

STATE OF IDAHO  
FISH AND GAME DEPARTMENT  
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FEDERAL AID TO FISH RESTORATION  
Annual Progress Report  
for  
Research Project F-51-R-1  
ANDERSON RANCH RESERVOIR - SOUTH FORK OF BOISE RIVER

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April, 1964

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PROGRESS REPORT  
RESEARCH PROJECT SEGMENT

State of IDAHO

Name Anderson Ranch Reservoir -  
South Fork of Boise River

Project No. F-51-R-1

Period Covered: March 1, 1963 to December 31, 1963

INTRODUCTION

The project was initiated March 1, 1963, with the objectives of evolving control programs on species of rough fish in both the reservoir and the drainage and other means of increasing game fish populations as best determined by evaluation of the data gathered. Anderson Ranch Reservoir is a large Bureau of Reclamation irrigation and power development containing 493,000 acre feet of water and is approximately 12 miles in length. Presently the reservoir is dominated by rough fish and sport fishing is generally poor. The South Fork of the Boise drainage covers an area of some 980 square miles and contains well over 150 miles of fishable streams. Much of the drainage is heavily populated with rough fish, and fishery problems are further complicated by mining activities and watershed erosion. Because of the extensive area and complexity of fishery problems involved, effective management on the reservoir and drainage hinges upon the collection of sufficient biological, limnological, and physical data. (See also preliminary project statements and job descriptions.)

The project Plans, Specifications and Estimates called for assignment of a full-time project leader. However, budget restrictions by the State Legislature prevented the placement of a project leader. This seriously curtailed the project work during 1963, and the segment on the reservoir and portions planned on the South Fork had to be abandoned completely. Most of the summer work was done by two biological aides and consisted primarily of stream inventory, fish collection and marking, and creel census.

ANDERSON RANCH RESERVOIR

Job No. 1-A, LIMNOLOGY

This portion abandoned.

Job No. 2-A, FISH LIFE HISTORY

Objectives were to determine species composition, distribution, migration, age and growth, spawning habits, food habits, and relative abundance of fish species in the reservoir. Data collected was very limited due to abandonment of the reservoir project segment.

Species Composition

Gill netting, creel census, and underwater observations show the following species present in the reservoir:

Rainbow trout	Coarse-scaled sucker
Dolly Varden	Fine-scaled sucker
Kokanee	Squawfish
Whitefish	Chiselmouth chub
Yellow perch	Redside shiner

Although dace were not collected, they are also believed present in the reservoir since they are common in the drainage. Data is presently too limited to establish the relative abundance of the individual species. However, all species other than trout and kokanee are very abundant.

Migration

A total of 3000 rainbow trout, averaging 9.75 inches in length, were jaw-tagged and released at three different locations in the reservoir on May 28 and 29, 1963. One-thousand tagged and 2000 untagged fish were released at each site: boat landing at the Pine airstrip; Fall Creek bay; and Wilson Creek boat landing (see map). During 1963, 159 tags or 5.3 percent were returned. Of these, 8.8 percent were taken in the river below the dam (apparently moved out over the spillway), 3.1 percent taken in the South Fork of

the Boise River at the Pine bridge, and 88.1 percent taken in the reservoir.

The fish appeared to have distributed themselves randomly throughout the reservoir from each planting site. Fish planted at Wilson Creek were taken at Fall Creek and Pine, and fish planted at Pine were caught at and below the dam. Movement of fish up the South Fork apparently did not extend more than one mile. One fish planted at Fall Creek was recovered five and one-half miles up Lime Creek.

In addition to the tagged fish, 20,620 fingerlings (averaging 80/pound) were adipose-clipped and released in the reservoir at the Pine airstrip on June 7, 1963. Total number of fingerling rainbow planted was 150,350. Fish collection on July 6 in a small side channel in the South Fork about one-half mile above the reservoir showed that some fingerlings had moved up into the river. Their movements and survival in the reservoir the remainder of the year is not known.

#### Age and Growth

This portion abandoned.

#### Spawning Habits

Observations on spawning habits of species within the reservoir were very limited. Ripe perch were collected on April 18. Ripe suckers were noted in the traps at the mouth of the South Fork on May 25. Squawfish were seen actively spawning along the east shoreline above Lime Creek from June 18 through July 8. Hatching time of squawfish eggs held in plastic mesh sacks in the reservoir was approximately 10 days.

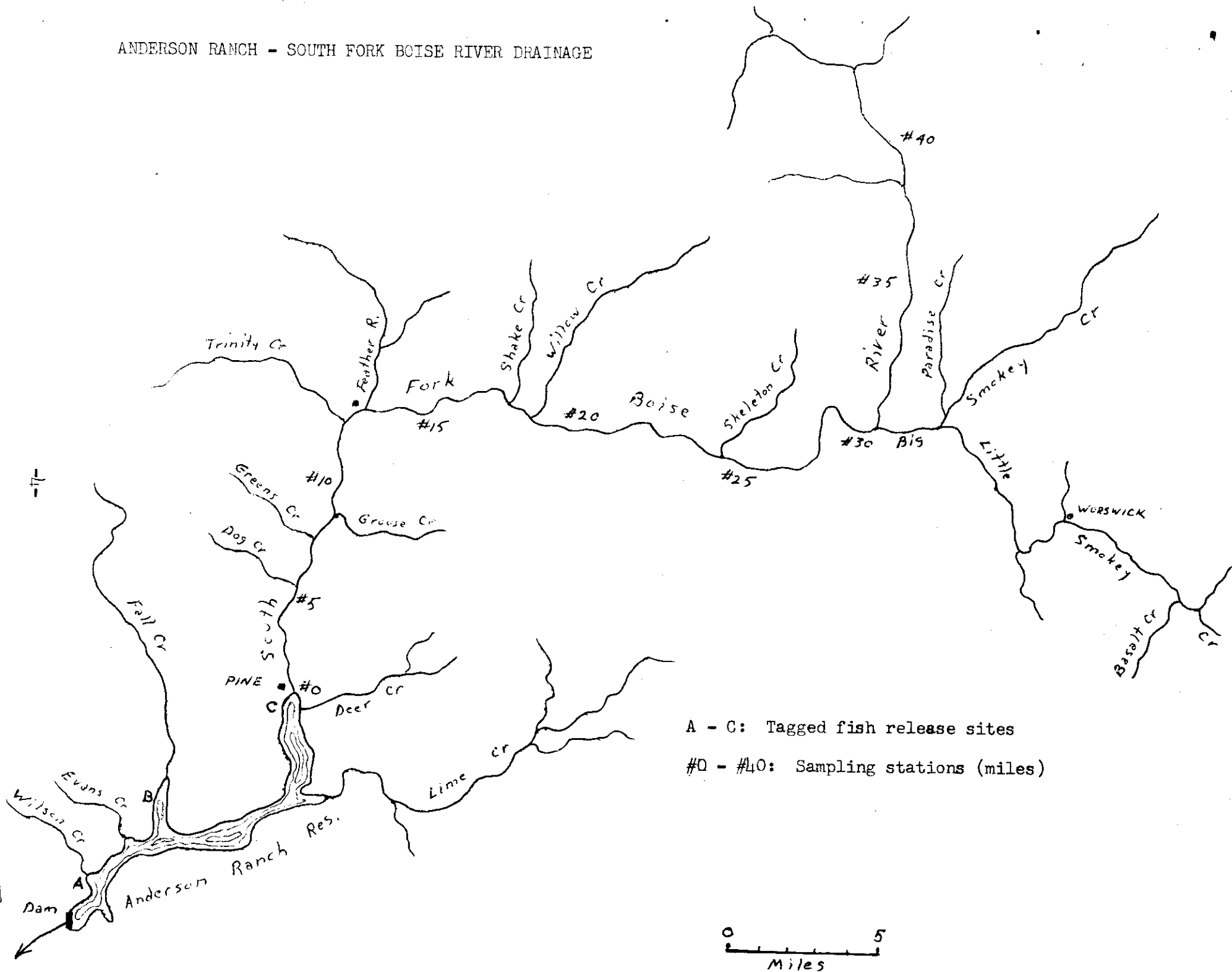
#### Food Habits

This portion abandoned.

Job No. 3-A, CREEL CENSUS

This portion abandoned.

ANDERSON RANCH - SOUTH FORK BOISE RIVER DRAINAGE



A - C: Tagged fish release sites

#0 - #40: Sampling stations (miles)

0 5  
Miles

## SOUTH FORK BOISE RIVER

Job No. 1-B, LIMNOLOGY

### Water Temperatures

A thermograph station was set up on the South Fork approximately one mile upstream from the reservoir. Temperature records were made for the periods May 16 - June 4 and July 29 - November 8, 1963 (Table 1). Temperature data on the drainage was collected in conjunction with other work, using pocket or maximum/minimum thermometers.

Comparison of data with that recorded at Pine showed that stream temperatures in the section of the river from Featherville to the reservoir (approximately 12 miles) were virtually identical. Summer temperatures in the area 20 miles above the reservoir averaged about five degrees cooler and 30 to 37 miles above the reservoir, temperatures averaged about eight degrees cooler than at Pine. Minimum temperatures in the upper river, however, were only one or two degrees cooler.

Temperatures on Big Smokey Creek and the upper South Fork were comparable. Mean temperatures on Little Smokey Creek below Worswick Hot Springs averaged 10 degrees warmer than Big Smokey Creek. This is no doubt due to influence of the hot springs. Stream temperatures above the hot springs are five degrees cooler. The maximum temperature taken in Big Smokey was 64° and 73° in Little Smokey.

### Other

Insufficient personnel prevented sampling schedules for collecting bottom fauna and making observations on stream conditions. Insect collections and stream flow measurements were made in September only. Stream flow estimates were made by the method described in the Journal of Wildlife Management, vol. 18, no. 3, 1954, pp: 366-369.



Table 1.--Stream temperatures on South Fork Boise River near Pine, 1963 (°F)

Period	Mean MIN	Mean MAX	Mean Range	Period MIN	Period MAX
5/16-5/21	43.7	51.3	7.7	43	53
5/22-5/31	44.7	49.3	4.6	43	51
6/1-6/4	44.2	48.3	4.3	44	51
7/29-7/31	53.0	68.3	15.0	53	69
8/1-8/7	54.7	68.3	13.6	51	72
8/8-8/14	58.7	71.1	12.4	58	73
8/15-8/21	54.7	68.5	14.3	53	71
8/22-8/31	53.4	65.2	11.8	51	68
9/1-9/7	54.7	64.6	9.8	52	67
9/8-9/14	55.0	65.7	10.7	53	68
9/15-9/21	51.5	59.5	8.3	51	62
9/22-9/30	50.4	61.7	11.2	49	63
10/1-10/7	51.4	59.4	8.0	49	61
10/8-10/14	49.0	55.6	6.6	47	58
10/15-10/21	45.4	53.1	7.7	44	55
10/22-10/31	40.5	45.9	5.4	35	52
11/1-11/8	37.6	41.4	3.8	34	43

Table 2.--Stream flow estimates on the South Fork drainage, 1963

Station	Date	Volume (c.f.s.)
Fall Creek #0	9/9	13.4
Lime Creek #0.2	9/9	25.1
Trinity Creek #3	9/2	18.7
Feather R. #3.5	9/2	22.3
Willow Creek #1	9/4	22.2
Skeleton Creek #0	9/4	12.1
South Fork Boise #31	9/5	55.5
Big Smokey Creek #2.8	9/5	80.0
Little Smokey Creek #1	9/6	15.0

Job No. 2-B, FISH LIFE HISTORY

Species Composition

The range and occurrence of various species of fish in the drainage are shown in Table 3. Percents composition are computed from collections made with a 2000 watt, 230 volt, AC shocker and rotenone. The coarse-scaled sucker was found to be the most abundant species on the main stem of the South Fork and were collected throughout the entire sampling area. Game fish, including hatchery rainbow and whitefish, comprised only 6.8 percent of the fish collected.

The higher percentages of fine-scaled suckers in Big and Little Smokey Creeks compared to the main South Fork were due primarily to the presence of a separate race of fish. They are considerably smaller than the river species, maturing sexually at seven to eight inches in length, and are probably a resident fish. Few coarse-scale suckers and no squawfish were collected in Little Smokey Creek. Small tributary streams on the South Fork are generally free of undesirable fish species.

Table 3.--Fish species composition (percents), South Fork Boise River drainage, 1963

Station	WRB	HRB	DV	EB	WF	PER	CSS	FSS	SQ	CM	SH	DC	SCP
Wilson Creek #0	100.0												
Evans Creek #0	100.0												
Fall Creek #0-1		28.6			5.6		49.2	5.6	1.6		8.7		0.8
Fall Creek #2.5-3.5	1.8	96.3					1.8						
Fall Creek #8.5-9.5	100.0												
Deer Creek #0	54.5						38.6	6.8					
Trap nets #0	0.2	0.1				1.1	87.4	2.0	9.0	0.1			
South Fork #0-5	0.5	0.2			12.1		56.4	6.2	4.7		5.3	12.2	2.5
South Fork #5-10	0.3	0.5			1.2		57.2	2.5	11.6	2.4	15.1	8.2	1.2
South Fork #10-15	1.7	1.5	0.2		6.1		43.8	4.7	8.7	2.1	18.4	11.2	1.7
South Fork #15-20	1.1	0.6	0.2		2.6		54.2	10.2	0.9	0.8	25.8	1.3	2.2
South Fork #20-30		16.4			21.5		53.7	0.5	4.7				3.3
South Fork #35-37	2.6	5.2	2.6		31.6		21.0		10.5				26.3
(Average S.F. #0-37)	0.6	1.2	0.05		5.0		54.9	4.1	8.5	1.6	13.8	8.2	1.9
Dog Creek #0	66.6		33.3										
Greens Creek #0	68.0												32.0
Grouse Creek #0	10.2						37.3	40.7	11.9				
Trinity Creek #0.5	11.9		1.5				25.4	9.0	3.0		34.3		14.9

Table 3. continued.

Station	WRB	HRB	DV	EB	WF	CSS	FSS	SQ	CM	SH	DC	SCP
Trinity Creek #3	75.0					25.0						
Trinity Creek #3.5	100.0											
Feather R. #0	3.1				5.7	89.3	1.9					
Feather R. #6	20.0	48.6										31.4
Shake Creek #0	71.0	3.2										25.8
Willow Creek	42.8					42.8						14.4
Skeleton Creek	20.0					80.0						
Big Smokey #0-1					25.8	43.0	8.6	18.3		0.5		3.8
Big Smokey #1-2	1.3	1.3			6.3	69.6	11.4	10.1				
Big Smokey #3	3.6	8.9			46.4	21.4		17.8				1.8
(Average B.S. #0-3)	0.9	1.9			24.6	45.8	7.8	17.2		0.3		2.3
Paradise Creek #0	8.2	15.3		42.4	1.2							32.9
Little Smokey #1-5	4.3	2.9			37.7	2.9	44.9			7.2		
Little Smokey #6.2	21.0				41.9		17.7				14.5	4.8
Little Smokey #11.5	12.2				60.3		4.1				1.0	22.4
Little Smokey #12	25.0	31.2										43.8
(Average L.S. #1-12)	13.1	2.8			45.3	0.8	18.8			2.0	4.0	13.1

Table 3. continued.

Station	WRB	HRB	DV	EB	WF	CSS	FSS	SQ	CM	SH	DC	SCP
Basalt Creek #0-1	8.5	8.5					53.2					29.8

WRB - wild rainbow trout  
 HRB - hatchery rainbow  
 DV - Dolly Varden  
 EB - Eastern brook  
 WF - whitefish

PER - yellow perch  
 CSS - coarse-scale sucker  
 FSS - fine-scale sucker  
 SQ - squawfish  
 CM - chiselmouth chub

SH - redbside shiner  
 DC - dace  
 SCP - sculpin

## Migration

During 1963 fish collected in the trap nets and with the shocker were given the following fin clips:

<u>Location</u>	<u>Fin Clipped</u>
Trap nets at mouth of South Fork	LEFT PELVIC
South Fork #0 - #12	RIGHT PELVIC
South Fork #12 - #30	LEFT PECTORAL
South Fork #30 - #40	RIGHT PECTORAL
Big Smokey Creek	LEFT PECTORAL - LEFT PELVIC
Little Smokey Creek	RIGHT PECTORAL - RIGHT PELVIC
Feather River	DORSAL
Trinity Creek	ANAL
Fall Creek	LEFT PELVIC - RIGHT PELVIC

All but two of the coarse-scale suckers marked at the reservoir were recaptured in the lower 12 miles of the South Fork. One fish was captured 16 miles above the reservoir and one in Big Smokey Creek, 31 miles above the reservoir. One squawfish marked at the reservoir was recovered in Trinity Creek. All species marked between #0 and #12 were recaptured within the marking area. Fish marked between #12 and #30 were recaptured in the marking area, except for one taken in Skeleton Creek and one in Big Smokey Creek.

Small tributary streams which contained suckers and squawfish during the spawning periods were free of these species in late August. This would indicate a downstream drift of adult fish following the spawning act. This was further substantiated by the recovery of an adult sucker eight miles below the marking site in late August.

Drift net samples during August and September showed a downstream movement of emergent fry. Fish movement was restricted to the hours of darkness between 10:00 P.M. and 4:00 A.M. Sampling was too limited to establish seasonal patterns or extent of the downstream movement.

Table 4.--Number and species of fish marked on the South Fork Boise drainage, 1963

Station	Coarse-scale suck. Marked/Recovered	Fine-scaled suck. Marked/Recovered	Squawfish Marked/Recovered
Trap nets #0	2138 / 19	50 / 0	220 / 1
South Fork #0-12	1888 / 110	71 / 1	138 / 5
South Fork #12-30	383 / 11	47 / 0	24 / 0
South Fork #30-40	113 / 0	1 / 0	13 / 0
Big Smokey Creek	145 / 0	25 / 0	52 / 0
Little Smokey Creek	2 / 0	31 / 0	
Feather River	125 / 6	3 / 0	
Trinity Creek	18 / 0	6 / 0	1 / 0
Fall Creek	62 / 0	7 / 0	2 / 0
Total marked	4874	241	450
Total recovered	146	1	6

#### Age and Growth

This portion abandoned.

#### Spawning Habits

Observations made during the spawning periods indicated that suckers and squawfish spawned throughout the entire drainage, and no particular area appeared to have disproportionate numbers of fish. Spawning was restricted primarily to the main stem of the South Fork, with the exception of a few larger tributaries, i.e. Big and Little Smokey Creeks, Grouse Creek, Trinity Creek, Feather River, Willow Creek, and Skeleton Creek.

Ripe coarse-scale suckers were taken at the trap nets (#0) on May 25 and a few were found still ripe on July 22. The peak of activity occurred around June 10. Spawning activity of fine-scale suckers was generally about a week later than the coarse-scale suckers. Ripe male squawfish were first

collected on June 12, and the spawning peak was around July 1 - 5. Ripe squawfish were collected as late as July 30. Dace were found spawning on July 6. Ripe shiners were collected from July 6 to August 8.

#### Food Habits

This portion abandoned.

### Job No. 3-B, CREEL CENSUS

#### Creel Composition

Species composition in fishermen creels from 1953 through 1963 is shown in Tables 5A, 5B, and 5C. Rainbow trout consistently made up 95 percent of the creel throughout the drainage. During the past three years, 97 percent of the rainbow on the main river were hatchery fish planted as catchable size. A large portion of the fish taken on the Smokey drainage are also hatchery fish.

#### Fishermen Success

Fishing success on the South Fork drainage, as seen in Table 6, is largely controlled by the size of the stream and the numbers of hatchery fish planted.



Table 5A.--Species composition in fishermen creels, South Fork Boise River

Year	RB	(Percent HRB)*	DV	EB	CT	WF (percents)
1963	96.8	96.8	0.7	0.3		2.2
1962	96.4	97.0	3.6			
1961	96.0	96.9	1.5		0.4	2.2
1960	94.3	82.0	2.0		0.8	2.8
1959	97.5	93.0	2.2	0.2		
1958	96.1		1.9			2.0
1957	95.2		2.8			2.0
1956	92.0		3.7			4.3
1955	99.2		0.4			0.4
1954	83.8		2.7			17.3
1953	92.4		1.0			6.6

\*Percent of rainbow that were hatchery fish

Table 5B.--Species composition in fishermen creels, Big Smokey Creek

Year	RB	(Percent HRB)*	DV	EB	WF (percents)
1963	99.8	99.4			0.2
1962	96.2	100.0	3.8		
1961	97.6	94.4	0.3		2.1
1960	93.0	99.3	4.1	2.9	
1959	95.2	67.5	0.7	4.1	
1958	95.8		2.9		1.3
1957	97.2		2.1	0.2	0.5
1956	97.4		2.0		0.6
1955	95.3		3.9		0.8
1954	98.9		0.4		0.6

\*Percent of rainbow that were hatchery fish

Table 5C.--Species composition in fishermen creels, Little Smokey Creek

Year	RB	(Percent HRB)*	DV	EB	WF (percents)
1963	99.2	82.4			0.8
1962	97.8	72.6	1.6		0.6
1961	95.3	23.0		1.6	3.1
1960	100.0	79.7			
1959	99.6		0.2	0.2	
1958	97.5		0.8		1.7
1957	95.5				4.5
1956	100.0				
1955	97.1		0.7		2.2
1954	97.4		0.9	0.6	1.1

\*Percent of rainbow that were hatchery fish

Table 6.--Fishing success on the South Fork Boise River drainage

Stream	Trout per hour			
	1963	1962	1961	1960
South Fork #0 - #12	0.67			
South Fork #12 - #30	1.31			
South Fork #30 - #40	2.14			
(Average #0 - #40)	1.35	0.59	1.37	2.79
Big Smokey Creek	1.78	0.46	2.81	3.00
Little Smokey Creek	1.41	1.32	1.05	3.36

## DISCUSSION

The number of recaptures of marked fish on the South Fork in 1963 was too limited to provide a conclusive picture of the spawning migrations. Trap netting at the mouth of the river failed to reveal any marked migration of squawfish out of the reservoir. The fact that squawfish were abundant and spawning throughout the drainage suggests that they may be primarily a resident species in the streams.

Sucker movement out of the reservoir in 1963 became pronounced at the onset of high water in May and dropped off as the river flow receded in June. Recaptures indicate that the bulk of these fish are spawning in the lower 12 miles of the river, although some travel as far as the Smokey Creek drainage 30 miles upstream. It should be noted that the upper drainage was more difficult to sample than the lower river, which would account in part for the higher number of recaptures in the lower 12 miles. During August, spawned out suckers were collected in a debilitated condition and possibly a large percentage of the adults die after spawning.

Since the trap nets were selective in capturing adult fish only, the numbers of immature fish moving out of the reservoir is not known. It is possible that the spawning run also consists of a number of immature fish which move into the drainage each spring, carryover in the streams, and spawn in following seasons. This would account for the early appearance of suckers in the streams prior to the reservoir run.

Data is presently too limited to determine the extent of residency of suckers in the drainage. The small fine-scaled suckers in the Smokey Creek drainage are undoubtedly a resident species. Limited sampling indicated that a definite downstream migration of emergents into the reservoir exists. The fact that very few juveniles, excluding emergent young-of-the-year fish, were collected during the shocker and rotenone sampling on the drainage would point to the conclusion that adult suckers on the South Fork originate from the reservoir.

Control of rough fish on the South Fork drainage will involve two separate programs. One program will require chemical treatment of the streams and would be best accomplished in September. Stream flows at this time would be minimal, stream temperatures would not be too cold for effective application, and fisherman use of the area would be light after Labor Day.

If the chemical treatment is to be of any long-term benefit, some means will have to be devised for blocking fish movement out of the reservoir. Construction of a barrier dam in the lower river would be extremely costly, since it would have to be designed to withstand maximum peak flows up to 7,580 cfs and average peak flows of 4,800 cfs and still create a migration barrier.

While collecting fish during 1963 with the 2,000 watt, 230 volt, AC shocker, it was observed that fish attempting to swim upstream through the electrical field would be momentarily upset and displaced by the water current. Investigation should be made into the design and cost of an experimental electrode-type barrier that could be placed in fast water that would effect the same response.

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