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Job Performance Report
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REGIONAL FISHERIES MANAGEMENT INVESTIGATIONS
SOUTHWEST REGION (Subprojects I-D, II-D, IV-D)

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SOUTH FORK BOISE RIVER

Introduction

A 9.6 km section of the South Fork Boise River was electrofished to determine trout standing stock and to collect scales to determine trout growth rates.

Methods

The section of river electrofished extended from the Village access area (T1 S, R8E, S15) approximately 4.0 km below Anderson Ranch Dam downstream 9.6 km (Ti N., R8E, S31). The lower boundary was approximately 1.6 km below the mouth of Cow Creek.

Equipment used included a 4.6 m raft and Coffelt model VVP-1 5 and VVP-2E. Anodes were mounted on booms attached to both sides of the raft and extended 1.8 to 2.4 m in front of the raft. The anode on each boom consisted of a 76 cm ring from which 8 dropper electrodes were suspended. Electrodes consisted of 20.3 cm pieces of 1.2 cm stainless steel conduit suspended 12 to 24 cm below the water surface.

The cathode consisted of three 2.4 m pieces of 0.95 cm diameter stainless steel cable suspended from each side of the raft.

Electrofishing occurred in a downstream direction. Attempts were made to collect all trout shocked. Following collection, trout were placed in a live car and transported downstream for up to one mile for processing. Processing included measuring, weighing, collecting scales, and marking. All trout were measured. Scales and weights were collected from 10 rainbow from each cm size group where possible. Marking consisted of removal of a small piece of the bottom or top of the caudal fin during the mark and recapture runs, respectively.

Population estimates and standard errors were made using the modified Petersen population and variance estimators (Seber 1973).

Scales were magnified using a standard microfiche reader. Annuli were identified and distance from the focus marked on a slip of paper. Slips of paper with distance marks were later digitized, and back calculated length-at-age estimates were made using DisBCal 89 V 1.0 program in the Fishery Analysis Tools software developed by the Missouri Department of Conservation.

Selected water chemistry parameters were measured following electrofishing.

Results and Discussion

Bull trout and rainbow trout (and rainbow/cutthroat hybrids) were the only trout collected during electrofishing. In addition to trout, numerous whitefish *Prosopium williamsoni* and sucker were present. Sculpin, northern squawfish *Ptychocheilus oregonensis,* redside shiners *Richardsonius balteaus,* and dace were also present.

A total of 791 rainbow trout from 65 to 515 mm were collected and measured during electrofishing. The length frequency of rainbow trout collected is shown in Figure 11.

Nine bull trout were collected during electrofishing. Bull trout represented 1.1 % of the trout collected. Mean length of bull trout collected was 411 mm. Length of bull trout collected ranged from 320 to 480 mm.

During processing, many rainbow trout were observed to have hook scars from being caught and released. A large percentage of this population is being recaught after being released.

The mean length, weight, and condition factor of rainbows were 341 mm, 468 g, and 1.03, respectively. The length-weight relationship is shown in Figure 12. The length-weight relationship is described by log (wt) = -4.92 + 2.97 *log(l).

Figure 13 shows the relationship between length and condition factor. The linear regression coefficient (slope) for the relationship between length and condition factor was -.00027. The negative regression coefficient supports the visual observation that many large trout seemed to be in relatively poor condition. The existing 305 to 508 mm slot limit regulation has allowed trout to become older and larger. Declining condition with increasing size may suggest that the trout population has reached equilibrium and future increases in the number of 508 mm + trout should not be expected.

A total of 351 and 441 rainbow trout were collected and marked or examined for marks during the mark and recapture runs, respectively. Seven rainbows were recorded as having died during mark run processing and were not included in population estimates. Twenty-two recaptures of marked rainbows were represented in the recapture run. The length distribution of rainbows collected during mark and recapture runs and of recaptures is shown in Table 5.

Population estimates for rainbow trout less than 249 mm were not made because no recaptures were obtained.

Mark run, recapture run, and recapture data were pooled for rainbow trout greater than 240 mm to estimate population size. The pooled population estimate and standard error was 4,540 (861), respectively, for the 9.6 km section, or 473/km. Mean weight of rainbow trout collected greater than 240 mm was 525 g. Biomass of rainbow trout greater than 240 mm was 247 kg/km.

During initial mark runs, electrofishing mortality of trout, whitefish, and suckers was noted. The number of trout that died is unknown. However, this mortality likely affected the

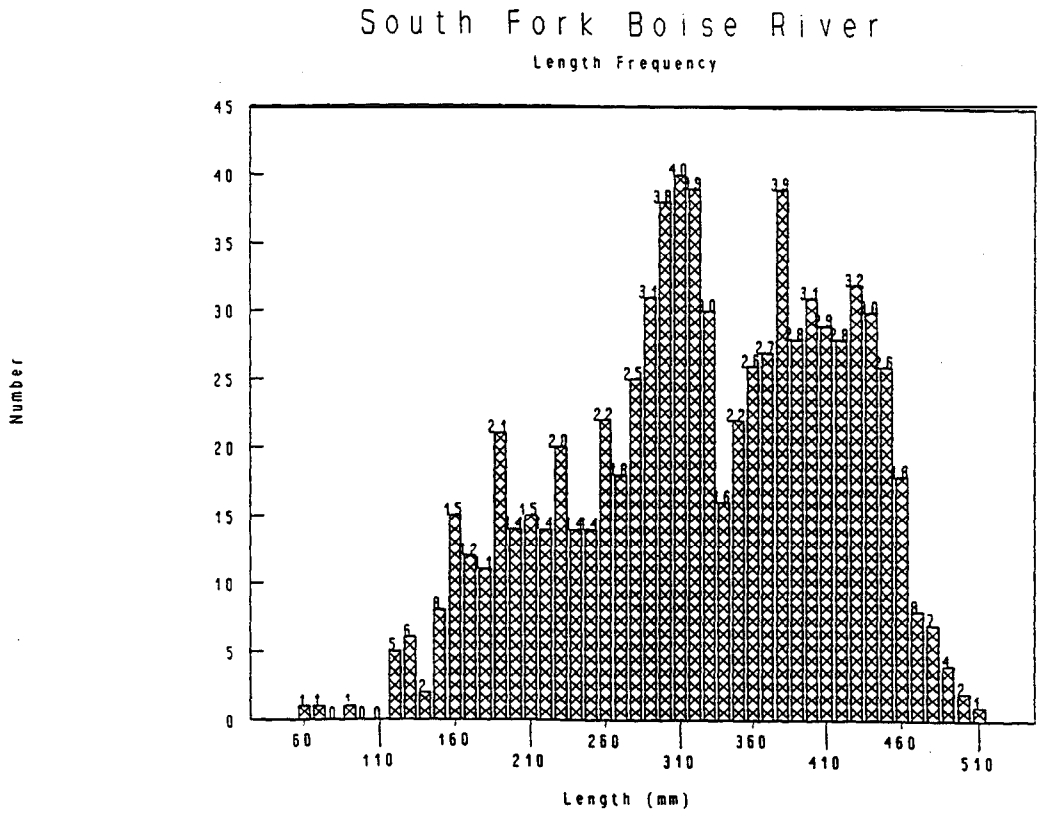

Figure 11. South Fork Boise River below Anderson Ranch Dam, rainbow trout length frequency, 1993.

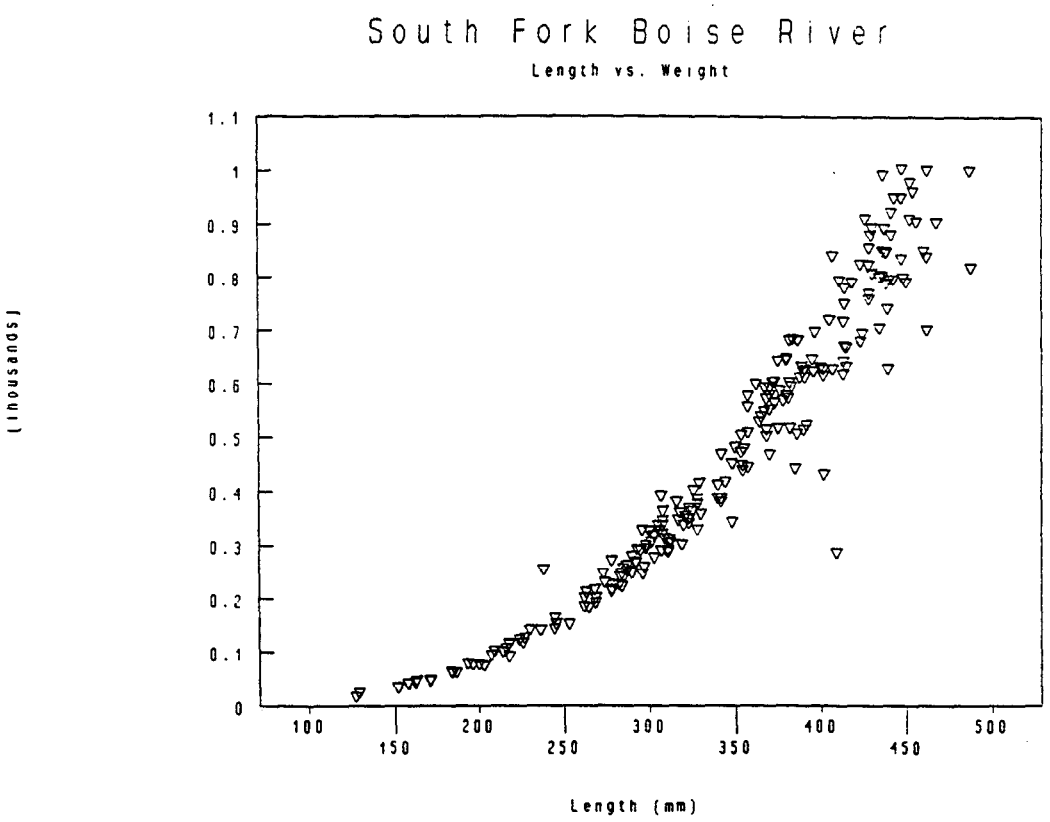

Figure 12. South Fork Boise River below Anderson Ranch Dam, rainbow trout length versus weight relationship, September 1993.

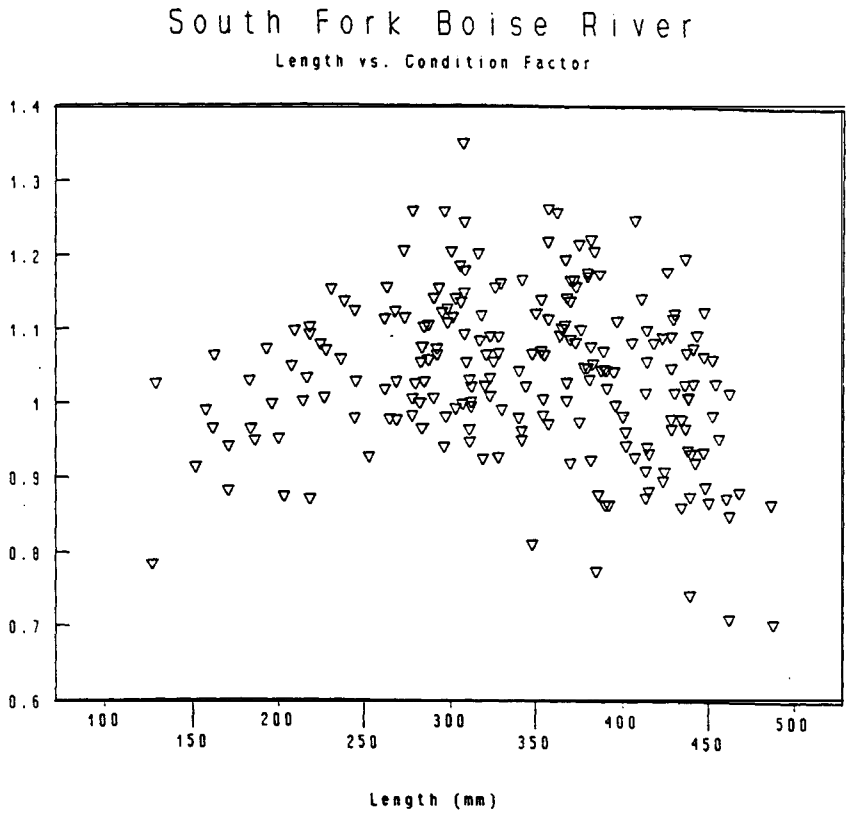

Figure 13. South Fork Boise River below Anderson Ranch Dam, rainbow trout length versus condition factor, September 1993.

Table 5. Length distribution of rainbow trout collected during the mark run, recapture run, and recaptures, South Fork Boise River below Anderson Ranch Dam, September, 1993.

Size class	Mark run	Recapture run	Recaptures
120	2	3	
130	3	4	
140	0	1	
150	4	4	
160	7	9	
170	3	9	
180	6	5	
190	8	10	
200	4	12	
210	5	8	
220	5	10	
230	6	13	
240	4	10	
250	3	15	1
260	7	15	
270	10	14	
280	13	16	
290	15	17	
300	19	19	
310	18	21	
320	17	20	1
330	5	27	1
340	11	6	
350	12	12	
360	11	12	1
370	19	11	2
380	20	21	3
390	12	15	1
400	12	20	2
410	14	14	2
420	16	14	1
430	21	17	3
440	14	16	1
450	11	11	2
460	8	7	
470	1	6	
480	4	2	1
490	1	3	
500		1	
510		1	

number of marked rainbows at large in the population during the recapture run. Mortality of marked trout likely caused the population estimate to be inflated by an unknown amount.

The Coffelt model VVP-2E was in use when mortality was detected. Mortality of trout was reduced by reducing voltage and amperage output and by decreasing the pulse frequency. However, decreasing voltage greatly reduced the numbers of trout collected. Generally, voltage settings of 680 v and a frequency of 60 pulses per second were required to collect trout. At these settings, whitefish, suckers, and some trout died. Mortality increased as voltage increased. Trout catch greatly decreased at reduced voltage settings.

Further experimentation was done in an attempt to increase trout catch and reduce whitefish, sucker, and trout mortality. A Coffelt model VVP-1 5 was used on two days during the recapture run. Fish collections were made using maximum voltage direct current (about 450 v). An immediate reduction in mortality of all species was noted, and trout netted and placed in the live car recovered much quicker relative to trout shocked with the VVP-2E. It was also noted that trout were drawn to the positive electrodes much better with the VVP-1 5 and they were much easier to net. We felt that mortality was reduced to a negligible level with the VVP-15.

Average daily catch for the VVP-2E and VVP-1 5 was compared. The VVP-2E was used during the first four days and the VVP-1 5 was used the last 2 days of electrofishing. The average number of rainbow trout caught per day was 105.5 (s.e. = 11.3) and 183.5 (s.e. = 20.5) for the VVP-2E and VVP-15, respectively. This difference in average daily catch was significant ($P<.05$).

Bull trout catch was also enhanced with the VVP-15. VVP-1 5 bull trout catch per day was 3 as compared to VVP-2E catch per day of 0.75.

Figure 14 shows a comparison of average daily catch for the VVP-15 and VVP-2E. Advantage of the VVP-1 5 is in increasing catch of small trout. Catch of trout less than 340 mm appears much greater for the VVP-15, while catch of trout greater than 340 mm is about equal for both VVPs. Figure 14 implies care must be taken when comparing length frequency data collected using different sampling equipment.

Scales were read and age determined for 228 rainbow trout. Mean back-calculated length at age for all year classes represented was 104, 192, 289, 351, 381, and 408 mm. Back-calculated length at age for each year class is given in Table 6.

Based on estimated age from scale analysis at the time of sampling, age 1 to age 6 rainbow trout averaged 201, 302, 376, 410, 413, and 433 mm, respectively. Minimum, maximum, and mean length at capture are given in Table 7.

Bull trout scales were provided. to Fish Research and will be analyzed and reported separately.

Water chemistry parameters are presented in Table 8.

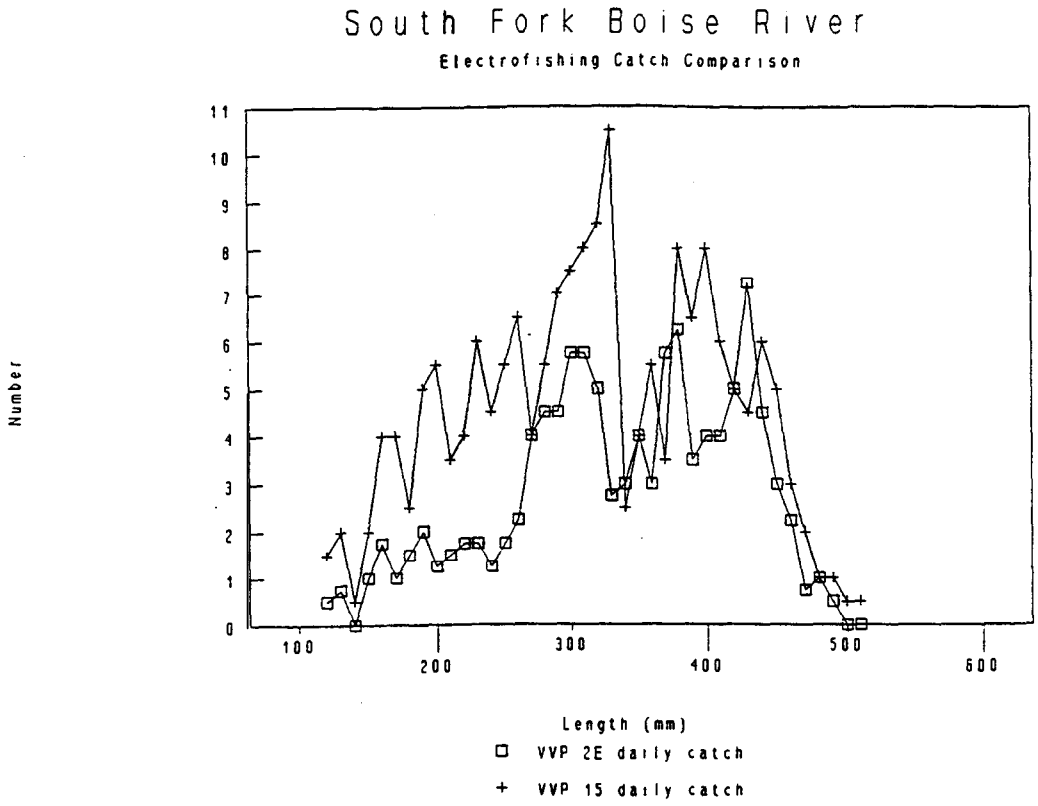

Figure 14. South Fork Boise River below Anderson Ranch Dam, comparison of average daily electrofishing catch using the VVP-2E and VVP-15, September 1993.

Table 6. Average back-calculated length at age for rainbow trout in the South Fork Boise River below Anderson Ranch Dam, September 1993.

Year Class	Age	N	1	2	3	4	5	6
1992	1	35	111					
1991	2	87	102	197				
1990	3	34	106	198	302			
1989	4	39	105	189	296	364		
1988	5	21	98	181	275	342	385	
1987	6	12	92	166	254	324	373	408
All			104	192	289	351	381	408
N		228	228	193	106	72	33	12

Table 7. Minimum, maximum, and mean length at capture by age for rainbow trout in the South Fork Boise River below Anderson Ranch Dam, September 1993.

Year Class	Age	N	Mean Length	Minimum Length	Maximum Length	Standard Error
1992	1	35	201	127	269	6.2
1991	2	87	302	183	452	4.6
1990	3	34	377	218	473	8.8
1989	4	39	410	308	487	6.4
1988	5	21	413	308	485	8.9
1987	6	12	432	388	498	9.7

Table 8. Water chemistry parameter measurements for the South Fork Boise River below Anderson Ranch Dam, September 30, 1993.

Conductivity	35 microS Us/cm^3
Hardness	20 mg/l $CaCO_3$
pH	7.0
M.O. alkalynity	40 mg/l $CaCO_3$
Flow	600 CFS
Temperature	10.5 C @ 10:30 a.m. 12.0 C @ 4:00 p.m.

Recommendations

1. Discontinue use of VVP-2E for electrofishing this river section. Excessive mortality of large trout must be avoided. VVP-2E may continue to be of use in other streams where water quality allows nonlethal fish collection.

2. Conduct fall population estimates for three additional years. Three additional years are recommended to determine year-to-year variability in population size without the problems caused this year by mortality of marked trout. Collect scales and evaluate growth all three years.

MIDDLE FORK BOISE RIVER

Introduction

Transects were snorkeled on the Middle Fork Boise River (MFBR) during August 17-19, 1993 by regional staff. All snorkel transects were repeats of snorkel transects done by Rohrer (1989).

Methods

All transects were completed with two snorkelers and a data recorder who walked along the stream edge. Fourteen transects were snorkeled from the confluence of the North Fork Boise River upstream to the town of Atlanta. Snorkelers identified fish species encountered, estimated sizes of fish, and relayed the data to the data recorder. Physical habitat measurements of transect length, three or more width measurements, three cross channel depth and substrate composition measurements, and stream gradient were taken at 11 of 14 transects. The three sites not measured were either too deep or swift of current to take the physical measurements.

Results

Six of 14 transects had higher wild rainbow trout densities than 1988; 8 of 14 transects had lower densities in 1993 (Table 9). Eight of 14 transects had higher densities of large (> 300 mm) wild rainbow trout, and in 6 transects, the larger rainbow were absent. None of the transects had the larger rainbow trout in 1988 (Rohrer 1989). Density of wild rainbow trout in 1993 was 0.98 trout/100 m^2 versus a density of 0.92 trout/100 m^2 in 1988 in these 14 transects. Densities for trout greater than 300 mm was 0.05/100 m^2 in 1993 versus 0.004/100 m^2 in 1988 in the transects sampled.