	0	0	4	0	0	30
Trudes Bay	20.0	101	7	1	6	1	9	0	1	126
Goose Island	21.0	158	19	0	1	2	9	26	0	215
Goose box #25	22.0	70	23	0	1	1	2	0	0	97
Goose box #56	22.5	44	35	0	5	4	7	0	1	96
Total	140.5	616	126	17	20	9	61	35	2	885
%	-	69.6	14.2	1.9	2.2	1.0	6.9	4.0	0.2	-

Appendix C. Species composition obtained from six gill net nights in Henrys Lake, Idaho, May 1998.



Appendix D. Number and timing of cutthroat trout fry captured in three Henrys Lake tributaries and associated trapping efficiencies, Henrys Lake, Idaho, 1998.



Appendix E. Winter 1999 dissolved oxygen concentrations at three standard sampling sites in Henrys Lake, Idaho.

		Dissolved oxygen (mg/l)	
Location	Depth (m)	January 14	February 24
1 mile south of Pittsburgh Creek	ice bottom	10.3	11.0
	1	11.0	11.0
	2	10.9	9.0
	3	8.3	7.4
	4	5.8	5.6
	5	4.3	2.6
300 yards off county dock	ice bottom	10.4	11.2
	1	10.5	11.2
	2	10.7	10.0
	3	9.2	6.3
	4	4.8	4.4
	5	1.6	0.6
300 yards off Wild Rose	ice bottom	10.8	11.0
	1	10.7	11.0
	2	10.0	9.4
	3	10.0	5.0
	4	4.6	1.9
	5	1.0	0.4

1998 ANNUAL PERFORMANCE REPORT

State of: Idaho

Program: Fisheries Management F-71-R-23

Project I: Surveys and Inventories

Subproject I-G: Upper Snake Region

Job: c-1

Title: Rivers and Streams Investigations-South Fork Snake River

Contract Period: July 1, 1998 to June 30, 1999

ABSTRACT

In the South Fork Snake River, a total of 2,236 individual trout were captured during four days of electrofishing at the Conant section in October 1998. Trout species composition and relative abundance were wild and hatchery cutthroat trout *Oncorhynchus clarki* (59%), wild rainbow *O. mykiss* and hybrid rainbow x cutthroat trout (20%), wild brown trout *Salmo trutta* (21%), and lake trout *Salvelinus namaycush* (<1%). No kokanee *O. nerka kennerlyi* were captured.

Brown trout relative abundance has varied from 7% to 21% since 1982, the first year of electrofishing in the South Fork. There is no apparent trend. Cutthroat trout relative abundance was five points higher than in 1997, the all time low. In contrast, rainbow and hybrid trout relative abundance was seven points lower than the all time high in 1997.

Average length was 295 mm for wild and hatchery cutthroat trout, 318 mm for rainbow and hybrid trout, 279 mm for brown trout, and 297 mm for all species combined. Quality stock density (QSD) was 5 for wild and hatchery cutthroat trout, 13 for rainbow and hybrid trout, 8 for brown trout, and 7 for all species combined.

Estimated density of age 1 and older fish was 237 fish/ha for wild and hatchery cutthroat trout, 64 fish/ha for rainbow and hybrid trout, 34 fish/ha for brown trout, and 308 fish/ha for all species combined.

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INTRODUCTION AND STUDY AREA

Wild trout populations in the mainstem South Fork Snake River are monitored annually using electrofishing (Corsi and Elle 1989, 1994; Elle and Corsi 1994; Elle and Gamblin 1993; Elle et al. 1987; Gamblin 1995; Gamblin et al. 1993). Four river sections have been electrofished in various years since 1986 (Figure 1): Palisades (5.0 km), Conant (4.9 km), Twin Bridges (2.9 km), and Lorenzo (4.8 km). However, only the Conant section has been sampled every year; a portion of this section was sampled in 1982 as well (Moore and Schill 1984). The last major creel census was conducted in 1996 (Schrader et al. 2003).

In the mainstem, special regulations restricting harvest of cutthroat trout *Oncorhynchus clarki* were enacted in the reach stretching from the Heise measuring cable to Irwin in 1984, and extended to Palisades Dam in 1988 (Table 1). Based on this success, the Upper Snake restricted cutthroat trout harvest regulation was implemented throughout Eastern Idaho in 1990, and included the lower South Fork (below Heise) and all South Fork tributaries. The two fish, none between 203-406 mm regulation was extended to all trout species in the mainstem (but not tributaries) in 1992. Emergency changes in 1999 removed rainbow trout *O. mykiss* (and later hybrid trout *O. mykiss x O. clarki*) from the special regulations, returning them to the general six fish bag limit with no size restrictions. The river below the Heise cable is open year round to fishing, whereas the upper river is closed December 1 to Memorial Day weekend (Figure 1).

OBJECTIVES

1. Monitor South Fork Snake River wild trout populations in the mainstem by electrofishing. Enter electrofishing data into MR4 computer program for standardized database and analysis. Summarize trout species composition, relative abundance, size structure, average fish length, quality stock density, and density for selected electrofishing sections.

2. Remove all rainbow and hybrid trout caught during recapture runs.

METHODS

Main Stem Electrofishing

During 1998, we electrofished at Conant on October 7, 8, 14 and 15 (Figure 1). Two marking run days, one day each at the upper and lower section, were followed by two recapture run days about a week later.

Fish were captured using direct-current (DC) electrofishing gear (Coffelt VVP-15 powered by a Honda 5000 W generator) mounted in an 18-foot Alumaweld sled with 150-hp outboard jet. We used pulsed DC current through two boom-and-dangler anodes fixed to the bow while driving downstream. The boat hull was the cathode. VVP settings were at 250-350 V,

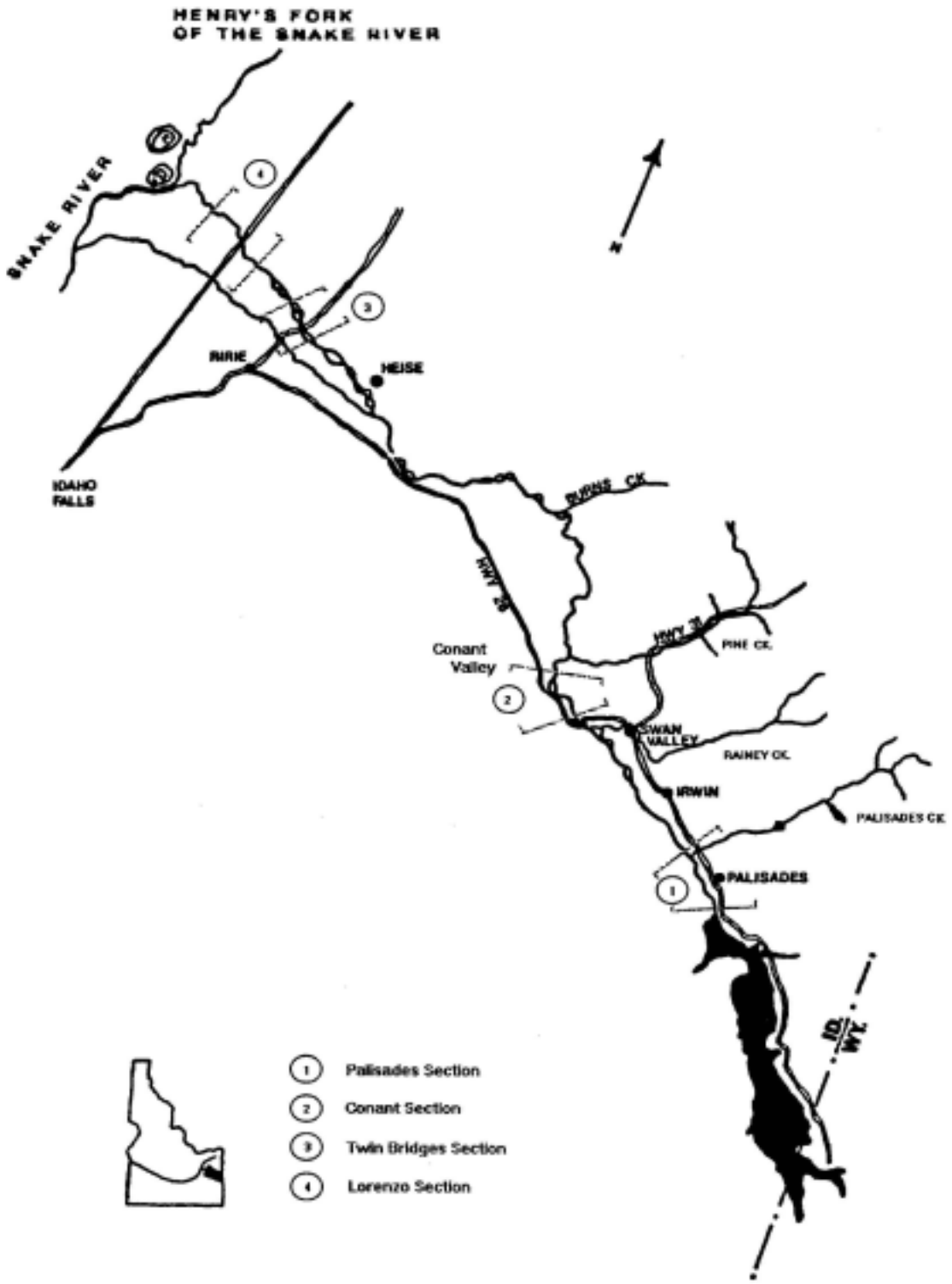

Figure 1. Map of South Fork Snake River showing electrofishing sections.

Table 1. Main stem South Fork Snake River fishing regulations 1970-1998.

Year	Season	Trout bag & size limit	Special
1970	May 30 - Nov 30	7 lb. + 1 fish, not to exceed 15 fish	Whitefish open 3/1 to 4/30 Irwin to Dam; Mouth to Heise cable open all year
1971	May 29 - Nov 30	Same	Same
1972	May 27 - Nov 30	7 lb. + 1 fish, not to exceed 10 fish	Same
1973	May 26 - Nov 30	Same	All species open 3/1 to 9/30 Irwin to Dam; Mouth to Heise cable open all year
1974	May 25 - Nov 30	10 fish, not more than 2 exceeding 14”	Same
1975	May 24 - Nov 30	Same	Same
1976	May 29 - Nov 30	10 fish, not more than 5 exceeding 12”, and not more than 2 exceeding 18”	Same
1977	May 28 - Nov 30	6 fish, only 2 over 16”	Same, except dam tailrace closed
1978	May 27 - Nov 30	Same	Dam tailrace closed; all species open 5/27 to 9/30 Irwin to Dam; Mouth to Heise cable open 5/27 to 12/31
1979	May 26 - Nov 30	Same	Dam tailrace closed; all species open 4/1 to 9/30 Irwin to Dam; Mouth to Heise cable open all year
1980	May 24 - Nov 30	Same	Same
1981	May 23 - Nov 30	Same	Same
1982	May 29 - Nov 30	Same	Same, except open 9/1 to 11/30 within 100 yards of Burns Creek
1983	May 28 - Nov 30	Same	Same
1984	May 26 - Nov 30	Same, except Heise cable to Irwin only 2 CT, none between 10-16”, barbless hooks	Same
1985	May 25 - Nov 30	Same, except added hybrids	Same
1986-1987	May 24/23-Nov 30	Same	Same
1988-1989	May 28/27-Nov 30	6 fish, only 2 over 16”; except Heise cable to Dam only 2 CT or HYB, none between 10-16”	Mouth to Heise cable open all year; open 9/1 - 11/30 within 100 yards of Burns Creek
1990-1991	May 26/25-Nov 30	6 fish (except only 2 CT or HYB, none between 8-16”, on all rivers and streams)	Mouth to Heise cable open all year
1992-1993	May 23/29-Nov 30	2 fish, none between 8-16”	Same
1994-1995	May 28/27-Nov 30	Same	Same
1996-1997	May 25/24-Nov 30	Same	Same
1998	May 23 - Nov 30	Same	Same

5-7 A, 20% pulse width, and 60 Hz (pulses per second). Measured water temperatures varied from 12°C to 14°C. Flows varied from 3,230 to 4,470 cfs (at Irwin gage; USGS, provisional data). Though sections were not blocked at each end, we assumed fish would not move beyond natural habitat boundaries between marking and recapture runs.

We attempted to capture all species and sizes of trout; mountain whitefish *Prosopium williamsoni* and nongame fish were ignored. Fish were anesthetized with tricaine methane-sulfonate (MS-222), identified, and measured to the nearest millimeter (TL). Incidental fish mortalities were dissected for otoliths using Schneidervin and Hubert's (1986) technique. Brown trout *salmo trutta* less than 150 mm and all other species less than 100 mm (approximately age 0) were not marked; age 1 and older fish were marked with a caudal fin punch and then released. All rainbow and hybrid trout caught during recapture runs were killed.

Electrofishing data for 1998 were entered and analyzed using the computer program MARKRECAPTURE 4.0 (MR4) (MDFWP 1994). General statistical analysis was conducted according to Zar (1984).

We assumed capture probabilities did not vary with species, and we estimated relative abundance using proportions of all individual trout captured. Although capture probabilities vary with fish length (Schill 1992), population size structures (length frequency distributions) and average fish lengths were estimated using all sizes of individual fish captured. Quality stock densities (QSD) were estimated using the number of individual fish captured >406 mm divided by the number >203 mm multiplied by 100. Densities were estimated using two methods in the MR4 computer program; the log-likelihood method was preferred over the modified Peterson method if modeled efficiency curves were acceptable (termcode=1 and at least one of two chi-square p-values >0.05).

RESULTS AND DISCUSSION

Mainstem Electrofishing

Conant Section

Trout Species Composition and Relative Abundance-A total of 2,236 individual trout were captured during four days of electrofishing in October 1998. Trout species composition and relative abundance (Figure 2; Appendix A) were wild and hatchery cutthroat trout (59%), wild rainbow and hybrid trout (20%), wild brown trout (21%), and lake trout *Salvelinus namaycush* (<1%). No kokanee *Oncorhynchus nerka kennerlyi* were captured. Hatchery cutthroat trout (fine-spotted), lake trout, and kokanee salmon are flushed from Palisades Reservoir; their numbers may be directly related to the extent of reservoir drawdown (Gamblin et al. 1993). About 1% of the cutthroat trout captured were of hatchery origin.

The proportion of brown trout captured by electrofishing has varied from 7% to 21% since 1982 (Appendix A). There is no apparent trend. The proportion of wild and hatchery cutthroat trout captured by electrofishing is five points higher than in 1997, the all time low. The proportion of rainbow and hybrid trout is seven points lower than in 1997, the all time high. We

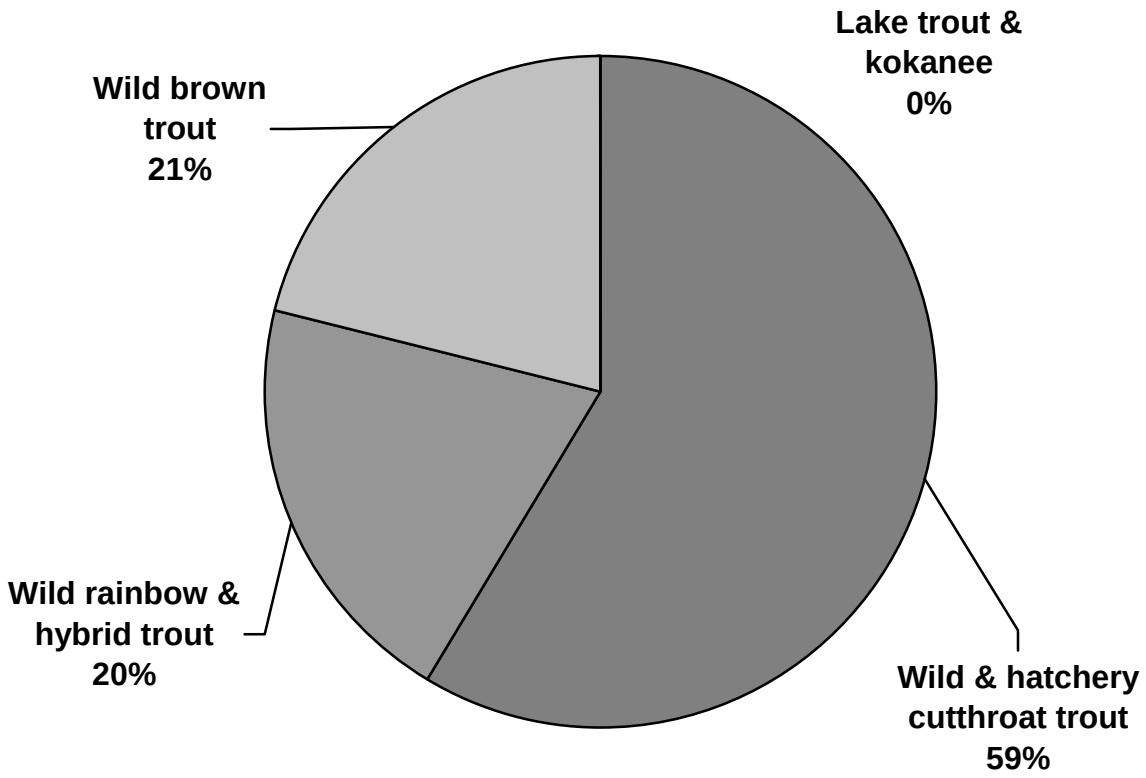

Figure 2. Trout species composition and relative abundance (%) at the Conant electrofishing section, South Fork Snake River, 1998. Total individual fish captured during mark and recapture runs = 2,236. Results are from MR4 database for all sizes of fish.

view the 1982, 1986, and 1987 data with caution as sampling was conducted in November rather than October. Further, the section was shortened in 1982 and 1987, and trout sample sizes were small (n=229 and n=348, respectively).

Size Structure, Average Length, and QSD-Wild and hatchery cutthroat trout length frequency distribution for 1998 shows good representation of what we believe are age 1 fish (152 to 254 mm) and age 2 and older fish (>254 mm; Figure 3). Likewise, strong groups of similar-sized age 1 and age 2 and older rainbow and hybrid trout (Figure 4) and brown trout (Figure 5) are apparent.

For 1998, average fish length was 295 mm for wild and hatchery cutthroat trout (n=1,312); 318 mm for rainbow and hybrid trout (n=454); 279 mm for brown trout (n=469); and 297 mm for all species combined (n=2,236; Appendix B). The QSD was 5 for wild and hatchery cutthroat trout, 13 for rainbow and hybrid trout, 8 for brown trout, and 7 for all species combined. Overall sampling efficiencies in 1998 were 11%, which is slightly lower than those of past years (Appendix C).

Density-For 1998, using the log-likelihood method, estimated density of age 1 and older fish was 237 fish/ha for wild and hatchery cutthroat trout (Appendix D); 64 fish/ha for rainbow and hybrid trout (Appendix E); 34 fish/ha for brown trout (Appendix F); and 308 fish/ha for all species combined (Appendix G). Age 1 and older fish were considered ≥ 102 mm for cutthroat, rainbow, and hybrid trout, and ≥ 152 mm for brown trout.

Fish Removal-We removed all rainbow and hybrid trout caught during recapture runs (259 fish).

RECOMMENDATIONS

1. Continue monitoring South Fork Snake River wild trout populations in the main stem by electrofishing. Analyze Lorenzo section data for 1987-1995.

2. Develop length-weight regressions for each wild trout species using electrofishing data collected in 1994 and 1995. Test for significant spatial (between sections) and temporal (between years) differences. Predict fish weights from measured lengths and estimate biomass and standing crops for all sections and years. Analyze for significant trends.

3. Coordinate with in-house Yellowstone Cutthroat Trout Management Team on management and research guidelines.

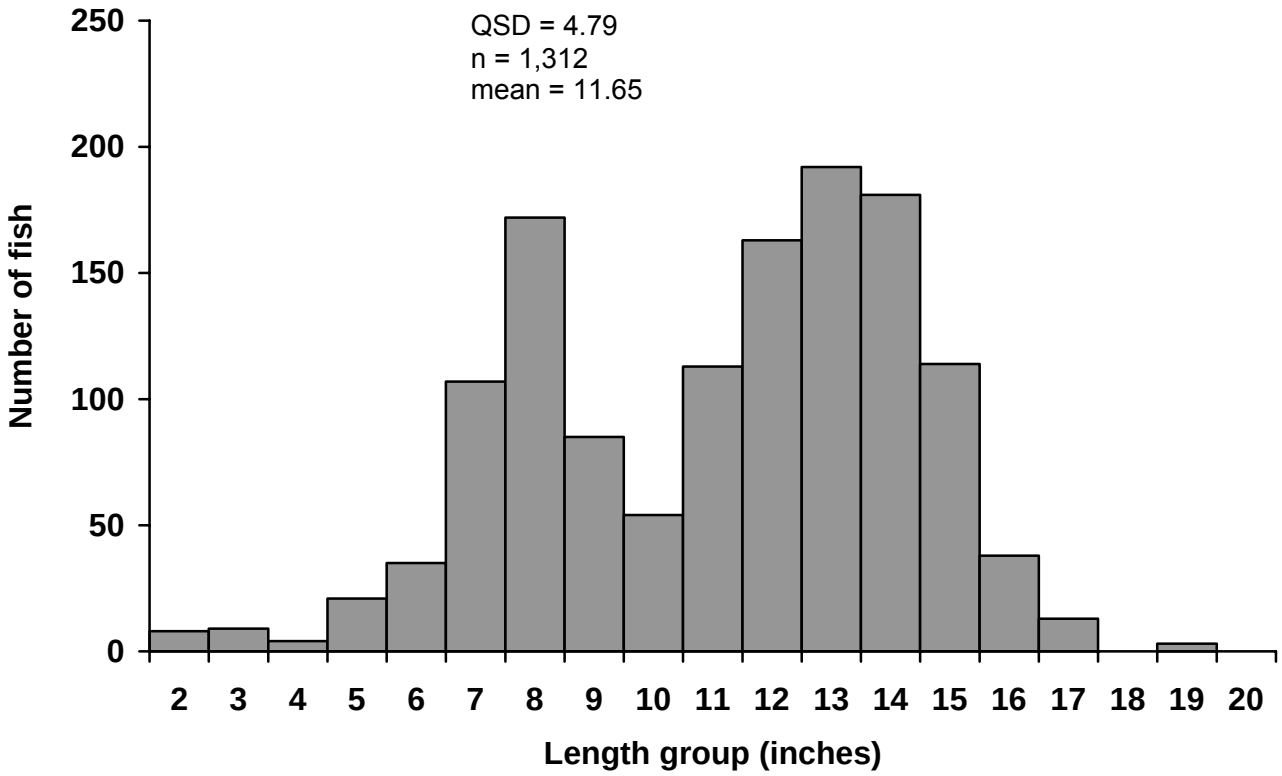

Figure 3. Length frequency distribution of wild and hatchery cutthroat trout captured at the Conant electrofishing section, South Fork Snake River, 1998. Total individual fish captured during mark and recapture runs = n. Results are from MR4 database for all sizes of fish.

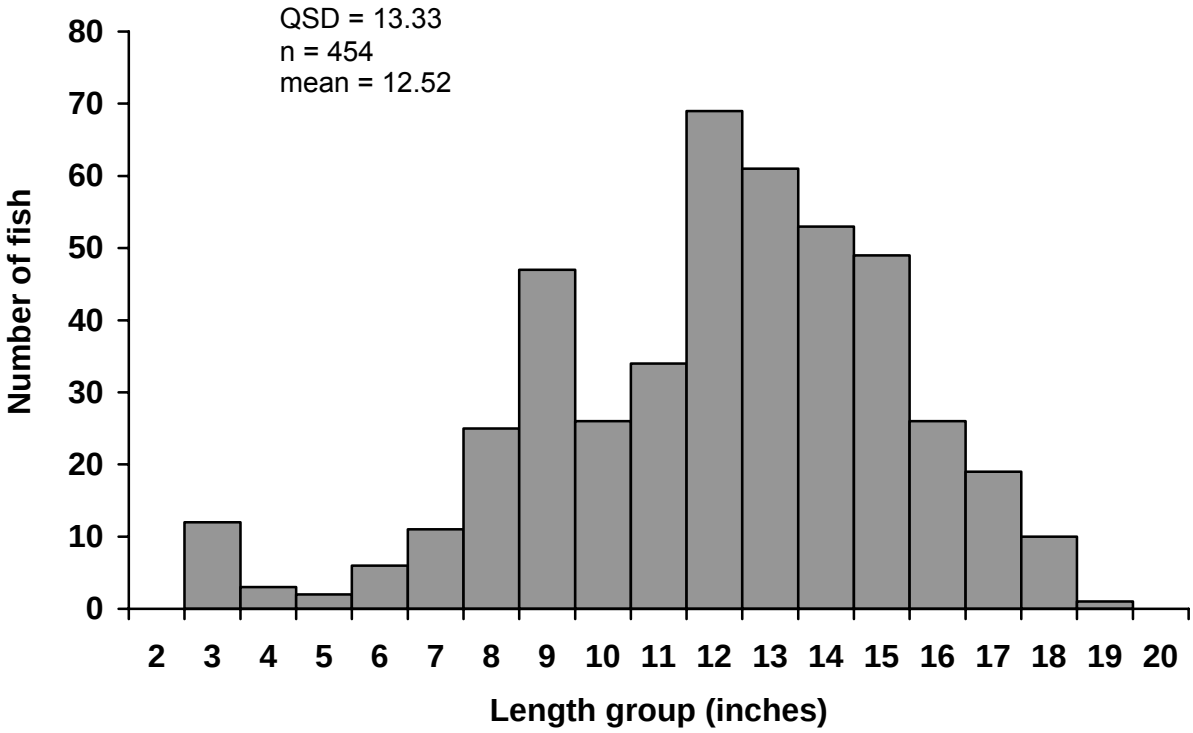

Figure 4. Length frequency distribution of wild rainbow and hybrid trout captured at the Conant electrofishing section, South Fork Snake River, 1998. Total individual fish captured during mark and recapture runs = n. Results are from MR4 database for all sizes of fish.

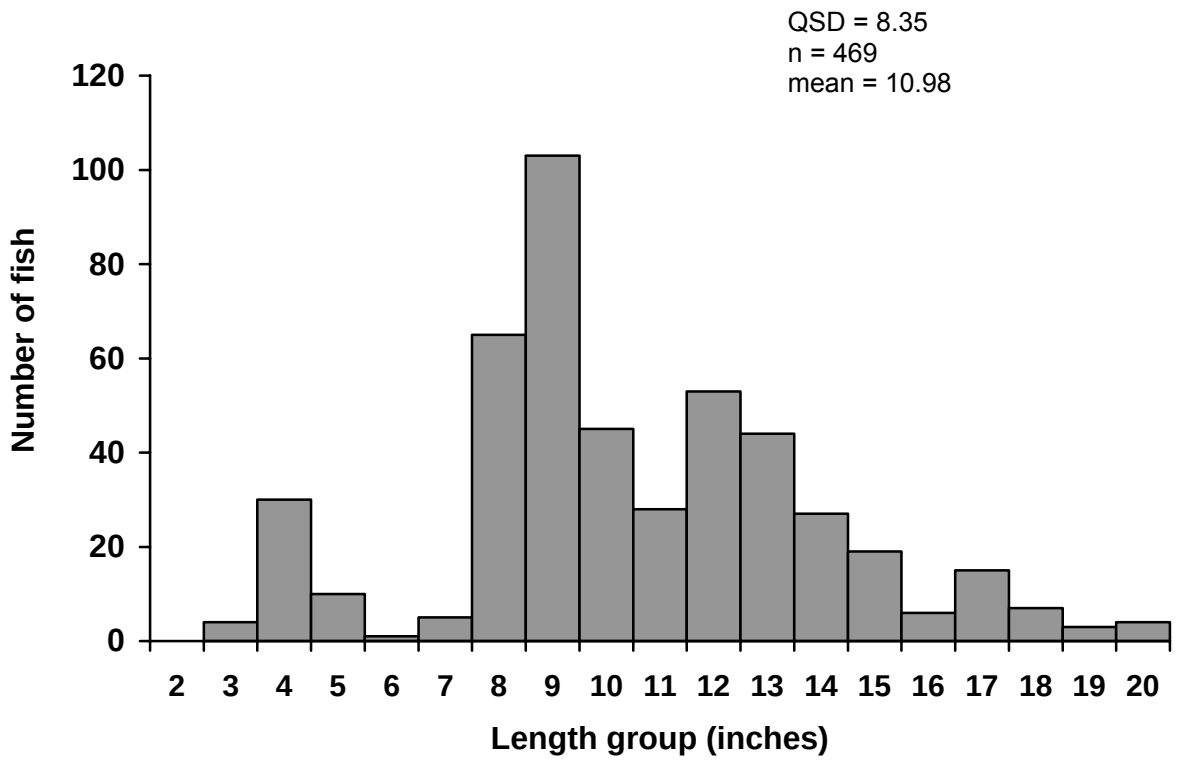

Figure 5. Length frequency distribution of wild brown trout captured at the Conant electrofishing section, South Fork Snake River, 1998. Total individual fish captured during mark and recapture runs = n. Results are from MR4 database for all sizes of fish.

ACKNOWLEDGEMENTS

Biological Aide Eric Bagley (IDFG) and volunteers Don Kemner (IDFG), Jeff Copeland (IDFG), Scott Bohr (Teton Valley Lodge), Don Wright (IDFG), Dave Koehler (IDFG), and Al Simpson (BOR) helped with electrofishing. Fishery technician Kent Jarcik (IDFG) entered the data.

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APPENDICES

Appendix A. Trout species composition and relative abundance (%) at the Conant electrofishing section, South Fork Snake River, October 1982-1998. Total individual fish captured during mark and recapture runs is in parentheses. Results are from MR5 database for all sizes of fish.

Year	WCT & HCT[a,b]	WRB & HYB[a]	BRN[a]	LKT[a,b]	KOK[a,b]	Total
1982[c,d,e]	79 (181)	1 (2)	19 (44)	1 (2)	0 (0)	100 (229)
1986[d]	83 (1,647)	2 (47)	14 (285)	<1 (4)	0 (0)	99 (1,983)
1987[d,f,g]	86 (299)	2 (6)	12 (43)	0 (0)	0 (0)	100 (348)
1988	88 (1,570)	3 (58)	9 (159)	<1 (1)	0 (0)	100 (1,788)
1989	89 (2,291)	4 (103)	7 (175)	0 (0)	0 (0)	100 (2,569)
1990	84 (2,978)	6 (216)	9 (335)	<1 (4)	0 (0)	99 (3,533)
1991	80 (1,646)	7 (150)	13 (259)	0 (0)	0 (0)	100 (2,055)
1992[f]	83 (598)	5 (34)	12 (87)	0 (0)	0 (0)	100 (719)
1993	85 (1,528)	6 (113)	9 (166)	0 (0)	0 (0)	100 (1,807)
1994[f]	79 (867)	9 (100)	12 (136)	0 (0)	<1 (1)	100 (1,104)
1995	69 (1,121)	16 (256)	16 (258)	0 (0)	0 (0)	101 (1,635)
1996	66 (1,190)	15 (274)	18 (325)	<1 (1)	<1 (1)	99 (1,791)
1997[h]	54 (1,676)	27 (840)	18 (567)	<1 (1)	<1 (2)	99 (3,086)
1998	59 (1,312)	20 (454)	21 (469)	<1 (1)	0 (0)	100 (2,236)

[a] WCT = wild cutthroat trout; HCT = hatchery cutthroat trout; WRB = wild rainbow trout; HYB = wild rainbow x cutthroat hybrid; BRN = wild brown trout; LKT = lake trout; KOK = kokanee.
[b] HCT, LKT, and KOK are believed to emigrate from Palisades Reservoir and numbers are directly related to extent of drawdown.
[c] Only 1.9 km of larger 4.9 km section was electrofished.
[d] Electrofishing conducted in early November.
[e] From Moore and Schill (1984), not MR5 database.
[f] No recapture runs due to low flows.
[g] Only 3.2 km of larger 4.9 km section was electrofished with drift boat.
[h] Major habitat changes with spring runoff.

Appendix B. Mean total length and quality stock density (QSD) of wild trout captured at the Conant electrofishing section, South Fork Snake River, October 1986-1998. Total individual fish captured during mark and recapture runs = n. QSD = (number ≥16 in/number ≥8 in) x 100. Results are from MR5 database for all sizes of fish.

	WCT/HCT[a,b]			WRB/HYB[a]			BRN[a]			All[b,c]		
Year	n	Mean (in)	QSD	n	Mean (in)	QSD	n	Mean (in)	QSD	n	Mean (in)	QSD
1986[d]	1,647	13.0	8.5	47	12.1	11.4	285	13.3	29.0	1,983	13.0	11.5
1987[d,e,f]	299	11.7	14.9	6	10.3	0.0	43	9.8	11.5	348	11.5	14.3
1988	1,570	13.3	5.6	58	12.9	12.3	159	12.2	22.8	1,788	13.2	7.3
1989	2,291	13.9	8.8	103	12.7	19.6	175	13.5	38.5	2,569	13.8	11.2
1990	2,978	12.6	8.4	216	10.6	13.3	335	10.5	20.4	3,533	12.2	9.7
1991	1,646	13.1	11.2	150	9.9	6.6	259	10.8	14.1	2,055	12.6	11.3
1992[e]	598	13.1	9.0	34	11.1	2.9	87	10.4	6.6	719	12.7	8.4
1993	1,528	13.8	15.3	113	13.4	18.2	166	13.0	34.2	1,807	13.7	17.2
1994[e]	867	11.7	11.2	100	9.9	13.4	136	9.3	7.4	1,104	11.3	10.9
1995	1,121	13.8	21.2	256	10.9	10.6	258	11.3	15.8	1,635	12.9	18.7
1996	1,190	12.2	8.7	274	10.3	6.6	325	11.2	12.7	1,791	11.7	9.2
1997[g]	1,676	11.5	4.5	840	10.3	4.3	567	10.8	12.5	3,086	11.0	6.0
1998	1,312	11.6	4.8	454	12.5	13.3	469	11.0	8.4	2,236	11.7	7.4

[a] WCT = wild cutthroat trout; HCT = hatchery cutthroat trout; WRB = wild rainbow trout; HYB = wild rainbow x cutthroat hybrid; BRN = wild brown trout.
[b] HCT, LKT, and KOK are believed to emigrate from Palisades Reservoir and numbers are directly related to extent of drawdown.
[c] Includes lake trout (LKT) and kokanee salmon (KOK).
[d] Electrofishing conducted in early November.
[e] No recapture runs due to low flows.
[f] Only 3.2 km of larger 4.9 km section was electrofished with drift boat.
[g] Major habitat changes with spring runoff.

Appendix C. Range of flows, mean flow, and electrofishing sampling efficiencies (R/C), Conant section, South Fork Snake River, 1986-1998. Flows were recorded at USGS Irwin gage. Electrofishing results are from MR5 database for all fish sizes.

Sampling dates	Range of flows (cfs)	Mean flow (cfs)	WCT & HCT[a,b]				WRB & HYB[a]				BRN[a]				All[b,c]				Catch rate (fish/ day)[d]
			M	C	R	R/C (%)	M	C	R	R/C (%)	M	C	R	R/C (%)	M	C	R	R/C (%)	
11/4,5, 6, 7,20 1986	3,540-3,780	3,590	1,171	546	70	13	32	17	2	12	186	107	8	7	1,393	670	80	12	413
11/5,6 1987[e,f]	869-941	905	299	--	--	--	6	--	--	--	43	--	--	--	348	--	--	--	174
10/3,4,11 1988	3,600-3,710	3,650	1,101	567	98	17	41	18	1	6	115	48	4	8	1,257	634	103	16	630
10/18,19,27 1989	2,990-3,060	3,040	1,424	1,067	200	19	58	55	10	18	107	79	11	14	1,589	1,201	221	18	930
10/11,12,18 1990	3,490-3,690	3,560	1,768	1,527	317	21	118	112	14	12	213	134	12	9	2,102	1,774	343	19	1,292
10/7,8,15 1991	4,490-4,790	4,650	1,159	627	140	22	105	54	9	17	158	120	19	16	1,422	801	168	21	741
10/14 1992[e]	--	2,130	598	--	--	--	34	--	--	--	87	--	--	--	719	--	--	--	719
10/13,14,21,22 1993	2,620-3,820	3,210	998	630	100	16	78	41	6	15	110	66	10	15	1,186	737	116	16	481
10/7,11,14 1994[e]	1,220-2,440	1,850	867	--	--	--	100	--	--	--	136	--	--	--	1,104	--	--	--	368
10/5,6,12,13 1995	2,570-4,090	3,290	633	565	77	14	130	143	17	12	154	117	13	11	917	825	107	13	436
10/3,4,10,11 1996	3,760-3,790	3,775	714	548	72	13	165	114	5	4	216	127	18	18	1,097	789	95	12	472
10/16,17,23,27 1997[g]	2,460-3,500	2,980	914	926	164	18	436	476	72	15	352	298	83	28	1,703	1,702	319	19	851
10/7,8,14,15 1998	3,230-4,470	3,870	679	694	61	9	221	259	26	10	276	242	49	20	1,176	1,196	136	11	593

[a] WCT=wild cutthroat trout; HCT=hatchery cutthroat trout; WRB=wild rainbow trout; HYB=wild rainbow x cutthroat hybrid; BRN=wild brown trout; M=number of fish marked on marking run; C=total number of fish captured on recapture run; R=number of recaptured fish on recapture run.
[b] Hatchery cutthroat trout (HCT), lake trout (LKT), and kokanee salmon (KOK) are believed to emigrate from Palisades Reservoir and numbers are directly related to extent of drawdown.
[c] Includes lake trout (LKT) and kokanee salmon (KOK).
[d] Includes recaptured fish; catch rate=(M+C)/number days sampled.
[e] No recapture runs due to low flows.
[f] Only 3.2 km of larger 4.9 km section was electrofished with drift boat.
[g] Major habitat changes with spring runoff.

Appendix D. Estimated abundance (N) of age 1 and older (≥4 in) wild and hatchery cutthroat trout at the Conant electrofishing section, South Fork Snake River, 1986-1998. Results are from MR5 database and analysis using modified Peterson (P) and log-likelihood (L) estimators. Standard deviations are in parentheses.

First marking date	Section length			N/section		N/mi		N/km		N/ha		N/100 m^2	
	(mi)	(km)	(ha)	P	L	P	L	P	L	P	L	P	L
11/4/86	3.04	4.9	35.0	9,021 (961)	14,161 (1,005)	2,967	4,658	1,841	2,890	258	405	2.58	4.05
11/5/87	3.04	4.9	35.0	--[a]	--	--	--	--	--	--	--	--	--
10/3/88	3.04	4.9	35.0	6,249 (541)	7,306 (370)	2,056	2,403	1,275	1,491	179	209	1.79	2.09
10/18/89	3.04	4.9	35.0	7,403 (434)	7,860 (269)	2,435	2,586	1,511	1,604	212	225	2.12	2.25
10/11/90	3.04	4.9	35.0	8,304 (374)	11,416 (432)	2,732	3,755	1,695	2,330	237	326	2.37	3.26
10/7/91	3.04	4.9	35.0	5,087 (352)	6,854 (340)	1,673	2,255	1,038	1,399	145	196	1.45	1.96
10/14/92	3.04	4.9	35.0	--[a]	--	--	--	--	--	--	--	--	--
10/13/93	3.04	4.9	35.0	6,004 (515)	7,364 (374)	1,975	2,422	1,225	1,503	172	210	1.72	2.10
10/7/94	3.04	4.9	35.0	--[a]	--	--	--	--	--	--	--	--	--
10/5/95	3.04	4.9	35.0	4,399 (429)	6,029 (367)	1,447	1,983	898	1,230	126	172	1.26	1.72
10/3/96	3.04	4.9	35.0	5,324 (546)	7,361 (562)	1,751	2,421	1,087	1,502	152	210	1.52	2.10
10/16/97[b]	3.04	4.9	35.0	4,946 (314)	5,609 (190)	1,627	1,845	1,009	1,145	141	160	1.41	1.60
10/7/98	3.04	4.9	35.0	7,435 (851)	8,286 (510)	2,446	2,726	1,517	1,691	212	237	2.12	2.37

[a] No estimate; recapture runs not made.
[b] Major habitat changes with spring runoff.

Appendix E. Estimated abundance (N) of age 1 and older (≥4 in) wild rainbow and hybrid trout at the Conant electrofishing section, South Fork Snake River, 1986-1998. Results are from MR5 database and analysis using modified Peterson (P) and log-likelihood (L) estimators. Standard deviations are in parentheses.

First marking date	Section length			N/section		N/mi		N/km		N/ha		N/100 m^2	
	(mi)	(km)	(ha)	P	L	P	L	P	L	P	L	P	L
11/4/86	3.04	4.9	35.0	--[a]	--	--	--	--	--	--	--	--	--
11/5/87	3.04	4.9	35.0	--[b]	--	--	--	--	--	--	--	--	--
10/3/88	3.04	4.9	35.0	--[a]	--	--	--	--	--	--	--	--	--
10/18/89	3.04	4.9	35.0	294	310 (65)	97	102	60	63	8	9	0.08	0.09
10/11/90	3.04	4.9	35.0	835	1,004 (161)	275	330	170	205	24	29	0.24	0.29
10/7/91	3.04	4.9	35.0	544	657 (135)	179	216	111	134	16	19	0.16	0.19
10/14/92	3.04	4.9	35.0	--[b]	--	--	--	--	--	--	--	--	--
10/13/93	3.04	4.9	35.0	449	538 (127)	148	177	92	110	13	15	0.13	0.15
10/7/94	3.04	4.9	35.0	--[b]	--	--	--	--	--	--	--	--	--
10/5/95	3.04	4.9	35.0	1,025	1,326 (181)	337	436	209	271	29	38	0.29	0.38
10/3/96	3.04	4.9	35.0	2,956	4,942 (1845)	972	1626	603	1009	84	141	0.84	1.41
10/16/97[c]	3.04	4.9	35.0	2,823	3,037 (183)	929	999	576	620	81	87	0.81	0.87
10/7/98	3.04	4.9	35.0	1,992	2,257 (196)	655	742	407	461	57	64	0.57	0.64

[a] Unbiased estimate not possible as R < 3 (Ricker 1975).
[b] No estimate; recapture runs not made.
[c] Major habitat changes with spring runoff.

Appendix F. Estimated abundance (N) of age 1 and older (≥6 in) wild brown trout at the Conant electrofishing section, South Fork Snake River, 1986-1998. Results are from MR5 database and analysis using modified Peterson (P) and log-likelihood (L) estimators. Standard deviations are in parentheses.

First marking date	Section length			N/section		N/mi		N/km		N/ha		N/100 m^2	
	(mi)	(km)	(ha)	P	L	P	L	P	L	P	L	P	L
11/4/86	3.04	4.9	35.0	2,166	3,142 (632)	713	1034	442	641	62	90	0.62	0.90
11/5/87	3.04	4.9	35.0	--[a]	--	--	--	--	--	--	--	--	--
10/3/88	3.04	4.9	35.0	1,061	1,652 (776)	349	543	217	337	30	47	0.30	0.47
10/18/89	3.04	4.9	35.0	596	936 (405)	196	308	122	191	17	27	0.17	0.27
10/11/90	3.04	4.9	35.0	1,578	1,806 (331)	519	594	322	369	45	52	0.45	0.52
10/7/91	3.04	4.9	35.0	905	954 (129)	298	314	185	195	26	27	0.26	0.27
10/14/92	3.04	4.9	35.0	--[a]	--	--	--	--	--	--	--	--	--
10/13/93	3.04	4.9	35.0	602	663 (194)	198	218	123	135	17	19	0.17	0.19
10/7/94	3.04	4.9	35.0	--[a]	--	--	--	--	--	--	--	--	--
10/5/95	3.04	4.9	35.0	1,175	1,442 (440)	387	474	240	294	34	41	0.34	0.41
10/3/96	3.04	4.9	35.0	1,400	1,538 (196)	461	506	286	314	40	44	0.40	0.44
10/16/97[b]	3.04	4.9	35.0	1,171	1,809 (507)	385	595	239	369	33	52	0.33	0.52
10/7/98	3.04	4.9	35.0	1,093	1,189 (90)	360	391	223	243	31	34	0.31	0.34

[a] No estimate; recapture runs not made.
[b] Major habitat changes with spring runoff.

Appendix G. Estimated abundance (N) of all trout (≥4 in, including lake trout and kokanee) at the Conant electrofishing section, South Fork Snake River, 1986-1998. Results are from MR5 database and analysis using modified Peterson (P) and log-likelihood (L) estimators. Standard deviations are in parentheses.

First marking date	Section length			N/section		N/mi		N/km		N/ha		N/100 m^2	
	(mi)	(km)	(ha)	P	L	P	L	P	L	P	L	P	L
11/4/86	3.04	4.9	35.0	11,521	13,935 (608)	3790	4584	2351	2844	329	398	3.29	3.98
11/5/87	3.04	4.9	35.0	--[a]	--	--	--	--	--	--	--	--	--
10/3/88	3.04	4.9	35.0	7601	9005 (434)	2500	2962	1551	1838	217	257	2.17	2.57
10/18/89	3.04	4.9	35.0	8427	8788 (262)	2772	2891	1720	1793	241	251	2.41	2.51
10/11/90	3.04	4.9	35.0	10,596	14,633 (435)	3486	4813	2162	2986	303	418	3.03	4.18
10/7/91	3.04	4.9	35.0	6640	7920 (287)	2184	2605	1355	1616	190	226	1.90	2.26
10/14/92	3.04	4.9	35.0	--[a]	--	--	--	--	--	--	--	--	--
10/13/93	3.04	4.9	35.0	7215	8058 (324)	2373	2651	1472	1644	206	230	2.06	2.30
10/7/94	3.04	4.9	35.0	--[a]	--	--	--	--	--	--	--	--	--
10/5/95	3.04	4.9	35.0	6785	8349 (391)	2232	2746	1385	1704	194	239	1.94	2.39
10/3/96	3.04	4.9	35.0	8900	11,233 (640)	2928	3695	1816	2292	254	321	2.54	3.21
10/16/97[b]	3.04	4.9	35.0	8845	9659 (234)	2910	3177	1805	1971	253	276	2.53	2.76
10/7/98	3.04	4.9	35.0	9999	10,770 (389)	3289	3543	2041	2198	286	308	2.86	3.08

[a] No estimate; recapture runs not made.
[b] Major habitat changes with spring runoff.

1998 ANNUAL PERFORMANCE REPORT

State of: Idaho

Program: Fisheries Management F-71-R-23

Project I: Surveys and Inventories

Subproject I-G: Upper Snake Region

Job: c-2

Title: Rivers and Streams Investigations- Henrys Fork Snake River, Buffalo River, Willow Creek Drainage

Contract Period: July 1, 1998 to June 30, 1999

ABSTRACT

An electrofishing survey in 1998 on the Box Canyon Reach of the Henrys Fork Snake River provided a population estimated of 6,619 wild rainbow trout *Oncorhynchus mykiss* over 150 mm in length. This is a 25% increase from 1997 and a 57% increase from the 1996 estimate. The decline in RSD-Q (406 mm) since the high of 39 in 1994 likely reflects gradual loss of large fish flushed from Island Park Reservoir during the 1992 drawdown, and an increase in wild trout recruitment below the dam. Size structure appears to have stabilized in the last two years, with a RSD-Q of 13 in 1997 and 12 in 1998.

An estimated 414 rainbow trout, including 134 adult spawners >406 mm ascended the Buffalo River fish ladder from January 1 to April 23, 1998. Estimates were considerably lower than counts done in 1997. Attempts to estimate emigration of juvenile rainbow trout into Box Canyon were unsuccessful, but evidence to date suggests that operation of the ladder has increased recruitment of age-1 rainbow trout to the Henrys Fork Snake River.

The Stone Bridge section of the Henrys Fork Snake River was electrofished to monitor size structure of the rainbow trout population and to collect tissue samples for pathological examination. Although the presence of *Myxobolus cerebralis*, the parasite causing whirling disease, was confirmed in this section of the Henrys Fork Snake River in 1997, there was no evidence of year class failure or other population effects on rainbow trout populations. Fish samples collected for whirling disease assessment in 1998 were not analyzed in time for inclusion in this report.

From June 19 to October 17 anglers were surveyed on the Henrys Fork Snake River between Ora Bridge and Chester Dam. Mean catch rate was 1.3 fish/hour, and release rate for rainbow and brown trout *Salmo trutta* was 99%. Although there are no gear restrictions on this section, over 90% of the recorded effort was by fly anglers.

As part of ongoing regional efforts to monitor Yellowstone cutthroat trout *O. clarki bouvieri* populations, four Willow Creek tributaries that had not been sampled since the early 1980s were surveyed. In four of five sites, cutthroat trout densities were lower than in previous surveys. Additional surveys will be necessary to fully describe status of cutthroat trout in the Willow Creek drainage. Future surveys should include assessment of stream habitat.

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OBJECTIVES

To obtain current information for fishery management decisions on rivers and streams, including angler use, success, harvest and opinions, fish population characteristics, spawning success, habitat characteristics, return-to-the-creel for hatchery trout and develop appropriate management recommendations.

METHODS

Henrys Fork Snake River

Box Canyon Population Estimate

A three-day mark recapture population estimate was conducted in Box Canyon during the middle of May 1998. Two days (May 12-13) were used to mark fish, and one day (May 20) to recapture fish. Two drift boat electrofishers made a total of eight passes during the marking event, and four passes during the recapture event. All captured fish were identified, measured and given a lower caudal fin punch. Mark-recapture data were analyzed with MR4 software.

Stone Bridge Section Population Estimate

Rainbow trout *Oncorhynchus mykiss* samples from this section in 1997 showed a low incidence (23 of 1,483 fish) of clinical signs associated with whirling disease. However, length-frequencies indicated a lower relative abundance of juvenile rainbow trout compared to the river below Ashton Reservoir. Six fish showing clinical signs of whirling disease were sacrificed for pathological examination. All six fish were confirmed positive for *Myxobolus cerebralis*, the parasite causing whirling disease. This section was re-sampled in 1998 to assess trends in size structure and to collect a random sample of rainbow trout for pathological examination.

The Henrys Fork Snake River was electrofished from Stone Bridge to the Highway 20 bridge on September 29, 1998. Two drift boat electrofishers made one pass each on opposite sides of the river. All salmonids were netted, identified, and measured (total length). A total of 45 yearling and 2-year old rainbow trout (120-239 mm) were sacrificed for pathological examination. Length-frequency distributions were compared to 1997 data to look for evidence of recruitment failure.

Ora Bridge to Chester Dam Creel Survey

Prior to 1992, this section of the Henrys Fork Snake River was managed under general statewide regulations. Since 1992 it has been managed as a quality wild trout fishery. Regulations are a two trout bag limit, no harvest between 203-406 mm, with no gear restrictions.

Electrofishing surveys in 1997 were used to describe size structure and species composition (Dillon et al. 2003).

From June 19 to October 17, 1998 a randomized roving creel survey was conducted in this area. The primary objective of the survey was to describe the quality of the fishery and characterize the anglers using it. No angler counts were done. Angler interviews were collected at access sites and by floating the section with a drift boat. Interview data was summarized to estimate catch and harvest rates, species composition, and angler gear types.

Buffalo River

Creel Survey

IDFG personnel coordinated with Henrys Fork Foundation (HFF) to monitor the fishery in the Buffalo River as part of the ongoing efforts to assess the effectiveness of the Buffalo River fish ladder and to describe its effects on the Henrys Fork Snake River fishery. This was the third consecutive year of creel survey work. Specific goals included quantifying angler effort and return to creel of hatchery rainbow trout, and determining the harvest rate of wild rainbow trout which ascend the fish ladder from Box Canyon.

From May 23 to September 7, HFF personnel conducted a random, stratified roving creel survey (Van Kirk and Giese 1999). The survey section included 3.3 km of the Buffalo River between the Elk Creek confluence and the mouth of the Buffalo River. Angler counts and interviews were conducted at randomized times on 50 of the 108 days within the interval. All harvested fish were identified and measured (total length). Henrys Fork Foundation personnel completed data analysis and interpretation (Van Kirk and Giese 1999).

Fish Ladder and Smolt Trap

In accordance with the 1998 operations agreement, the Buffalo River fish ladder was opened to fish migration on October 15, 1997 and closed when the dam checkboards were pulled on April 23, 1998. Henrys Fork Foundation personnel used 1997 escapement data (from 24-hour video monitoring) to develop a sampling design to estimate 1998 escapement. From January 1 to April 23 the video recorder was used only during set sampling periods. Counts were expanded to provide a complete estimate for the period. Sizes of observed fish were recorded and estimates partitioned into total fish and fish $\geq$406 mm (adult spawners).

On May 21 a rotating screw trap (smolt trap) was installed to sample and enumerate rainbow trout produced in the Buffalo River and migrating back to Box Canyon. The trap was located approximately 0.5 km above the dam and hydroelectric plant. To maximize trapping efficiency the trap was positioned in the thalweg and a pulley system was used to adjust positioning. Additionally, on June 25 two 1.3 x 2.6 m panels were placed upstream of the trap to direct more flow through the trap and improve sampling efficiency. Panels were constructed of angle iron frames covered with 6 mm polyethylene mesh. Prior to and just after installing the panels, 100 radishes were released 0.5 km above the trap site. The intent was to use the

neutrally buoyant radishes to estimate efficiency of the smolt trap at capturing passively migrating juvenile trout, and to evaluate whether the placement of the panels improved efficiency. Trapping was coordinated with HFF and IDFG-trained HFF interns on trapping protocol. From May 21 to October 31, captured fish were processed 2-3 days per week. All fish were identified to species, checked for fin clips, enumerated and measured. Salmonid fry (<40 mm) were released below the trap. To calculate sampling efficiencies and estimate total outmigration, all salmonids >40 mm were adipose-clipped, transported upstream approximately 1.5 km to the Highway 20 bridge, and released. Recaptured fish were counted on each day.

Data summary and analyses for the 1997 and 1998 trapping seasons were completed by HFF personnel (Van Kirk and Beesley 1999). Low catch rates precluded using recapture data to estimate trapping efficiency or total outmigration. Monthly (May through September) capture data was compiled to assess seasonal trends in outmigration, size, and species composition.

Willow Creek Drainage

Fish populations in the Willow Creek drainage have not been assessed on a broad scale since the early 1980s. Moore et al. (1983) and Corsi (1986) surveyed over 30 individual stream sections in 12 tributaries, the mainstem Willow Creek and the mainstem Grays Lake outlet. In 19 sites, they used multiple-pass depletion methods to estimate abundance and density of Yellowstone cutthroat trout, and also characterized species composition and habitat conditions at some sites.

Four Willow Creek tributaries were resurveyed in 1998: Sellars (two sites), Brockman, Lava, and Hell creeks. Where possible, site descriptions provided by Corsi (1986) were used to duplicate his sampling locations on each stream. Backpack electrofishers were used to complete three-pass depletion estimates of fish abundance and species composition at each site. Results were compared to previous samples.

RESULTS AND DISCUSSION

Henrys Fork Snake River

Box Canyon Population Estimate

A total of 1,053 wild rainbow trout >152 mm were sampled in marking and recapture runs combined. Other fish sampled included brook trout *Salvelinus fontinalis* (n=36), hatchery rainbow trout (n=24), rainbow x cutthroat trout hybrids (n=23), and kokanee *Oncorhynchus nerka* (n=1). Based on species, fin clips, and fin erosion patterns, less than 4% of the total catch were emigrants from Island Park Reservoir.

Wild rainbow trout sampled in this reach ranged in size 76-533 mm. Sampling efficiency increased slightly with fish size.

Estimated abundance of wild rainbow trout >152 mm was 6,619 fish using the modified Peterson method and 8,527 fish using the log-likelihood method (Table 1). These estimates are 25% and 61% higher, respectively, than 1997 estimates, the second consecutive year showing a marked increases in abundance. Using the modified Peterson estimates this equates to about 2,758 fish per river mile.

Although population numbers have increased the last two years, size structure has consistently and dramatically declined since 1994. In 1994, RSD-Q (406 mm quality length) was 39 compared to only 13 in 1997 and 12 in 1998 (Table 1). This likely reflects a gradual loss of large fish originating from Island Park Reservoir, which were introduced to Box Canyon during the 1992 fall drawdown. Additionally, increasing recruitment into stock-length sizes is likely adding to the decline in RSD-Q. The RSD-Q change from 1997 to 1998 was small, suggesting that the population may now be reaching equilibrium, with mainly in-river production and a low level of emigration from the reservoir.

Stone Bridge Section Population Estimate

A total of 126 rainbow trout and 33 brown trout *Salmo trutta* were collected during electrofishing runs in the Stone Bridge Section of the Henrys Fork Snake River. Pathological examination of rainbow trout was not completed in time for inclusion in this report. Although sample size is much smaller than that obtained during population estimates in 1997, size structure appears similar between years with relatively few rainbow trout <125 mm captured (Figure 1). Despite the presence of the whirling disease parasite and some fish showing clinical symptoms of the disease, there is no evidence of year class failure in this reach. Differences in juvenile abundance between Stone Bridge (low abundance) and the Ora Bridge reach (high abundance) may simply reflect differences in habitat availability for juvenile trout.

Ora Bridge to Chester Dam Creel Survey

From June 19 to October 17, creel clerks interviewed 61 anglers. These anglers fished a total of 164 hours, catching 209 fish of which 42 were harvested. Mean catch rate was 1.3 fish/hour. Of the 42 harvested fish, 41 were mountain whitefish *Prosopium williamsoni*. Release rate on rainbow and brown trout was >99%. Although there are no gear restrictions on this section, over 90% of the recorded effort was by anglers using fly fishing gear. Only 6% of anglers used bait, while 3% used lures.

Table 1. Estimated abundance of wild rainbow trout (>152 mm) in the Box Canyon section, Henrys Fork Snake River, 1993-1998.

Season/Year	Modified Peterson method (MPM)	Log-likelihood method (LLM)	# / river mile by MPM (LLM)	#/Reach MPM (LLM)	QSD (406 mm)
Fall 1993	~10,000		~4,200	11,800	NA
Spring 1994	7,234	9,359	3,014 (3,900)	8,489 (10,920)	39.4
Spring 1995	6,080	5,904	2,533 (2,460)	7,092 (6,888)	28.1
Spring 1996	3,390	4,210	1,413 (1,754)	3,965 (4,911)	19.4
Spring 1997	5,302	5,278	2,209 (2,199)	6,185 (6,157)	12.7
Spring 1998	6,619	8,527	2,758 (3,553)	7,722 (9,948)	11.9

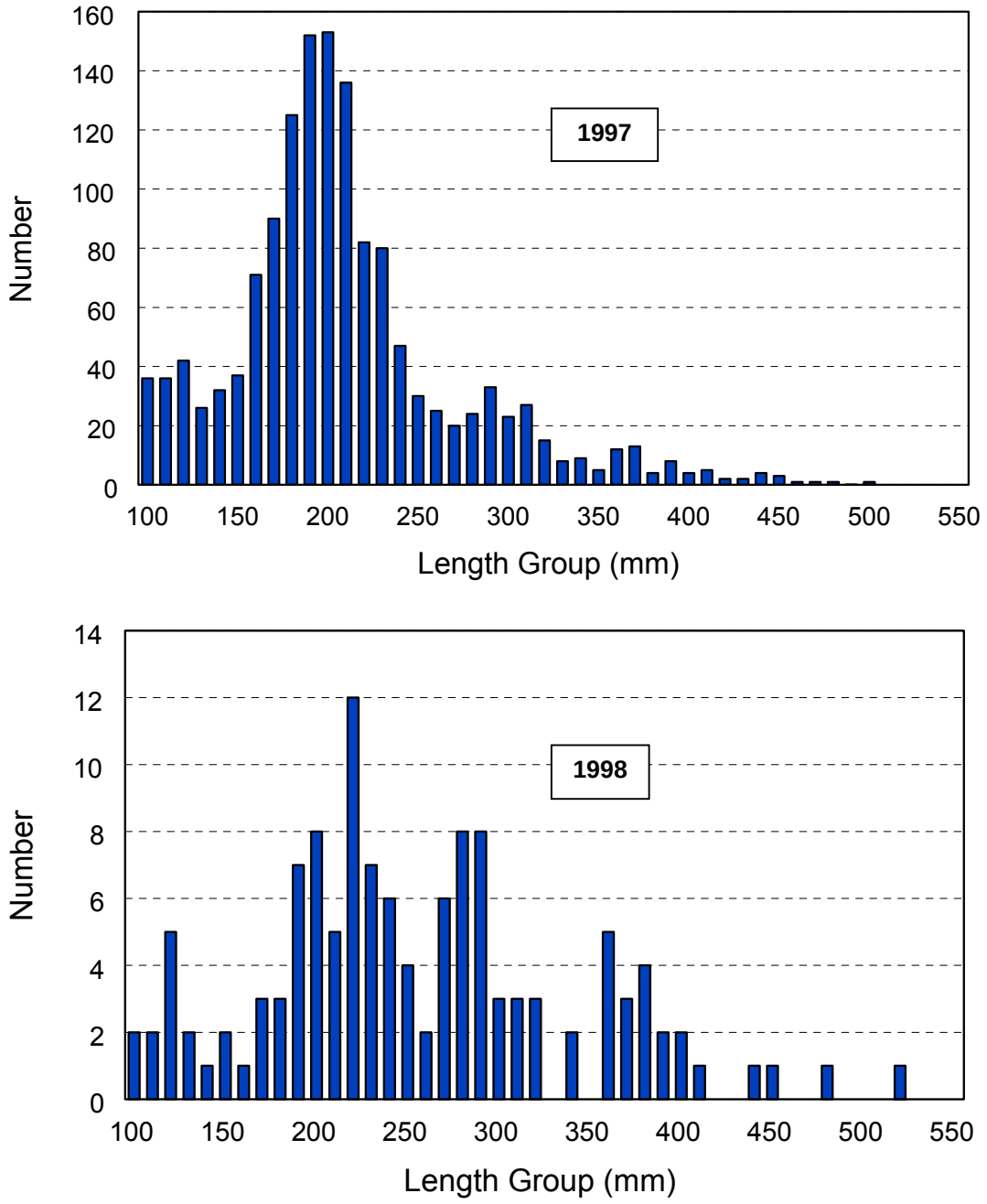

Figure 1. Length frequency distribution of wild rainbow trout sampled during population estimates on the Stone Bridge Reach of the Henrys Fork Snake River, Idaho, September 1997 and 1998.

Buffalo River

Creel Survey

Anglers fished an estimated 8,925 hours from May 23 to September 7, 1998 and caught an estimated 18,583 fish for an overall catch rate of 2.1 fish/hour (Van Kirk and Giese 1999; Appendix A). Estimated harvest totaled 4,132 fish, and consisted of 68% brook trout and 18% hatchery rainbow trout. Wild rainbow trout (n=488) comprised 14% of the harvest in 1998, compared to 2% in 1996 and 19% in 1997. Overall release rate by anglers (all species) was 78%. Estimated harvest of hatchery rainbow trout was 538 of the 3,258 stocked (22% return to creel). Including the additional 882 hatchery fish that were caught and released, angler utilization of hatchery fish was 49% of the total stocked.

None of the wild rainbow trout observed in the creel were >406 mm, suggesting negligible harvest of adult spawners from Box Canyon in 1998 (Van Kirk and Giese 1999). Although angler effort per stream mile in 1997 and 1998 was much higher than a 1988 estimate (Elle and Corsi 1994), harvest of wild rainbow in both years was lower than in 1988. Mean size of harvested fish was higher in 1998, suggesting that fish migrating from the Henrys Fork Snake River comprised at least some of the wild rainbow harvest in the Buffalo River (Van Kirk and Giese 1999). Given the increasing wild rainbow trout population in Box Canyon over the last three years, Van Kirk and Giese (1999) conclude that operation of the Buffalo fish ladder and consequent harvest of some Henrys Fork Snake River fish in the Buffalo River has had no negative impacts on the Henrys Fork Snake River fishery.

Fish Ladder and Smolt Trap

From January 1 to April 23, the fish ladder and video monitoring system was in operation on the Buffalo River. An estimated 414 wild rainbow trout ascended the ladder, of which 134 were >406 mm and were assumed to be spawning adults. This compares to 742 fish and 224 >406 mm ascending the ladder the previous season from December 1, 1996 to April 24, 1997.

Van Kirk and Beesley (1999) completed a comprehensive analysis of Buffalo River downstream migration trapping data for 1997 and 1998. From May 21 to October 30, 1998, 185 wild rainbow trout >30 mm were captured in the trap. Of these, 170 were marked and released upstream at the Highway 20 bridge. Because no marked fish were recaptured in 1998, it was impossible to estimate total emigration rates from the Buffalo River to Box Canyon. However, after analyzing ladder count and emigration patterns for 1997 and 1998, Van Kirk and Beesley (1999) made the following tentative conclusions:

1. Mean size of outmigrants was significantly larger in 1998 than in 1997.

2. A large proportion of the young-of-the-year rainbow trout migrating downstream in the Buffalo River were produced by spawners from the Henrys Fork Snake River.

3. Operation of the Buffalo fish ladder is also increasing recruitment of age 1+ rainbow trout into the Henrys Fork Snake River.

Van Kirk and Beesley (1999) recommend continuing to operate and monitor the fish ladder. Because capture rates and efficiency of the rotating screw trap are poor, they also recommend developing new trapping methods for downstream migrants in the Buffalo River.

Willow Creek Drainage

In all four sampling sites which duplicated the sites of Corsi (1986) or Moore et al. (1983), estimates of Yellowstone cutthroat trout densities were lower than previous estimates (Table 2). In three of four sites sampled in 1998, too few Yellowstone cutthroat trout were captured to allow density estimates. The Sellars Creek site below the Long Valley road had not been surveyed previously, but had the highest density of Yellowstone cutthroat trout (36/100 m^2) of the five 1998 sites. With the exception of this site, fish communities were dominated by cyprinids and catostomids including redside shiner *Richardsonius balteatus*, dace *Rhinichthys* spp., and Utah sucker *Catostomus ardens*. One ripe female hatchery rainbow trout was captured in Hell Creek, and one splake *Salvelinus namaycush x S. fontinalis* was captured in Sellars Creek below Long Valley Road. These fish had moved upstream from Ririe Reservoir approximately 30 km and 40 km, respectively.

Corsi (1986) concluded that through 1984, overexploitation and habitat loss had contributed to declines in Willow Creek Yellowstone cutthroat trout populations. Since that time, however, increasingly restrictive fishing regulations have been implemented and have likely reduced the role of angler exploitation as a limiting factor. The Upper Snake Region cutthroat trout regulation applies (two-fish bag limit, none between 203-406 mm may be retained), and key tributaries open to fishing on July 1 to protect adult spawners. Identical rules on the South Fork Snake River resulted in a substantial increase in cutthroat trout abundance within a few years after implementation.

Corsi (1986) used qualitative criteria to describe habitat conditions in the Willow Creek drainage. He found that cutthroat trout densities were higher in ungrazed and moderately grazed stream sections than in heavily grazed, severely impacted sections. Although habitat variables were not measured in 1998 survey sections, most showed evidence of past or ongoing habitat damage. The Brockman Creek site was comprised of head cut reaches lacking riparian cover, interspersed with beaver dam complexes with heavy willow cover and deep pools. The Lava Creek site also showed head cutting, unstable banks, and low depth-to-width ratio, but still had areas of pool-riffle complexes and woody debris. The Hell Creek site was severely head cut. Dense riparian vegetation was well established on the steep banks, but the stream channel substrate was primarily fine clays with some undercut banks and woody debris. The Sellars Creek site below the Blackfoot Reservoir Road showed moderate head cutting, was heavily sedimented with sparse willow cover, undercut banks and woody debris. Below the Long Valley Road, Sellars Creek has a higher gradient, gravel-boulder substrate, well developed pool-riffle complexes, large amounts of woody debris, and dense riparian vegetation.

Table 2. Yellowstone cutthroat trout density estimates, species composition, and comparisons to previous data for five sites in four Willow Creek tributaries, August 1998.

Location	Transect length (m)	Total YCT captured	Yellowstone cutthroat trout (YCT) densities (fish/100 m^2) 1998	Species composition (sample size)	1980s
Brockman Creek below FS Road 282	77	1 fry	NE[a]	redside shiner 54% dace 28% sculpin 18% (n=57)	3.6[b]
Lava Creek above Brockman Road	180	34	6.3	Yellowstone cutthroat 21% redside shiner 45% dace spp. 29% sucker spp. 5% (n=164)	17.1[b]
Sellars Creek below Bone Road	60	1	NE[a]	Yellowstone cutthroat 6% redside shiner 50% sucker spp. 37% sculpin 6% (n=16)	42-58[c]
Sellars Creek below Long Valley Road	141	132	35.9	Yellowstone cutthroat 56% dace spp. 24% sculpin 9% sucker spp. 8% redside shiner 2% brook, brown, splake 2% (n=237)	22-34[b]
Hell Creek above Dan Creek Road	200	1	NE[a]	Yellowstone cutthroat 4% sucker spp. 75% dace spp. 18% hatchery rainbow 4% (n=28)	5.0[b] 13.0[c]

[a] YCT capture rates insufficient to estimate density
[b] Corsi (1986)
[c] Moore et al. (1983)

The above sampling effort is inadequate to fully characterize current status of Yellowstone cutthroat trout populations in the Willow Creek drainage. Future sampling should include more duplicates of Corsi's 1986 sample sites, particularly in the mainstem Willow Creek and Grays Lake Outlet. Habitat parameters including representative photo points should be included in the sampling protocol for each site. Describing relationships between habitat characteristics and cutthroat trout abundance will help direct future habitat enhancement projects.

RECOMMENDATIONS

1. Continue spring estimates of wild rainbow trout in the Box Canyon reach of the Henrys Fork Snake River.

2. Continue to monitor the Buffalo River fish ladder and recruitment of juvenile rainbow trout to the Henrys Fork Snake River. Develop alternative methods to estimate outmigration, and characterize net effect of the fish ladder on the Henrys Fork Snake River population.

3. Conduct population estimates for the lower Henrys Fork Snake River below St. Anthony (Warm Slough access area).

4. Continue to assess whirling disease effects on fish populations in the upper Henrys Fork Snake River watershed.

5. Continue Yellowstone cutthroat trout surveys in the Willow Creek drainage; include habitat parameters in the sampling design.

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APPENDIX

Appendix A**.** Abstract from Van Kirk and Giese (1999).

ABSTRACT

We used stratified random sampling to conduct angler counts and interviews for the purposes of estimating angler effort and catch on the Buffalo River from Elk Creek to the Henrys Fork Snake River confluence from opening day (23 May) to Labor Day (7 September) 1998. Estimated effort was 8,925 angler-hours, which was greater than that observed in 1988, 1996, and 1997. Average catch rate for all trout species was 2.07 fish/hour. Brook trout made up the majority of the catch, and anglers released 78 percent of their catch. Total harvest was made up primarily of brook trout; wild rainbow trout made up 14 percent of the total harvest. Average sizes of fish in the creel were 8.5 inches for brook trout, 9.7 inches for hatchery rainbows, and 9.6 inches for wild rainbow trout. Mean length of wild rainbow trout was significantly lower than that observed in 1997 (t-test, df=7, P=0.008). Return-to-the-creel of hatchery rainbows was 22 percent, but total utilization was near 50 percent when those caught-and-released were counted. Some of the wild rainbows harvested probably migrated into the Buffalo River from the Henrys Fork Snake River, although we could not determine if these fish utilized the fish ladder at the Buffalo power dam or migrated over the dam during spring runoff when the check boards were removed. Despite harvest of some Henrys Fork Snake River rainbow trout in the Buffalo River, we found no evidence that this harvest had a negative impact on the Henrys Fork Snake River population, which increased in both 1997 and 1998. Analysis of all Buffalo River monitoring data suggests that the fish ladder project is positively impacting the Box Canyon rainbow trout population in the form of increased recruitment of one-year-old trout. The fish ladder is also providing protection against losing year classes of rainbows in the Henrys Fork Snake River to catastrophic events occurring at or below Island Park Dam and to whirling disease. We recommend continuing annual ladder and downstream migrant monitoring but reducing the frequency of Buffalo River creel and angler surveys to every second or third year.

1998 ANNUAL PERFORMANCE REPORT

State of: Idaho | Program: Fisheries Management F-71-R-23

Project II: Technical Guidance | Subproject II-G: Upper Snake Region

Contract Period: July 1, 1998 to June 30, 1999

ABSTRACT

Technical guidance was provided to federal, state, county, municipal, and private agencies/entities upon request. Technical guidance was also provided to organized sportsmen's groups, conservation organizations, and private citizens in the form of fish pond development, stocking and management advice, funding requests and project feasibility opinions, and various conservation and educational programs.

Upper Snake Region fishery management staff provided technical assistance and guidance to the following government agency and private groups:

Bingham County
Henrys Fork Foundation
Island Park Sportsmen Association
Sheridan Creek Restoration Committee
Henrys Fork Watershed Council
Eagle Rock Bass Masters
Upper Snake River Fly Fishers
Snake River Cutthroats (TU chapter)
U.S. Fish and Wildlife Service
Jackson National Fish Hatchery
U.S. Forest Service
U.S. Bureau of Land Management
City of Rexburg
North Fork Reservoir Company
Palisades Creek Canal Company
South Fork WAG
Fall River Rural Electric Cooperative
The Nature Conservancy
HFWC Water Quality SubCommittee
Boise Valley Fly Fishers
Region 6 Wildlife Council
Idaho Department of Parks and Recreation
Idaho Department of Water Resources
Idaho Department of Lands
U.S. Bureau of Reclamation
Idaho Water Resource Board
HFWC Cutthroat Trout SubCommittee
City of Idaho Falls
Teton Regional Land Trust
Wyoming Game and Fish Department
Idaho National Environmental and Engineering Lab
Bonneville County
Fremont County
Henrys Lake Foundation
Idaho Division of Environmental Quality
U.S. Natural Resources Conservation Service
One Fly Committee
PacifiCorp
Idaho Fish and Wildlife Foundation
Southwest Flyfishers
Ted Trueblood Chapter Trout Unlimited

Regional personnel responded to numerous requests for technical assistance and permit processing by private pond owners. Particular attention was given to private pond permit applications in the South Fork Snake River, Willow Creek, Teton River and Henrys Lake watersheds, where native Yellowstone cutthroat trout *Oncorhynchus clarki bouvieri* management goals might conflict with private requests to stock rainbow trout *O. mykiss* in those watersheds.

We gave five informational presentations to sporting groups and the Idaho Fish and Game Commission on the status of rainbow and cutthroat trout in the South Fork Snake River, responding to public concerns and questions about cutthroat trout conservation measures implemented by regional personnel.

Regional fisheries management personnel contributed over 100 man-days to technical guidance requests in 1997.

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1998 ANNUAL PERFORMANCE REPORT

State of: Idaho | Program: Fisheries Management F-71-R-23

Project III: Habitat Management | Subproject III-G: Upper Snake Region

Contract Period: July 1, 1998 to June 30, 1999

ABSTRACT

Regional personnel conducted routine maintenance and repair operations on Henrys Lake riparian fence and irrigation diversion fish screens as well as Palisades Creek and Burns Creek irrigation diversion fish screens. The 1997 flood flows on Palisades Creek resulted in erosion damage to the canal diversion, fish screen by-pass pipe facility and created sedimentation problems in the fish screen containment basin. Idaho Department of Fish and Game (IDFG) Engineering Bureau work crews repaired 1997 flood damage to the Palisades fish screen infrastructure.

The IDFG Engineering Bureau work crews began construction on a new irrigation diversion structure for the Palisades canal on Palisades Creek.

Regional fish management personnel, Bingham County, and students from Shelley High School conducted routine maintenance on the Sellars Creek riparian fence and continued work to replace the fish ladder on the Sellars Creek culvert and worked to restore erosion damage to the Sellars Creek channel.

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INTRODUCTION

Since the early 1980s, the Upper Snake Region fisheries management program has worked with local ranchers and Henrys Lake Foundation to improve Henrys Lake tributary spawning and rearing habitat, provide fish passage around in-stream barriers, and reduce cutthroat trout *Oncorhynchus clarki* fry losses to irrigation diversions. These projects include riparian fence to control livestock damage, reestablish riparian vegetation communities, and protect irrigation diversion fish screens. Each project is designed to maintain or increase the significant gains that have been achieved in the last 16 years towards restoring and enhancing cutthroat trout spawning and recruit production for the Henrys Lake fishery. In 1998 all work conducted was routine maintenance and operation. No new riparian fence, fish screens or riparian habitat projects were implemented at Henrys Lake.

The Idaho Department of Fish and Game (IDFG) has also cooperatively installed, operated, and maintained two irrigation diversion screens on important South Fork Snake River cutthroat trout spawning tributaries. These screens are located on Burns Creek and Palisades Creek and require working with local landowners and the Bureau of Reclamation. The Burns Creek screen has been in operation continuously since 1981, and the Palisades Creek Canal screen has been in operation since 1993.

Spring flood flows in 1997 caused erosion damage to the Palisades Creek Canal fish screen foundation that required repair and maintenance work. This work was funded with Federal Emergency Management Agency (FEMA) flood damage compensation funds. The IDFG is also responsible for the replacement of original Palisades Canal water control structures under the cooperative agreement, between the IDFG, U.S. Bureau of Reclamation and the Palisades Canal Company, that facilitated construction of the fish screen on the Palisades Canal.

The Burns Creek fish screen was installed in 1981 under a cooperative agreement between the IDFG, Targhee National Forest and the Fullmer family, holders of the Burns Creek Canal water rights. Under this agreement, the IDFG is responsible for ensuring that a reliable supply of irrigation water is provided beyond the point of the fish screen. Any and all maintenance and repair to the canal necessary to meet that obligation is the sole responsibility of the Department so long as the fish screen remains in operation.

In 1988, Regional fisheries management personnel constructed approach pools and installed angle iron fish ladders in culverts crossing Sellars Creek and Mill Creek, tributaries to Willow Creek. These projects were designed to facilitate cutthroat trout spawning migration from Willow Creek to spawning and rearing habitat in upper Sellars and Mill creeks and were accomplished as cooperative projects with volunteer assistance from local anglers and a Boy Scout Troop. The Sellars Creek culvert fish ladder, in the Wolverine Road crossing culvert and at the upper end of the riparian fence exclosure, was severely damaged by flood flows in 1996 and was completely blown out during flood flows in 1997.

In 1990, two riparian exclusion fences were constructed on Sellars Creek to rehabilitate and protect riparian habitat from uncontrolled cattle grazing. Cattle grazing is managed for fall grazing only on this section of the LDS Church-owned ranch property. Approximately 1.6 km of fence, on both sides of Sellars Creek was constructed on the LDS Stake Farm between the Blackfoot Reservoir Road and the Wolverine Road. The second fence was constructed on

privately owned property approximately 1.6 km above the Stake Farm fence. The property owner maintains the fence on private property. Maintenance of the Stake Farm fence is the responsibility of Upper Snake Region personnel.

OBJECTIVES

1. Work with landowners to improve/restore habitat on degraded streams on private property with good potential to enhance wild trout recruitment.

2. Provide upstream and downstream fish passage in key wild trout spawning and recruitment streams.

METHODS

Henrys Lake

Riparian fence and fish screens on the Henrys Lake project were managed under standard maintenance schedules by temporary personnel at the Henrys Lake hatchery.

South Fork Snake River Tributaries

Burns Creek

The Burns Creek screen received normal service and required no additional maintenance or repair in 1997. Regional fisheries management and habitat management personnel also performed emergency repair and maintenance work on the Burns Creek Canal, following a severe canal washout. A temporary culvert was placed in the washed out section of canal and was stabilized with reinforcing timber piers to ensure delivery of irrigation water to the landowner during the 1997 irrigation season.

Palisades Creek

The Palisades Creek fish screens were maintained by regional fish management temporary personnel. The 1997 flood caused erosion damage for the Palisades Canal diversion and the fish screen by-pass pipe and caused the fish screen containment basin to fill almost completely with sediment. Regional fisheries management personnel worked with Regional habitat management personnel, IDFG Engineering Bureau personnel, FEMA, NRCS, and Bonneville County to assess damage to the fish screening facilities. Damage claims were processed through FEMA for federal compensation for flood damage to the fish screen facility.

Those funds were used by IDFG Engineering Bureau work crews to repair the 1997 flood erosion damage to the fish screen foundation.

Willow Creek Tributaries

Sellars Creek

Regional fisheries staff worked with IDFG Engineering Bureau personnel to design stream channel stabilization structures below the culvert. This modification will raise the stream level sufficient to allow migratory Yellowstone cutthroat trout *Oncorhynchus clarki bouvieri* to access the culvert and new fish ladder once repair work is complete. Materials were acquired and work scheduled with the Engineering Bureau to accomplish this fish passage restoration project in 1999. In 1998 IDFG worked with Bingham County Road and Bridge personnel to stockpile rock and other fill material to be used in stabilizing the Sellars Creek channel and constructing approach pools to the newly laddered culvert.

Mill Creek

Fisheries personnel also worked with Engineering Bureau staff to survey and design a new approach pool for the Mill Creek culvert ladder.

RESULTS AND DISCUSSION

Henrys Lake

The Henrys Lake tributary riparian fence and fish screen project operated without significant problems in 1997. The Howard Creek fish screens were installed and will be in operation for the beginning of the 1998 irrigation season.

South Fork Snake River Tributaries

Palisades Creek

A cost-share agreement has been developed with the U.S. Bureau of Reclamation, Trout Unlimited and the Palisades Creek Canal Company to replace the Palisades Creek canal diversion with a permanent diversion and fish ladder structure similar to the Rainey Creek diversion structure described above. The IDFG Engineering Bureau work crews completed one-half of the new irrigation diversion structure construction and accomplished all of the

erosion damage repair work to the fish screen foundation. The remainder of the irrigation diversion structure construction will be completed in the fall of 1999.

Rainey Creek

Construction of the canal diversion and fish ladder was completed in October 1997. The facility will be in operation for the South Fork Snake River spring spawning run and the 1998 irrigation season. Regional fisheries management personnel will begin collecting data on rainbow and cutthroat trout spawning escapement at the fish ladder. These observations will help us develop a conservation management strategy for Yellowstone cutthroat trout in the South Fork Snake River by managing the Rainey Creek drainage solely for Yellowstone cutthroat trout production. To achieve this, some modification of the diversion structure may be necessary to ensure that we can block or selectively allow fish passage at the diversion structure. We will continue to work with IDFG Engineering Bureau personnel to make the necessary adaptations to the diversion and fish ladder structure.

Willow Creek Tributaries

Sellars Creek

The initial survey and design work for reconstruction of a permanent approach pool to the culvert fish ladder was accomplished by IDFG Engineering Bureau personnel in 1997. Materials were procured and this project has been scheduled by the Engineering Bureau for fall 1999. If completed on schedule, spawning cutthroat escaping from Willow Creek will again have access to the Sellars Creek drainage above the Wolverine Road crossing.

Regional fish management personnel, Bingham County, and students from Shelley High School conducted routine maintenance on the Sellars Creek riparian fence and continued work to replace the fish ladder on the Sellars Creek culvert and worked to restore erosion damage to the Sellars Creek channel.

RECOMMENDATIONS

1. Continue Sellars Creek fish habitat maintenance program with Shelley High School.

2. Complete Palisades Creek canal diversion/fish ladder and Sellars Creek and Mill Creek fish passage projects in 1998.

3. Complete modification of the Rainey Creek irrigation diversion structure to provide for fish trapping capability and control of upstream fish movement.

4. Continue to maintain the Burns Creek Canal in 1999 and complete construction of a new diversion structure and pipeline to ensure a reliable and constant water supply to the point of the fish screen.

1998 ANNUAL PERFORMANCE REPORT

State of: Idaho Program: Fisheries Management F-71-R-23

Project IV: Population Management Subproject IV-G: Upper Snake Region

Contract Period: July 1, 1998 to June 3,0 1999

ABSTRACT

During October, a fish salvage operation was conducted below Palisades Dam to remove fish stranded by falling water levels in the stilling basin. Approximately 398 game fish including 59 cutthroat trout *Oncorhynchus clarki*, 2 rainbow/hybrid trout *Onchorhynchus spp.,* 116 brown trout *Salmo trutta*, 151 lake trout *Salvelinus namaycush*, and 70 mountain whitefish *Prosopium williamsoni* were salvaged and released to the South Fork Snake River immediately below the stilling basin. The number and size distribution of lake trout sampled confirm this species is reproducing naturally in Palisades Reservoir. Beginning the fall of 1999, U.S. Bureau of Reclaimation personnel will assume responsiblity for the salvage effort under the direction of IDFG regional fisheries management personnel.

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INTRODUCTION

In addition to routine hatchery fish stocking activities, a variety of fish population management situations require regional attention by fisheries management personnel. Annual maintenance of the Palisades Dam spill gates requires the stilling basin to be drained, stranding hundreds of fish. The Idaho Department of Fish and Game, U.S. Bureau of Reclamation and volunteers routinely salvage and move stranded game fish to the main river channel.

OBJECTIVES

1. Prevent wasteful loss of public game fish resources where cost-effective and practical.

2. Capitalize on opportunities to enhance existing angling opportunities and, where possible, develop new opportunities for the angling public.

METHODS

Palisades Reservoir Stilling Basin Salvage

Annual fall maintenance and repair of the Palisades Dam stilling basin by U.S. Bureau of Reclamation personnel was coordinated with fish salvage efforts as in previous years. The maintenance and repair work requires shutting the spill gates and draining the stilling basin immediately below the gates, stranding fish in the drained stilling basin. Fish salvage operations were conducted on October 13, 1998 with the assistance of Bureau of Reclamation personnel, IDFG reservists and volunteers.

Stranded fish were concentrated with a 50-m beach seine and captured with backpack electrofishing equipment. Gamefish and nongame fish were immediately sorted, with gamefish (trout *Oncorhynchus spp*. and whitefish *Propsopium williamsoni*) carried to the river in buckets and released. Cutthroat trout *O. clarki* were examined for fin clips, denoting hatchery catchables stocked in Palisades Reservoir.

RESULTS AND DISCUSSION

Palisades Reservoir Stilling Basin Salvage

Of the 425 fish collected from the stilling basin salvage effort, 398 (94%) were trout or mountain whitefish. Fifty-nine cutthroat trout, two rainbow trout *O. mykiss* and hybrid trout, 116 brown trout *Salmo trutta*, 151 lake trout *Salvelinus naymaycush* and 70 mountain whitefish were released back to the river.

The presence of young lake trout in the salvage sample is again evidence that this species is self-sustaining in Palisades Reservoir. Kokanee salmon *O. nerka* have not been stocked in Palisades Reservoir or the South Fork Snake River drainage above the reservoir since the early 1960s. Lake trout were stocked in Palisades Reservoir until 1991; however we again observed that most of the salvaged lake trout were obviously too young to be holdover hatchery fish from previous stockings, and must be the product of natural reproduction.

RECOMMENDATIONS

1. Continue monitoring efforts for fin-clipped trout from Palisades Reservoir in Palisades Dam stilling basin.

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