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1995 Annual Performance Report
Program F-71-R-20

REGIONAL FISHERIES MANAGEMENT INVESTIGATIONS
SOUTHEAST REGION (Subprojects I-F, II-F, III-F)

PROJECT I.	SURVEYS AND INVENTORIES
Job b.	Southeast Region Lowland Lakes Investigations
Job c.	Southeast Region Rivers and Streams Investigations
PROJECT II.	TECHNICAL GUIDANCE
PROJECT III.	HABITAT MANAGEMENT
PROJECT IV.	POPULATION MANAGEMENT

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1995 ANNUAL PERFORMANCE REPORT

State of: Idaho | Program: Fisheries Management F-71-R-20

Project I: Surveys and Inventories | Subproject I-F: Southeast Region

Job: b | Title: Lowland Lakes Investigations

Contract Period: July 1, 1995 to June 30, 1996

ABSTRACT

We conducted a creel survey on Chesterfield Reservoir and assisted Research with a population estimate of rainbow trout *Oncorhynchus mykiss* on Daniels Reservoir in continuation of a catchable versus fingerling trout research program. Anglers fished 49,497 hours during the January through June 1995 survey on Chesterfield Reservoir and caught 18,726 fish for a catch rate of 0.4 fish/h. They harvested 60% of all fish caught. Each stocking cohort is designated by its size (C for catchable and F for fingerling) and year. The best return during the entire study (1993-1995) by number was the C94 cohort with 52%. However, the best return by weight was the F93 cohort with an impressive 460%. Growth of all cohorts was dictated by temporal placement. Those cohorts that were stocked in the recently drained and renovated reservoir first grew best; those stocked second grew second-best and so forth. C93 did better than C94 while C94 did better than C95. The only exception to the rule was the F92 cohort, which is most likely the result of a lack of available food so soon after the renovation. Research estimated the total rainbow trout population of Daniels Reservoir in 1995 was 6,450. If the population level in 1994 was close to the same, then anglers caught each individual fish 3.3 times in one year, based upon the 1994 creel survey. In addition, rainbow trout grew asymptotically. That is, they grew rapidly until they approached 450 mm and then further growth was minimal.

We conducted lowland lake surveys on Alexander Reservoir and two of the eight McTucker Ponds (#1 and #4) in 1995. While Alexander Reservoir fish biomass (as indexed by catch per unit of sampling effort) had doubled since 1992, it continued to be dominated (95%) by nongame species, especially carp *Cyprinus carpio* and Utah suckers *Catostomus ardens*. Successful spawning of transplanted white crappie *Pomoxis annularis* was indicated but it appears no young survived their first year. The surveys of McTucker Ponds indicated an intrusion of nongame fish from the nearby Snake River during high spring flows. The pond that escaped flooding (#4) contained almost exclusively young of warmwater species, mainly bluegill *Lepomis macrochirus* and largemouth bass *Micropterus salmoides*.

We conducted an electrofishing survey on Lamont Reservoir to determine the status of the recovering warmwater fisheries, specifically bluegill and largemouth bass. Lamont Reservoir had been chemically renovated in 1986 and it is unclear when the warmwater species were reintroduced. We collected 88 bluegill with a mean length of 158 mm and a proportional stock density (PSD) of 45%, up from only 14% in 1992. The bluegill's mean relative weight was 113% of the standard, down from 1992's 131%. We collected 199 largemouth bass with a mean length of 254 mm and a dismal PSD of 1%. They had a mean relative weight of 96%.

While the PSD remains far below desirable levels, the change in mean length (up from 202 mm in 1992) indicates that the population is still recovering and improving.

We closely monitored two bass tournaments on June 24 and 25, 1995 on Condie and Glendale reservoirs, respectively. The anglers fished a total of 400 hours on each reservoir. On Condie Reservoir they caught a total of 93 largemouth bass for a catch rate of 0.23 fish/h. The largemouth bass had a mean length of 315 mm and a PSD of 77%. On Glendale Reservoir, the anglers caught a total of 422 largemouth bass for a catch rate of 1.05 fish/h. The fish had a mean length of 318 mm and a PSD of 86%.

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OBJECTIVES

1. Compare effectiveness of spring-stocked catchable rainbow trout and fall-stocked fingerling rainbow trout in Chesterfield and Daniels reservoirs.

2. Document fishery status in Alexander Reservoir and two of the eight McTucker Ponds using a lowland lake survey.

3. Document the status of the largemouth bass and bluegill fisheries at Lamont Reservoir using an electrofishing survey.

4. Document the status of largemouth bass populations in Condie and Glendale reservoirs through the use of catch information from formal bass fishing tournaments.

5. Estimate percent of Oneida Reservoir walleye that are harvested using returns from tagged fish.

6. Document results of 'traditional' opening weekend fisheries on Chesterfield and Blackfoot reservoirs through the use of sportsmen's check station on Interstate 15.

7. Consider the feasibility, potential benefits, and potential drawbacks of smallmouth bass introduction into Blackfoot Reservoir.

INTRODUCTION AND METHODS

Catchable versus Fingerling Rainbow Trout

Chesterfield Reservoir Creel Survey

The purpose of the investigation was to determine relative benefits of stocking catchable-size rainbow trout about 22 cm long in spring, and fingerling-size trout about 15 cm long in fall. Spring, the beginning of the growing season, is usually considered the most desirable time to stock trout. Since stocked fingerling trout spend less time in the hatchery than do stocked catchable-size trout, fingerlings cost about 30% as much to raise as catchables per individual. If survival and ultimate return-to-creel in numbers of fingerlings is near 30% of the return rate for catchables, then both groups would have equal value to the angler per license dollar spent to raise and stock the fish. However since one group may return at a smaller size, another way to compare value would be to compare weight of fish stocked to weight of fish return-to-creel. We made both comparisons in this report.

We conducted creel surveys on seven Southeast Region reservoirs from 1992 through 1994 to evaluate performance of rainbow trout stocked at fingerling and catchable size (Scully et al. In Press). We continued the survey on one of the reservoirs, Chesterfield, through mid-summer 1995. The additional survey was to provide longer-term information on growth and contribution to the fishery of cohorts stocked during both the high and low precipitation years of

1993 and 1994, respectively. Details of creel survey sampling methods are presented in previous annual job performance reports (Scully et al. 1995 and 1998) for this catchable and fingerling trout evaluation.

Drought returned to southeast Idaho in 1994 following a year of abundant precipitation in 1993. The Portneuf-Marsh Valley Irrigation Company, after discussion with Department personnel, agreed to leave about 25% of the reservoir capacity at the end of the 1994 irrigation season to sustain the fishery. Average annual precipitation was then recorded in 1995. Game species present during the three-year study were rainbow trout, brown trout *Salmo trutta*, and rainbow x cutthroat trout hybrids *O. mykiss x O. clarki*.

The evaluation of stocked fingerling and catchable-size rainbow trout in Chesterfield Reservoir was the cooperative effort of management, research, hatcheries, and enforcement divisions of the Department. Creel survey statistics were estimated using the Department's ACreel computer program. Fisheries research, directed by Jeff Dillon, collected data on limnological characteristics, zooplankton size and species composition, and fish community. Additionally, the following authors estimated trout population size in the trophy trout reservoirs (Dillon and Jarcik 1994, Dillon and Alexander 1995, Dillon and Alexander 1996).

We stocked and evaluated six cohorts of rainbow trout and one rainbow x cutthroat hybrid trout cohort during the 3.5-year study. Additionally, two cohorts of fingerling brown trout were stocked, but at much lower densities than the others. Catchable rainbow trout stocked in spring 1993 (C93 cohort) and 1994 (C94 cohort) were marked with left and right maxillary bone clips, respectively. Catchables stocked in the spring of 1995 (C95) were marked with an adipose fin clip. Fingerling rainbow trout stocked in the fall of 1992 (F92 cohort), 1993 (F93 cohort) and 1994 (F94 cohort) were not marked. We assumed that we would be able to distinguish each fingerling cohort by length frequency analysis. Catchable-size hybrid trout stocked in the spring of 1995 were not marked, but could be distinguished through the end of the study by their small size, spotting pattern, and red slashes along the ventral side of their heads.

We stocked the evaluated cohorts into Chesterfield Reservoir at 62 catchables/ha and 208 fingerlings/ha. This is an average stocking density for small- to medium-size reservoirs in southeast Idaho. The ratio of one catchable to 3.375 fingerlings is proportional to the hatchery's cost to raise and stock them, i.e., it costs the same amount to produce one 22 cm catchable as it does to produce 3.373 15 cm fingerlings. Stocking history throughout the study is presented in Table 1.

Fishing was poor at Chesterfield Reservoir during the 1987-1992 drought, and many anglers had stopped fishing there. Chesterfield Reservoir was drained on June 20, 1992. With the return of a full reservoir in the spring of 1993, anglers fished 28,598 hours at Chesterfield Reservoir in 1993, from May through December. All trout in Chesterfield Reservoir were small in the early months of 1993 and it was not until late summer that anglers discovered a good density of 0.5 to 1 kg trout. Reports of good fishing brought additional fishing effort in 1994, when anglers fished 157,854 hours or 244 hr/ha on Chesterfield Reservoir, a 5.5 fold increase over the 1993 effort. Trout density increased with additional stocking, and trout survival and growth were excellent, at least until mid-summer of 1994, when anglers caught 116,331 trout and harvested 61% of their catch. Average catch rate was 0.7 fish/h (Scully et al. In Press).

Table 1. Number and weight of all cohorts of trout stocked into Chesterfield Reservoir, Idaho from fall 1992 through mid-1995.

Cohort Name	Date Stocked	Number Stocked	Kilograms Stocked	Mean Wt. (g)	Mean Length (mm)
Fall 1992 (F92) Fingerling Rainbow Trout	9/29/92	134,995	6,226	46	161
Fall 1992 (BF92) Fingerling Brown Trout	10/02/92	4,596	178	39	152
Spring 1993 (C93) Catchable Rainbow Trout	5/04/93	39,995	4,491	112	25
Fall 1993 (F93) Fingerling Rainbow Trout	9/20/93	129,850	5,557	43	150
Fall 1993 (BF93) Fingerling Brown Trout	10/18/93	1,020	39	38	150
Spring 1994 (C94) Catchable Rainbow Trout	5/06/94	40,005	5,185	130	229
Fall 1994 (F94) Fingerling Rainbow Trout	9/29/94	134,994	5,275	39	152
Spring 1995 (C95) Catchable Rainbow Trout	5/15/95	20,000	3,241	162	254
Spring 1995 (HYB) Catchable Hybrid Rainbow x Cutthroat	5/08/95	20,951	2,318	111	223

Daniels Reservoir

Although creel surveys on all Southeast Region catchable/fingerling rainbow trout evaluation reservoirs except Chesterfield Reservoir ended in 1994 (Scully et al. In Press), research and management personnel sampled trout populations in several of the reservoirs throughout 1995. Research also estimated population size in 1995 at Daniels Reservoir using both shoreline electrofishing and mid-reservoir purse seine (Dillon and Alexander 1996).

Lowland Lake Surveys

Alexander Reservoir

Alexander Reservoir is a 408 ha impoundment of the Bear River constructed to create hydrological head for power production. Full pool volume is 1,944 hectare-meters and mean retention time ranges from 3 days in abundant precipitation years like 1994, to over 12 days in drought years like 1991. Both retention times are extremely low and preclude development of an abundant zooplankton food base (Scully et al. 1995). Additional limitations on plankton production are caused by suspended sediment that limits Secchi disc depth of visibility to 0.3 m in the headwaters and generally less than 1.5 m near the dam (Scully et al. 1993). During the winter of 1990-1991, Utah Power and Light drained Alexander Reservoir to repair the dam and the action may have evacuated many fish from the reservoir. Prespawn white crappie *Pomoxis annularis* and 20 cm channel catfish *Ictalurus punctatus* were stocked into Alexander Reservoir in 1991 from west Idaho's Brownlee Reservoir and from an Oklahoma hatchery, respectively. We conducted a lowland lake survey at Alexander Reservoir in 1992, and again in 1995 to monitor restoration of the fish community after the draining, and to evaluate benefits of fish stocking. The survey reports the catch from one hour of shoreline electrofishing, one surface and one bottom set of experimental gill nets, and one trap net left in the reservoir overnight. The cumulative fishing power of these sampling gears is equal to one unit of effort and the catch from this effort is the catch/unit of effort.

McTucker Ponds

The McTucker Ponds are gravel excavation pits dug down below the water table in Bingham County. In the fall of 1992 the eight McTucker ponds were at a low water level because the nearby Snake River and American Falls Reservoir were low. The ponds contained the stunted warmwater species of yellow perch *Perca flavescens*, crappie, brown bullhead *Ameiurus nebulosus,* and nongame species of common carp, Utah sucker, Utah chub *Gila atraria*, and redside shiner *Richardsonius balteatus*. In May 1993, we restocked McTucker ponds with prespawning largemouth bass *Micropterus salmoides* and bluegill *Lepomis macrochirus* from Lamont Reservoir in Franklin County, and channel catfish fingerlings from Oklahoma. In the fall of 1993, numerous schools of largemouth bass fry were observed in all the ponds. In the winter of 1993-1994, we placed clusters of Christmas trees, wired to cinderblock weights on the ice-cover of the McTucker ponds. Once the ice melted, the trees sank to the bottom and provided in-pond cover for the warmwater fish populations.

On July 21, 1995, we conducted a lowland lake survey on McTucker ponds #1 and #4 (Figure 1). The planned survey included overnight sets of one floating and one sinking experimental gill net, one trap net and one hour of electrofishing. However, the electrofishing equipment malfunctioned, so all catch data came from the nets.

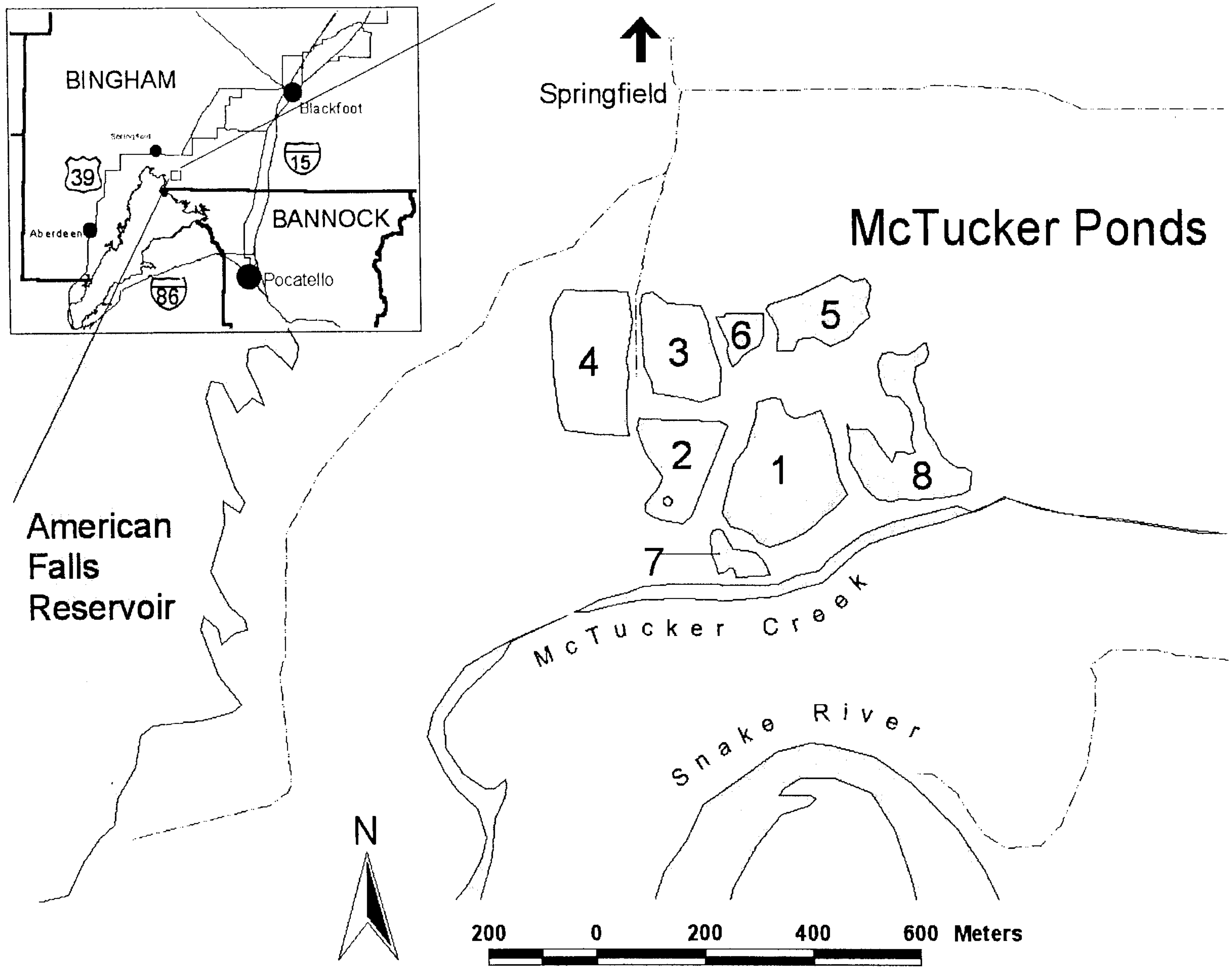


Figure 1. Map indicating location and identification of McTucker Ponds, Idaho.

Lamont Reservoir Electrofishing

Lamont Reservoir was poisoned in December of 1986 to remove Utah chubs (Heimer et al. 1987). The reservoir had been drawn down to 4.7 hectare-meters for irrigation, allowing the renovation to be completed with a minimum of cost. A sample of 333 largemouth bass, ranging in size from 92 mm to 504 mm, was collected at the renovation. The most abundant size groups were 140 mm to 150 mm and 250 mm to 260 mm. Very few stock size (>200 mm) largemouth bass were over 300 mm long as indicated by a proportional stock density (PSD) of 12%. In a comparison of largemouth bass growth rates among the four Franklin County reservoirs of Condie, Glendale, Lamont, and Winder, best growth had occurred in Lamont Reservoir (Heimer et al. 1987).

Assuming that the Department or local anglers restocked spawning-size largemouth bass into Lamont Reservoir the spring following renovation, then the oldest year-class in Lamont Reservoir in 1992 should have been five, and should have been the dominant size class (near 350 mm). However, since the dominant year-class in Lamont Reservoir in 1992 was centered near 200 mm, the fish were more likely to be only two- or three-years-old. Thus, restocking of Lamont Reservoir probably did not occur until 1989 or 1990. In order to document the current status of Lamont Reservoir's largemouth bass and bluegill populations, we conducted an electrofishing survey. Game species present in the reservoir include yellow perch, largemouth bass, bluegill, and rainbow trout.

Largemouth Bass Fishing Tournaments

The Wyoming Bass Federation held fishing tournaments on Condie and Glendale reservoirs on June 24 and 25, 1995, respectively. They were special permission tournaments allowing the anglers to retain up to 5 bass (>12 inches) per angler in their boat livewells and to weigh them at the end of the tournament before release back into the reservoir. Additionally, the Department requested that the anglers retain all largemouth bass caught and Department personnel periodically collected them throughout the tournament, took the excess and culled fish to be measured, weighed and released. The procedure allowed the Department to obtain a larger sample of largemouth bass in a length frequency distribution more representative of what anglers catch. As an evaluation of the success of largemouth bass management in these reservoirs, this technique may be more valuable than sampling with electrofishing or other standard fisheries sampling gear.

We used the proportional stock density (PSD) statistic to determine what changes had occurred in population size structure since changes from general to special regulations occurred. It is a statistic based on the ratio of largemouth bass greater than 200 mm that are also greater than 300mm.

Condie Reservoir

Condie Reservoir has been managed with special bass rules since 1990; originally with two bass over 46 cm and then two bass over 51 cm beginning in 1992. The management goal is to have at least 20% of the catch be at least 41 cm. Largemouth bass grow slowly in southeast Idaho reservoirs, reaching 30 cm in 5 years and 41cm in 7 years (Schill and Heimer 1988). Adult largemouth bass are relatively easy to catch in small reservoirs, especially during May and June when spawning fish move into shallow water and become highly aggressive toward fishing lures moved through their nesting territories. Without special regulations to protect bass from overharvest, few fish over the 30 cm general minimum size limit would remain in most southeast Idaho reservoirs. Many bass anglers realize most of their fishing enjoyment catching (and releasing) bass rather than harvesting them. For this reason, the Department was asked to manage some reservoirs as a way to stockpile larger (older) fish.

In a 1986 electrofishing survey of Franklin County reservoirs (Heimer et al. 1987), very few largemouth bass collected were more than five years old. Of the four reservoirs examined (Glendale, Lamont, Condie, and Winder), Condie was the only reservoir where larger largemouth bass were caught. Thus, when the decision was made to establish a "trophy bass" management lake in Franklin County, Condie was selected.

Glendale Reservoir

Glendale Reservoir has been managed with a two bass over 41 cm limit since 1992. The management goal at Glendale Reservoir is to increase the catch of largemouth bass from 30 cm to 41 cm. In 1991, anglers said that largemouth bass were abundant in Glendale Reservoir, but they rarely caught fish over 12 inches long. The condition of the fish appeared adequate for good growth and the angling public supported a "quality bass" regulation to protect bass less than 16 inches in length.

<u>Oneida Reservoir Walleye</u>

Oneida Reservoir is a mainstem impoundment on the Bear River. Marginal water quality and abundant nongame fish led to the decision to introduce walleye *Stizostedion vitreum* as a predator in 1974. Recruitment is supplemented annually with 500,000 newly hatched fry, half of which are imported from Missouri in April, and half from North Dakota in May. Since Oneida Reservoir has a very rapid turnover rate, as fast as every three days in high precipitation years and as slow as every 12 days in drought years, zooplankton abundance is too low to expect good walleye fry survival or abundant populations of prey species. Additionally, walleye fry may be carried from the reservoir with the current. Thus, only a fair walleye fishery can be expected in Oneida Reservoir.

To determine if anglers were catching many of the available walleye in Oneida Reservoir, we captured walleye with boat-mounted electrofishing equipment at the headwaters of Oneida Reservoir in March of 1993 and 1994. Walleye larger than 250 mm were tagged with numbered Floy anchor tags. The tag anchor was inserted into the back muscle and between the dorsal fin support bones. The protruding plastic tube was brightly colored, numbered to identify individual fish, and requested that anglers return the tag for a $5 reward.

Memorial Day Weekend Check Station

Two of the most popular fishing reservoirs in the Southeast Region are 648 ha Chesterfield Reservoir and 7,285 ha Blackfoot Reservoir. In 1992, Chesterfield drained completely and Blackfoot nearly drained. As of the 1995 Memorial Day weekend, both reservoirs were recovering from the 1987-1992 drought. All the fish in Chesterfield Reservoir and most of Blackfoot Reservoir's 1995 spring catch were trout that had been stocked since the spring of 1993. During the 1995 Memorial Day weekend, we examined trout that had been harvested from the two reservoirs at a check station on Interstate Highway 15 near Pocatello.

Consideration of Smallmouth Bass Introduction into Blackfoot Reservoir

Ever since development of the upper Blackfoot River and Reservoir plan in 1988 (Schill and LaBolle 1990), introduction of smallmouth bass *Micropterus dolomieu (SMB)* has been considered for Blackfoot Reservoir. Most of the fish biomass in the reservoir is Utah sucker, Utah chub, and common carp (Scully et al. 1993). The nongame fish were considered so detrimental to the native cutthroat trout and introduced rainbow trout fisheries in Blackfoot Reservoir that in 1961 the Department attempted, unsuccessfully, to remove them with a chemical toxin.

In the most recent summer creel survey (Mende et al. 1993), average catch rate was only fair at 0.18 trout/h. The catch was 95% stocked rainbow trout. Anglers and the Department would like to reduce the abundance of nongame fish, and at the same time expand the sport fishery with the introduction of the exotic SMB. However, introductions of species that can form self-sustaining populations may result in undesirable, irreversible consequences. For that reason, there has been indecision relative to the potential SMB introduction into Blackfoot Reservoir.

We set thermographs from late April to the end of June 1994, and from the beginning of July through the end of September 1995, to record the approximate temperature regime and relate that to the needs for SMB growth and reproduction. Thermographs were set in the reservoir near the mouth of Blood Bay. The upper Blackfoot River enters the reservoir at the head of Blood Bay and thus the temperature at the thermograph sites may be somewhat cooler than at other locations, such as at isolated bays away from inlet streams.

Relative to the proposed introduction of SMB, we considered: 1) the suitability of the Blackfoot Reservoir environment for this predator; 2) the potential of SMB to provide a fishery at Blackfoot Reservoir, and most importantly; 3) the potential of SMB to negatively impact the native Yellowstone cutthroat trout *Oncorhynchus clarki bouvieri*.

RESULTS AND DISCUSSIONS

Catchable versus Fingerling Rainbow Trout

Chesterfield Reservoir

During the January through mid-July 1995 creel survey, anglers fished 49,497 hours and caught 18,726 rainbow trout for a catch rate of 0.4 rainbow trout/h. Catch decreased by 65% from 1994 to 1995 during the same January to mid-July interval (Table 2). Angling effort decreased by 32%. Effort probably decreased as anglers found that catch rates were not as good as they had been the year before. Catch rates in 1994 through mid-July were considerably higher at 0.74 trout/h. Anglers in 1995 kept 60% of the trout they caught, whereas in 1994 they kept only 48%.

Growth-Rainbow trout continued to grow well in 1995 (Table 3), but not as well as in 1993 or 1994. Exceptional growth of the 1993 cohorts was likely because they were the first fish entering a full reservoir following partial, then complete draining in the previous six years. The C93 cohort grew faster than the C94 cohort and in turn the C94 cohort grew faster than the C95 cohort. Similarly, the F93 cohort grew faster than the F94 cohort (Table 4).

The C93 cohort grew to 428 mm and 941 g by the end of 1993 whereas the C94 cohort grew only to 371 mm and 563 grams (Scully et al. 1995 and In Press) by the end of 1994. Fish density was higher in 1994, with one weak cohort from 1992 (F92) and two strong cohorts from 1993 (C93 and F93) with which the 1994 cohorts had to compete. Additionally, 1994 drought conditions caused irrigators to remove much of the reservoir volume by early fall. Cohorts F92 and C93 averaged 420 mm at the end of 1993 (Table 5, interval 1). A year later, the F93 and C94 cohorts averaged only 380 and 370 mm, respectively (Table 5, interval 13). Also the F93 fingerlings averaged 230 mm by mid-winter following fall stocking where as the F94 fingerlings averaged only 210 mm by the following mid-winter (Scully et al. In Press).

Return to the Angler-Very few of the F92 cohort returned to the angler because Chesterfield Reservoir had just begun to refill when they were stocked. Reservoir surface area and volume were less than 5% of capacity. Food would have been scarce, and potential for avian predation would have been high. Also, the ensuing winter brought deep snow to cover the ice and there were probably very few macro-invertebrates or zooplankton available as food until the following spring. From 1993 through mid-1995, anglers harvested 2% by number and 32% by weight of the F92 cohort (Table 6). Even though few of the cohort survived, those that did took advantage of the abundance of food in 1993, and grew quickly to a large size.

By mid-1995 anglers had harvested 34% of the C93 cohort by number, mostly in 1993 and 1994, and anglers harvested 235% of C93 by weight stocked. In 1995 (and also in 1994 [Scully et al. In Press]), the largest contributors to catch by number (5,149) were the F93s. Between 1993 and 1995, anglers harvested 39% by number and 460% by weight of the F93 cohort. Most of this harvest (83%) took place by the end of 1994. Harvest of the cohort continued to be strong through the January to mid-July 1995 survey. The F93 cohort was the most successful in Chesterfield Reservoir during the interval of the study. The largest percent by

Table 2. Basic creel survey statistics from Chesterfield Reservoir, Idaho, January through mid-July of 1995 and comparison with the same interval range in 1994.

1995 Sampling Intervals	Angling Effort (Hours)	Number of Fish Caught	Fish Caught Per Hour	Number and % of Fish Kept
1 [01/01-01/28]	3,971	2,470	0.6	1,275 (52%)
2 [01/29-02/25]	5,649	4,377	0.8	2,562 (59%)
3 [02/26-03/25]	1,346	1,855	1.4	664 (36%)
4 [03/26-04/22]	6,823	1,548	0.2	748 (31%)
5 [04/23-05/20]	4,452	1,216	0.3	408 (34%)
6 [05/21-06/17]	13,951	4,825	0.4	3,403 (71%)
7 [06/18-07/15]	13,305	2,435	0.2	2,168 (89%)
1995 Totals	**49,497±22%**	**18,726±29%**		**11,228±31%**
1995 Mean			**0.4**	
1994 Totals for intervals 1-7	73,045	54,030		26,103
1994 Mean for intervals 1-7			0.74	
Difference from 1994 to 1995	32% decrease	65% decrease	46% decrease	57% decrease

Table 3. Length and weight growth of rainbow trout cohorts stocked in Chesterfield Reservoir, Idaho, through the 1995 creel survey period.

Interval	F92 mm and (g)	C93 mm and (g)	F93 mm and (g)	C94 mm and (g)	F94 mm and (g)	HYB mm and (g)	C95 mm and (g)
Stocked 09/29/92	**161 (46)**						
Stocked 05/04/93		**225 (112)**					
Stocked 09/20/93			**165 (43)**				
Stocked 05/06/94				**229 (130)**			
Stocked 09/29/94					**152 (39)**		
1 [01/01-01/28]			397 (694)	375 (589)	219 (103)		
2 [01/29-02/25]		523 (1,700)	396 (670)	374 (559)	220 (112)		
3 [02/26-03/25]			394 (661)	379 (575)			
4 [03/26-04/22]	441 (780)		413 (754)	394 (765)			
5 [04/23-05/20]			412 (779)	375 (587)			
Stocked 05/08/95						**223 (111)**	
Stocked 05/15/95							**254 (162)**
6 [05/21-06/17]			430 (959)	403 (850)	270 (245)	288 (276)	259 (194)
7 [06/18-07/15]		502 (1,367)	442 (928)	428 (750)	316 (375)	328 (381)	336 (445)
8 [07/16-08/12]	493 (1,500)	555 (1,780)	428 (866)	457 (1,067)	332 (438)	326 (404)	290 (261)
9 [08/13-09/09]							
10 [09/10-10/07]	518 (1,600)		470 (1,379)		380 (690)		

Table 4. Comparative growth of rainbow trout stocked between spring 1993 and spring 1994 (cohorts C93, F93 and C94) and between spring 1994 and spring 1995 (cohorts C94, F94 and C95) in Chesterfield Reservoir, Idaho.

Cohort	Stocking length (mm) and weight (g).	Growth Interval	Final Length	Final Weight
C93	May 1993 225 mm and 112 g	14 months until July 1994	484 mm	1,282 g
C94	May 1994 229 mm and 130 g	14 months until July 1995	457 mm - 27 mm	1,067 g - 215 g
F93	September 1993 165 mm and 43 g	10 months until July 1994	341 mm	489 g
F94	September 1994 152 mm and 39 g	10 months until July 1995	332 mm - 9 mm	438 g - 51 g
C94	May 1994 229 mm and 130 g	2 months until July 1994	320 mm	391 g
C95	May 1995 254 mm and 162 g	2 months until July 1995	290 mm - 30 mm	261 g -130 g

Table 5. Length and weight growth of rainbow trout cohorts in Chesterfield Reservoir, Idaho, in 1994.

Interval and mid-point	F92 length (mm)	F92 weight (g)	C93 length (mm)	C93 weight (g)	F93 length (mm)	F93 weight (g)	C94 length (mm)	C94 weight (g)	F94 length (mm)	F94 weight (g)
Stocked 09/29/92	**161**	**46**								
Stocked 05/04/93			**225**	**112**						
Stocked 09/20/93					**165**	**43**				
1 [01/14/94]	421	812	426	886	232	123				
2 [02/11/94]	473*	1,235*	423	682	235	128				
3 [03/11/94]	441*	970*	425	670*	240	153*				
4 [04/08/94]			427	903	250	145				
Stocked 05/06/94							**229**	**130**		
5 [05/06/94]	462*	1,275*	463	1,250	296	332	272	224		
6 [06/03/94]	501	2,268*	464	1,144	315	388	285	293		
7 [07/01/94]	476	1,197*	485	1,031*	335	451	312	387		
8 [07/29/94]	513*	1,496*	484	1,282*	341	489	320	391		
9 [08/26/94]			498	1,180*	349	489	333	441		
Stocked 09/29/94									**152**	**39**
10 [09/23/94]	447*	988*	489	1,150*	364	568	350	490		
11 [10/21/94]	433*	934*	380*	640*	378	603	356	480	186*	72*
12 [11/18/94]					384	650	371	558		
13 [12/16/94]					383	631	371	563	209	92

- indicates that sample size was less than 5.
-

Table 6. Yield of rainbow trout from Chesterfield Reservoir, Idaho, by sampling interval from January through mid July 1995, with cumulative summaries for 1995 and combined for 1993 through mid-July 1995.

Interval and Mid-point	F92-Number and (Wt in kg)	C93-Number and (Wt in kg)	F93-Number and (Wt in kg)	C94-Number and (Wt in kg)	F94-Number and (Wt in kg)	C95-Number and (Wt in kg)	Hybrid-Number and (Wt in kg)
1 [01/14/95]			443 (307)	484 (285)	162 (17)	NA	NA
2 [02/11/95]		179 (304)	1,190 (797)	916 (512)	188 (21)	NA	NA
3 [03/11/95]		39 (66)	263 (174)	125 (72)	0	NA	NA
4 [04/08/95]			604 (455)	69 (53)	0	NA	NA
5 [05/06/95]	86 (67)	43 (59)	123 (96)	12 (7)	74 (18)	NA	NA
6 [06/03/95]		60 (82)	1,423 (1,365)	60 (51)	188 (46)	1,538 (411)	60 (10)
7 [07/01/95]	54 (81)	178 (244)	1,103 (1,024)	16 (12)	436 (164)	444 (169)	
Totals Number±95%CL Weight (kg)	**140 ±139% 148**	**499 ± 65% 755**	**5,149±37% 4,218**	**1,682±53% 992**	**1,048±72% 266**	**1,982±119% 580**	**60±228% 10**
January through mid-July 1995 yield as % of that stocked	**0.1 (2.4)**	**1.2 (16.8)**	**4.0 (75.9)**	**4.2 (19.1)**	**0.8 (5.0)**	**9.9 (17.9)**	**0.2 (0.4)**
1993 through mid-July 1995 yield as % of that stocked	**2 (32)**	**34 (235)**	**39 (460)**	**52 (183)**	**1 (6)**	**10 (18)**	**<1 (<1)**

number of any cohort harvested was 52% of the C94. However, most of this harvest occurred in 1994 before the fish had gained much weight, thus their return to the angler by weight was only 183%. By the time the study ended, the C93, F93, and C94 cohorts had all exceeded the Department's goal of 100% return by weight to the angler of stocked trout cohorts.

The Chesterfield Reservoir creel survey was continued through the first half of 1995 to see how much more of these strong cohorts would be harvested and to see how the F94 fingerlings fared after being stocked in low volume drought conditions. In a 10-month comparison from the fall stocking time in September until the following mid-July, the F93 cohort returned 14.4% by number and 118% by weight. In contrast, the F94 cohort returned only 1.1% by number and 5.0% by weight in the same amount of time. The excellent survival and growth of the F93 cohort that led to the high return rates can be attributed to: 1) the cohort entering the reservoir when it was relatively full in an abundant precipitation year; 2) having only one significant fish cohort (C93) in the reservoir with which to compete; and 3) the possibility that the 1987-1992 drought had oxidized organic matter on the exposed reservoir bottom, making it available for incorporation in the food chain when the reservoir finally filled in 1993. In contrast, the F94 trout entered the reservoir when volume was low and the fish population may have been near carrying capacity with larger, more competitive trout.

Whether stocking dollar-equivalents of fall fingerlings or spring catchables is best is not clear based on the results of the study because of the continual changes in the environment. Dillon and Alexander (1996) concluded that if reservoirs were low in the fall (such as in 1994), then fall fingerlings would perform poorly. Conversely, if there is an abundance of water in the fall (such as in 1993), then fall-stocked fingerlings will return-to-creel in good numbers. Competing species may decrease fingerling growth and survival, so that only catchables on a put-and-take, with slight growth potential would be practical to stock. The superior performance of the F93 cohort in Chesterfield Reservoir demonstrated that if there is an adequate food supply, fingerlings, even stocked in the fall are very cost-effective for stocking into productive reservoirs.

Daniels Reservoir

Length of catchable-size trout in Daniels Reservoir, reached an asymptotic length near 450 mm, two to three years after being stocked at a length near 225 mm (Figure 2). Conditions may have improved in 1995 since the 1993 catchables reached the 450 mm size in 1995 at the same time that the 1992 stocked catchables reached the same length.

Fingerlings stocked in the fall of 1992 reached the same asymptotic length (450 mm) as the catchables two years after stocking (Figure 3). Even with an additional year, no further change was observed in mean length of sampled trout. Beginning in 1992, management reduced stocking by one-half to 63 catchables and 104 fingerlings/ha to reduce density and seek a compensatory increase in growth. In order to produce many trout in excess of the minimum harvestable size of 508 mm, further reduction in stocking would likely be necessary.

The population of catchable size ($\geq$300 mm) trout in Daniels Reservoir obtained from combined electrofishing and purse-seining by Research (Dillon and Alexander 1996) in 1995 was 6,450 or 42/ha. Approximately half of these trout exceeded 400 mm in length. If the catchable size trout population in 1994, when catch was estimated to be 21,109 trout (Scully et al. In Press), was close to the 1995 population estimate, then each trout in Daniels Reservoir would have been caught over three times (3.3 times) that year.

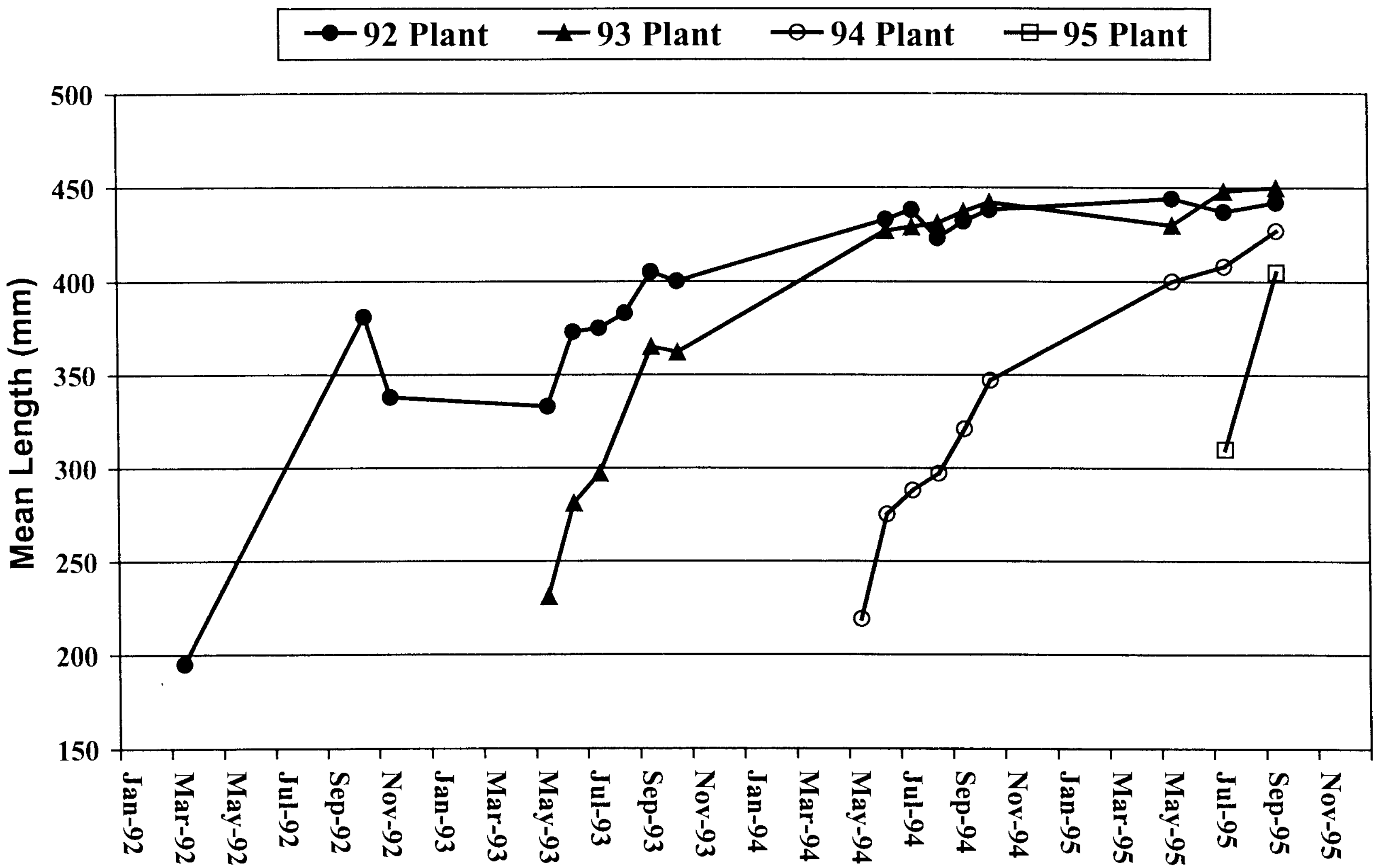


Figure 2. Plot of growth rate of four catchable rainbow trout cohorts stocked into Daniels Reservoir, Idaho.

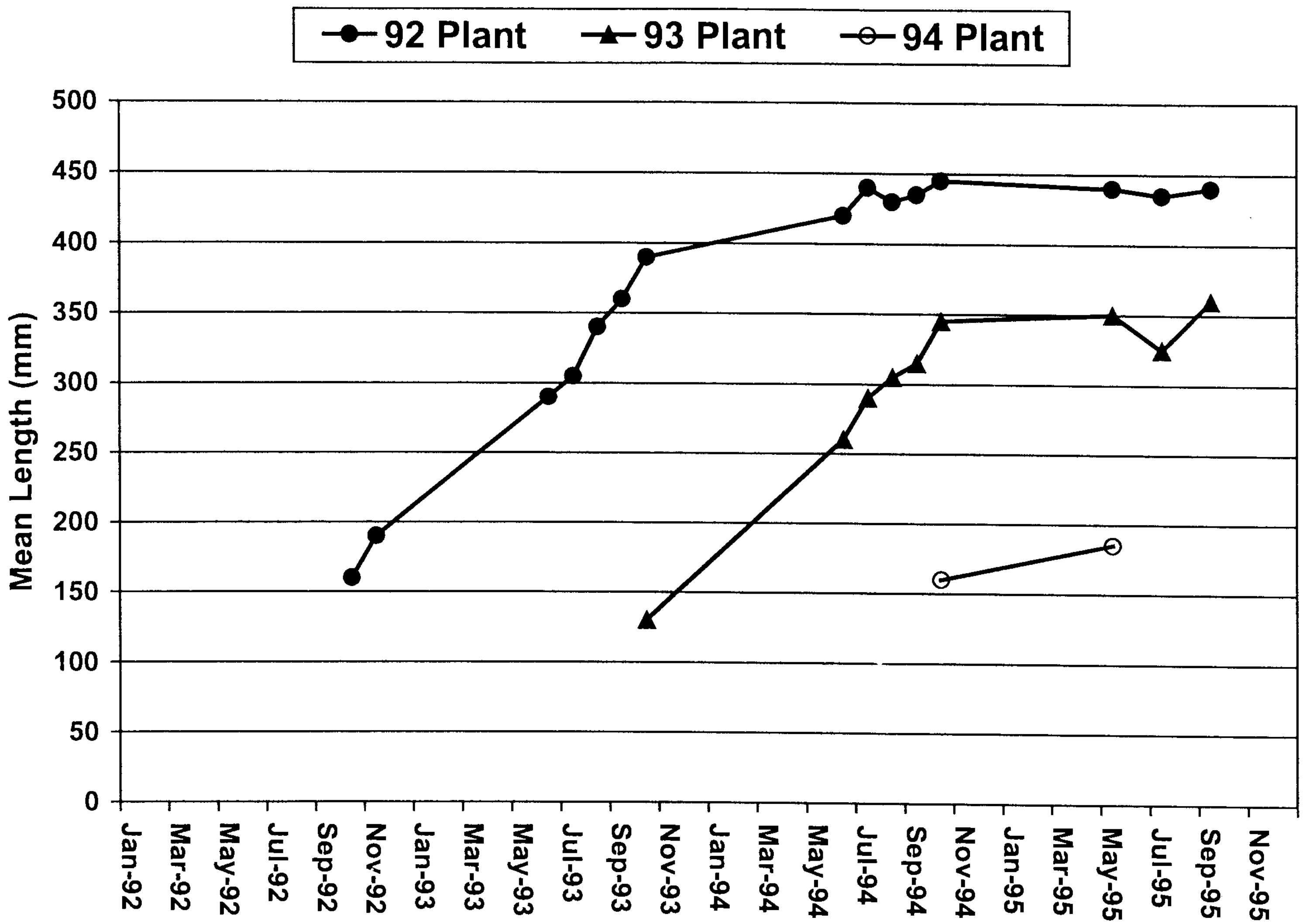


Figure 3. Plot of growth rate of three fingerling rainbow trout cohorts stocked into Daniels Reservoir, Idaho.

Lowland Lake Surveys

Alexander Reservoir

In the 1992 survey, common carp and Utah suckers dominated the catch numerically and especially by weight (Table 7). Yellow perch had not yet become abundant and only a small number of them averaging 164 mm were caught. No hatchery rainbow trout were caught, but a small number of adult native cutthroat trout were caught. Mountain whitefish *Prosopium williamsoni* were present, but rare in the catch. A few channel catfish were caught. They had grown approximately 85 mm in the single year they had been in the reservoir (from 200 mm to 285 mm). Total weight of fish caught per standard unit of effort (PSUE) was 40.0 kg. Suckers and carp comprised 97% of that weight.

Total biomass in one unit of effort in the 1995 survey was 90.0 kg, 2.2 times what it was in the 1992 survey (Table 8). Additionally, the number of yellow perch increased from 7 to 86, a 12-fold increase. However, most of the yellow perch in 1995 were small (mean length 102 mm) and were probably young since the reservoir had only been refilled since 1991 (Figure 4). There were still very few channel catfish and cutthroat trout, but more than in 1992. Mountain whitefish were still present and still scarce. Some of the crappie stocked in 1991 and 1993 were still alive and spawning as indicated by the one 57 mm crappie caught. However, crappie fry do not appear to be surviving through their first winter, as we caught no crappie from previous years production in the sampling gear. The attempt at crappie introduction into Alexander Reservoir may not have succeeded.

Detritus and diptera larvae are likely the bases of the food chain in Alexander Reservoir. Carp and suckers do well on this diet. Yellow perch may also become abundant in Alexander Reservoir on a diptera larvae diet. However, with little zooplankton and without predation to thin the population, yellow perch may grow to only marginal size for harvest. Detritus and diptera may be a good food source for channel catfish. However, because of the short and cool growing season, channel catfish may grow slowly.

Recommendations-There should be 20,000 20 cm channel catfish stocked in mid-summer and two consecutive year-classes marked with pectoral fin clips so their growth and return to the angler could be documented in a creel survey. These fish would likely provide only a "put-and-grow" fishery, as the short, cool, growing season would likely prevent channel catfish fry from surviving through their first winter of life.

McTucker Ponds

High water in the spring of 1995 had connected some of the ponds with McTucker Creek and/or Snake River water. Pond #1 was one of the ponds that had connected to river and stream flow while pond #4 had not. Pond #1 contained very few game fish and many nongame fish (Table 9). Of the 18 fish caught in the sample, 94% were Utah suckers and Utah chubs. The species averaged 373 mm and 268 mm in length, respectively. The only game fish caught was a single 235 mm largemouth bass.

Table 7. Fish catch statistics from a May 21, 1992 lowland lake survey on Alexander Reservoir, Idaho.

	Number Caught	C.P.U.E. Number & (%)	Mean Length (mm)	Mean Weight (g)	C.P.U.E. (kg) Weight & (%)
Game Species					
Channel catfish	4	1.5 (14%)	285	220	0.333 (18%)
Cutthroat trout	5	1.9 (17%)	349	425	0.807 (45%)
Mountain whitefish	1	0.4 (4%)	170	80	0.032 (2%)
Yellow perch	19	7.1 (65%)	164	87	0.617 (35%)
Subtotal		**10.9**			**1.786**
Nongame Species					
Common carp	28	10.5 (38%)	472	1,789	18,785 (48%)
Utah sucker	45	16.9 (62%)	478	1,187	20,060 (52%)
Subtotal		**27.4**			**38,845**
Total		**38.3**			**40.6 kg**

Table 8. Fish catch statistics from a June 16, 1995 lowland lake survey on Alexander Reservoir, Idaho.

	Number Caught	C.P.U.E. Number & (%)	Mean Length (mm)	Mean Weight (g)	C.P.U.E. (kg) Weight & (%)
Game Species					
Channel catfish	14	6.8 (7.0%)	278	217	1.476 (32%)
White crappie	1	0.5 (0.5%)	57	--	-- --
Cutthroat trout	5	2.5 (2.6)	327	395	0.988 (21%)
Mountain whitefish	1	1.0 (1.0%)	197	90	0.090 (2%)
Rainbow trout	2	1.0 (1.0%)	319	380	0.380 (8%)
Yellow perch	150	85.7 (87.9%)	102	20	1.714 (37%)
Subtotal		**97.5**			**4.648**
Nongame Species					
Common carp	59	33.7 (43%)	458	1,237	41.678 (46%)
Green sunfish	8	4.6 (6%)	101	--	-- (<1%)
Longnose dace	3	1.7 (2%)	47	--	-- (<1%)
Redside shiner	4	2.3 (3%)	85	--	-- (<1)
Utah sucker	62	35.4 (46%)	466	1,366	48.365 (54%)
Sub-total		**77.7**			**90.043**
Total		**175.2**			**94.691kg**

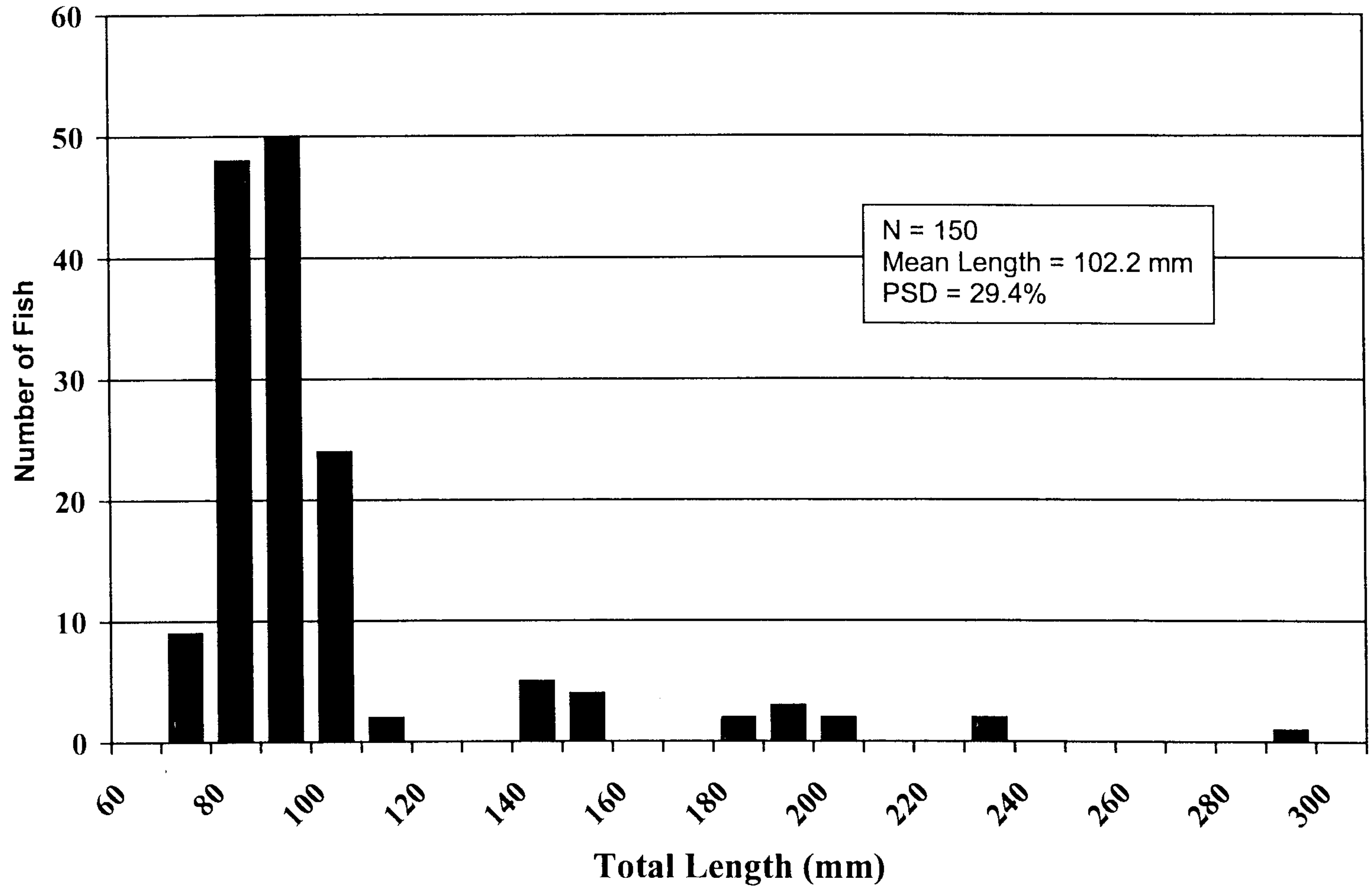


Figure 4. Length frequency distribution of yellow perch caught by experimental gillnetting and electrofishing in Alexander Reservoir, Idaho, June 16, 1995.

Table 9. Fish population structure of McTucker Pond #1, Idaho, July 21, 1995.

Species	% Abundance	Total Caught	Catch per Unit Effort	Mean Length	Mean Weight
Game Fish					
Largemouth Bass	5.6	1	1	235	-
Subtotal	5.6	1	1		
Nongame Fish					
Utah Sucker	72.2	13	13	373	-
Utah Chub	22.2	4	4	268	-
Subtotal	94.4	17	17		
Total	**100**	**18**	**18**		

In pond #4, a total of 16 fish were caught (Table 10). Of these, 88% were game fish. There were six bluegill averaging 116 mm, six largemouth bass averaging 154 mm, and two channel catfish averaging 245 mm. The remaining two fish in the catch were nongame fish, Utah chubs that averaged 205 mm.

Recommendations-Discuss with Bingham County the possibility of raising levees around the McTucker Ponds so that a high water event in the Snake River would not flood the ponds. Floodwaters pollute the ponds with nongame fish. Also, continue to manage warmwater fish populations in those ponds that were not invaded with nongame fish. If sufficiently tall levees are constructed, seek an opportunity to again chemically renovate some of the McTucker Ponds.

Lamont Reservoir Electrofishing

Largemouth bass sampled in Lamont Reservoir with electrofishing in 1992 had a unimodal distribution with a mean length of 202 mm. One year later the unimodal distribution was still present with a mean length of 214 mm (Figure 5). If the two modes represent the same cohort, then mean largemouth bass growth in the 1992 drought year was only 12 mm. In 1993, we removed 1,700 largemouth bass to stock in McTucker Ponds, Mud Lake (in the upper Snake River region), Foster and Johnson reservoirs. In 1995 the largemouth bass length frequency distribution in Lamont Reservoir was bimodal with one mode averaging 150 mm and another averaging 266 mm (Figure 5). The larger mode is likely the same cohort observed in the 1992 and 1993 sampling. If so, the cohort grew 52 mm in two years. This still appears to be very slow growth, but it is faster growth than between 1992 and 1993 before the cohort was 'thinned' to obtain fish for stocking other waters. Heimer et al. 1987 estimated largemouth bass growth between age-2 and age-3 to be 49 mm (from 180 to 229 mm) and from age-3 to age-5 to be 143 mm (from 229 to 372 mm).

Either the original largemouth bass cohort grew exceptionally slowly, possibly due to a shortage of prey, or the larger individuals were not in the shoreline zone during the electrofishing sampling. A third possibility is that previous estimates of largemouth bass growth, based on scale reading, overestimated growth rates in Lamont Reservoir.

Relative weights (Nielsen and Johnson 1983) of three-quarters of Lamont Reservoir largemouth bass in 1992 were below the desired 100% of standard (Figure 6). The low mean relative weight is an indication of insufficient forage base for the predators. Even after removal of 1,700 approximately 200 mm largemouth bass in 1993, relative weights remained below standard (Figure 7). Apparently, removal of 1,700 200 mm bass (46/ha) did not significantly increase the availability of prey for the bass that remained.

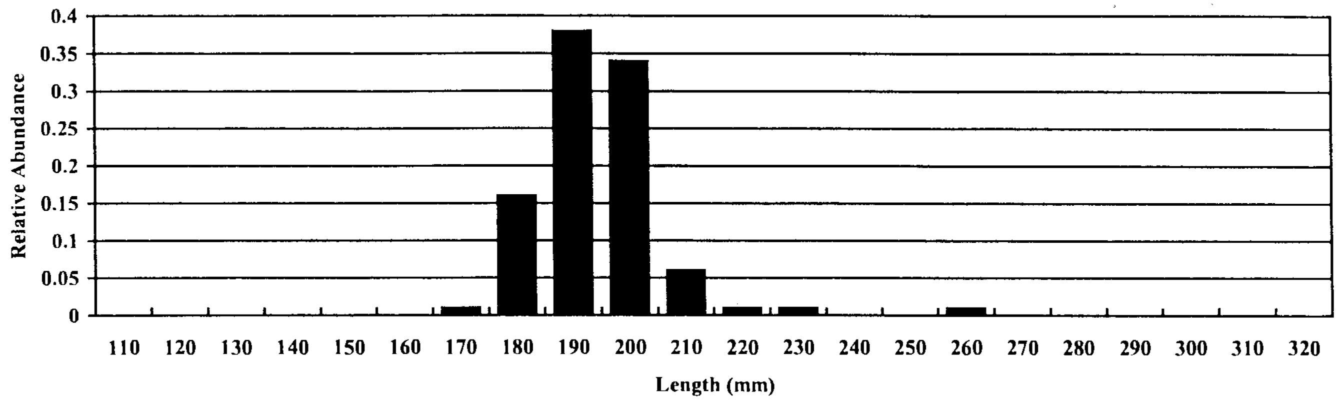
Bluegill in the northern portion of their range generally require four years to reach a minimum acceptable size for harvest of 150 mm (Carlander 1977). Bluegill in Lamont Reservoir in 1992 ranged from 80 to 170 mm (Figure 8). The fish were likely age-1 to age-4, indicating that after the 1986 rotenone renovation, bluegill were not restocked until at least 1988 and possibly 1989. In 1995, the bluegill length frequency distribution in Lamont Reservoir was clearly bimodal with the larger fish averaging 200 to 210 mm (Figure 8). The fish had grown 50 to 75 mm from 1992 to 1995 and appeared sufficiently abundant to provide a fishery on quality size (>200 mm) bluegill.

Table 10. Fish population structure of McTucker Pond #4, Idaho, July 21, 1995.

Species	% Abundance	Total Caught	Catch per Unit Effort	Mean Length	Mean Weight
Game Fish					
Bluegill	37.5	6	6	116	42
Largemouth Bass	37.5	6	6	154	40
Channel Catfish	12.5	2	2	245	115
Subtotal	87.5	14	14		
Nongame Fish					
Utah Chub	12.5	2	2	205	115
Subtotal	12.5	2	2		
Total	100	16	16		

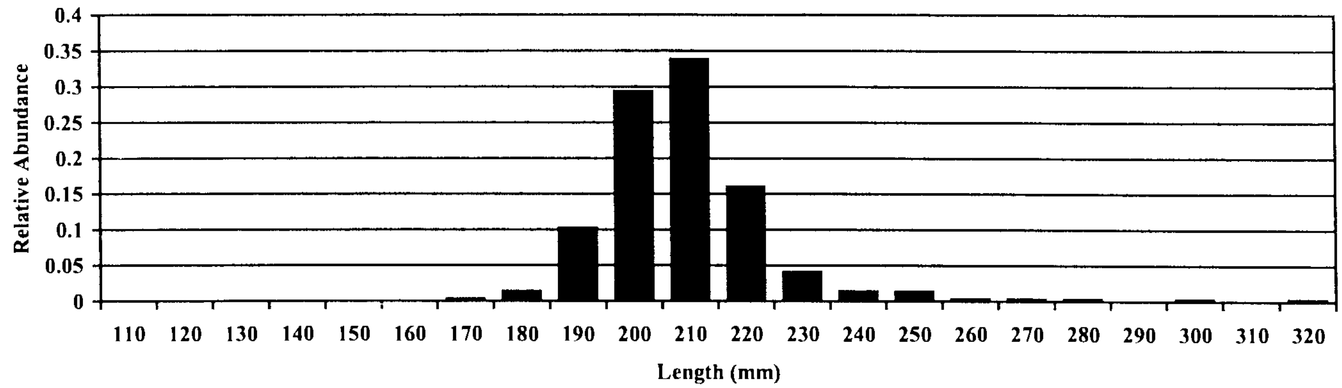
1992

Sample Size = 80
Mean Length = 202 mm
PSD = 3%



1993

Sample Size = 293
Mean Length = 214 mm
PSD = 1%



1995

Sample Size = 199
Mean Length = 254 mm
PSD = 1%

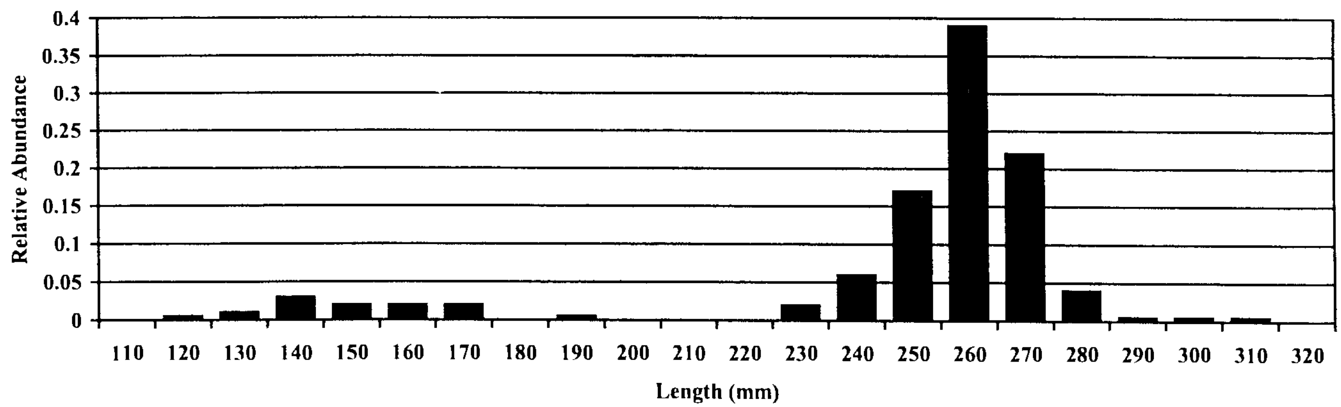


Figure 5. Comparative length frequencies of largemouth bass from Lamont Reservoir, Idaho, in 1992,

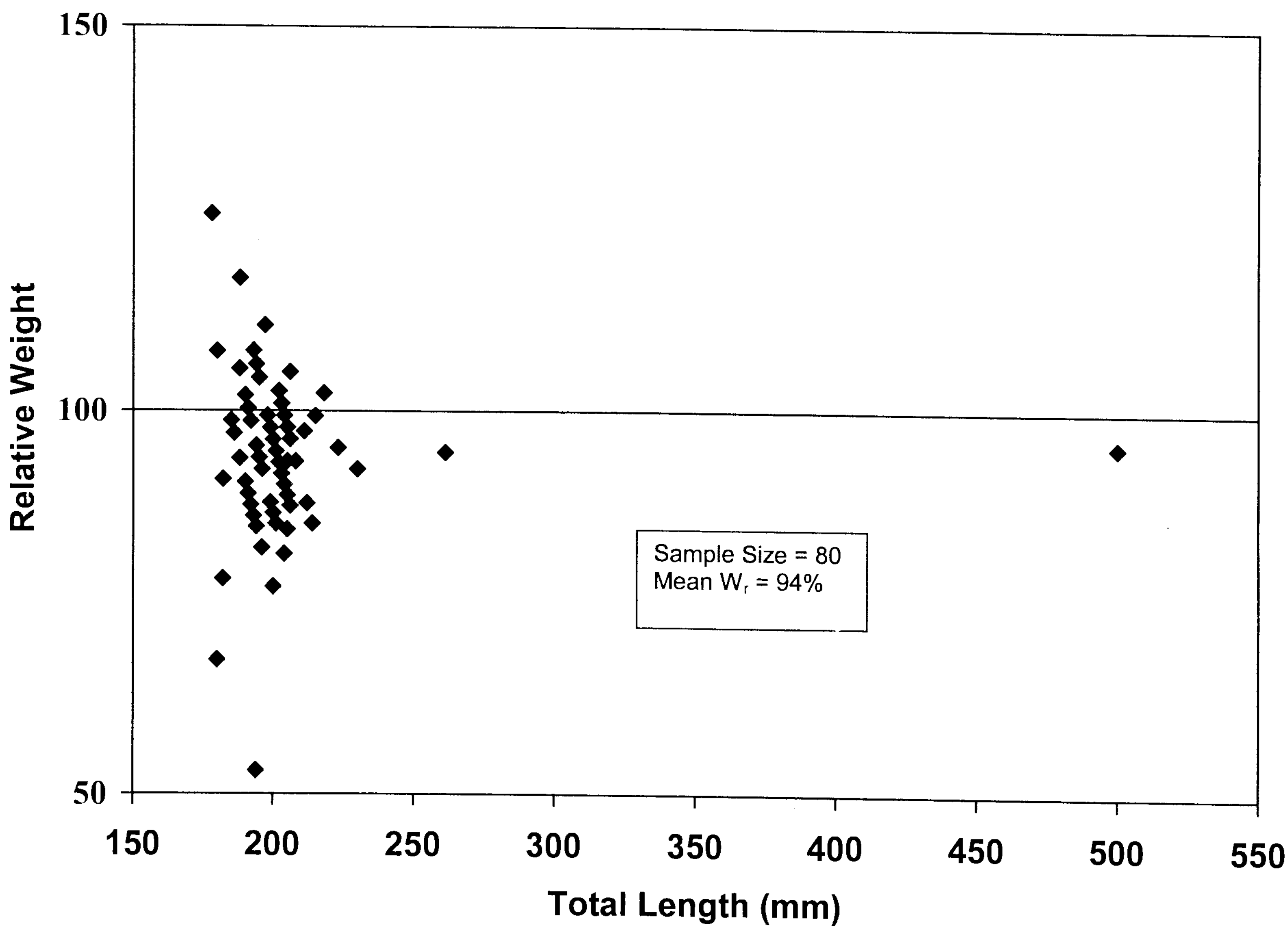


Figure 6. Relative weight analysis for largemouth bass sampled from Lamont Reservoir, Idaho, July 2, 1992.

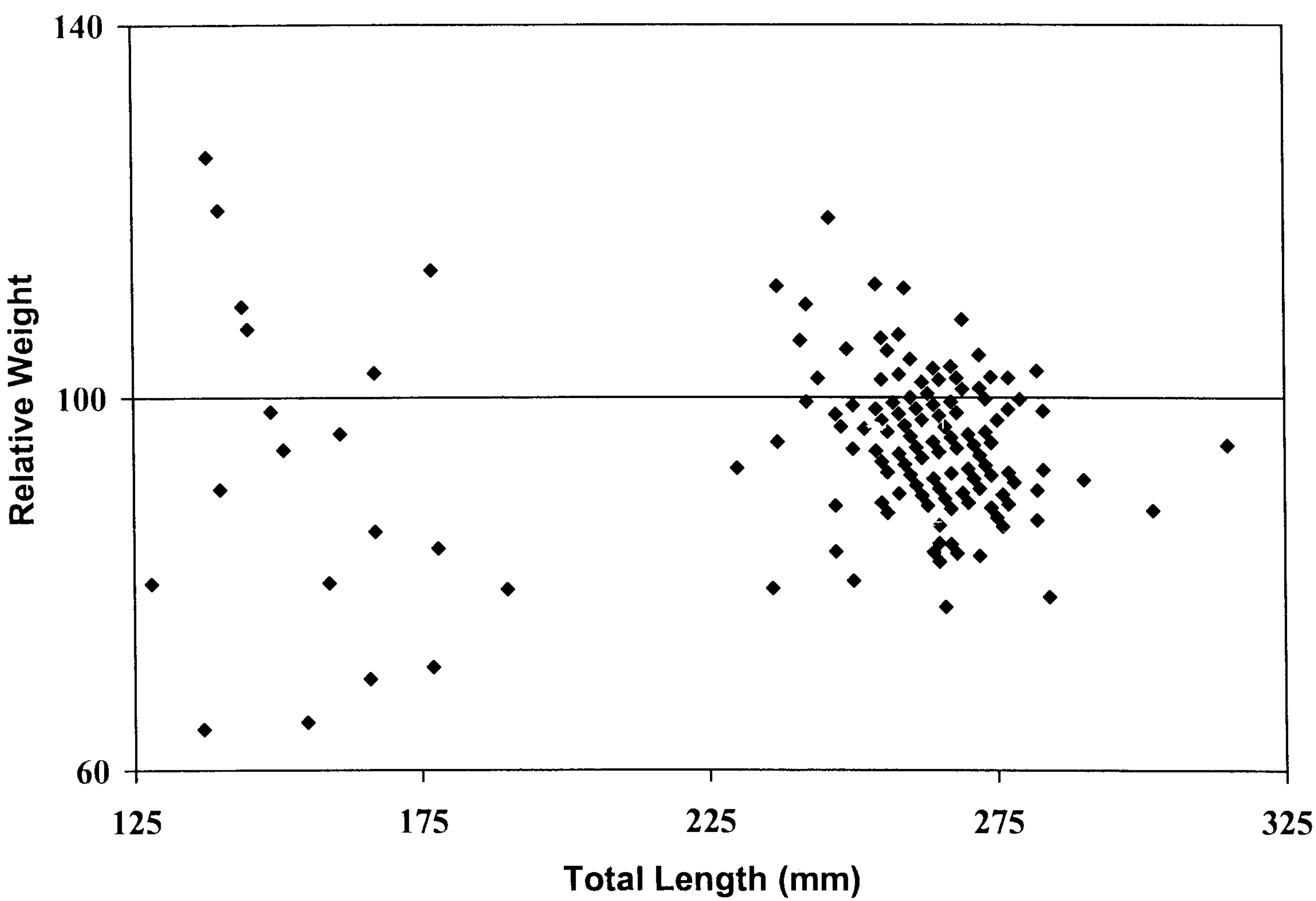
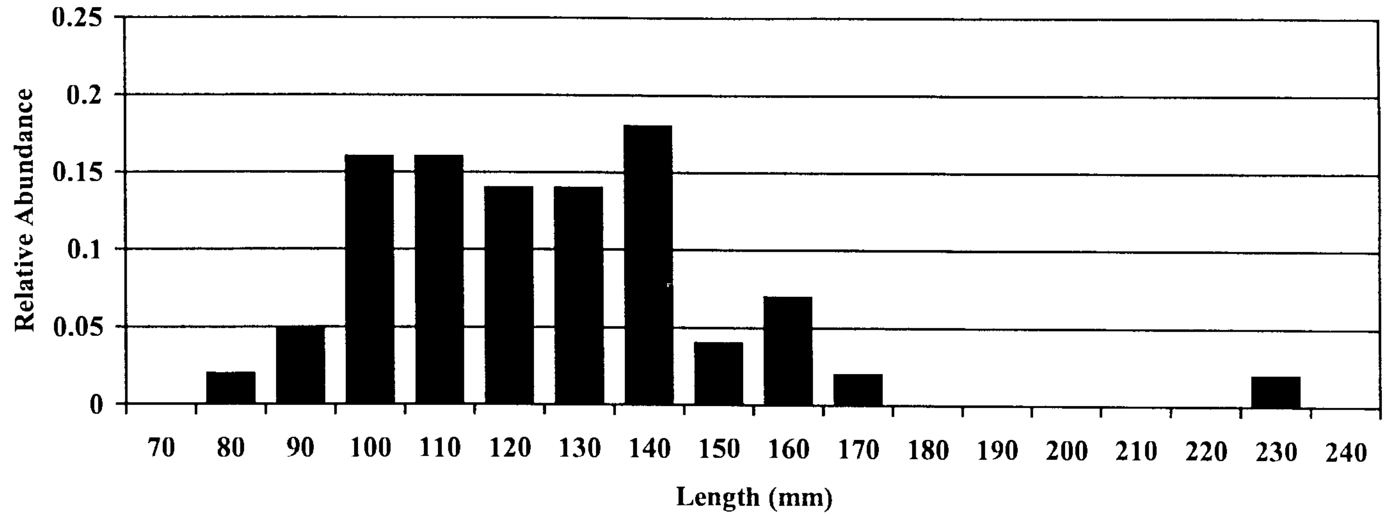


Figure 7. Relative weight analysis for largemouth bass sampled from Lamont Reservoir, Idaho, May 31, 1995.

1992

Sample Size = 56
Mean Length = 128 mm
PSD = 14%



1995

Sample Size = 88
Mean Length = 158 mm
PSD = 45%

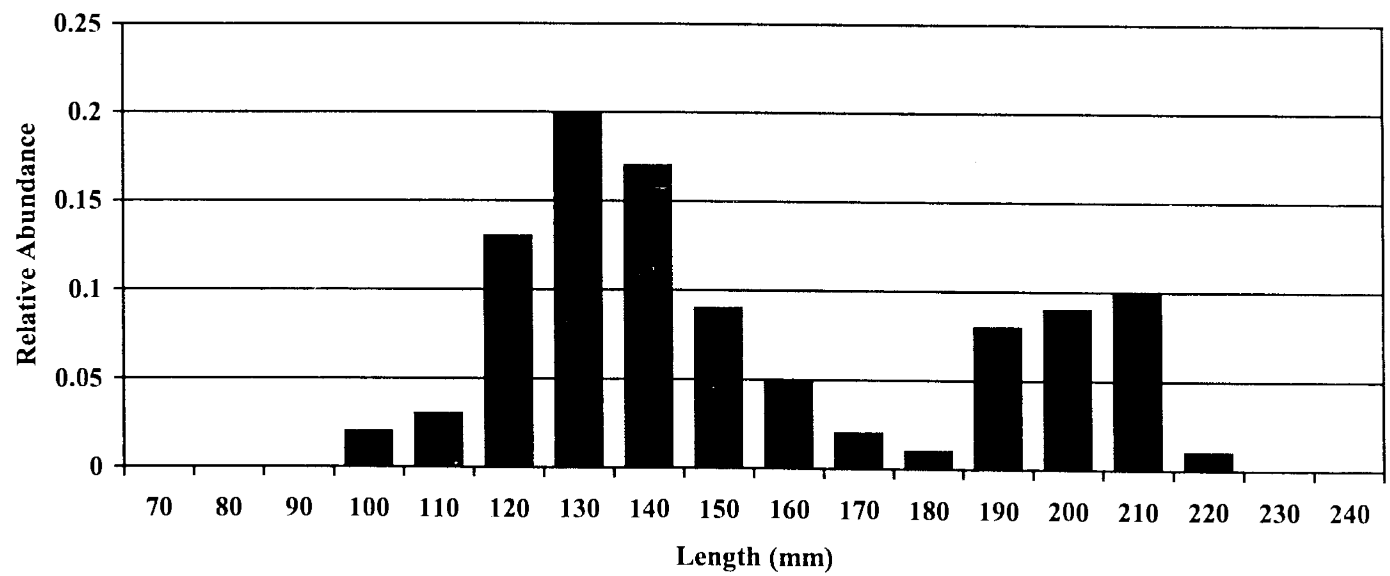


Figure 8. Length frequency distributions for bluegill sampled from Lamont Reservoir, Idaho, 1992 and 1995.

Relative weights of bluegill were exceptional in 1992 (Figure 9) and declined somewhat by 1995 (Figure 10). Conditions remained good with three-fourths of sampled bluegill having relative weights above the 100% line. With such robust physical condition, bluegill should grow as rapidly as water temperature will allow.

Recommendations-Mark a large sample of largemouth bass with individually numbered visual implant tags, remove a scale from the fish and estimate their age. Then sample the population again in future years, and determine the growth of marked individuals and remove a scale for examination to determine if the known age difference between the mark and recapture date is clearly obvious from the scale growth-ring pattern.

Largemouth Bass Fishing Tournaments

Condie Reservoir

Forty anglers in twenty boats fished 10 hours each (400 hours of effort) on June 24, 1995 at Condie Reservoir. They caught 93 largemouth bass for a catch rate of 0.23 fish/h. Of the 93 largemouth bass caught, 81 were at least 203 mm and 61 were at least 305 mm for a PSD of 75% (Figure 11). Additionally, of the fish at least 305 mm in length, 15% were also at least 406 mm. In 1990, when Condie Reservoir first became special-regulation bass water, PSD, as measured by electrofishing, was only 31%. The condition of the population in 1995, as measured by relative weights, was also good, with a mean relative weight of 106% (Figure 12).

Glendale Reservoir

The same anglers and boats that fished Condie Reservoir the day before, fished another 10 h at Glendale Reservoir on June 25, 1995. They caught 422 largemouth bass for a catch rate of 1.05 fish/h. All but three of the fish were at least 203 mm and 333 were at least 305 mm for a PSD of 80% (Figure 13). However, only 0.3% (one individual at 406 mm) of the bass over 305 mm was also at least 406 mm. The mean relative weight of the population was acceptable at 101% (Figure 14). In 1991, the year before special regulations were established on Glendale Reservoir, largemouth bass PSD was only 17%.

Such large percentages of quality-size largemouth bass are desirable to bass anglers, but insufficient smaller (younger) fish could lead to a decline in predation on forage fish populations. However, the two reservoirs are drawn down considerably in late summer for irrigation and, young forage fish are crowded with largemouth bass during a time when the predators should be feeding heavily. Largemouth bass probably feed on various size prey under drawdown conditions and have a controlling effect on excess production of young-of-the-year (YOY) forage fish.

Recommendations-Monitor the size distribution and catch rate of largemouth bass in Condie and Glendale reservoirs during alternate years with bass tournament data. Put special emphasis on enforcing bass harvest regulations during May and June when adult fish are most vulnerable to exploitation. Collect a large sample of largemouth bass scales and otoliths from mortalities at tournaments to see if growth rates have changed after several years of trophy and quality size bass management.

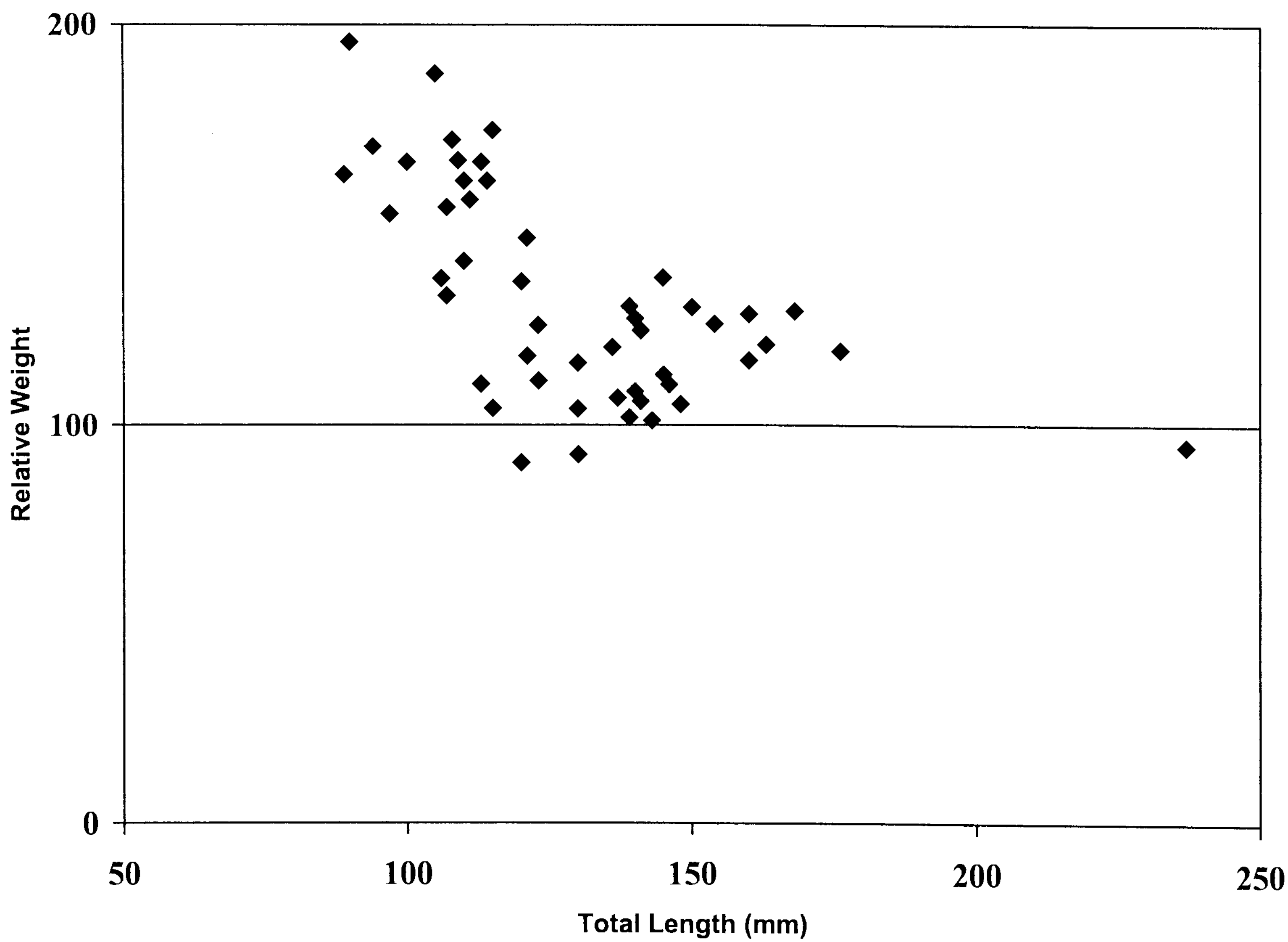


Figure 9. Relative weight analysis for bluegill sampled from Lamont Reservoir, Idaho, July 2, 1992

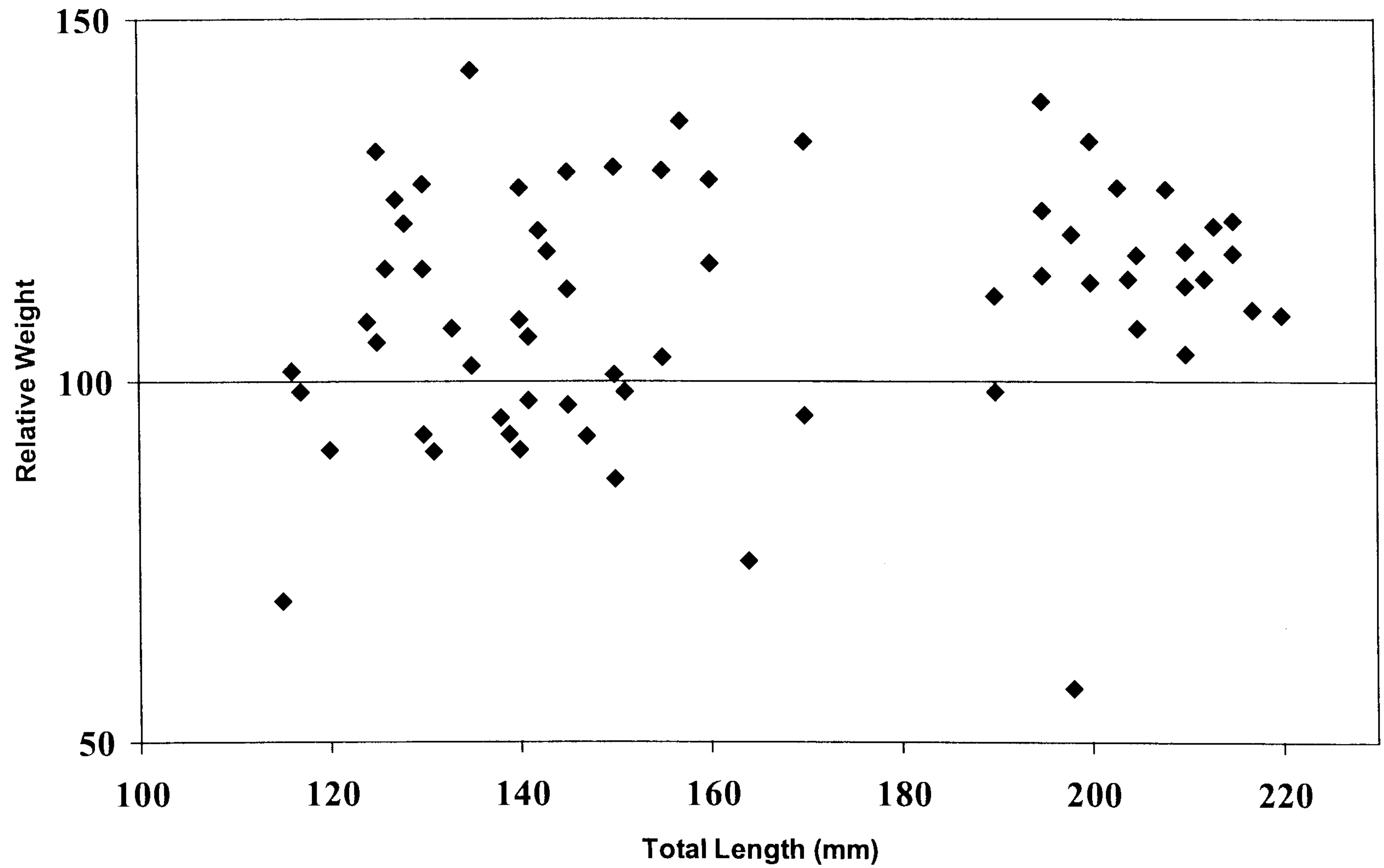


Figure 10. Relative weight analysis for bluegill sampled from Lamont Reservoir, Idaho, May 31, 1995

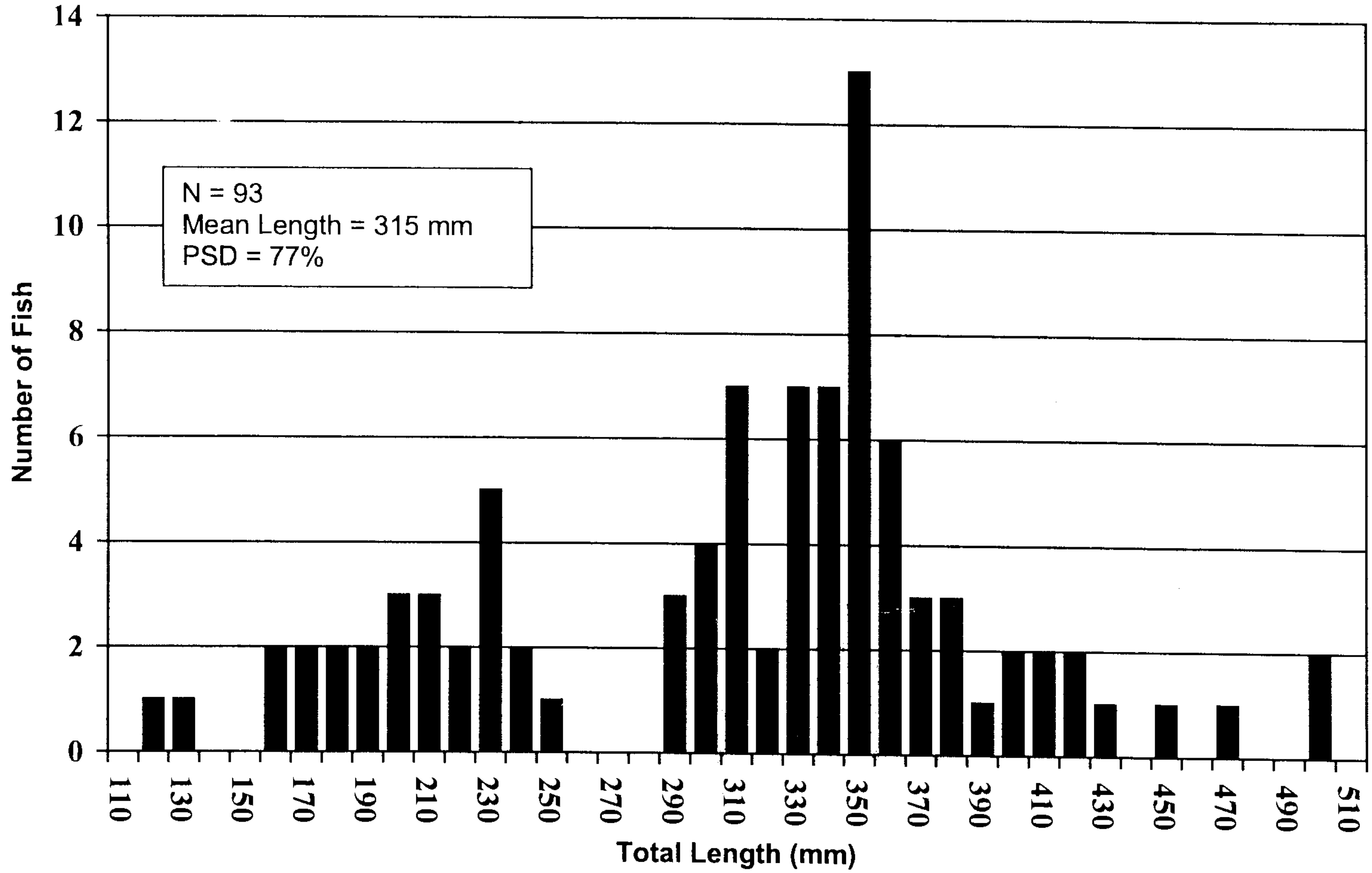


Figure 11. Length frequency distribution of largemouth bass caught by anglers at the June 24, 1995, Condie Reservoir, Idaho, bass tournament.

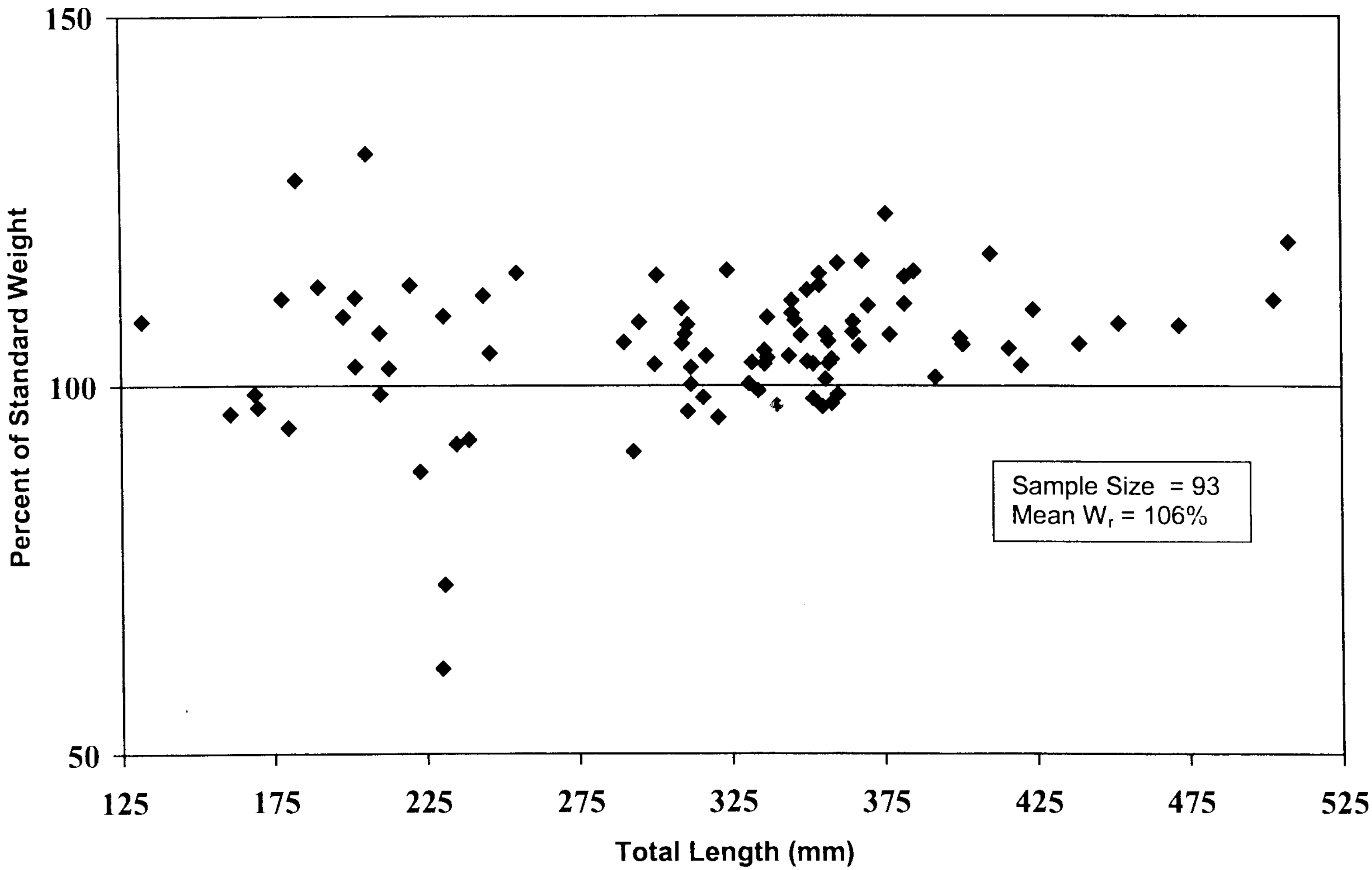


Figure 12. Relative weights of largemouth bass caught by anglers during the June 24, 1995, Condie Reservoir, Idaho, bass tournament.

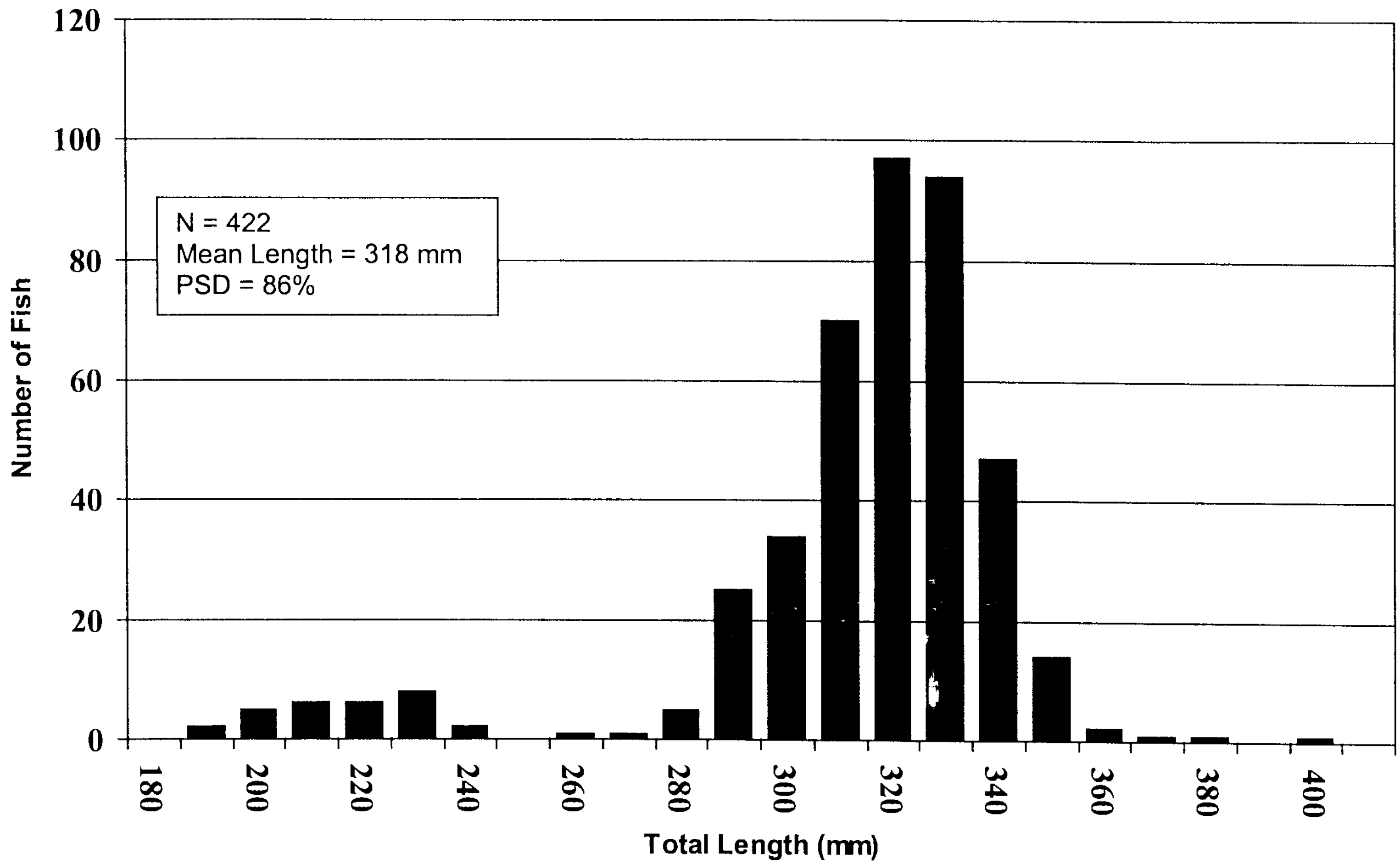


Figure 13. Length frequency distribution of largemouth bass caught by anglers at the June 25, 1995, Glendale Reservoir, Idaho, bass tournament.

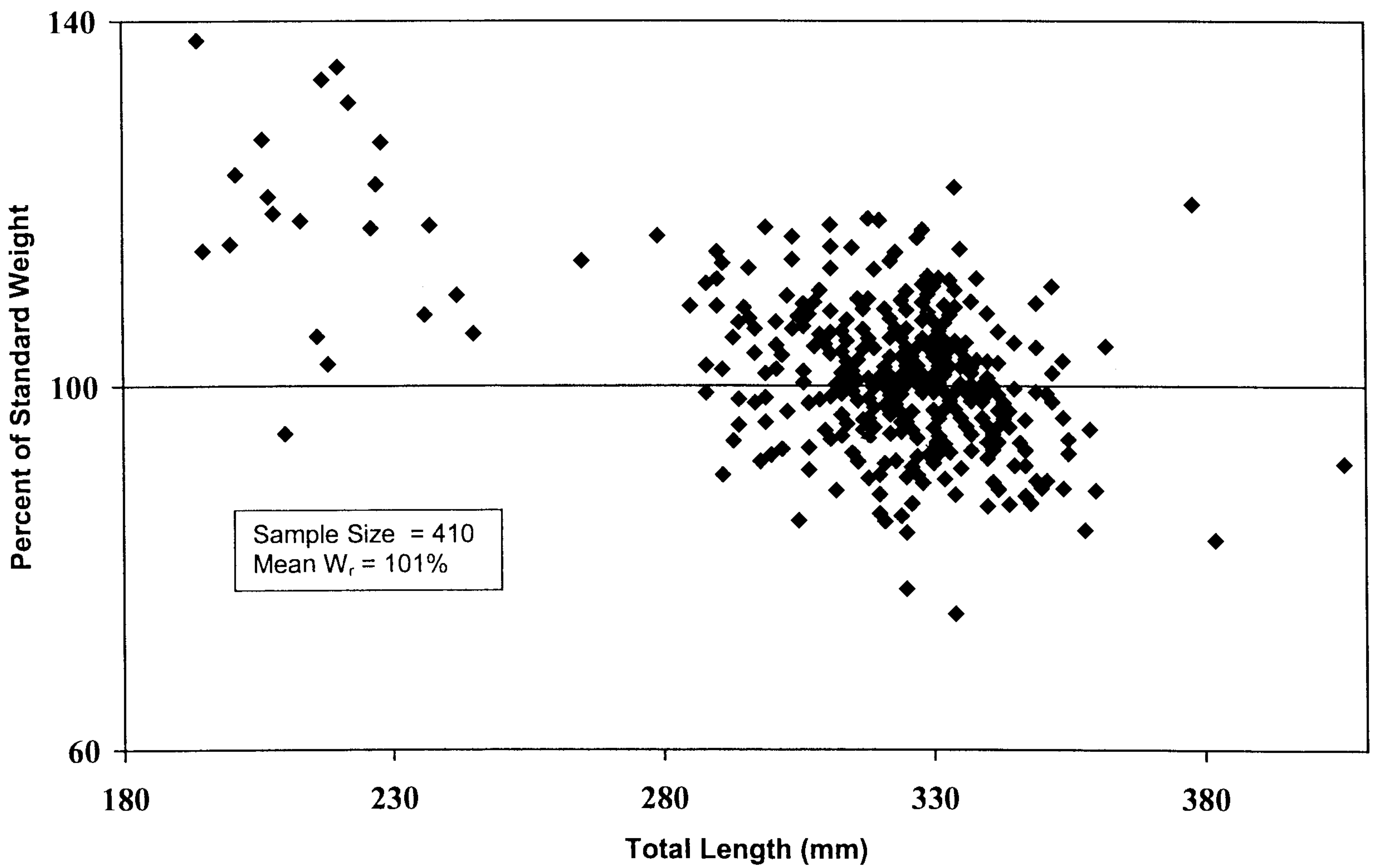


Figure 14. Relative weights of largemouth bass caught by anglers during the June 25, 1995, Glendale Reservoir, Idaho, bass tournament.

Oneida Reservoir Walleye

We tagged 18 walleye in 1993 and 87 walleye in 1994. By the end of 1995, anglers had returned 7 (39%) of the 1993 tags and 17 (20%) of the 1994 tags. Thus, anglers are harvesting a significant portion of the walleye population in Oneida Reservoir. The walleye fishery is popular with a small percentage of southeast Idaho anglers and provides an exotic component to the suite of diverse southeast Idaho fishing opportunities. The walleye limit in Oneida Reservoir is five fish from May through February and two during the March through April spawning season when adult walleye concentrate at spawning sites and are highly vulnerable to angling.

Recommendations-Continue stocking walleye at the current density and maintain the current fishing regulations.

Memorial Day Weekend Check Station

Blackfoot Reservoir

We measured 66 trout from Blackfoot Reservoir (Figure 15). Trout less than 300 mm in Blackfoot Reservoir were likely stocked in the spring of 1995 at catchable size (approximately 225 mm). Of harvested trout, 92% were carry-over (fish stocked at least one year earlier) trout at Blackfoot Reservoir. The carry-over trout ranged from 360 to 480 mm and averaged 423 mm in length.

Chesterfield Reservoir

We measured 228 trout from Chesterfield Reservoir (Figure 16). Trout less than 320 mm in Chesterfield Reservoir were likely stocked in the spring of 1995 as catchable size or in the fall of 1994 as approximately 150 mm fingerlings. In Chesterfield Reservoir, 67% of the catch was carry-over trout. That is, one-third of the trout caught were newly stocked catchables or were from the previous fall's planted fingerlings. Carry-over trout ranged from 330 to 470 mm and averaged 420 mm in length. Thus, carry-over size trout from Chesterfield and Blackfoot reservoirs were about the same size. Also at Blackfoot Reservoir, a much higher percent of harvested fish were carry-overs.

Consideration of Smallmouth Bass Introduction into Blackfoot Reservoir

A survey of the Blackfoot Reservoir shoreline revealed that most of the littoral areas are low gradient and dominated by clay and mixed clay/gravel. However, there are littoral areas with adequate cobble, boulder, and bedrock that could provide habitat for several smallmouth bass populations. Although a desirable smallmouth bass prey, crayfish *Pacifastacus spp.*, may not be common in Blackfoot Reservoir, there is an abundance of forage fish and large zooplankton (Dillinger et al. 1993).

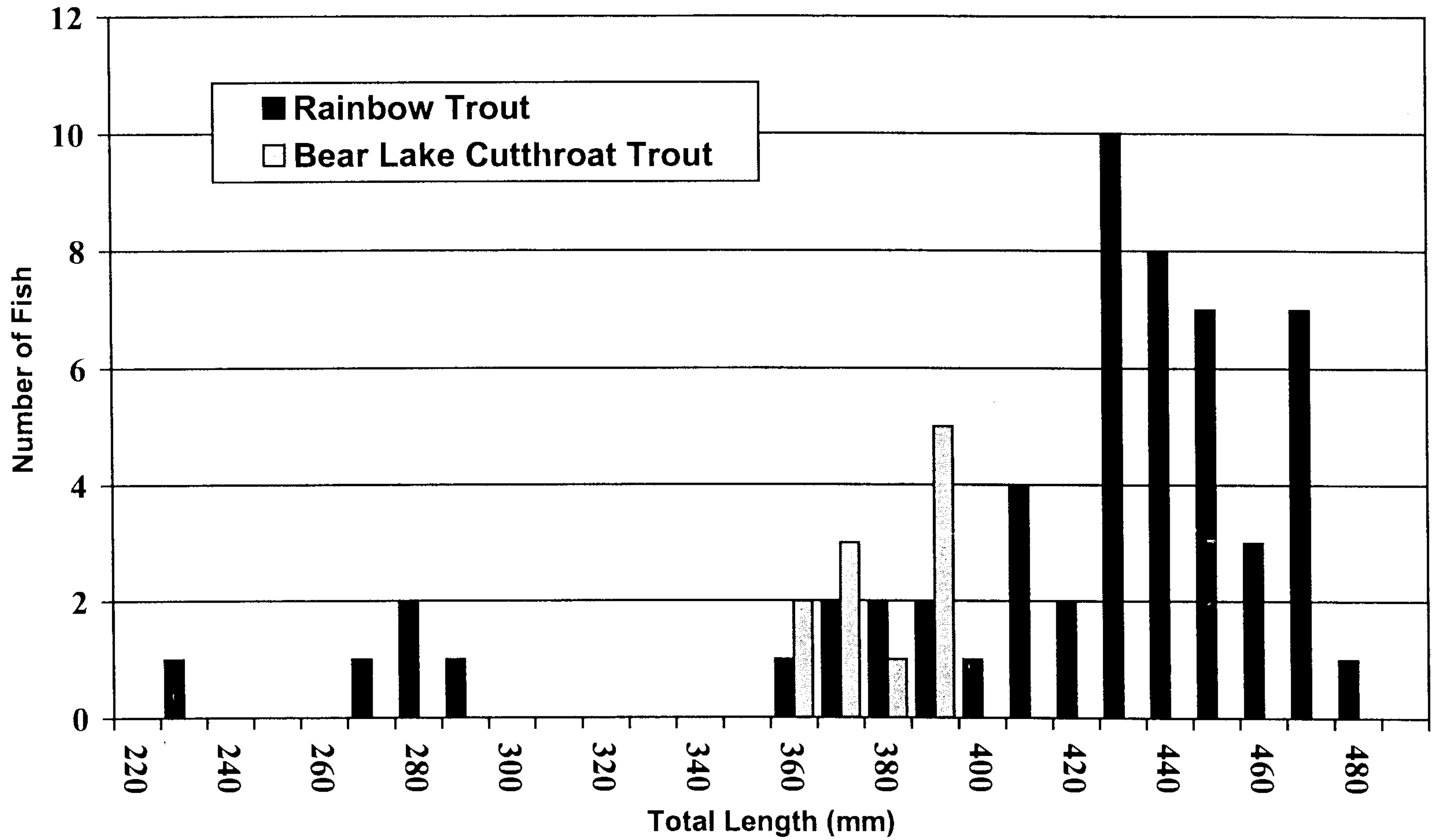


Figure 15. Length frequency distribution of rainbow trout and Bear Lake cutthroat trout harvested by anglers from Blackfoot Reservoir, Idaho, over Memorial Day Weekend, 1995.

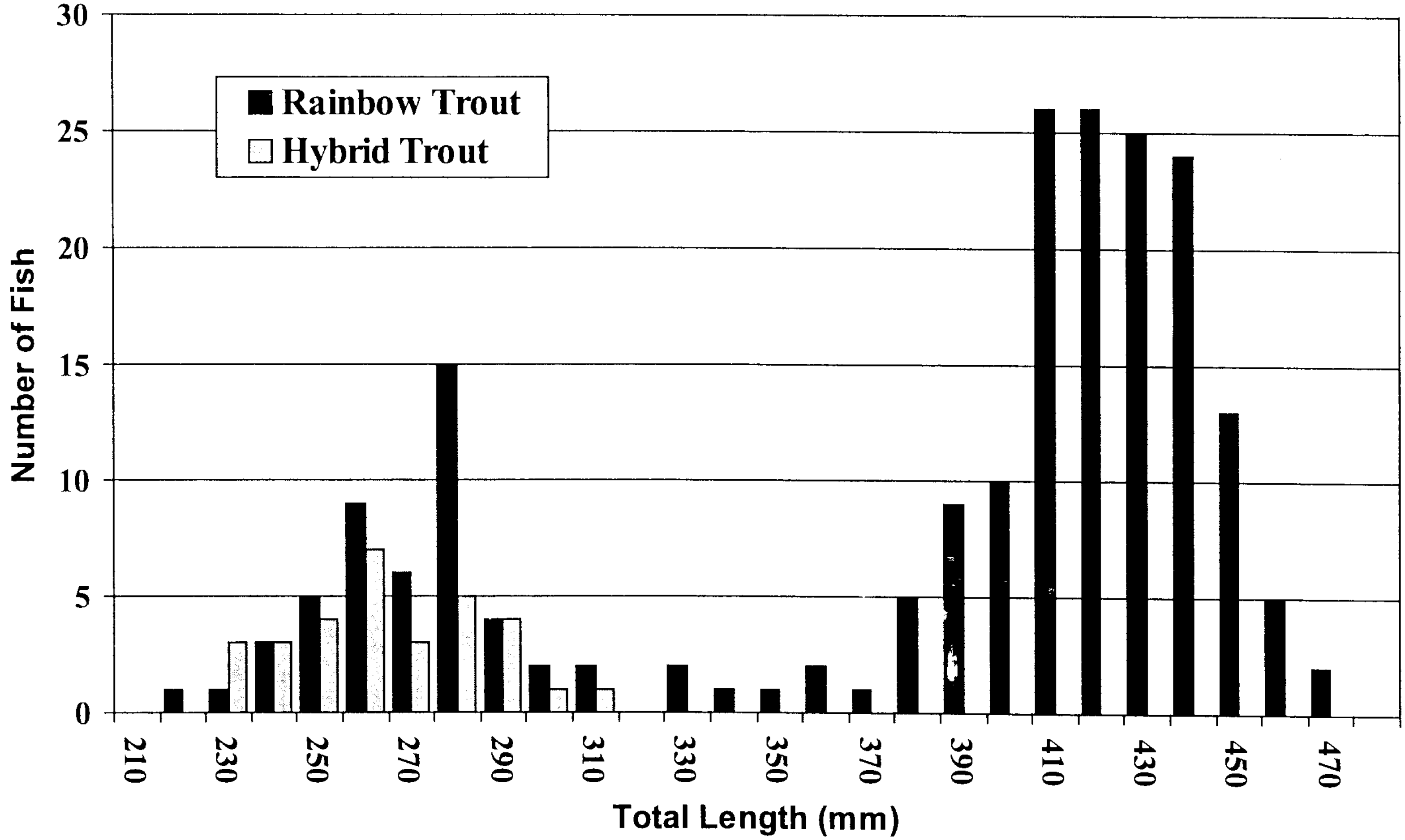


Figure 16. Length frequency distribution of rainbow trout and hybrid trout harvested by anglers from Chesterfield Reservoir, Idaho, over Memorial Day Weekend, 1995.

Smallmouth bass do not feed actively when water temperature is less than 10°C. Nest building and spawning occurs in the spring when water temperature is between 13°C and 21°C, but generally at least 15°C (Edwards et al. 1983). Water temperature at the thermograph sampling site rose to near 10°C the first week of May, to near 15°C the first week of June and did not fall back to 10°C until the end of September. Temperature was near 20°C for much of July and August, which is in the lower part of the preferred summer temperature for smallmouth bass growth.

Vaughn Paragamian (personal communication) said that, in waters at elevations above 1,800 m, natural recruitment of smallmouth bass is limited. Since the full pool elevation of Blackfoot Reservoir is 1,865 m, smallmouth bass may not form a self-sustaining population. If smallmouth bass did form a self-sustaining population, the high elevation might keep the fish from growing to quality size and making them unsatisfactory to anglers. However, since Blackfoot Reservoir is very productive biologically, the high elevation effect may be less significant than it would be in a less fertile body of water.

The most important consideration relative to introduction is what would be the impact of smallmouth bass on native Yellowstone cutthroat trout in Blackfoot Reservoir and the Blackfoot River, both above and below the reservoir. At the lower elevation, smallmouth bass in Anderson Ranch, Cascade, Dworshak, Brownlee, and Ririe reservoirs, have had no obvious negative effects on trout populations. Nor have the predators been considered a significant problem for salmonids in the Snake, Salmon or Clearwater rivers, where they have formed stable populations.

There are numerous potential predators on Yellowstone cutthroat trout in the Blackfoot Reservoir/River system now. They include hundreds of thousands of rainbow trout stocked annually into the reservoir as well as Bear Lake cutthroat trout. These species have essentially the same coldwater temperature preference as Yellowstone cutthroat trout and would generally be in the same areas of the reservoir together. In contrast, smallmouth bass prefer temperatures above 20°C, as do the forage fishes of suckers and cyprinids. Trout prefer temperatures below 20°C and in most cases would avoid those areas preferred by smallmouth bass. Trout are also preyed upon by birds: double crested cormorants *Phalacrocorax auritus*, white pelicans *Pelecanus erythrorhynchos*, various species of grebes *Aechmophorus occidentalis, Podiceps nigricollis, Podilymbus podiceps* and gulls *Larus spp.*, great blue herons *Ardea herodias*, night herons *Nycticorax nycticorax* and ospreys *Pandion haliaetus*. Although smallmouth bass are predaceous, they are a warmwater species and should focus their predation on fish species living in the warmest parts of the reservoir and even then only in areas with a rocky substrate.

The primary argument against stocking smallmouth bass in Blackfoot Reservoir is that they may become established in lower miles of the upper Blackfoot River and feed on Yellowstone cutthroat trout parr (100 to 200 mm long) as they migrate to the reservoir. However, it is likely that these downstream migrations by parr occur in the spring with high (and cold, generally less than 10°C) flows and again in the fall when water temperature drops below 10°C. At these low temperatures, predation by smallmouth bass on salmonid young would be rare.

Recommendation-In summary, the potential negative effects of smallmouth bass on Yellowstone cutthroat trout in the Blackfoot Reservoir and upper Blackfoot River are small. The potential benefits of smallmouth bass are uncertain relative to their predation impact on suckers, chubs, and carp, and in their ability to become abundant enough and grow large enough to become a desirable component of the Blackfoot Reservoir fishery. Because the potential fishery benefits from smallmouth bass for the reservoir fishery may be small, the Department decided not to accept the potential, albeit small, risk that the predator could have negative effects on Yellowstone cutthroat trout. The Department has decided not to stock smallmouth bass into Blackfoot Reservoir.

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1995 ANNUAL PERFORMANCE REPORT

State of:	Idaho	Program:	Fisheries Management F-71-R-20
Project I:	Surveys and Inventories	Subproject I-F:	Southeast Region
Job:	c	Title:	Rivers and Streams Investigations

Contract Period: July 1, 1995 to June 30, 1996

ABSTRACT

We electrofished two 1-km sections of the upper Blackfoot River at the upper and lower ends of the Wildlife Management Area (WMA). Out of 285 trout collected, 6 were brook trout *Salvelinus fontinalis*. The remaining 98% were Yellowstone cutthroat trout *Oncorhynchus clarki bouvieri*. Population densities and mean lengths for cutthroat trout were 1.1 fish/100 m^2 and 266 mm in the upper section and 0.3 fish/100 m^2 and 318 mm in the lower. Thirty-seven percent of the fish were greater than 305 mm long.

We established temperature loggers on July 13, 1995 in the upper Blackfoot River and its tributary of Angus Creek on the WMA. Water temperatures ranged from 9°C to 19°C in July at the upper end and from 12°C to 20°C at the lower end of the approximately 11-km long WMA. Water temperatures in Angus Creek, which enters the Blackfoot River midway through the WMA, ranged from 11°C to 24°C, significantly higher than in the river. The daily temperature fluctuations were wide, with temperatures during most of the diel cycle being well within the desirable salmonid range below 20°C.

We estimated fish population density in about 2.4 km of the lower Blackfoot River where it runs through the Reed Ranch. A fair population of cutthroat trout (103/km) and mountain whitefish *Prosopium williamsoni* (330/km) occurred within the reach. Out of 54 cutthroat trout sampled, only one was less than 203 mm long, indicating that the area is not a nursery for juvenile cutthroat trout or that there is little spawning habitat in the reach. Of the 53 cutthroat trout at least 203 mm long, 83% ranged from 305 mm to 457 mm with most being 305 mm to 381 mm long. Landowners have been restoring the riparian habitat in this reach and wanted to see how many fish were using the area.

We electrofished four 400 m sections of Marsh Creek on the Arimo Ranch, two inside and two outside cattle exclosures. Of the 95 fish collected, 83% were Utah suckers *Catostomus ardens* and 7% were common carp *Cyprinus carpio*. Only two trout were collected. Temperature loggers were established July 15 at the upper and lower ends of the Arimo Ranch, about 6.4 stream km apart. Temperatures at both sites ranged from 16°C to 22°C during July, and from 13°C to 23°C during August. Temperature, habitat, and fisheries time series data will be collected for up to ten years.

We installed a temperature data logger on the Portneuf River near Pocatello on July 5, 1995 at the downstream end of the Edson Fichter Nature Area. Water temperature ranged from 20°C to 26°C throughout the month of July. August temperatures were slightly cooler, ranging from 17°C to 26°C, with most daytime temperatures below 23°C. These are very high stream temperatures and would have serious negative effects on trout survival. Major irrigation withdrawals, return flows from agricultural fields, turbidity, high width/depth ratios, and reduction of riparian cover all contribute to the high water temperatures.

We electrofished Crow Creek in Caribou County to obtain additional information of the effects of the 203 mm to 406 mm cutthroat trout slot limit. Of cutthroat trout at least 203 mm long, 17% ranged from 305 mm to 406 mm. For brown trout *Salmo trutta* at least 203 mm long, 44% ranged from 305 mm to 457 mm long.

We conducted habitat and snorkel surveys in two sections of lower St. Charles Creek (Little Arm) during midsummer to estimate fish population densities, relative species composition, and length frequency composition. The two sections totaled 366 m in length and 2,234 m^2 in area. We observed 96 brook trout and 32 Bear Lake cutthroat trout *O. clarki ssp.* in the sections. Approximately, three-fourths of the trout in the critical Bear Lake cutthroat trout stream are brook trout. The finding is similar to that seen in electrofishing samples conducted by Utah State University on upper St. Charles Creek in 1995. Part of the program to rebuild the wild cutthroat trout population in Bear Lake may include a significant reduction of brook trout from St. Charles Creek. We also operated a trap on St. Charles Creek (Little Arm) in the spring to count Bear Lake cutthroat trout spawners. Only 48 spawners were counted at the trap prior to high water in early June, which required its removal. The late, cool, and wet spring may have caused the fish to migrate late. However, similar depressed spawner numbers were reported at the Swan Creek trap in Utah.

We estimated Bonneville cutthroat trout *O. clarki Utah* density and habitat parameters within seven sections on Preuss Creek and four sections on Giraffe Creek. Fish populations have been monitored since 1981. Peak densities occurred in 1986 and declined precipitously through 1993. Densities increased slightly in 1995. The increase could be a response to a combination of factors. In 1994 and 1995, the Caribou Cattle Association and Forest Service installed several miles of fences in the low gradient reaches of Preuss and Giraffe creeks to exclude livestock as a means of improving stream habitat. Additionally, 1993 and 1995 were abundant water years, in contrast to the drought conditions which occurred from 1987 through 1992 and again in 1994. Streams were cooler, larger, and had better habitat than during earlier periods of the trend interval.

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OBJECTIVES

1. Document the status of the upper Blackfoot River fishery through the use of an opening day creel survey, electrofishing population estimates, thermographic data collection and spawning run observations (fish trap and redd surveys).

2. Document the population of game fish species in a defined reach of the lower Blackfoot River for future comparisons.

3. Document the fishery status in Marsh Creek on the Arimo Ranch as a baseline for future comparisons and determination of success in habitat restoration (using population estimates, thermographic recorders, and habitat assessments).

4. Document the water temperature regimen of the Portneuf River along the Edson Fichter Nature Area and determine the feasibility of setting up a put-and-take fishery.

5. Document angler effort and success on the Snake River below American Falls Reservoir on the opening day of fishing season as part of an annual monitoring program.

6. Document the fishery status in Crow Creek through analysis of population length structure and relative species composition.

7. Monitor the status of the fishery in St. Charles Creek through the use of snorkel surveys, thermographic recorders, habitat assessments, and a spawning-run fish trap.

8. Monitor the status of Bonneville cutthroat trout populations in the tributaries of the Thomas Fork of the Bear River using depletion population estimates.

INTRODUCTION AND METHODS

Upper Blackfoot River

Opening Day Creel Survey

The upper Blackfoot River was famous for its wild Yellowstone cutthroat trout *Oncorhynchus clarki bouvieri* fishery, especially from the 1940s through the 1960s. The fishery then declined, due in part to overfishing, especially in the Blackfoot Reservoir nursery area, to habitat deterioration (Thurow 1981) and finally to drought conditions which began in 1987 and lasted through 1992 (Scully et al. 1995). In 1990 the Idaho Fish and Game Commission authorized a management plan to restore the upper Blackfoot River and reservoir fishery (Schill and LaBolle 1990). It included prohibition of wild cutthroat trout harvest on Blackfoot Reservoir, and set a short season, large minimum size and low limit on harvest of cutthroat trout on the upper Blackfoot River. Additionally, the Department sought opportunities for habitat restoration projects and considered artificial spawning of wild cutthroat trout and release of non-imprinted fry into under-seeded tributaries of the upper Blackfoot River system. Game species present in the upper Blackfoot River system include Yellowstone cutthroat trout, rainbow trout *Oncorhynchus mykiss*, and brook trout *Salvelinus confluentus*.

As an index of restoration status, the Department began opening day creel surveys in 1994. The survey was repeated in 1995. The annual surveys provide trend information on angler numbers; catch rate, size distribution and relative species composition of fish caught and percentage of cutthroat trout caught that are harvested. A mandatory check station was established on opening day (July 1) at the Highway 34 turnout near the Trail Creek Road connection north of Soda Springs. The check station was operated from 9:00 am until 8:00 p.m. Anglers arriving at the check station were asked how many hours they had fished the upper Blackfoot River, how many trout of each species they caught and released, and what size (to the nearest inch), their catch had been. We measured and recorded the length of each harvested trout by species.

Blackfoot River Wildlife Management Area

Population Estimate-In 1994, the Department, with assistance from the Conservation Fund, purchased the 700 ha Revee Stocking Ranch anu began managing the property as a wildlife management area (WMA). The ranch straddles the upper Blackfoot River with an upper boundary where Lanes, Diamond, and Spring creeks meet to form the river, and the lower boundary is at the head of a canyon commonly known as the upper narrows. Approximately, 11 km of river wind through the property as well as about 1.6 km of Angus Creek, a historical cutthroat trout spawning and rearing stream. Biologists surveyed habitat on the State Land section within the ranch in October 1994 (Scully et al. In Press). In 1995, we estimated trout population densities using a mark-recapture method in an upper (3.1 km) and lower (4.0 km) section (Figure 1). We captured (with drift boat-mounted electrofishing gear) and marked fish on August 22 and recaptured fish on August 29, 1995. All trout caught were measured and weighed. We recorded substrate and habitat characteristics within each reach.

Thermographs-We deployed three thermographs in the headwaters of the upper Blackfoot River on July 10 and maintained them until the end of September 1995. Two thermographs were placed in the main river at the upper (site 1) and lower (site 2) ends of the Blackfoot River WMA, about 10 river kilometers apart (Figure 1). The upper site was located about 1 km downstream from the river's origin at the confluence of Lanes, Diamond and Spring creeks. The lower site was located at the point furthest downstream on the WMA property. The third thermograph was located on Angus Creek (site 3) about 1 km above its confluence with the Blackfoot River, midway between the two river thermographs (Figure 1). Additionally, we established nine photo-point locations distributed throughout the WMA river reach. Photo-points were marked with 1.8-m long, flexible Carsonite posts, extending about 1.1 m above the ground.

Spawning Run Observations

Fish Trap-Since 1991, we have attempted to operate a fish trap on the upper Blackfoot River to count pre-spawning cutthroat trout migrating from Blackfoot Reservoir. The trap is located approximately 2 km upriver from Blackfoot Reservoir at a site locally known as the sucker trap. Trapping was possible in 1991 and 1992, which were drought years with very little

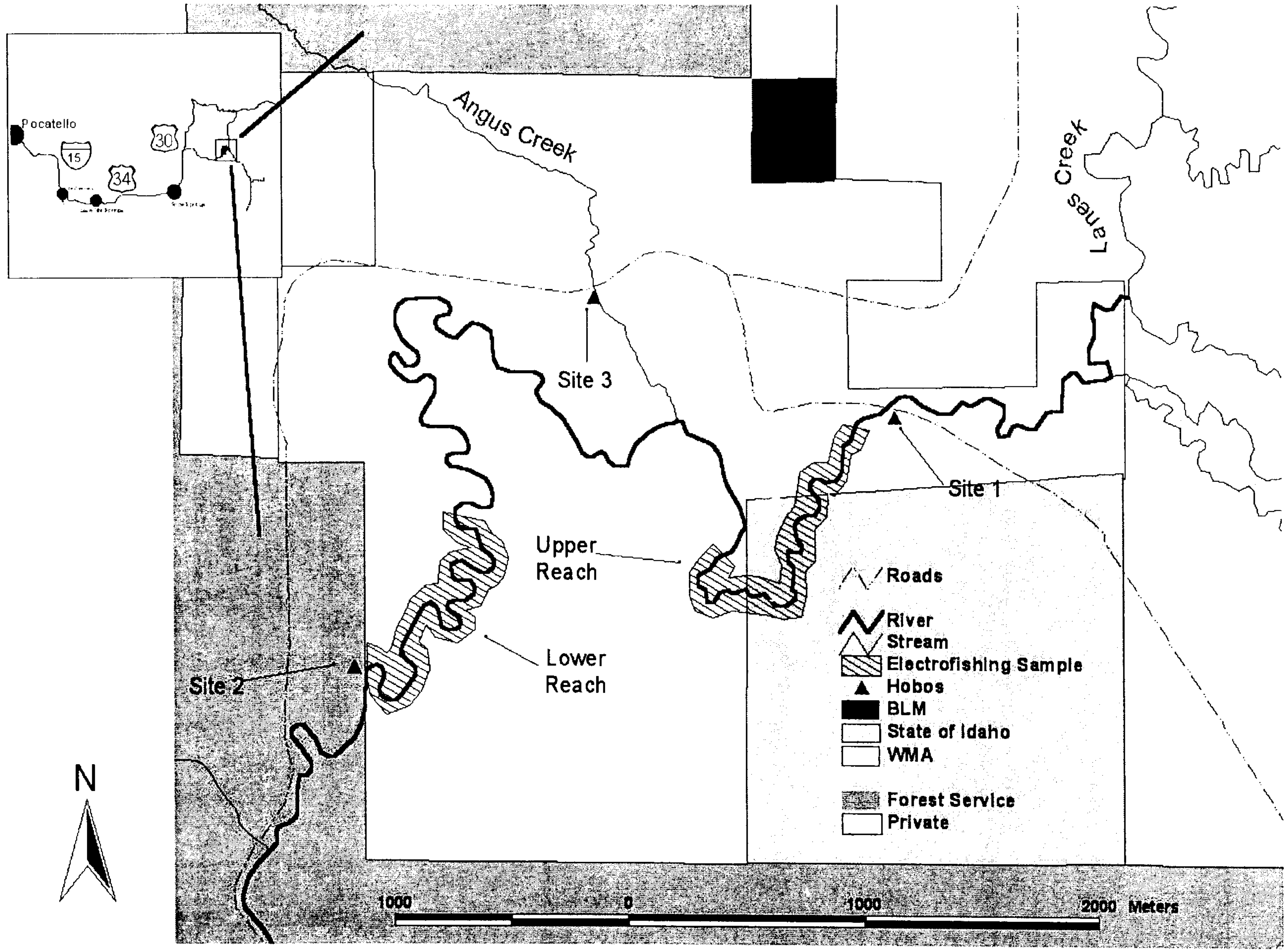


Figure 1. Map of upper Blackfoot River WMA indicating locations of electrofishing reaches and HOBO temperature data loggers for summer 1995.

rise in flow from snowmelt. In those years, we counted 575 and 521 pre-spawn cutthroat trout, respectively. During 1991 and 1992, water temperatures rose early in the spring, stimulating a prespawning run of Utah suckers *Catostomus ardens* that ran simultaneously with the cutthroat trout. In both years a commercial fisherman removed the Utah suckers at the trap. In 1991, 110,000 kg of Utah suckers were removed. Since the fish averaged 2 kg each, about 55,000 individuals were harvested.

In 1993, a large snowpack produced spring flows too large for trap operation. In 1994, another drought year, an early freshet in March prevented us from installing the trap until mid-April and it is likely that many cutthroat trout passed the trap location before trapping began. In 1995 we installed the trap in early March. We operated the trap throughout the spawning run into mid-June. We attempted to maintain genetic purity in the run by preventing upstream movement of rainbow trout and Bear Lake cutthroat trout *O. clarki Utah* (identified by adipose clip). The exotic trout were transported to Meadow Creek and released.

Spawning Ground Surveys-Thurow (1980) began spawning ground surveys on major spawning tributaries of the upper Blackfoot River in 1978. The surveys were continued through 1993 when redd counts became so low that we began to question our ability to identify redds. Standard redd count locations were on Bacon, Browns Canyon, Diamond, Spring, Kendall, Lanes, Sheep, Stewart, Timber and Timothy creeks. In 1995 we conducted spawning ground surveys on the standard transects of Sheep and Spring creeks only.

Lower Blackfoot River Population Estimate

On October 18, 1995, we electrofished a section of the lower Blackfoot River on the Reed Ranch and collected all fish possible. All cutthroat trout and mountain whitefish *Prosopium williamsoni* captured were adipose fin-clipped to provide a mark. On October 30, we returned to the same location and again collected all fish possible with electrofishing equipment. All fish were measured for length and a sub-sample was weighed during each electrofishing event. The number of previously marked fish was noted during the second survey. The number of fish marked during the first day multiplied by the number of fish captured the second day and divided by the number of marked fish recaptured provides an estimate of fish population in the sampled area.

Arimo Ranch on Marsh Creek

The Department signed a 10-year agreement with the Arimo Ranch on Marsh Creek to improve water quality and riparian habitat. The Department applied for and received a Section 319 of the Clean Water Act grant for materials and construction of a riparian corridor fence to exclude livestock from about 40% of the ranch reach. The rest of the riparian corridor would be managed with riparian pastures. A three-person crew electrofished four 400 m sections of the Arimo Ranch reach of Marsh Creek on August 1, 1995. They also surveyed the stream substrate and habitat within the four sections. We deployed thermographs at the upper and lower ends of the 6.4 km stream reach and operated them from July 5 through the end of September. The baseline data will be compared with future readings after the project riparian areas have had a chance to recover from the impacts of livestock.

Edson Fichter Nature Area on Lower Portneuf River

In May of 1994, the Department purchased the 17.4 ha plot of land in Bannock County subsequently named the Edson Fichter Nature Area. Plans for the site, located at the southern end of Pocatello, include the establishment of a put-and-take trout fishery in the Portneuf River where it runs through the Nature Area. In order to determine the feasibility of such a fishery, one thermograph was deployed on July 5 and removed at the end of September 1995.

Snake River below American Falls Reservoir

On the opening day of fishing season, May 27, 1995, we interviewed anglers and measured fish in their catch on the Snake River below American Falls Reservoir. Most of the information came from completed fishing trips of boat anglers. As a measure to prevent overharvest of the tailwater fishery, the Snake River from American Falls Dam downstream approximately 13 km is closed from October 31 until the Saturday of Memorial Day weekend. Several hundred anglers, most fishing from boats, traditionally fish this reach on the opening weekend. Trout and trout food enter the river from 22,700 ha American Falls Reservoir, making this tailwater reach of the Snake River a high quality and quantity trout fishery. Game species present include rainbow trout, cutthroat trout, brown trout *Salmo trutta*, yellow perch *Perca flavescens* and white sturgeon *Acipenser transmontanus*.

Crow Creek

Crow Creek is a major tributary of the Salt River in Wyoming and it provides spawning and rearing habitat for cutthroat trout, brown trout and mountain whitefish. However, because of Crow Creek's geographical isolation (extreme eastern edge of the region), the Department has gathered little information on the status of this fishery. In order to increase our knowledge and evaluate the effectiveness of the cutthroat trout slot-limit, on June 27 and 28 we electrofished four reaches of Crow Creek using canoe-mounted electrofishing equipment. We measured and weighed all salmonids collected. Results from the four reaches were pooled and compared to similar collections performed in 1993. The earlier collections had been done on five Crow Creek sections and one Deer Creek section, which is a tributary to upper Crow Creek.

St. Charles Creek

Snorkel Survey

On August 31, 1995, we conducted snorkel surveys on two sections of St. Charles Creek. The snorkeling sections were in the approximate locations of the 1987 electrofishing sections described in Schill and Heimer (1988); scck-1 on the lower kilometer of the Little Arm of St. Charles Creek branch and scck-5 less than ½-km above the Little/Big Arm split (Figure 2). On the Little Arm of St. Charles Creek we surveyed 107 m of stream running through Glen

Transtrum's property. We sampled 130 m of St. Charles Creek near scck-5. In the 1995 snorkel survey, two or three observers in wetsuits, facemasks, and snorkels worked their way upstream through the sections of stream and reported to a recorder the species and estimated length (to the nearest inch) of each fish observed. Additionally, we recorded the length and several widths of each section snorkeled. Habitat type, water depth and substrate composition were also recorded at 20 m intervals throughout the length of each section.

Previously, Schill and Heimer (1988) 1987 found 2 trout/100 m^2 of age-1+ fish at scck-1 of which 96% were wild cutthroat trout and 4% were brook trout. The survey also found 9 trout/100 m^2 of age-1+ fish in section scck-5 of which 51% were brook trout, 13% were cutthroat trout, 31% were rainbow trout and 3% were rainbow-cutthroat trout hybrids. Since sampling was done in September, the authors thought that the cutthroat trout in scck-1, within 2 km of Bear Lake, might have been outmigrant parr on their way to Bear Lake. All cutthroat trout sampled were between 100 and 185 mm.

Thermographs

We operated continuous recording thermographs from June 7 to October 3, 1994 at scck-5 and below scck-1, just above the Bear Lake estuary (Figure 2). The upper section (5) was at the lower end of a high gradient reach, at the base of a canyon. Within the stream stretch that passes from scck-5 to scck-1 the gradient is lower, and much of the water is removed at the Big/Little branch split. There are two diversions on the Little Arm reach upstream from the lowest thermograph. The diversions at times further reduce flows and receive water returning from irrigated fields. Significant changes in flow during mid-summer possibly cause large temperature fluctuations.

Fish Trap

We established a fish trap on the Little Arm of St. Charles Creek immediately below the Pole Line Road Bridge on May 9, 1995 (Figure 2). The trap allowed us to count pre-spawning cutthroat trout ascending St. Charles Creek from Bear Lake and record size and proportionality of the run by sex. We removed the trap on June 13 when the spawning run appeared near completion.

Bonneville Cutthroat Trout

Monitoring of fish density in tributaries (Dry, Giraffe and Preuss creeks) of the Thomas Fork of the Bear River began in 1979 when it was determined that native Bonneville cutthroat trout of good meristic quality persisted in the streams (Wallace 1978). During monitoring activities, multiple sections, approximately 100 m in length, are sampled with backpack electrofishers, within established strata. Fish captured in the first pass are held in the stream outside the sampled section in perforated buckets. Then a second pass is made. If the number of fish captured in the second pass is less than 30% of the first pass, then the data are sufficient to estimate the population in the section and no further collection occurs. If more than 30% of the previous pass are caught then another pass is made until the <30% number is achieved.

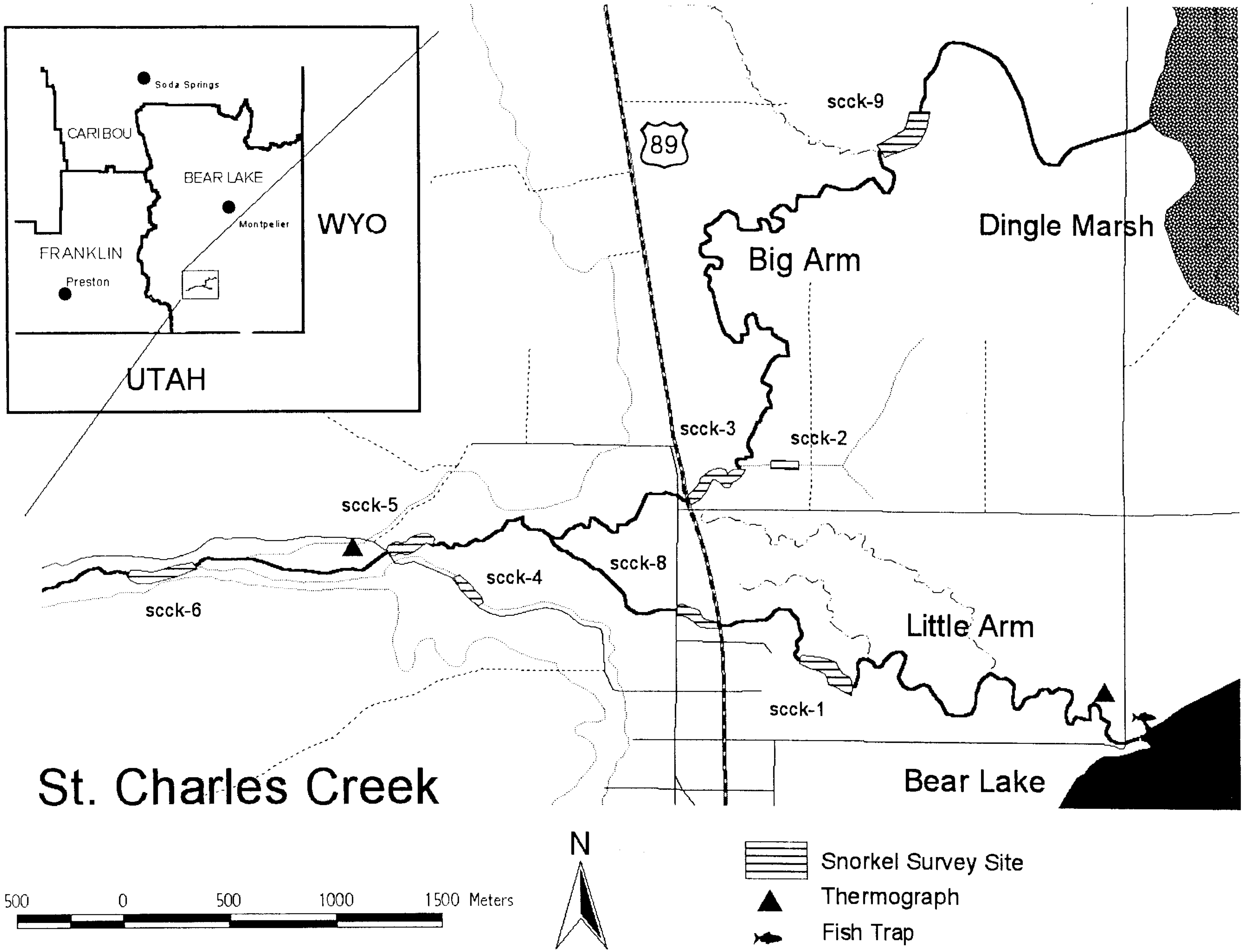


Figure 2. Map of St. Charles Creek, Idaho, indicating snorkel survey site locations.

After all passes are complete, the captured fish are identified as to species, measured and returned to the stream. We also measure length, average width and average depth of each section. We estimate the relative abundance of sand, gravel, rubble and boulder at the substrate surface and estimate the percentage of the section that has pool, run, riffle, pocket-water, and backwater habitat.

In the early 1990s cutthroat trout density in the Thomas Fork tributaries was very low (Figure 3). To improve conditions for cutthroat trout, fishing was closed in 1992 and in 1994 a conservation agreement was developed with livestock grazing permittees and natural resource agencies to reduce grazing impacts in riparian areas. Additionally, annual precipitation increased in 1993. Improvements in water flow, riparian habitat, and fish populations have since occurred.

Preuss Creek is sampled on Forest Service lands from its headwater above the Crow Creek Road downstream to the private land boundary through a distance of 12.8 km (Figure 4). The greatest amount of sampling has occurred in stratum B with samples from 8 of the last 11 years. A short, approximately 100-m long, livestock exclosure was constructed in stratum B, just below the mouth of Beaver Creek in 1981. Separate sections, both inside and outside the exclosure are sampled. Forest Service lands along Dry Creek have been partitioned for sampling purposes into three stream reach strata (Figure 4). Stratum A along Dry Creek is a cattle exclosure. The entire length of Giraffe Creek in Idaho is on Forest Service Land. Giraffe Creek flows from the Caribou National Forest in Idaho to the Bridger-Teton National Forest in Wyoming. From 1980 through 1994 there was an approximately 100-m long livestock exclosure (stratum B) within the meadow reach (stratum C). Beginning in 1995 the entire meadow (stratum C) became a livestock exclosure; therefore, stratum B no longer exists.

RESULTS AND DISCUSSION

Upper Blackfoot River

Opening Day Creel Survey

A total of 58 anglers came through the Trail Creek Road check station. Of those, 19 (33%) were non-residents. Interviewed anglers fished 223 hours and caught 336 trout for a catch rate of 1.5 fish/h. Of those fish caught, 69% were wild cutthroat trout and 31% were rainbow trout. Anglers released all the trout they reported catching, including six cutthroat trout that were reported to be between 18 and 20 inches, and could have been legally harvested. Anglers fished an average of 3.84 hours and caught an average of 4 trout. Angler estimates of the size of cutthroat trout they released were generally in the 12-17 inch range. A comparison of 1995's check station results with 1994's is provided in Table 1.

Blackfoot River Wildlife Management Area

<u>Population Estimate</u>-We captured 243 cutthroat trout and two brook trout in the 3.1-km upper section and 100 cutthroat trout and two brook trout in the lower 4.0-km section. Trout

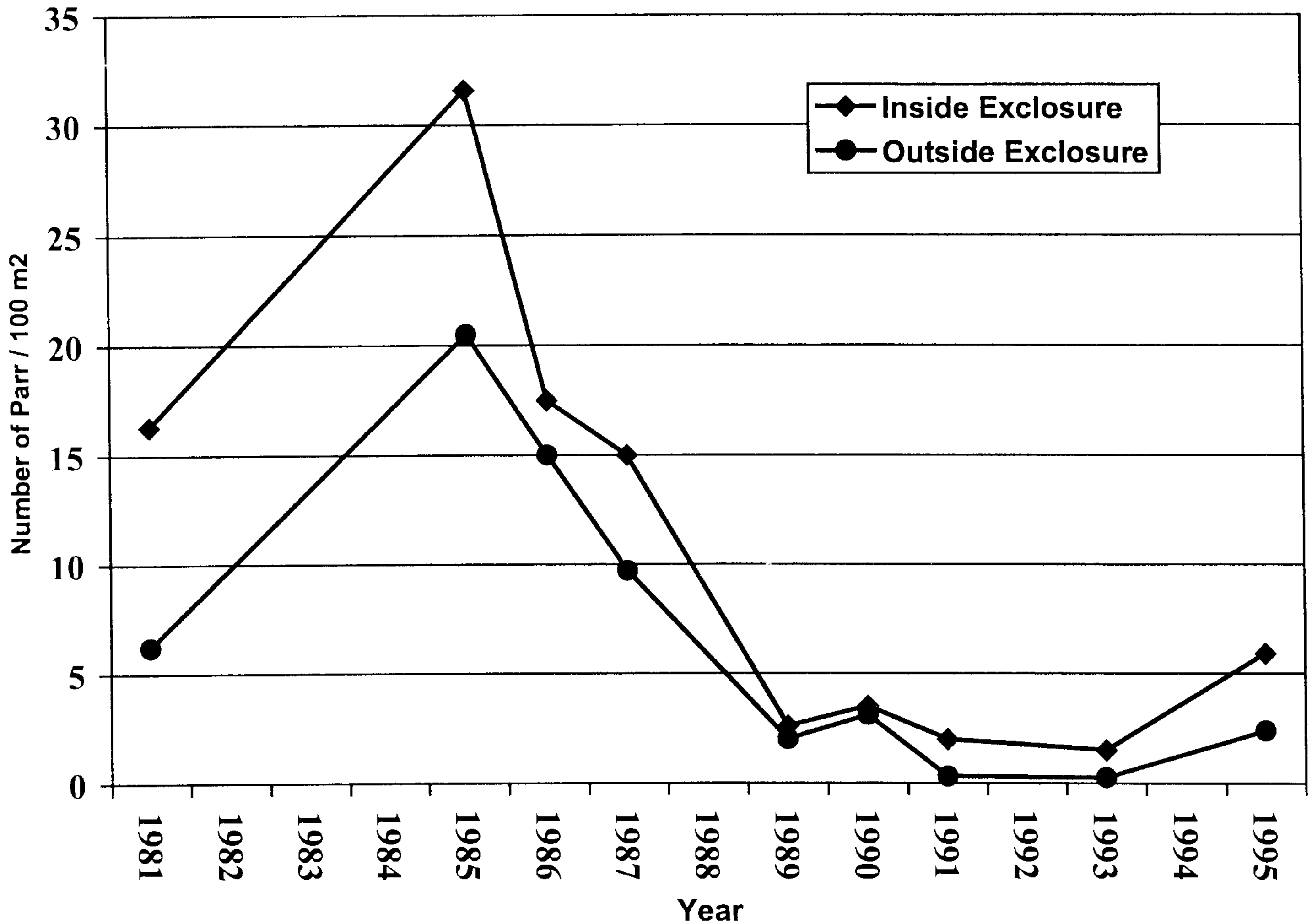
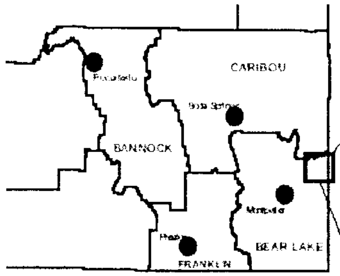
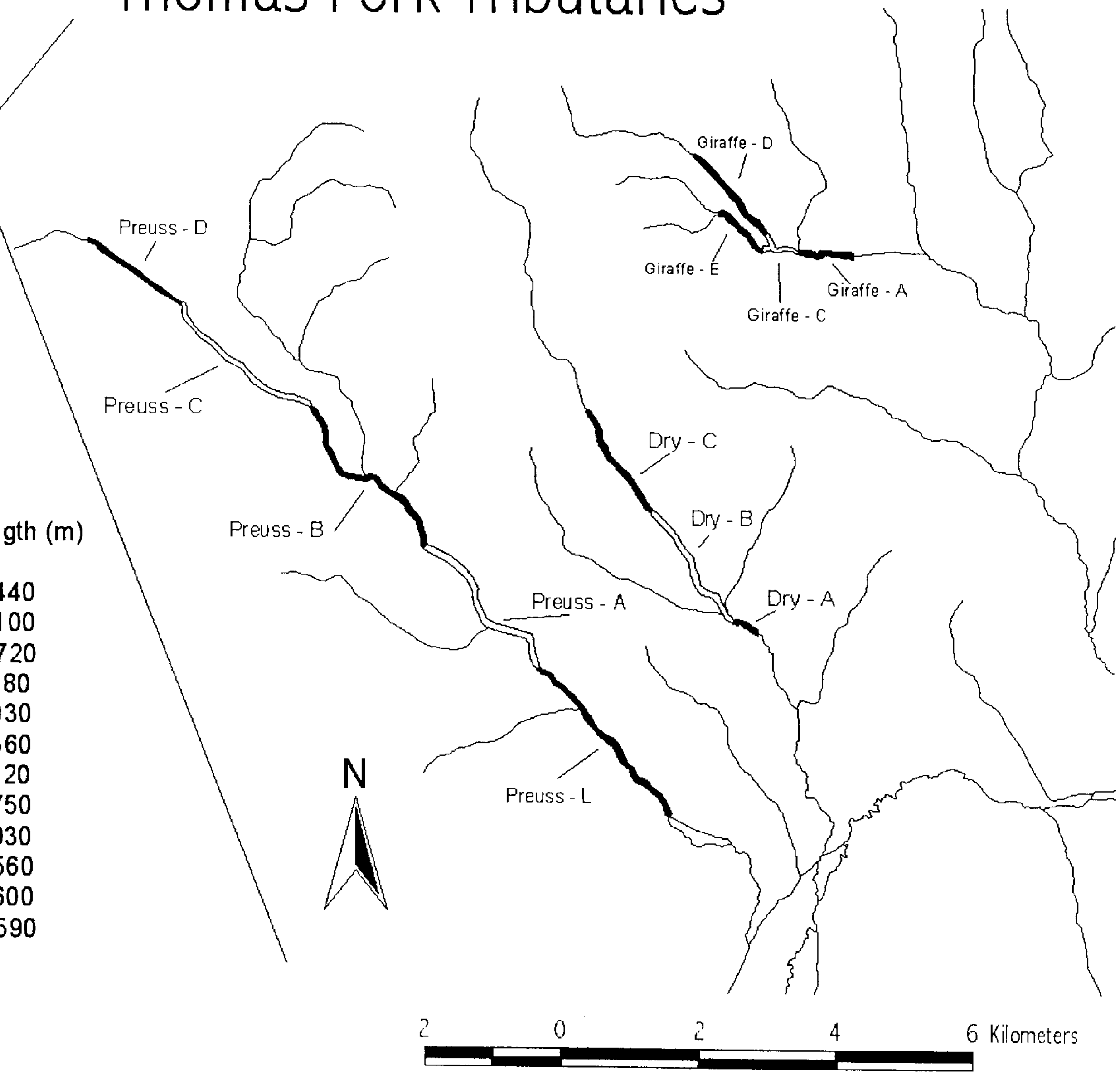


Figure 3. Parr densities inside and outside of cattle exclosure on Preuss Creek, Idaho, from 1981 through 1995.

Thomas Fork Tributaries





Stratum	Length (m)
Dry - A	440
Dry - B	2100
Dry - C	1720
Giraffe - A	880
Giraffe - C	1030
Giraffe - D	1560
Giraffe - E	920
Preuss - A	2750
Preuss - B	3030
Preuss - C	2560
Preuss - D	1600
Preuss - L	3590

Figure 4. Map indicating locations and lengths of sampling strata in the tributaries of the Thomas Fork of the Bear River, Idaho.

Table 1. Trend in statistics from the opening day (July 1) creel survey on the upper Blackfoot River, Idaho, from 1994 and 1995.

	1994	**1995**
Number of anglers checked	36	58
Non-resident anglers	8%	33%
Total Hours Fished	155	233
Total Trout Caught	288	336
% Wild Cutthroat Trout	77%	69%
% Rainbow Trout	21%	31%
% Brook Trout	<1%	0%
% of Cutthroat Trout Estimated $\geq$ 18 inches	1.8%	2.6%
Mean Individual Effort h/angler	4.3	3.84
Catch Rate (fish/h)	1.9	1.5
Cutthroat Trout Size (Estimated to nearest inch)	mostly 12-17 inches with a few 18-20 inches	mostly 12-17 inches with a few 18-20 inches

population estimates (and densities) for the two sections were 454 (1.07/m^2) and 215 (0.28/m^2), respectively. Fish population confidence intervals were 348 to 651 in the upper section and 140 to 466 in the lower section. Mean size of trout in the upper section (273 mm) was smaller than in the lower section (316 mm), with much of the fish in the upper section appearing to be age-1+ and age-2+ cutthroat trout 140 mm to 220 mm in length (Figure 5 and Figure 6). Only 3% of the cutthroat trout sampled exceeded the 457 mm minimum harvest size. However, the time of year may have affected the sample. Many of the post-spawn cutthroat trout may have moved further downstream toward Blackfoot Reservoir.

Substrate in the upper reach contained 32% sand, 42% gravel and 26% rubble. Sand in riffles was 27% of the substrate composition. Riffles comprised 39% of the habitat. This indicates good juvenile rearing habitat and fair spawning habitat as percent sand is marginally high (Scully and Petrosky 1991). Substrate in the lower reach contained 66% sand, 17%gravel and 17% rubble. Sand in riffles was 74% of the substrate composition. Runs and pools comprised 73% of the habitat. The habitat is satisfactory for adult trout, poor for rearing juveniles, and not satisfactory for spawning.

Riparian habitat management on the WMA will emphasize recovery of riparian vegetation and stabilizing riverbanks. Less sediment will recruit to the river from the WMA, undercut bank habitat should increase and overhanging sedges and larger willows should increase in abundance. Nevertheless, water quality and suspended sediment on the WMA is very dependent on riparian and stream bank management upstream. It is a long-term objective for the WMA to allow grazing on the WMA uplands by livestock owned by upstream landowners, in exchange for management on their lands that will lead to improved riparian and stream bank habitat. This will not only improve trout habitat upstream but will improve quality of water arriving at the WMA.

Thermographs-Water temperature at site 1 remained below 20°C during the interval from July 12 through September 30 (Figure 7). Temperatures reached 19°C on only three days and 18°C only 10 days. Daily temperatures fluctuated as much as 11°C within each of 3 days. The mean daily temperatures spanned a range of 8.1°C. Temperatures generally fell below 12°C every night during the summer. Temperatures rarely rose above 11°C after mid-September.

After the river's water had reached site 2, water temperatures were typically cooler and within-day fluctuations decreased (Figure 7). Temperatures remained below 20°C, reaching 19°C on one day and 18°C on 8 days. Within-day temperature fluctuations never exceeded 7°C and the mean within-day fluctuation was 5.0°C. Water temperature on the Blackfoot River WMA reach was not as influenced by the variable air temperature as the three tributaries that entered not far above site 1.

Angus Creek was much warmer than both Blackfoot River sites and had the widest daily temperature fluctuations (Figure 7). Of the 61 summer days considered (July 12 through September 10), 54 (89%) had water temperatures reaching 20°C or higher. Temperatures rose to 22°C on 21 days and even reached 24°C on two days. Mean daily temperature fluctuation was 9.3°C. Temperatures nearly always fell to near 15°C or lower at night.

Water temperatures at site 1 on the Blackfoot River were much cooler than on downstream Angus Creek. Also, minimum temperatures at the upper Blackfoot River site were generally about 3°C cooler than in Angus Creek. Thus Angus Creek water was warmer

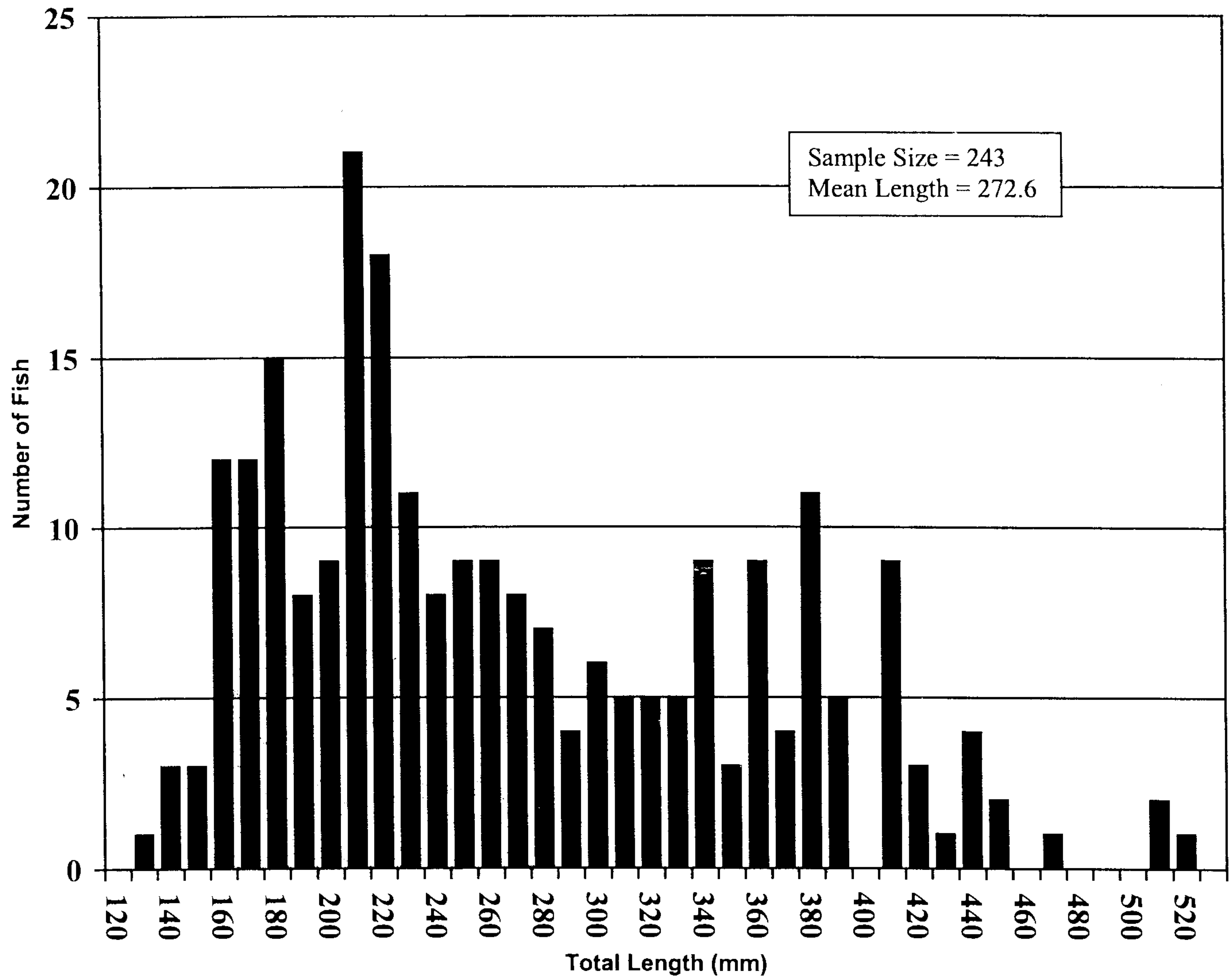


Figure 5. Length frequency of cutthroat trout caught to determine population density on the upper section of the Blackfoot River Wildlife Management Area, upper Blackfoot River, Idaho, August 22 and 29, 1995

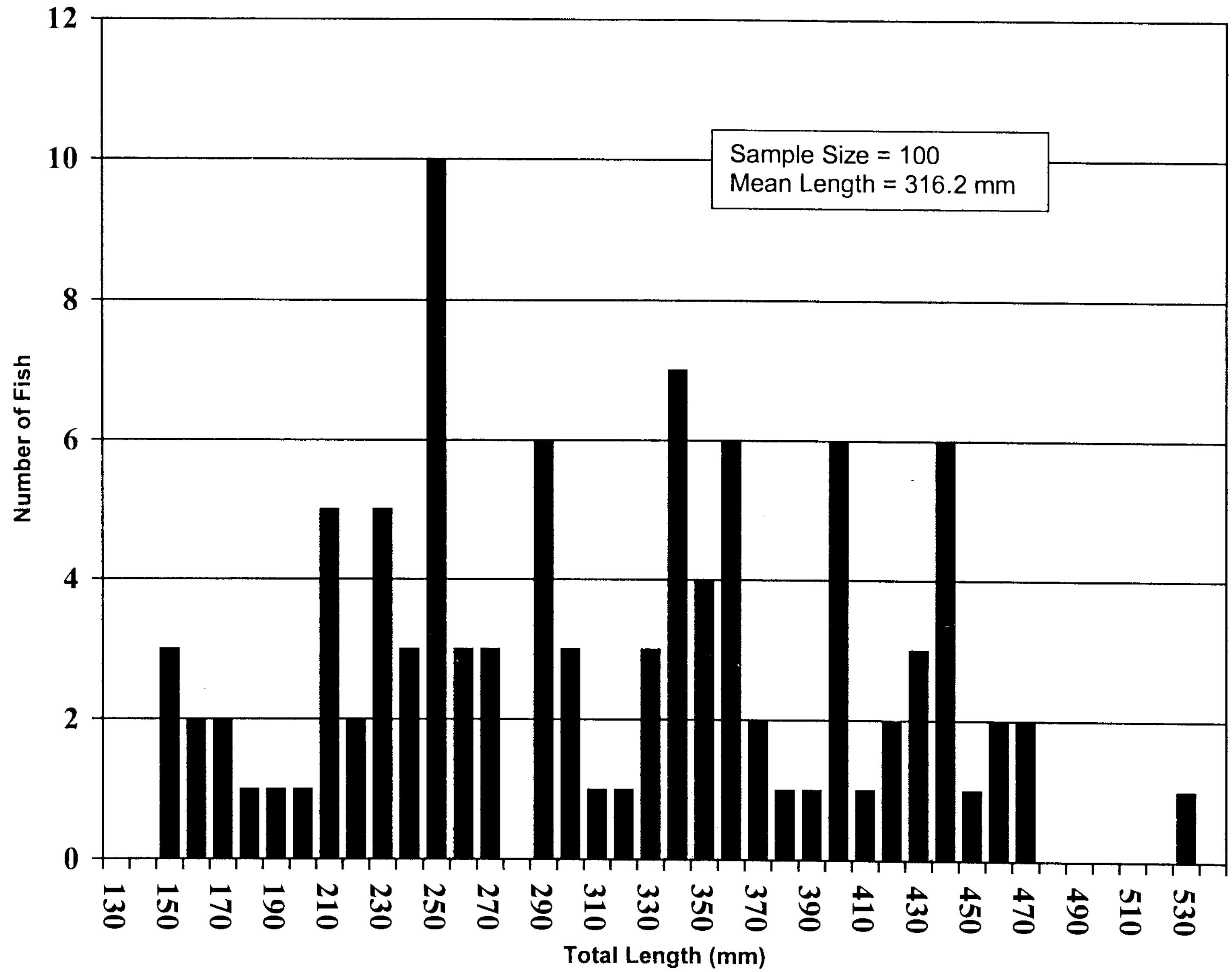


Figure 6. Length frequency of cutthroat trout caught to determine population density on the lower section of the Blackfoot River Wildlife Management Area, upper Blackfoot River, Idaho, August 22 and 29, 1995.

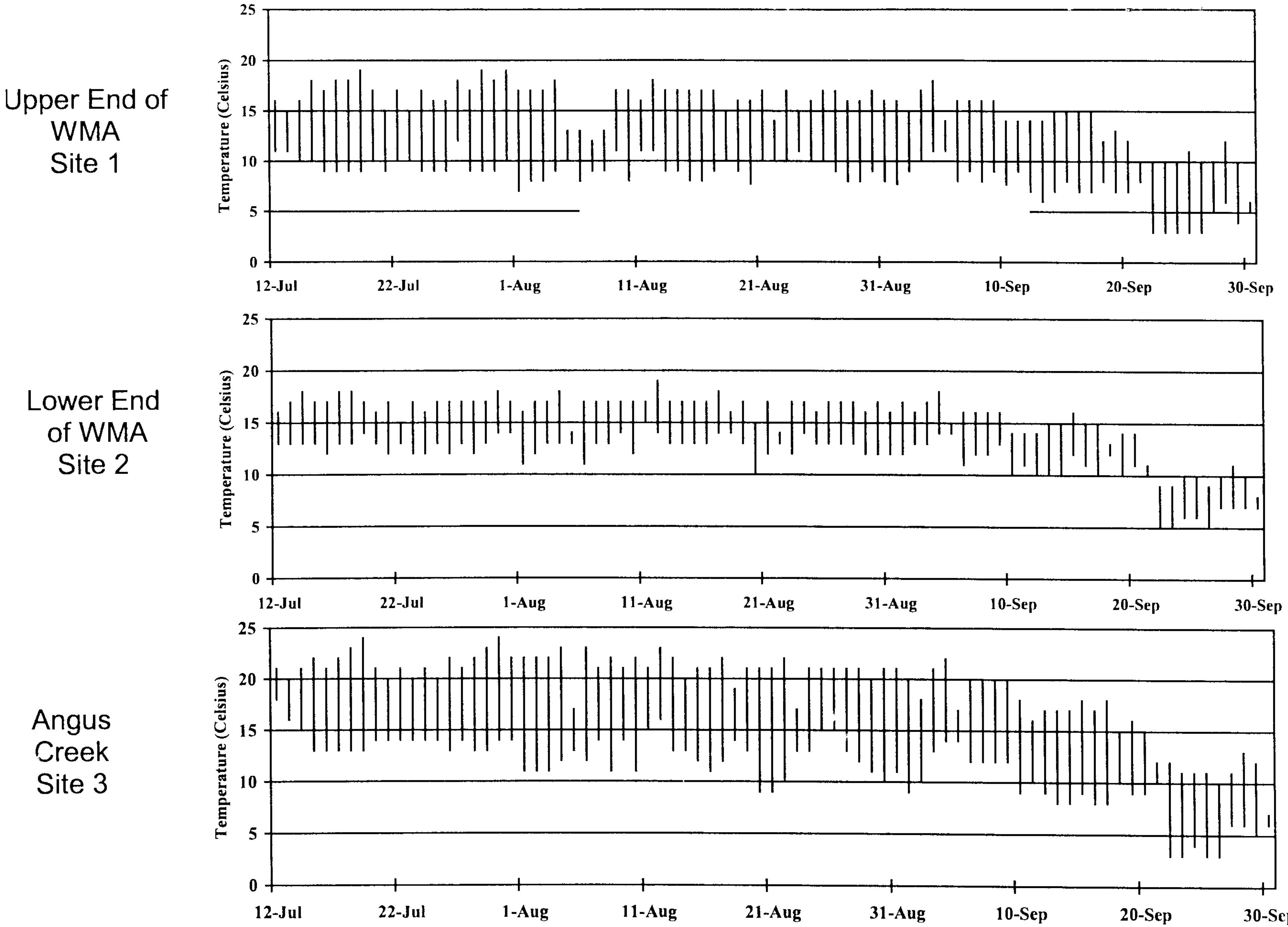


Figure 7. Water temperature regimens for July 12 through September 30, 1995, from three sites on the Blackfoot River Management Area, Idaho.

throughout the day and stayed warmer at night than the river. Also, daily temperature fluctuations were highest at the Angus Creek site. Because of the temperature regime, there are few trout but numerous redside shiners *Richardsonius balteatus* in Angus Creek. Unless warm-water springs exist on Angus Creek, the warmer water is probably due to solar radiation on the wide, shallow stream with a north facing aspect. However this shouldn't cause the warm night temperatures. As riparian vegetation increases in size and abundance within the WMA, the shading effect will hopefully cool summer water temperatures on lower Angus Creek. Such a change should be more evident on Angus Creek than on the river.

Spawning Run Observations

Fish Trap-1995 was an ideal year for trapping. The fish trap was installed before any spring freshets and each time water temperatures would rise to near 10 °C, cool weather would reduce it and slow the snowmelt. The cool water temperatures kept Utah suckers from running during the April-May period of the cutthroat trout run. Additionally, cool temperatures kept snow from melting quickly so that we were able to trap the months of April and May with the trap flooding out only a total four days in April. The trap captured 1,663 pre-spawn cutthroat trout in 1995. Before and after the four-day period that the trap flooded, daily cutthroat trout catches were between 50 and 100. It is likely that the actual cutthroat trout pre-spawning run was near 2,000 (Table 2).

Spawning Ground Surveys-In two important spawning tributaries, Sheep and Spring creeks, redd numbers have seriously declined. During the 1980-1985 interval, Sheep Creek had an average of 37 observed redds within the standard transect. That number has dropped to 10 in 1995. An average of 129 redds were observed during the 1980-1985 interval in Spring Creek. In 1995, only 13 redds were observed in the same transect. These numbers represent a 72% and 90% decrease respectively. Historical spawning ground survey data from the upper Blackfoot River tributaries is presented in Appendix A.

Lower Blackfoot River Population Estimate

Population estimates in the Reed Ranch section for cutthroat trout and mountain whitefish $\geq$150 mm (age-1+) were 96 and 242, respectively. Catch statistics for the two species are presented in Figure 8 and Figure 9.

Arimo Ranch on Marsh Creek

Population Estimates

The surveys documented that the Marsh Creek reach was poor habitat for salmonids. Density of all (game and non-game) fish combined was 0.58/100 m^2 (Table 3). However, only 2 of 95 fish sampled were trout, one 33-cm cutthroat and one 43-cm brown trout. Most of the fish present were Utah suckers with a smaller number of carp and Utah chubs. Healthy trout streams should have few or none of the non-game species and should have 10-20 age 1+ trout/100 m^2.

Table 2. Recent catch at fish traps on the upper Blackfoot River "sucker trap" (located 0.5 km east of the China Hat store) and on the Little Blackfoot River (located at Henry), Idaho.

Year	"Sucker trap" on the Blackfoot River					Trap on the Little Blackfoot River
	Yellowstone Cutthroat Trout	Bear Lake Cutthroat Trout	Rainbow x Cutthroat Trout Hybrids	Rainbow Trout	Utah Suckers	Bear Lake Cutthroat Trout
1989						583
1990						203
1991	575	31		96	55,000	85
1992	521	15		?	?	4
1993	53[a]	1	2	3	?	
1994	145[b]	28	16	21	30,000	
1995	1,663[c]					

[a] The trap was flooded for 21 days in the middle of the run so that fish could pass the trap without being counted.
[b] The trap was not installed until after one spring runoff event in late March-early April. An unknown portion of the run was not counted.
[c] For four days during the middle of the spawning run the water was too high, so that fish could pass by the trap. Total run may have been near 2,000.

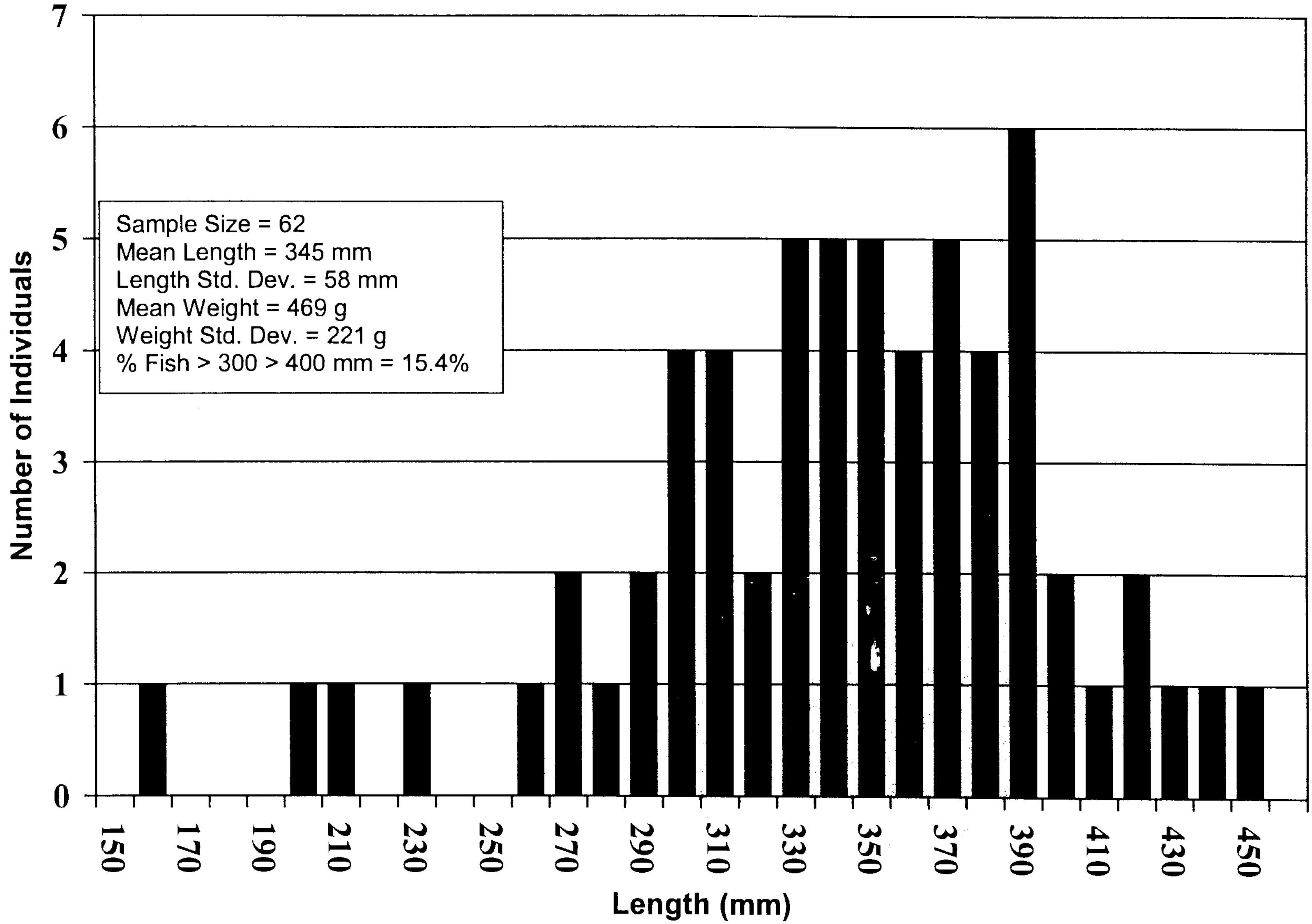


Figure 8. Length frequency distribution and catch statistics of cutthroat trout caught to determine population density on the lower Blackfoot River, Idaho, September 18 and 30, 1995.

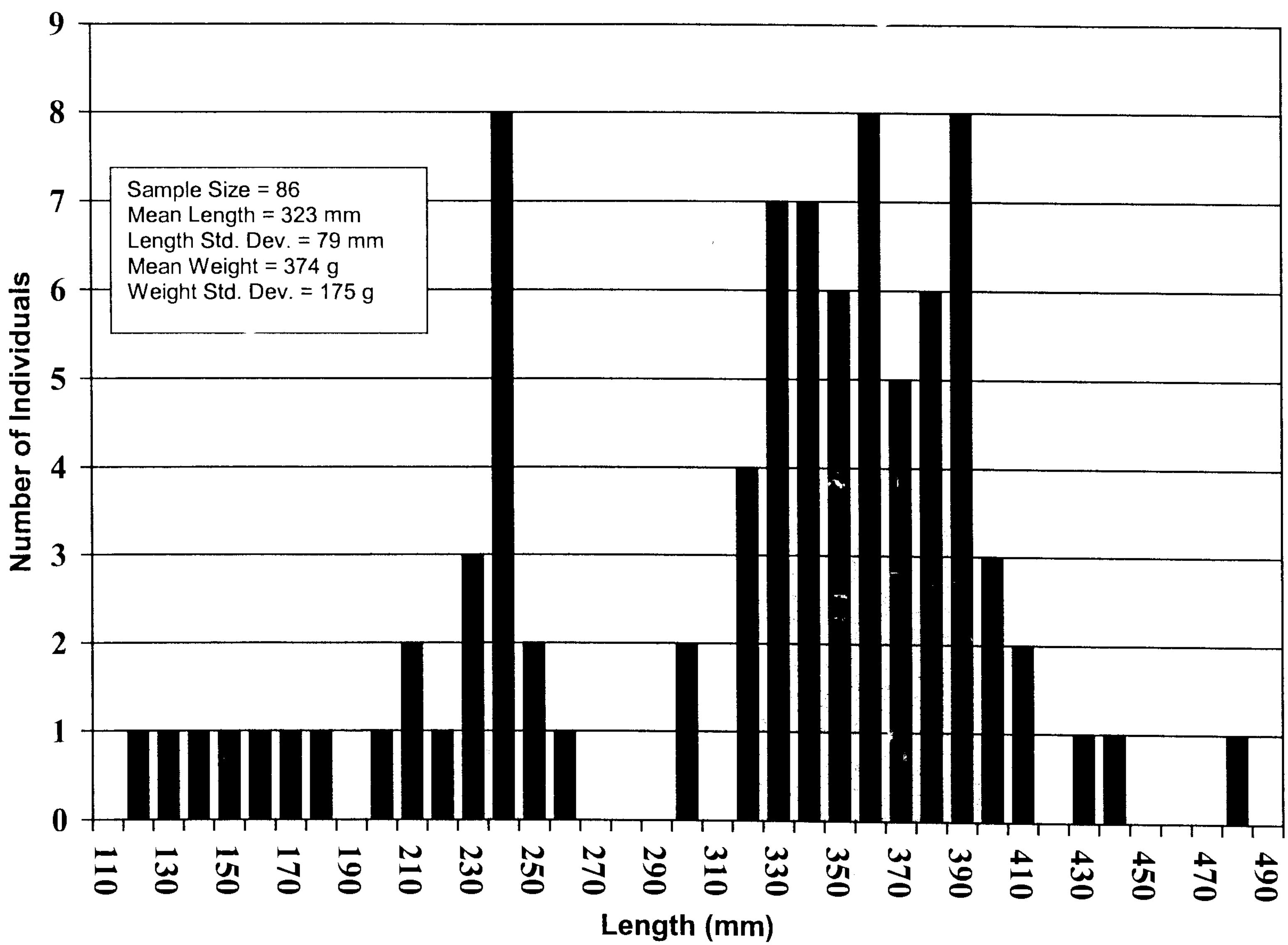


Figure 9. Length frequency distribution and catch statistics of mountain whitefish caught to determine population density on the lower Blackfoot River, Idaho, September 18 and 30, 1995.

Table 3. Sample size, mean length and density of fish species captured on the Arimo Ranch reach of Marsh Creek, Idaho, August 1, 1995.

Species	**Sample Size**	**Mean Length (mm)**	**Density (number/100 m^2)**
Utah sucker	79	461	0.45
Common carp	7	580	0.04
Utah chub	8	163	0.05
Redside shiner	5	90	0.03
Cutthroat trout	1	340	0.006
Brown trout	1	420	0.006
Totals	**95**		**0.58**

Habitat Assessment

We also surveyed the stream substrate in the four electrofishing sections. The stream bottom was mostly mud. Mud and sand comprised 85% to 99% of the substrate in the four sections sampled. Trout spawning is greatly limited when fines (mud and sand) exceed 30% of the substrate. Trout egg survival would be near zero when fines approach 50%. Ideal trout spawning substrate should be comprised of 80% or more of 6-50 mm gravel. Gravel comprised from 1% to 17% of the substrate in the four sections sampled on the Arimo Ranch reach of Marsh Creek. Thus, gravel is present, but until sediment recruitment from upstream is reduced, and an increasing amount of fines are flushed out, trout spawning in Marsh Creek will not occur. Unfortunately it appears that a large amount of sediment entered the Arimo Ranch reach from upstream in 1995. The problem may have been exacerbated by a channel-dredging project that was permitted across from the town of Downey in the spring of 1995. Additionally, the Arimo Ditch Company flushes sediment from their ditch in the spring, just before irrigation begins, into Marsh Creek about three km upstream from the Arimo Ranch.

The width : depth ratio ranged from 13.1 to 29.7 and averaged 18.0. Healthy streams should have width : depth ratios of less than 10. Platts (1991) stated that livestock grazing could affect the riparian environment by changing, reducing, or eliminating vegetation and by actually eliminating riparian areas through channel widening, channel aggrading, or lowering of the water table. It appears that all of these changes have occurred at Marsh Creek. Platts (1991) further states that streams modified by improper livestock grazing are wider and shallower than normal, containing more fine sediment, and stream banks are more unstable, banks are less undercut and summer water temperatures are higher than in ungrazed reaches; and because of these factors, salmonid populations are reduced. Results of the habitat assessment are presented in Table 4.

Thermographs

On the Arimo Ranch, mean daily water-temperature fluctuations were 5.2°C and 3.9°C at the upper and lower sites, respectively. The upper sight had a higher mean maximum (19.6°C) and a lower mean minimum (14.4°C) than at the lower site (mean range of 19.1°C to 15.2°C). Daily maximum temperatures at both sites frequently reached 20°C to 21°C. These temperatures are good for suckers and minnows, but are considered marginal for salmonids. Complete thermographic data is provided in figure 10.

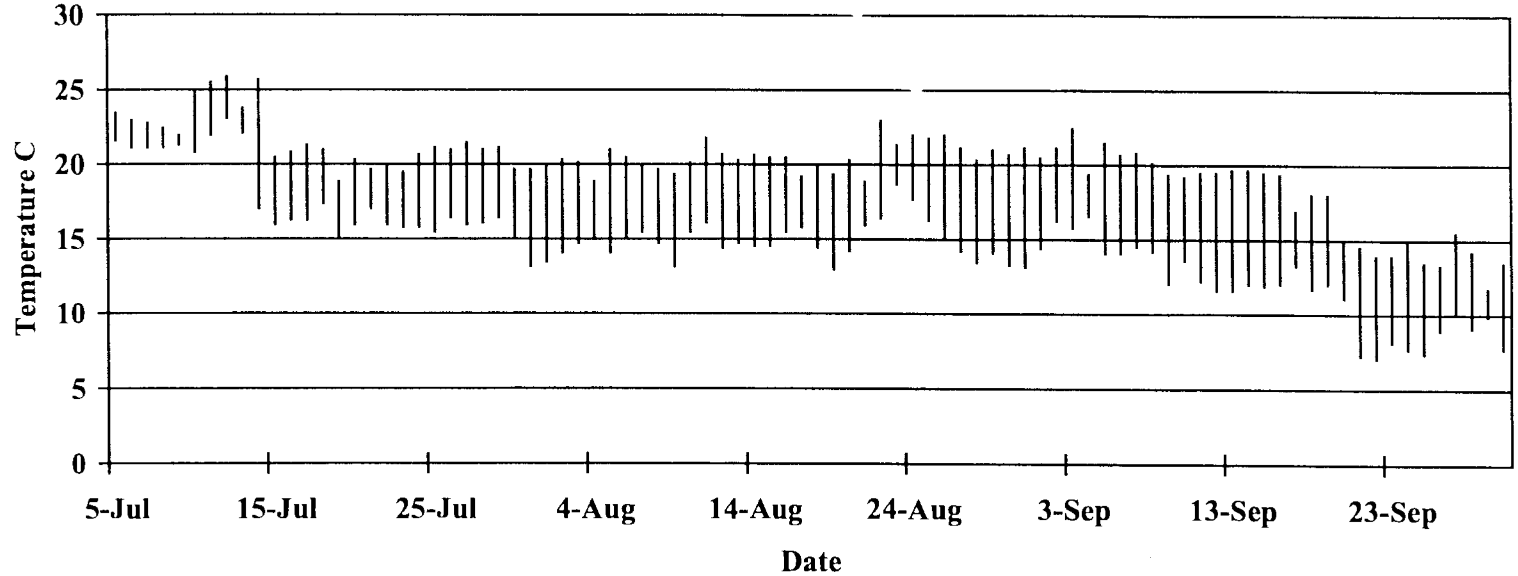
<u>Edson Fichter Nature Area on Lower Portneuf River</u>

In early July, temperatures were high with daily lows near 21°C and daily highs near 23°C to 26°C. During August, temperatures receded slowly, but daily highs remained in the 21°C to 22°C range with lows generally above 17°C. Temperatures stayed below 20°C in September. The summer temperature scenario would not be conducive to maintenance of a salmonid population. On or about August 1 the thermograph recorded a temperature spike of over 30°C. There is a possibility that the thermograph may have been uncovered by water for a short period of time. Excessive irrigation withdrawals may have left the thermograph high and dry. Complete thermographic data is presented in Figure 11.

Table 4. Stream width, depth, substrate composition and habitat type at four sections of the Arimo Ranch on Marsh Creek, Idaho, August 1, 1995.

		Section 1	Section 2	Section 3	Section 4
Length		400 m	400 m	400 m	400 m
Mean width		8.9 m	9.9 m	11.6 m	12.8 m
Mean depth		0.68 m	0.44 m	0.39 m	0.49 m
Width : depth ratio		13.3	33.5	29.7	26.7
Surface area		3,560 m^2	3,968 m^2	4,652 m^2	5,140 m^2
Substrate-surface composition	**Mud**	90%	65%	47%	93%
	Sand	5%	18%	38%	6%
	Gravel	2%	16%	15%	1%
	Rubble	3%			
Habitat type		No data	96% run 4% riffle	100% glide	100% glide

Arimo Ranch Upper Site



Arimo Ranch Lower Site

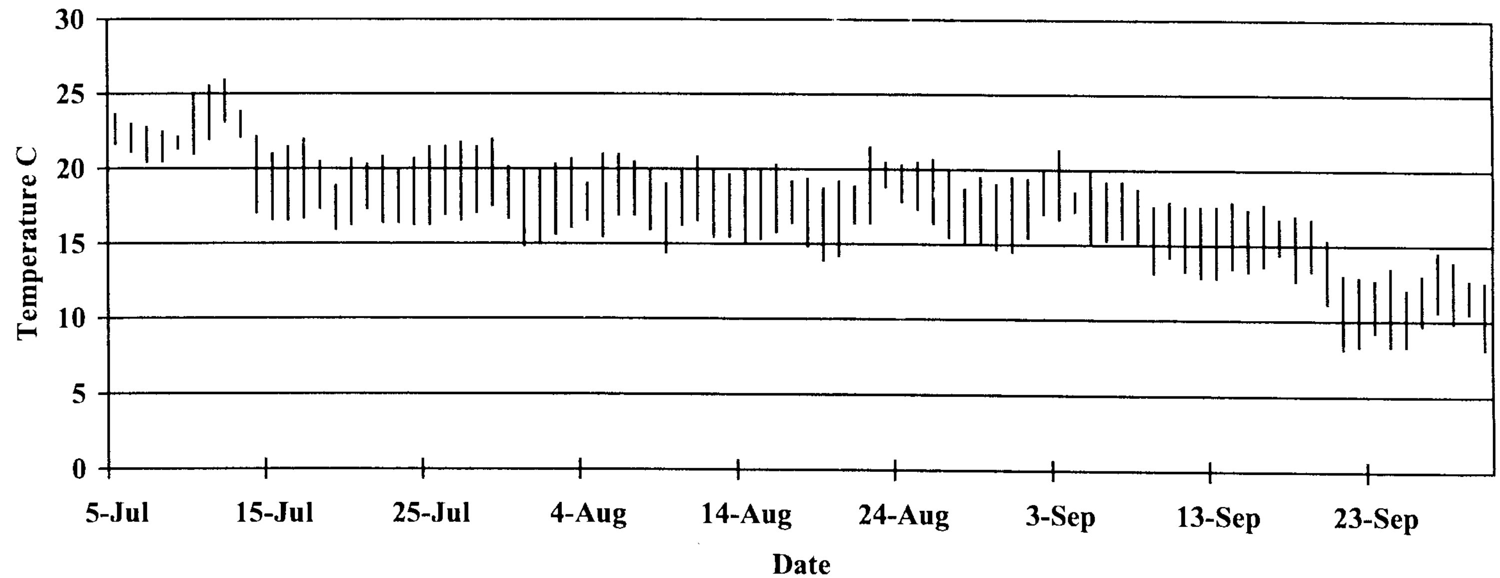


Figure 10. Thermographic data from two sites (upper and lower) on the Arimo Ranch reach of Marsh Creek, Idaho, during the Summer of 1995.

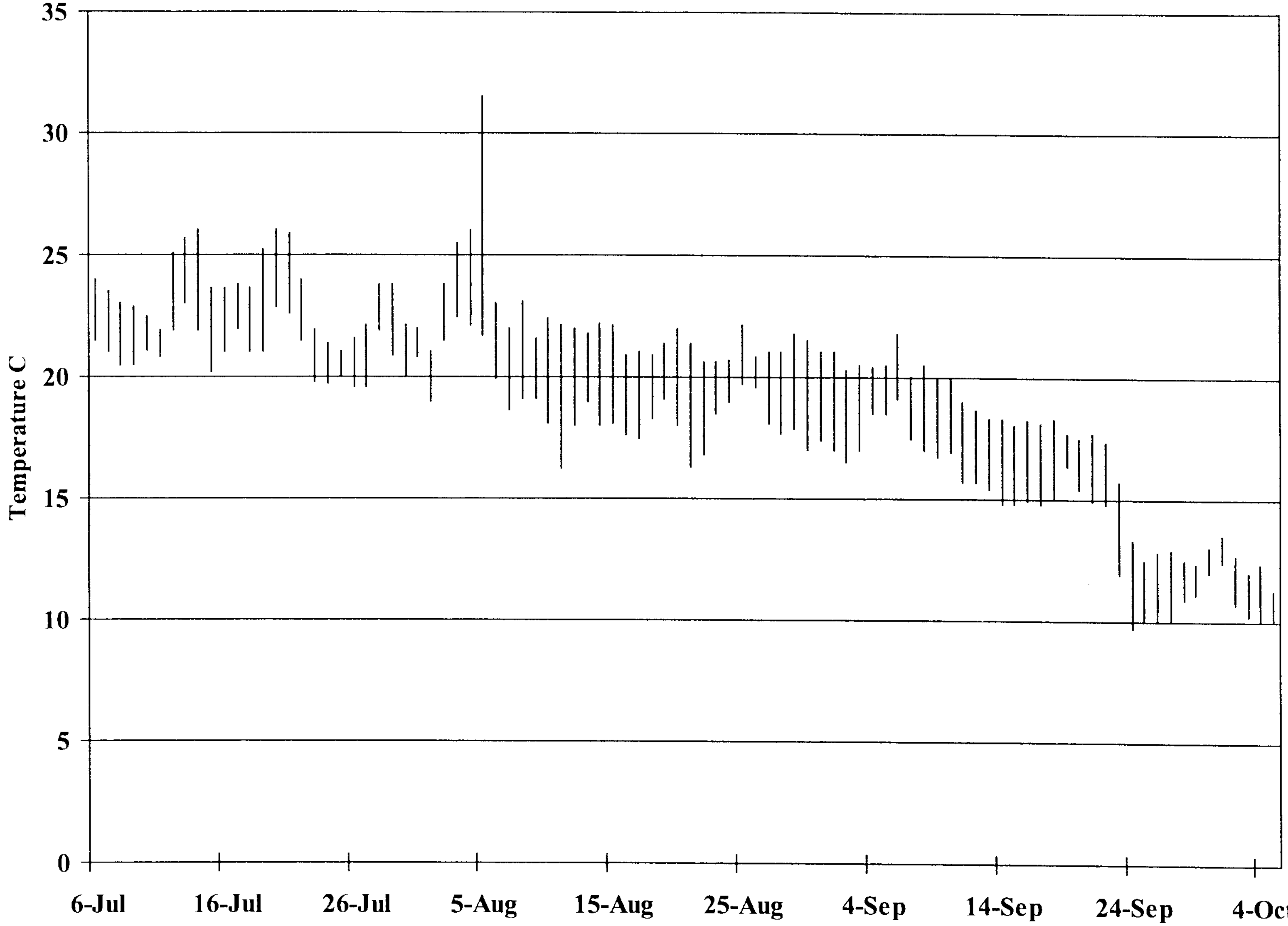


Figure 11. Thermographic data from the Edson Fichter Nature Area reach of the Portneuf River, Idaho, during the summer and early fall of 1995.

Snake River below American Falls Reservoir

On the opening day of fishing season, we interviewed 148 anglers who had fished a total of 677 hours. They caught 564 trout for a catch rate of 0.83 fish/h. They harvested 67% of their catch and released 33%. Of the harvested fish, 98.4% were rainbow trout. The remaining 1.6% were native cutthroat trout. Mean length of trout in the harvest (Figure 12) was 445 mm. Of the trout at least 300 mm long, 84% were also at least 400 mm in length. Only 3 out of 408 trout harvested were less than 300 mm long. Anglers stated that they were very pleased with the catch; however, some anglers expressed a concern that harvest of such a large number of bigger trout would detrimentally impact the fishery.

Crow Creek

The locations of the four sampled sections from 1995 are indicated in Figure 13. We compared the relative abundance of brown and cutthroat trout between the 1993 and 1995 surveys. In 1993, relative numbers were three cutthroat trout for every four brown trout (Scully et al. 1997). By 1995 that ratio had dropped to two cutthroat trout for every four brown trout. Another difference between the two surveys was the presence of mountain whitefish. No whitefish were collected in 1993 whereas they made up 37% of the salmonid catch in 1995. The differences may be because 1995 sample locations were further downstream than the 1993 sample locations.

Although the number of sub-catchable size trout that could potentially recruit to the fishery was nearly equal for cutthroat trout, brown trout and mountain whitefish, there were about twice as many stock size brown trout compared to the others (Table 5). Length frequency distributions for all three species are presented in Figure 14. There were about eight times as many quality size brown trout and whitefish as there were quality size cutthroat trout. The fishery itself, as the individual fish grow larger, may be the cause for the observed change in relative abundance. In general, whitefish are the least desirable salmonid to catch or harvest by anglers and brown trout, while desired, are generally difficult to catch. Thus most harvest pressure on the larger fish falls onto the cutthroat trout and their relative abundance in the population declines as all fish age in the creek.

St. Charles Creek

Snorkel Survey

Density of cutthroat trout and brook trout in scck-1 were each 3.1 age 1+ trout/100 m^2. This is about three times the number of trout estimated in 1987. However, the percent of brook trout in the sample increased from 4% to 50%. In scck-5, there were 3.6 age 1+ cutthroat trout/100 m^2, 8.7 age 1+ brook trout/100 m^2 and 0.3 age 1+ rainbow x cutthroat trout/100 m^2. The relative species composition was similar to that observed in the 1987 electrofishing survey. Estimated length frequency distributions for observed fish from both sections are provided in Figures 15, 16, and 17.

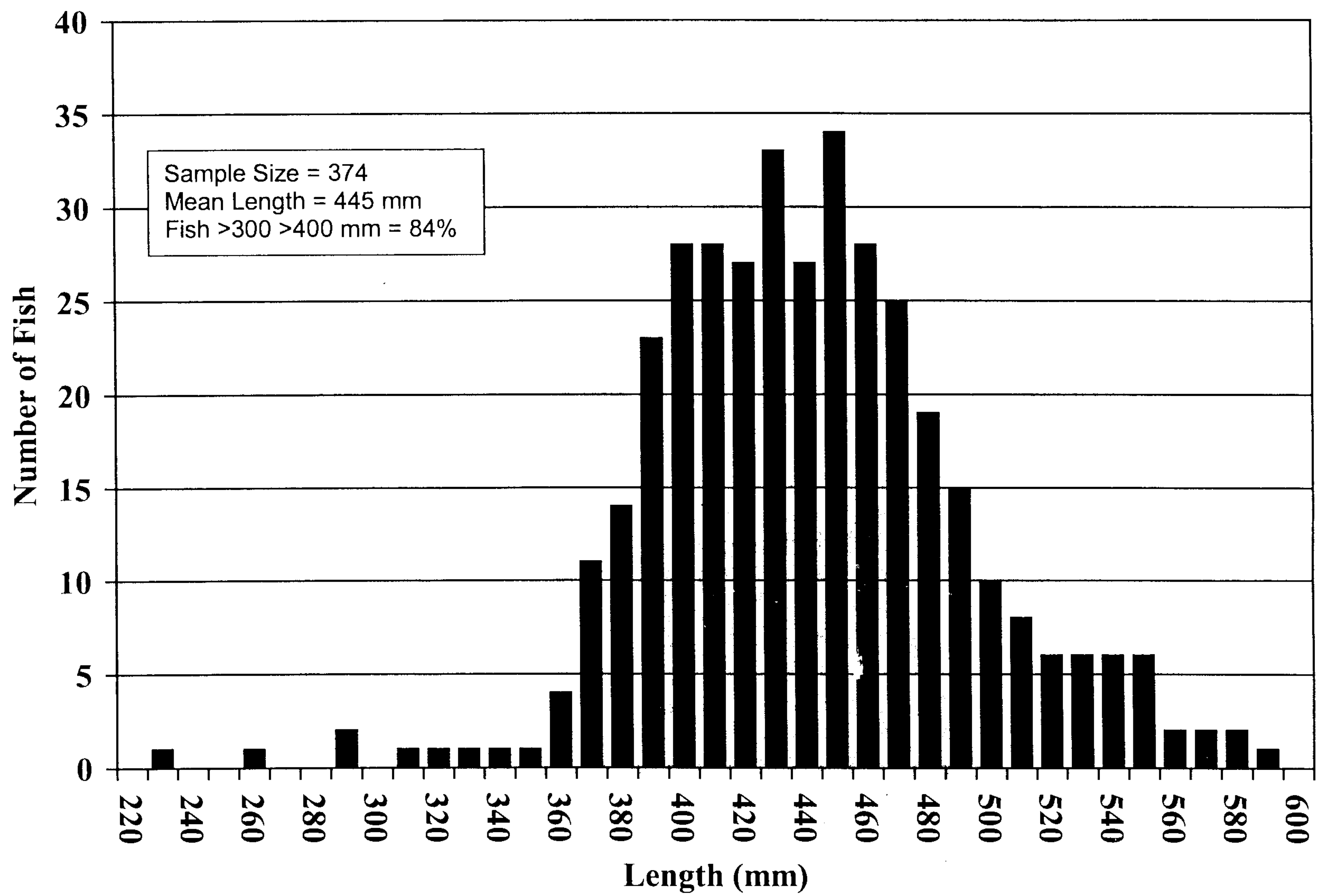


Figure 12. Length frequency distribution of trout (rainbow and cutthroat trout) harvested from the Snake River below American Falls Dam, Idaho, during the season opener May 27, 1995.

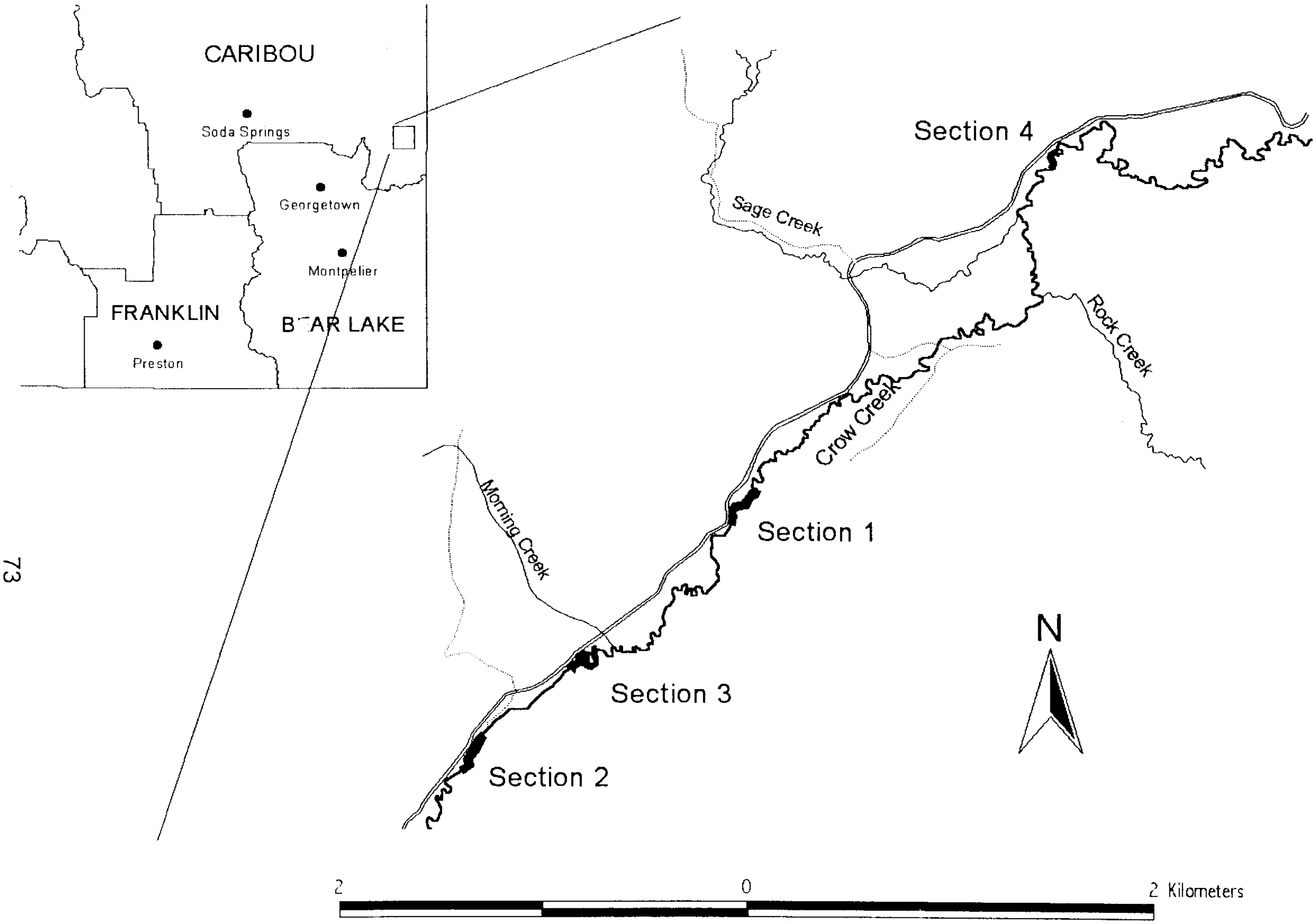


Figure 13. Map indicating locations of electrofishing sampling sites on Crow Creek, Idaho, June 27 and 28, 1995.

Table 5. Catch of salmonid species in four sections of Crow Creek, Idaho, during June of 1995.

Species	Fish ≤ 200 mm (potential recruitment)	Fish 200-299 mm (stock size)	Fish ≥ 300 mm (quality size)
Finespot cutthroat trout	24	14	3
Brown trout	26	28	23
Mountain whitefish	25	17	26

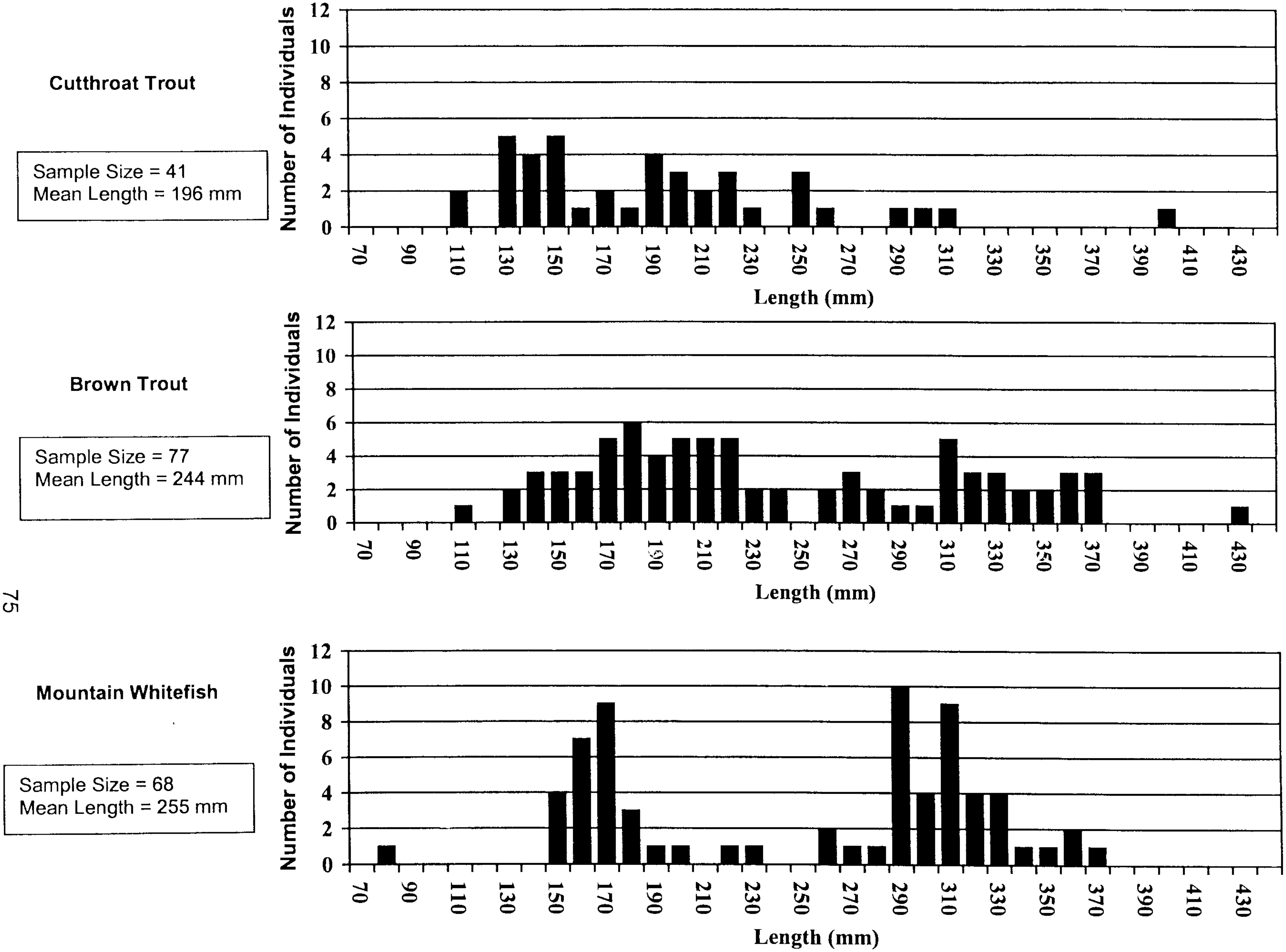


Figure 14. Length frequency distribution of cutthroat trout, brown trout and mountain whitefish sampled from four sites on Crow Creek, Idaho, June 27 and 28, 1995.

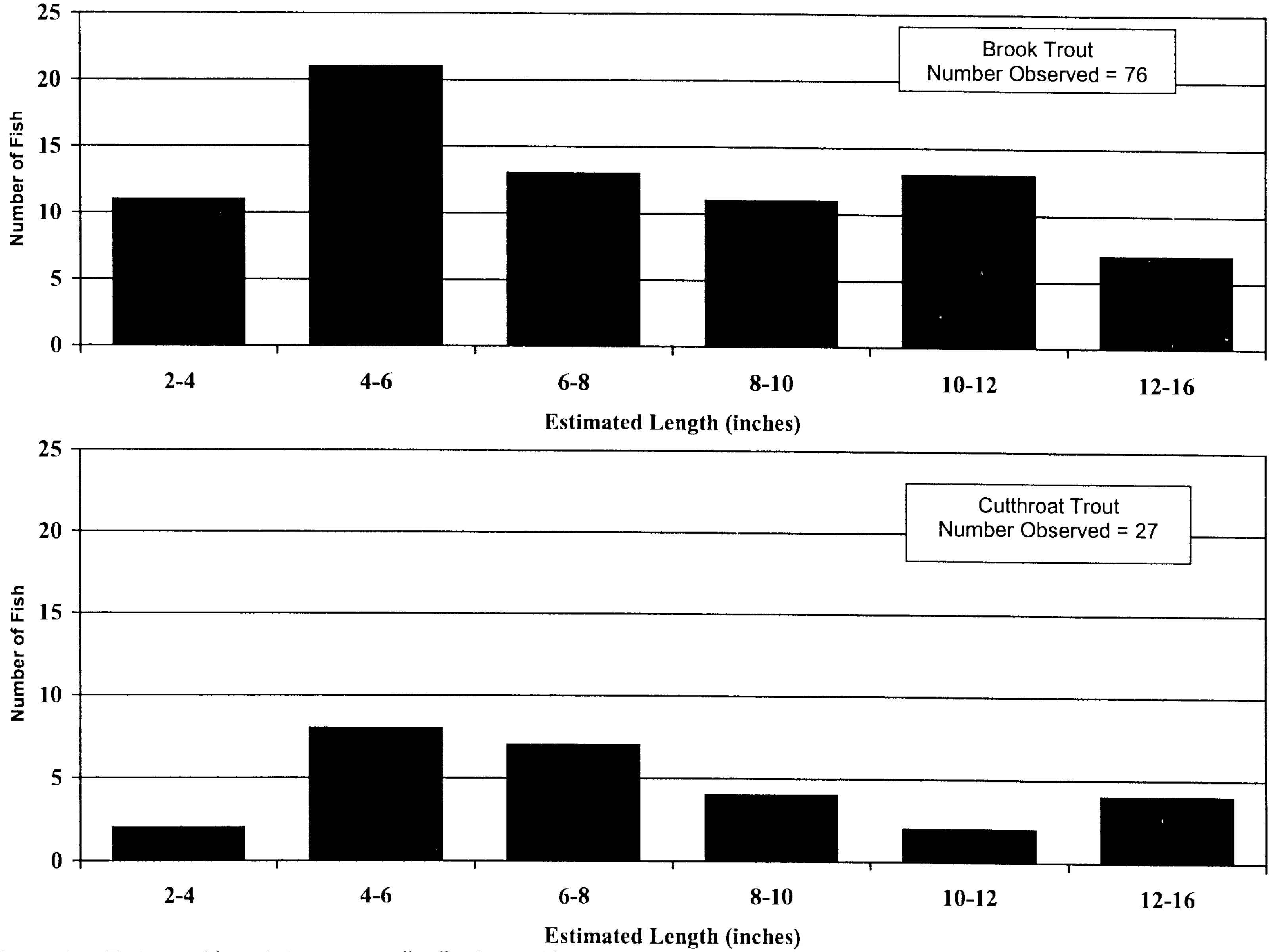


Figure 15. Estimated length frequency distributions of brook trout and cutthroat trout observed by snorkeling in the Little Arm of St. Charles Creek, Idaho, on Glen Transtrum's property (scck-1) August 31, 1995.

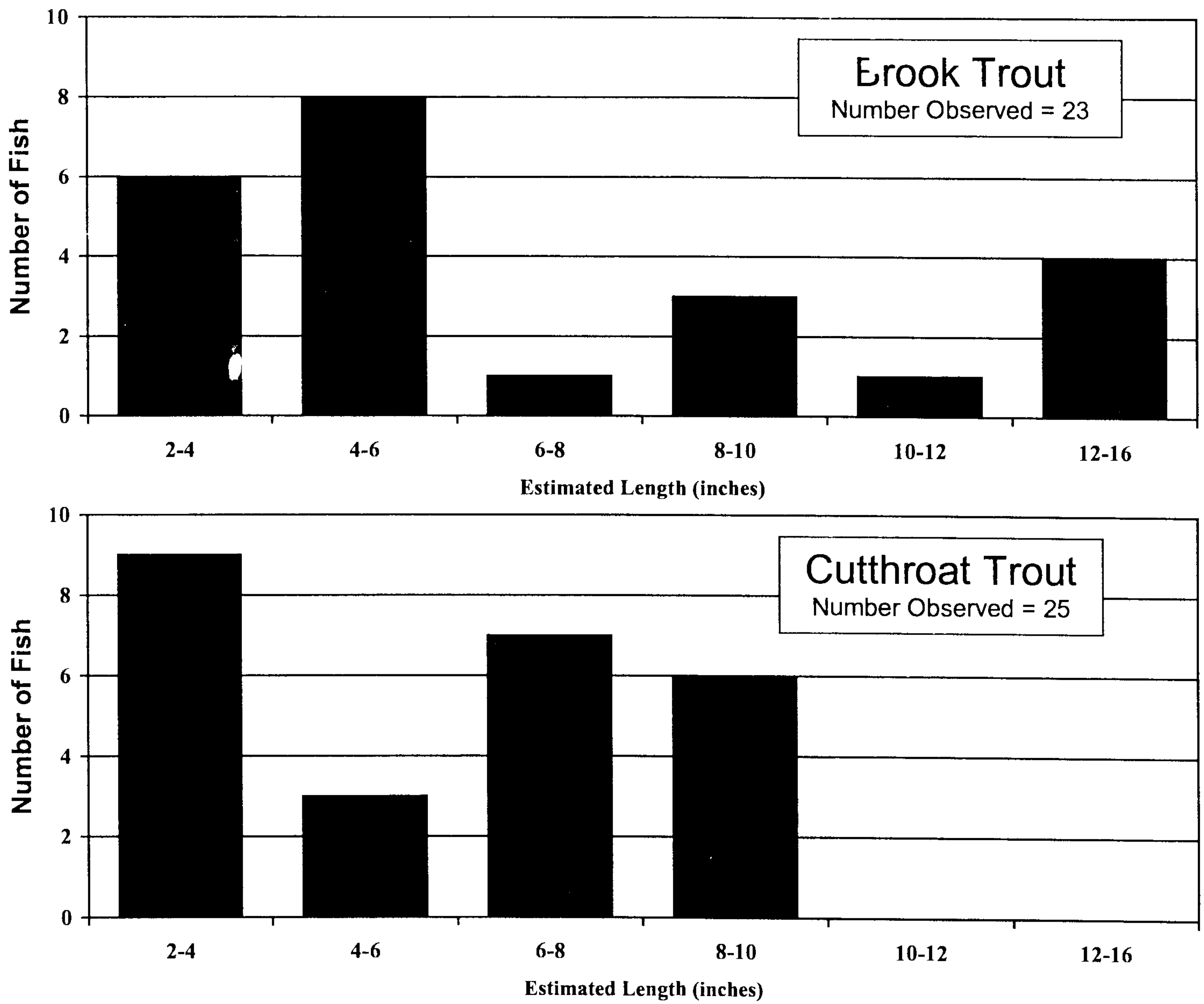


Figure 16. Estimated length frequency distributions of brook trout and cutthroat trout observed by snorkeling in St. Charles Creek, Idaho, near the red-roof cabin (scck-5) August 31, 1995.

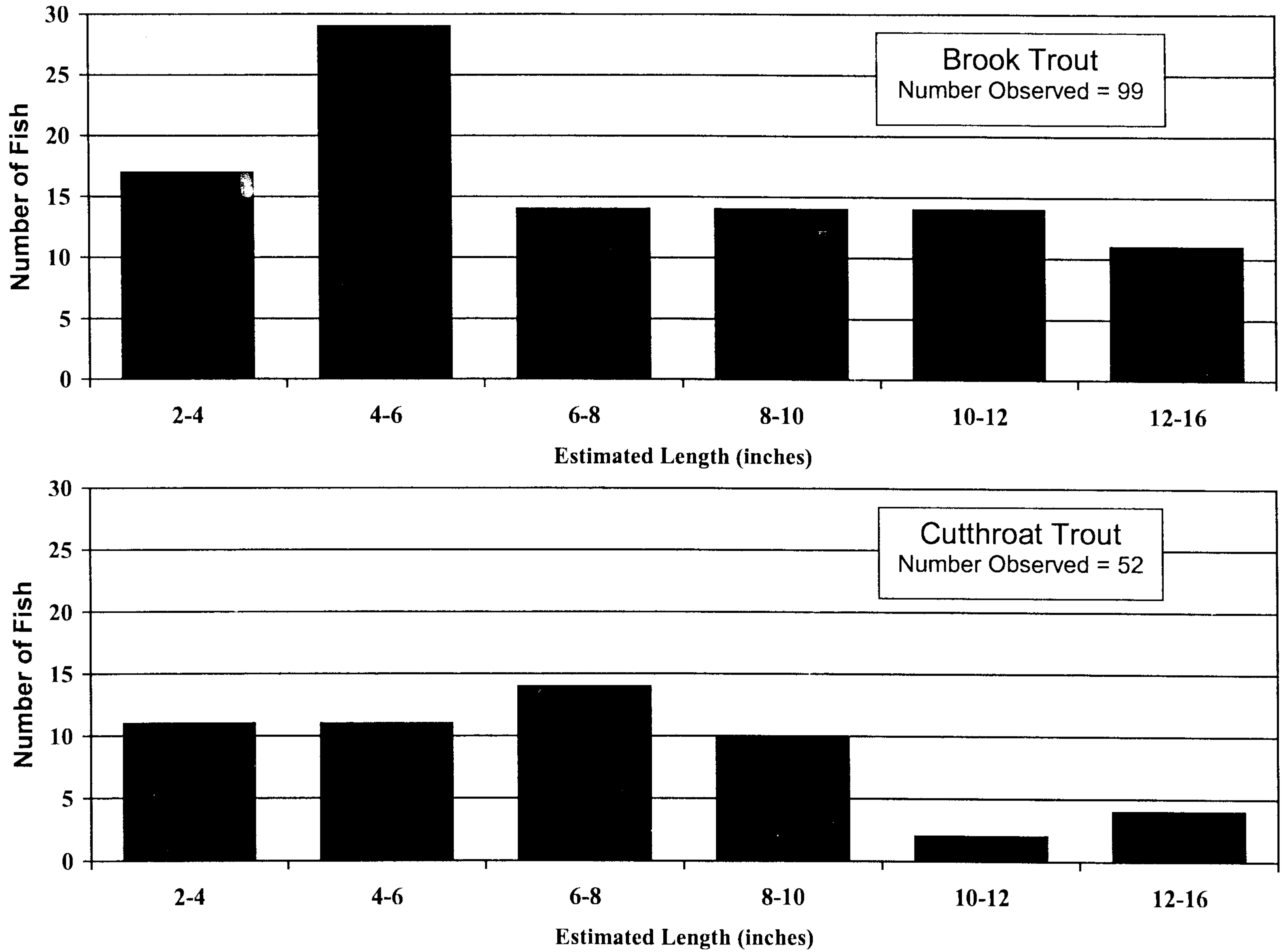


Figure 17. Estimated length frequency distributions of brook trout and cutthroat trout observed by snorkeling in both sites (scck-1 and scck-5) of St. Charles Creek, Idaho, August 31, 1995.

Site scck-1 averaged 5.5 m wide, and the width to depth ratio was 20; an indicator that pools are partially filled with sediment, or livestock have widened the stream channel. Substrate surface was 72% fines (≤6 mm), and 28% gravel (>6 mm and ≤75 mm) with no cobble or boulder. The stream reach has no spawning substrate (non-imbedded gravel) or substrate cover. However, cover in the form of submerged and overhanging riparian willows is abundant.

Site scck-5 averaged 5.7 m wide, only slightly wider than scck-1. Width to depth ratio was 17. Gradient and flow appeared higher at scck-5, making it less likely to accumulate sediment. Substrate surface was 47% fines, 31% gravel, 12% cobble and 10% boulder. Stream banks were covered and stable. There was ample overhead cover from riparian willows. Riffles in this reach would likely provide good spawning habitat.

Thermographs

At scck-5, daily maximum temperatures slowly rose from 10°C in early June to near 15°C the first week of August. They then progressively declined back towards 10°C by the end of September (Figure 18). Daily minimum temperatures went from near 6°C to near 9°C then back down to near 6°C during the same time interval. Daily fluctuations rarely exceeded 7°C. The seasonal temperature regime is ideal for trout growth and survival.

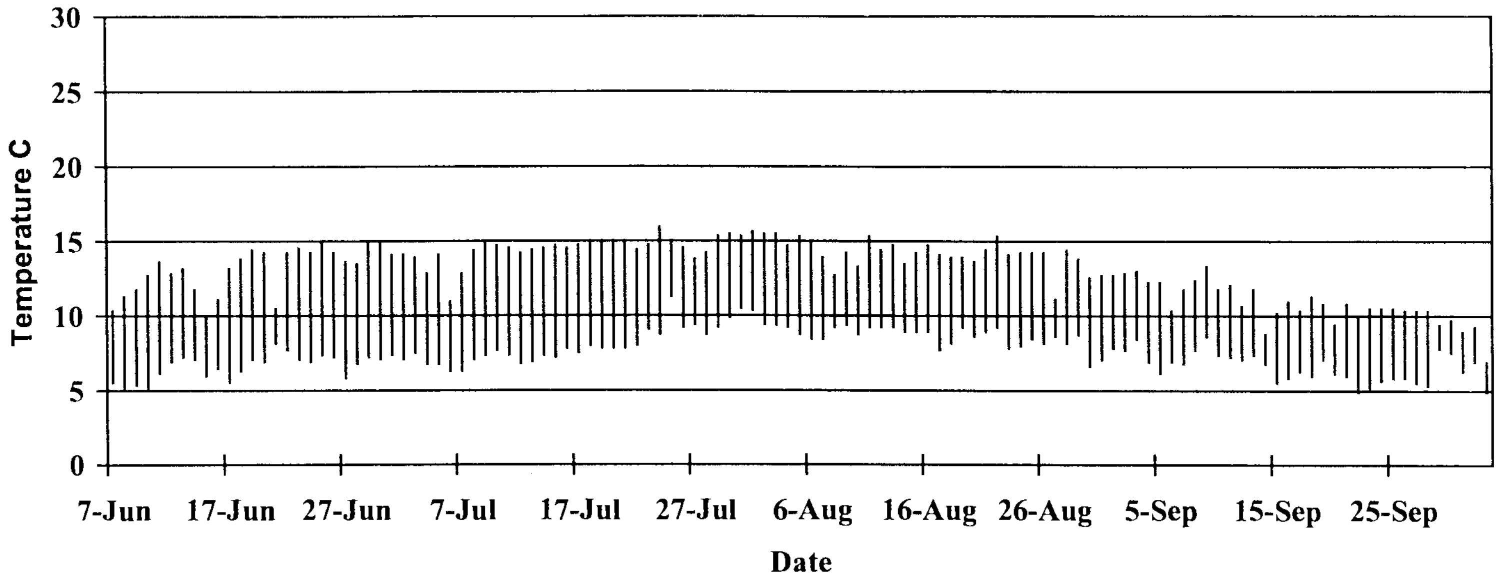
The temperature regime downstream from scck-1 was a great deal different from scck-5 and could be considered detrimental to the well-being of trout. In early June, maximum daily temperature fluctuated between 22°C and 27°C from thermograph deployment until mid-August. Maximum daily temperatures did not recede below 20°C until mid-September, at which time daily temperature maximums rapidly dropped to near 14°C and stayed there until the end of September (Figure 18).

Daily minimum temperatures near the Bear Lake estuary rose from about 10°C to near 17°C in early August then returned to near 10 °C by the end of September. Daily temperature fluctuations were widest from early to late June and again from late August through mid-September, when within-day ranges were as large as 15 degrees. Irrigation from the Little Arm of St. Charles may have been occurring at these times. Narrower within-day temperature fluctuations occurred at other intervals throughout the summer.

Fish Trap

The first cutthroat trout arrived at the trap on May 12. Forty-eight pre-spawn (and one juvenile) cutthroat trout, ranging in length from 373 mm to 670 mm ascended St. Charles Creek from Bear Lake to enter the trap (Figure 19). Of those, 18 (38%) were identifiable as female and 27 (56%) as males. Mean length of females and males were 501 mm and 517 mm, respectively. Forty-eight is a small number of spawning fish for a stream the size of St. Charles Creek. In the 1970s and early 1980s, spawning runs numbering from 300 to 500 fish were more typical. The 1987 through 1992 drought reduced the number of spawners that could enter St. Charles Creek from Bear Lake and probably reduced survival of juvenile trout in the creek itself. With increased protection of St. Charles Creek habitat, increased precipitation in the drainage, and greater protection of Bear Lake cutthroat from harvest, the St. Charles Creek spawning run should increase from 1995s paltry run.

St. Charles Creek Mainstem scck-5



St. Charles Creek Little Arm scck-1

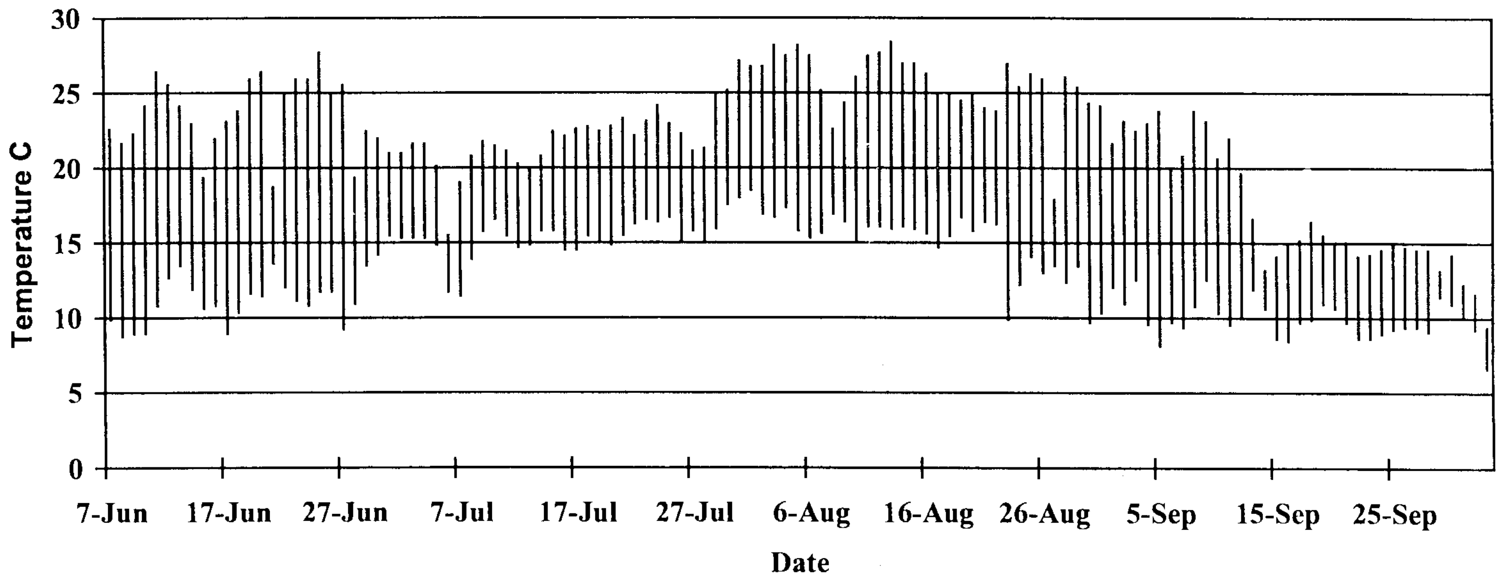


Figure 18. Water temperature regimes from June 7, 1994 through October 3, 1994 for two sites on St. Charles Creek, Idaho (scck-5 and scck-1).

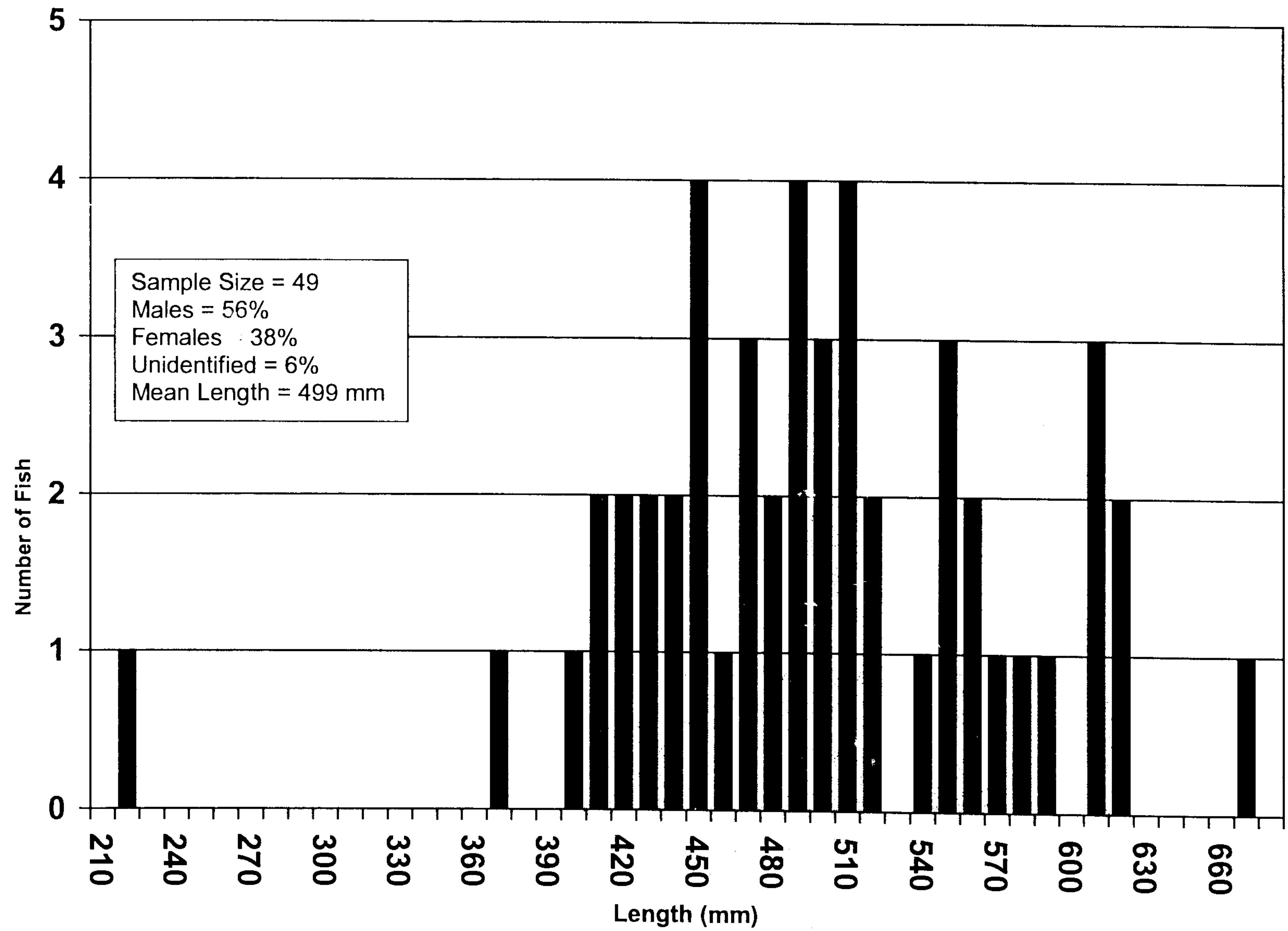


Figure 19. Length frequency distribution of Bear Lake cutthroat trout caught in the fish trap on the Little Arm of St. Charles Creek, Idaho, May 9 - June 13, 1995.

Bonneville Cutthroat Trout

In 1995, we sampled fish with backpack electrofishers in several strata of Preuss and Giraffe creeks. Sample section sizes and parr (age-1+) densities during the August 15 and 16 samples are presented in Table 6. We estimated Bonneville cutthroat trout density and habitat parameters within seven sections on Preuss Creek and four sections on Giraffe Creek.

Peak parr densities occurred in 1985 (Scully et al. 1993) then declined to their lowest levels in 1991 and 1993, near the end of the 1987-1992 droughts. Densities have since increased slightly in 1995 (Table 7). The slight increase in parr density in 1995 is likely a response to the fishing closure, better livestock management in riparian areas, and increased precipitation.

In 1994, the Caribou Cattle Association and Forest Service installed several miles of fences in the low gradient reaches of Preuss and Giraffe creeks to exclude livestock as a means of improving stream habitat. Warren Clary from the Intermountain Forest Research Center participated in an interagency and grazing association tour to determine if grazing practices were meeting the criteria described in his publication "Managing Grazing of Riparian Areas in the Intermountain West". In most cases the criteria were being met, with the exception of the lower reach of the south fork of Giraffe Creek (stratum E). Additionally, abundant precipitation fell in 1993 and 1995 in contrast to drought conditions that occurred from 1987 through 1992 and again in 1994. Streams were cooler, had more flow and provided better habitat during the recent wet years.

Within the four sections sampled in Giraffe Creek during 1995, width : depth ratios ranged from 6.6 to 11.0 and averaged 8.5. Within the seven sections sampled on Preuss Creek, width : depth ratios ranged from 7.3 to 31.0 and averaged 17.0. More cover and sediment flushing ability would occur in Preuss Creek if width : depth ratios were consistently less than 12 as they are in Giraffe Creek. Both pools and riffles were well represented in each creek. Substrate sand averaged 70% in Giraffe Creek and 48% in Preuss Creek. The high sand levels probably decrease interstitial spaces available for invertebrate and juvenile fish habitat. On the positive side, substrate sand in riffles was only 25% and 19% in Giraffe and Preuss creeks, respectively. This should be low enough for good salmonid egg survival (Scully and Petrosky 1991). Nevertheless, we only found young-of-the-year (YOY) cutthroat trout in one of the 11 sampled sections of Giraffe and Preuss creeks in 1995. Three YOY were collected (and two more observed) in section 2 of stratum B in Preuss Creek. Likely reasons for the low number of trout fry are: 1) in a high precipitation year like 1995, most of the fry may not have emerged from the gravel redds by mid-August and; 2) because the adult population was still low, the density of redds and fry would also be low. Instream habitat survey results are provided in Appendix B.

Recommendations

Continue monitoring cutthroat trout populations in the Thomas Fork tributaries. Continue monitoring riparian habitat and grazing management relative to requirements established in the Conservation Agreement.

Table 6. Results of electrofishing surveys on Preuss and Giraffe creeks, Idaho, on August 15 and August 16, 1995.

Stream	Stratum	Section	Surface Area (m^2)	Population Estimate	Density (parr/100 m^2)
Preuss	B	1	156.6	2	1.3
	B	Exclosure	136.4	8	5.9
	B	2	318.4	11	3.5
	C	1	152.0	4	2.6
	C	2	381.3	10	2.6
	D	1	202.9	5	2.5
	D	2	369.8	3	0.8
	Mean				**2.7**
Giraffe	A	1	253.7	12	4.7
	C	1	162.4	4	2.5
	E	1	86.0	0	0
	D	1	69.6	4	5.7
	Mean				**3.2**

Table 7. Parr (age-1+) density information for the tributaries of the Thomas Fork of the Bear River, Idaho, from 1979 through 1995.

Year	*Unweighted* Mean Density (parr/100 m²)	Stream	Individual Sample Densities (parr/100 m²)						
1979	4.4	Giraffe	4.4						
1981	6.7	Giraffe	4.2	0.2					
		Preuss	16.3	6.2					
1985	26.1	Preuss	31.6	20.5					
1986	18.3	Giraffe	21.4	19.1					
		Preuss	15.0	17.5					
1987	18.1	Dry	14.4						
		Giraffe	32.7	41.5					
		Preuss	9.3	15.7	7.0	10.1	14.2		
1989	14.4	Giraffe	19.0	33.9					
		Preuss	2.0	2.7					
1990	6.0	Dry	4.3						
		Giraffe	14.1	5.5					
		Preuss	3.1	3.5	6.8				
1991	2.3	Preuss	0.6	0.0	2.0	5.8	0.7	5.5	1.7
1993	1.8	Dry	0.0	0.0	0.0	0.0			
		Giraffe	0.5	0.0	0.0				
		Preuss	1.5	0.5	0.0	9.6	3.0	9.5	1.1
1995	2.9	Giraffe	4.7	2.5	5.7	0.0			
		Preuss	1.3	5.9	3.5	2.6	2.6	2.5	0.8

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APPENDICES

Appendix A. Spawning ground survey summaries on the upper Blackfoot River tributaries, Idaho, 1978 through 1995.

Creek Name	Date surveyed	Km surveyed	Number of Spawners	Spawners/km	Number of redds	Redds/km
Bacon	06/08/78	3.0	82	27.3	225	75.0
	06/11/79	3.9	49	12.6	0	0.0
	06/17/80	4.9	110	27.7	156	31.8
	06/03/81	4.4	155	35.0	218	50.0
	06/11/82	1.5	118	78.7	138	92.0
	06/13/83	7.8	214	27.4	232	29.7
	06/21/84	4.8	18	3.8	4	0.8
	06/13/85	2.1	4	1.9	25	11.9
	06/12/86	5.0	18	3.6	89	17.8
	06/08/87	3.7	15	4.1	27	7.3
	06/09/88	1.2	15	12.5	64	53.3
	06/07/89	1.2	33	27.5	29	24.2
	1990	No survey				
	06/??/91	1.2	0	0.0	16	13.3
	06/09/92	1.2	0	0.0	0	0.0
	06/24/93	1.2	1	0.8	3	2.5
	1994	No survey				
	1995	No survey				
Brown's Canyon	06/12/78	1.9	23	12.1	4	1.3
	06/11/79	5.0	6	1.2	0	0.0
	06/12/80	3.5	26	7.5	26	7.4
	1981	No survey				
	06/11/82	1.5	14	9.3	3	2.0
	06/21/83	1.5	6	4.0	4	2.7
	06/20/84	1.6	8	5.0	2	1.3
	06/13/85	1.6	1	0.6	4	2.5
	06/12/86	1.6	1	0.6	6	3.8
	06/11/87	1.6	6	3.8	9	5.6
	06/07/88	1.6	4	2.5	15	9.4
	06/25/89	1.6	7	4.4	7	4.4
	1990	No survey				
	06/??/91	1.6	3	1.9	9	5.6
	06/09/92	1.6	0	0.0	0	0.0
	06/23/93	1.6	0	0.0	0	0.0
	1994	No survey				
	1995	No survey				
Diamond (lower)	06/11/86	1.6	2	1.3	2	1.3
	06/09/87	1.6	0	0.0	6	3.8
	06/06/88	2.7	11	4.1	30	11.1
	1989	No survey				
	06/05/90	2.7	0	0.0	1	0.4
	06/03/91	No survey				
	06/10/92	2.7	0	0.0	0	0.0

Appendix A. continued

Creek Name		Km surveyed	Number of Spawners	Spawners/km	Number of redds	Redds/km
Diamond (lower)	1994	No survey				
	1995	No survey				
Diamond (Spring)	06/12/86	0.5	0	0.0	38	76.0
	06/08/87	0.5	3	6.0	21	42.0
	06/06/88	0.8	3	3.8	15	18.8
	06/07/89	0.8	0	0.0	15	18.8
	06/06/90	0.8	0	0.0	0	0.0
	06/03/91	0.8	0	0.0	1	1.3
	06/04/92	0.8	0	0.0	0	0.0
	06/15/93	0.8	0	0.0	0	0.0
	1994	No survey				
	1995	No survey				
Kendall	06/10/78	1.0	4	4.0	2	2.0
	06/11/79	3.0	1	0.3	0	0.0
	06/17/80	2.0	10	5.0	4	2.0
	06/03/81	0.9	19	21.1	42	46.7
	06/11/82	0.7	48	68.6	16	22.9
	06/22/83	0.7	10	14.3	14	24.3
	1984	No survey				
	1985	No survey				
	06/11/86	1.5	3	2.0	1	0.7
	06/09/87	1.5	0	0.0	1	0.7
	06/07/88	1.6	1	0.6	7	4.4
	06/09/89	1.6	1	0.6	2	1.3
	06/04/90	1.6	0	0.0	0	0.0
	06/??/91	1.6	0	0.0	2	1.3
	06/04/92	1.6	1	0.6	0	0.0
	06/24/93	1.6	0	0.0	1	0.6
	1994	No survey				
	1995	No survey				
Lanes	06/13/86	1.1	14	12.7	6	5.5
	06/11/87	1.1	0	0.0	0	0.0
	06/07/88	1.2	16	13.3	13	10.8
	1989	No survey				
	1990	No survey				
	1991	No survey				
	1992	No survey				
	06/24/93	1.2	0	0.0	2	1.7
	1994	No survey				
	1995	No survey				
Sheep	06/29/78	2.1	66	31.4	17	8.1
	06/13/79	3.9	13	3.3	0	0.0

Appendix A. continued

Creek Name	Date surveyed	Km surveyed	Number of Spawners	Spawners/km	Number of redds	Redds/km
Sheep	06/18/80	6.1	42	6.9	100	16.3
	06/08/81	4.6	6	1.3	55	12.0
	06/18/82	1.3	8	6.2	22	16.9
	06/22/83	3.7	6	1.6	14	3.8
	06/20/84	2.9	12	4.1	10	3.5
	06/13/85	2.5	0	0.0	22	8.8
	06/13/86	4.3	5	1.2	25	5.8
	06/10/87	4.3	6	1.4	25	5.8
	06/08/88	4.5	23	5.1	75	16.7
	06/09/89	4.5	22	4.9	41	9.1
	06/04/90	4.5	14	3.1	34	7.6
	06/04/91	4.5	10	2.2	29	6.4
	06/03/92	4.5	0	0.0	17	3.8
	06/24/93	4.5	0	0.0	10	2.2
	1994	No survey				
	06/23/95	4.5	0	0.0	10	2.2
Spring	06/15/78	3.0	82	27.3	225	75.0
	06/11/79	3.9	49	12.6	0	0.0
	06/17/80	4.9	110	27.7	156	31.8
	06/03/81	4.4	155	35.0	218	50.0
	06/11/82	1.5	118	78.7	138	92.0
	06/13/83	7.8	214	27.4	232	29.7
	06/21/84	4.8	18	3.8	4	0.8
	06/13/85	2.1	4	1.9	25	11.9
	06/12/86	5.0	18	3.6	89	17.8
	06/08/87	3.7	15	4.1	27	7.3
	06/09/88	2.7	6	2.2	74	27.4
	06/08/89	2.7	11	4.1	47	17.4
	1990	No survey				
	06/05/91	2.7	4	1.5	11	4.1
	06/??/92	2.7	0	0.0	10	3.7
	1993	No survey				
	1994	No survey				
	06/23/95	2.7	2	0.7	13	4.8
Stewart Canyon	06/10/81	2.3	1	0.4	1	0.4
	06/17/82	1.8	0	0.0	2	1.1
	1983	No survey				
	06/19/84	1.8	5	2.8	1	0.6
	06/12/85	1.8	4	2.2	0	0.0
	06/09/87	1.8	0	0.0	2	1.1
	06/06/88	1.8	5	2.8	16	8.9
	1989	No survey				
	06/05/90	1.8	0	0.0	0	0.0
	1991	No survey				
	06/05/92	1.8	0	0.0	0	0.0

Appendix A. continued

Creek Name	Date surveyed	Km surveyed	Number of Spawners	Spawners/km	Number of redds	Redds/km
Stewart Canyon	06/15/93	1.8	0	0.0	0	0.0
	1994	No survey				
	1995	No survey				
Timber	06/10/81	1.4	3	2.1	3	2.1
	06/10/82	1.0	23	23.0	10	10.0
	06/13/83	2.0	80	40.0	46	23.0
	06/19/84	1.8	10	5.6	4	2.2
	06/12/85	1.8	10	5.6	3	1.7
	06/11/86	1.8	6	3.3	5	2.8
	06/08/87	1.8	0	0.0	0	0.0
	06/06/88	1.9	16	8.4	18	9.5
	1989	No survey				
	06/05/90	1.9	2	1.1	1	0.5
	1991	No survey				
	06/05/92	1.9	0	0.0	3	1.6
	06/15/93	1.9	7	3.7	0	0.0
	1994	No survey				
	1995	No survey				
Timothy	06/16/78	3.9	52	13.3	25	6.4
	06/15/79	6.3	20	3.2	--	--
	06/17/80	7.0	135	19.3	--	--
	1981	No survey				
	06/12/82	0.6	14	23.3	4	6.7
	06/20/83	1.9	13	6.8	--	--
	06/19/84	1.2	13	10.8	--	--
	1985	No survey				
	06/12/86	4.0	18	4.5	12	3.0
	06/11/87	4.0	6	1.5	22	5.5
	06/09/88	1.4	15	10.7	28	20.0
	06/07/89	1.4	5	3.6	5	3.6
	06/06/90	1.4	26	18.6	68	48.6
	06/??/91	1.4	7	5.0	8	5.7
	06/09/92	1.4	8	5.7	4	2.9
	06/24/93	1.4	4	2.9	6	4.0
	1994	No survey				
	1995	No survey				

Appendix B-1. Instream habitat data recorded for Preuss Creek, Idaho, August 15, 1995.

Stratum	Section	Surface Area (m^2)	Percent Substrate Types			Percent Gradient	Mean Depth (m)	Mean Width (m)	Width/Depth Ratio	Percent Habitat Type				% Sand in Pool/Run	% Sand in Riffles
			Sand	Gravel	Cobble					Run & Pool	Riffle	Backwater	Pocket Water		
B	1	156.6	37	54	9	0.73	0.22	1.6	7.3	100				37	0
	Exc.	136.4	49	32	19	0.44	0.29	2.2	7.6	75	8	9	8	74	0
	2	318.6	53	38	9	1.59	0.13	2.7	20.8	33	42	25		58	60
	Mean	203.9	46	41	13	0.92	0.21	2.2	10.5	69	17	11	3	56	20
C	1	152.0	63	27	10	1.7	0.13	1.9	14.6	42	50	8		62	58
	2	381.3	41	4	55	2.5	0.10	3.1	31.0	8	67	17	8	80	14
	Mean	266.7	52	15	33	2.1	0.12	2.5	20.8	25	59	13	3	71	36
D	1	202.86	8	61	31	3.1	0.10	2.1	21.0	8	83	9		0	0
	2	369.84	83	7	10	1.9	0.17	2.8	16.5	67		13	20	95	0
	Mean	286.4	46	34	20	2.5	0.14	2.5	17.9	38	42	11	9	47.5	0
Overall Mean		**245.4**	**47.7**	**31.9**	**20.4**	**1.7**	**0.16**	**2.3**	**14.4**	**47.6**	**35.7**	**11.6**	**5.1**	**58**	**18.9**
2 X Standard Error		**81.4**	**17.6**	**16.3**	**13.0**	**0.7**	**0.05**	**0.4**		**26.3**	**25.4**	**5.9**	**5.7**	**23.7**	**21.1**

Appendix B-2. Instream habitat data recorded for Giraffe Creek, Idaho, August 16, 1995.

Stratum	Section	Surface Area (m^2)	Percent Substrate Types			Percent Gradient	Mean Depth (m)	Mean Width (m)	Width/Depth Ratio	Percent Habitat Type				% Sand in Pool/Run	% Sand in Riffles
			Sand	Gravel	Cobble					Run & Pool	Riffle	Backwater	Pocket Water		
A	1	253.7	53	30	17	0.67	0.20	2.2	11.0	50	41	9			38
C	1	162.4	100			0.08	0.20	1.95	9.75	100				100	
D	1	69.6	88	12		1.3	0.12	0.8	6.67	50	50			88	50
E	1	86.0	40	55	5		0.15	1.0	6.67	67	25	8			13
Overall Mean		**143**	**70**	**24**	**5.5**	**0.68**	**0.17**	**1.3**	**7.6**	**66.8**	**29**	**4.3**		**47**	**25.3**
2 X Standard Error		**84.1**	**28**	**24**	**8**	**0.70**	**0.04**	**1.0**		**23.6**	**21.9**	**4.9**		**54.5**	**22.8**

1995 ANNUAL PERFORMANCE REPORT

State of: Idaho

Program: Fisheries Management F-71-R-20

Project II: Technical Guidance

Subproject II-F: Southeast Region

Contract Period: July 1, 1995 to June 30, 1996

ABSTRACT

We reviewed proposals and provided written and verbal comments on activities affecting fish and anglers. We coordinated with personnel of various agencies on hydropower, mining, roads, stream alteration, grazing allotments, National Pollution Discharge Elimination Systems permits, fill/excavation, and other projects. The Southeast Region fisheries personnel worked with anglers to improve rapport and open more lines of communication with agencies and the public. The technical assistance activities accounted for approximately ten days of regional fishery personnel time.

We held eight public meetings early in 1995 to discuss fisheries management programs, the current Five-year Management Plan, and ask for suggestions for the 1996-2000 Management Plan. Consensus from the public was to stay the course of the existing plan. Fisheries updated the drainage text and tables to reflect current and planned fisheries management activities.

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1995 ANNUAL PERFORMANCE REPORT

State of: Idaho Program: Fisheries Management F-71-R-20

Project III: Habitat Management Subproject III-F: Southeast Region

Contract Period: July 1, 1995 to June 30, 1996

ABSTRACT

We participated in a National Resources Conservation Service class on stream bank restoration and applied that information in a project on a severely eroded upper Portneuf River bank located on Department property. Thirty state and federal agency employees cabled hawthorn branches, and used willow bundles, posts and stems in several techniques to protect the section. Willows for the project were cut by volunteer Boy Scout troops.

We worked with the Friends of the Portneuf River and King Creek Cattle Grazing Association personnel to shore up fences along the upper Portneuf River where cattle were entering livestock exclosures. Without frequent vigil during the grazing season, until the fences are shown to be livestock proof, fisheries benefits from over $100,000 in capital outlay investments will be nil.

In 1994, a Bonneville cutthroat trout *Oncorhynchus clarki utah* Conservation Agreement for the headwaters of the Thomas Fork of the Bear River was signed by the U. S. Fish and Wildlife Service, Caribou National Forest, Caribou Grazing Association, and the Idaho Department of Fish and Game. Based on the agreement, reaches of stream flowing through highly erosive meadows have been excluded from livestock grazing and less erosive canyon habitat is managed with reduced grazing intensity. In addition to fish population sampling, fisheries personnel participated in field tours to Preuss, Dry, and Giraffe creeks in the drainage with agency and permittee representation. During the trips, participants observed the effects of the new grazing regime and developed suggestions for future improvements.

We worked with landowners and eight AmeriCorps volunteers to install corridor fences along lower St. Charles Creek. Post and pole fences now prevent livestock from entering critical spawning and rearing habitat for Bear Lake cutthroat trout *O. clarki ssp.* on properties owned by three landowners. Engineering personnel constructed and installed a self-cleaning fish screen on the lower diversion of St. Charles Creek, and installed a head box at a second diversion point in preparation for installation of a fish screen when funds become available.

We worked with the Portneuf-Marsh Valley Canal Company to obtain challenge grant funds as partial funding for grade control structures in the "outlet canal" of the Portneuf River below Chesterfield Reservoir. The project was completed in November 1995 and will reduce sediment recruitment into the upper Portneuf River. The upper Portneuf River was once one of Idaho's Blue Ribbon trout fisheries before it received large quantities of sediment in the 1980's.

We worked with eight AmeriCorps volunteers to build 183 m of riparian corridor fence along Marsh Creek on the John Hart property near Downey. The fence is a demonstration project and part of the overall goal of reducing sediment in the Portneuf River drainage.

We worked with landowner Chris Robinson, the Natural Resources Conservation Service, and the Division of Environmental Quality to initiate stream habitat restoration on 4.8 km of Marsh Creek. Fisheries personnel wrote the grant application and coordinated with the landowner and other agencies to construct riparian corridor fences, establish photo points, plant willows, and do fish population and habitat surveys. Volunteers and Idaho Department of Fish and Game reservists have been used extensively on the project.

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