

1994 ANNUAL PERFORMANCE REPORT

State of: Idaho

Program: Fisheries Management F-71-R-19

Project I: Surveys and Inventories

Subproject I-D: Southwest Region

Job: c

Title: Rivers and Streams Investigations

Contract Period: July 1, 1994 to June 30, 1995

ABSTRACT

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The same 9.6 km section of the South Fork Boise River electrofished in 1993 was electrofished in September 1994. Objectives were to estimate trout population size, biomass, and growth rates. Comparison of 1994 estimates with 1993 estimates will document annual variability in population estimates. Work goals are to estimate baseline population parameters and to determine trout population limiting factors.

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SOUTH FORK BOISE RIVER

Introduction

The same 9.6 km section of the South Fork Boise River electrofished in 1993 was electrofished in September 1994. Objectives were to estimate trout population size, biomass and growth rates. Comparison of 1994 estimates with 1993 estimates will document annual variability in population estimates. Work goals are to estimate baseline population parameters and to determine trout population limiting factors.

Methods

The section of river electrofished extended from the Village access area (T1S, R8E, S15), 4 km below Anderson Ranch Dam, downstream 9.6 km (T1N, R8E, S31). The lower boundary was approximately 1.6 km below the mouth of Cow Creek.

Electrofishing methods and equipment were similar to 1993 (Allen et al., 1995), except that in 1994, a Coffelt VVP-15 was used on all electrofishing runs.

River flows in 1994 were (600 ft³sec⁻¹) for the mark runs and (300 ft³sec⁻¹) for the recapture runs.

All trout were measured to the nearest mm. Samples of trout were weighed to the nearest g. Scales were collected from up to 10 trout per cm size group.

Population estimates and standard errors were made using the modified Petersen population and variance estimators (Seber 1973). Estimates were made by pooling all fish from size group estimates from mark runs, recapture runs, and recaptures. Size group population estimates were made for rainbow trout greater than 129 mm and for rainbow trout greater than 239 mm.

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 V1.0 program in the Fishery Analysis Tools software developed by the Missouri Department of Conservation.

Results and Discussion

Species Collected

Bull trout, rainbow trout, and rainbow x cutthroat hybrids were the only trout collected during this survey. In addition to trout, kokanee, mountain whitefish, bridgelip sucker, largescale sucker, northern pikeminnow, redbreast shiners, dace, and sculpin were collected or observed.

Mean number of rainbow trout greater than 129 mm collected per day of electrofishing was 199 during the mark runs and 291 during the recapture runs. Increased catch during recapture runs is due to lowering water levels from 600 cfs to 300 cfs for the recapture runs.

Length, Weight, and Condition Factor

Rainbow trout collected September 7, 8, 9, 20, and 23, 1994 were measured to the nearest mm. Mean length of 1,221 trout measured was 290 mm (SE=2.93).

Rainbow trout greater than 99 mm collected on September 7 and 20 were weighed to the nearest g. Mean weight of 383 rainbow trout collected was 325 g (SE=13.0).

The length-weight relationship for rainbow collected in September 1994 is described by $\log(\text{wt}) = -4.81 + 2.91 \cdot \log(L)$.

Mean length and weight of rainbow trout collected in September 1993, 341 mm and 468 g, were greater than those collected in 1994. These differences in size of rainbows collected are statistically significant at the .05 level. However, this difference is due to differences in sampling gear efficiency (VVP-2E versus VVP15) rather than differences in mean size of the rainbow trout in the population (Allen et al., 1996).

Mean condition factor for 380 rainbow trout weighed and measured was 0.97 (SE=.0054). The regression equation describing the relationship between length and condition factor (CF) was $CF = 1.057 - .00029 \cdot L$. The correlation coefficient (r) was significant ($P < .01$), indicating as rainbow trout grow longer, body condition tends to decrease.

Six bull trout were collected during five days of electrofishing, representing 0.52% of the trout population in the section. Size of bull trout ranged from 243 to 514 mm. Mean length of bull trout collected was 388 mm (SE=38.2).

Eleven kokanee were collected during electrofishing. Size ranged from 207 to 420 mm. Mean length of kokanee was 297 mm (SE=25.6). Two age groups appeared to be represented in the kokanee sample. One size group ranged from 207 to 270 mm and one group ranged from 330 to 420 mm.

Age and Growth

Scales were read and age determined for 282 rainbow trout. Mean back-calculated length at age for all age classes from 1 to 8 was 96, 180, 288, 344, 384, 401, 418, and 397 mm, respectively. Age classes 7 and 8 are each represented by one fish. Back-calculated length at age for each year class is given in Table 21.

At the time of sampling, age 0 to age 8 rainbow trout averaged 89, 169, 250, 359, 429, 429, 480, and 424 mm, respectively. Average, minimum, and maximum length at capture are given in Table 22.

The age distribution (percent by age) of rainbow trout by cm size group is shown in Table 23. Rainbow trout exhibit large variation in growth. The best guess explaining the large variation in growth is either age estimates are inaccurate, hatchery fish from Anderson Ranch Reservoir exhibiting different annuli and growth patterns from resident trout are migrating into the section, or perhaps the riverine population is a mixture of rainbow trout spawned in the river and tributaries that exhibit greatly different growth patterns.

Scales from bull trout collected in 1993 and 1994 were read by IDFG Fisheries Research personnel. Bull trout length and estimated age are shown in Table 24. Scales were read by two independent readers. Estimated age was agreed upon for 60% of the fish.

Population and Biomass Estimates

Numbers of rainbow trout in the marked sample, recapture sample, and number of recaptures by cm size group are shown in Table 25. A total of 42 recaptures ranging from 160 to 470 mm were collected.

The smallest age 1 rainbow trout collected was 130 mm (Table 22). The pooled population estimate for rainbow trout greater than 130 mm was 8,093 (SE=1132). The pooled population estimate for rainbow trout greater than 239 mm was 4898 (SE=811). Allen et al. (1995) estimated 4,540 (SE=861) rainbow trout greater than 239 mm in 1993.

River width was measured in 12 separate locations during electrofishing. Mean river width was 37.0 m (SE=2.4).

The mean weight of rainbow greater than 130 mm in the sample was 324 g. Biomass of rainbow trout in the 9.6 km section was estimated to be 2,622 kg or 273 kg/km. There were 355.2 ha within the section. Estimated biomass was 7.38 kg/ha.

Recommendations

1. Electrofishing catch was greatly enhanced by electrofishing at reduced flows. Future electrofishing should be done after river flows are reduced to 300 cfs.
2. Determine if electrofishing can be done at night to minimize angler conflict.
3. Mark hatchery fingerling rainbow trout planted in Anderson Ranch Reservoir to determine their contribution to the South Fork fishery below Anderson Ranch Reservoir.
4. Conduct annual population estimates in this river section for two more years to determine annual variability in trout populations.

Table 21. Average back-calculated length-at-age for rainbow trout in the South Fork Boise River below Anderson Ranch Dam, September 1994.

Year Class	Age	N	1	2	3	4	5	6	7	8
1993	1	50	95							
1992	2	101	97	179						
1991	3	69	97	191	306					
1990	4	33	95	171	268	351				
1989	5	16	100	173	276	344	396			
1988	6	11	90	161	254	329	375	405		
1987	7	1	125	216	290	343	398	430	465	
1986	8	1	80	136	214	266	298	328	371	397
All			96	180	287	343	384	401	418	397
N			282	232	131	62	29	13	2	1

Table 22. Minimum, maximum, and average length-at-capture by age for rainbow trout in the South Fork Boise River below Anderson Ranch Dam, September 1994.

Year Class	Age	N	Minimum Length	Average Length	Maximum Length	Standard Error
1994	0	11	49	65	84	2.97
1993	1	50	130	169	375	5.82
1992	2	101	175	250	430	5.55
1991	3	69	266	359	465	5.14
1990	4	33	280	393	470	8.48
1989	5	16	364	429	475	7.74
1988	6	11	196	452	507	9.34
1987	7	1	480	480	480	0
1986	8	1	424	424	424	0

Table 23. Age distribution (percent) of rainbow trout by size group.

Size Group (cm)	Sample Size	Age 1 %	Age 2 %	Age 3 %	Age 4 %	Age 5 %	Age 6 %	Age 7 %	Age 8 %
13	7	100							
14	9	100							
15	8	100							
16	9	100							
17	10	70	30						
18	9	44	56						
19	8	12	88						
20	9	11	89						
21	10	10	90						
22	11	9	91						
23	9		100						
24	11		100						
25	5		100						
26	8		88	12					
27	78		22						
28	2		100						
29	6	17	50	33					
30	4		75	25					
31	8		75	12	12				
32	9			22	56	22			
33	5		40	60					
34	10			100					
35	11		9	55	36				
36	10		10	70	10	10			
37	9		11	78	11				
38	6				67	16	16		
39	8		12	38	38	12			
40	9		22	33	44				
41	10		10	20	40	30			
42	11			27	36	18	9		
43	7		14	29	29	14	14		
44	5					60	40		
45	4			25	50		25		
46	7			14	14	43	28		
47	2				50	50			
48	2						50	50	
49	0								
50	1						100		

Table 24. Length and estimated age of bull trout collected from the South Fork Boise River below Anderson Ranch Reservoir, September 1993 and 1994.

Length	243	327	375	397	405	428	429	430	433	450	460	488	490	514
Age	3	3	4	4	4	5	5	4	5	5	6	4	5	5

Table 25. Numbers of rainbow trout collected by cm group during mark and recapture runs, and number of recaptures in the South Fork Boise River below Anderson Ranch Dam, September 1994.

Length (cm)	Mark Run	Recap Run	Recaps	Length (cm)	Mark Run	Recap Run	Recaps
13	14	6		32	22	15	1
14	25	18		33	31	29	3
15	19	26		34	18	29	3
16	22	26	2	35	41	32	3
17	18	27	3	36	24	30	1
18	16	33	3	37	23	29	
19	20	10		37	22	23	1
20	23	23	1	39	27	26	2
21	14	17	2	40	26	21	2
22	20	23	2	41	20	13	2
23	14	11		42	12	15	3
24	8	17		43	9	10	1
25	8	12		44	7	10	
26	12	11		45	10	6	1
27	10	12		46	6	6	1
28	5	5		47	3	3	1
29	14	8		48	2	1	
30	11	16	2	49	1		
31	19	14	2	50	1		