

Density, Distribution, and Growth of Rainbow
(Salmo gairdneri) and Cutthroat (S. clarki) Trout
in Big Creek and Tributaries, Idaho Primitive Area

A Research Proposal

to

The Wilderness Research Center
College of Forestry, Wildlife and Range Sciences

by

Robert Jateff

April 13, 1978

Title: Density, distribution, and growth of rainbow (Salmo gairdneri) and cutthroat (S. clarki) trout in Big Creek and tributaries, Idaho Primitive Area.

Objectives:

1. To assess and compare the distribution of rainbow and cutthroat trout in Big Creek and tributaries in relation to habitat parameters;
2. To estimate stock densities of rainbow and cutthroat trout in Big Creek and tributaries;
3. To determine migrations of rainbow and cutthroat trout in Big Creek and tributaries;
4. To determine age and size composition of rainbow and cutthroat trout in Big Creek and tributaries; and
5. To formulate management recommendations for rainbow and cutthroat trout in Big Creek and tributaries.

Background:

Since 1960, fish populations in the Middle Fork of the Salmon River have been studied (Mallet 1963; Ortmann 1969), but little research has been done on the tributaries to the Middle Fork and in particular, Big Creek and its feeder streams. Studies of fish populations in tributary streams are important because the tributaries provide spawning and nursery areas for rainbow and cutthroat trout; two species recognized by the U.S. Fish and Wildlife Service as target organisms for priority research (Stalnaker and Arnette, 1976).

A study by Mallett (1963) has shown that the Middle Fork cutthroat is a migratory strain which spends the winter months near the confluence of the Middle Fork and the main Salmon River. Because

of this trait, stricter regulations were imposed on the Middle Fork to allow adequate spawning escapement. Studies in Big Creek could prove valuable in determining whether or not the cutthroat in Big Creek contribute to the Middle Fork fishery.

Mallet (1963) also conducted extensive age and growth studies on the cutthroat in the Middle Fork. He found a long lived strain of fish which is exposed to several seasons of fishing pressure before it spawns at 6 years of age. Similar data on both rainbow and cutthroat trout in Big Creek could provide valuable base information on future trends in population.

For rainbow and cutthroat trout to exist in the same drainage, some form of separation must exist. Rainbow and cutthroat spawn in the spring and juveniles of both species appear to utilize the same habitat for rearing, therefore it become necessary to evaluate the differences associated with habitat preference between the two species. Hanson (1977) found that steelhead and cutthroat trout exhibited an interactive segregation which did not allow them to live sympatrically. He also found that velocity and substrate size were the two most significant factors in habitat selection by both species. Since steelhead and cutthroat trout occupy the Big Creek drainage, some similar distributional data on them could prove valuable in determining whether or not the two species are living sympatrically.

The proposed study will evaluate age and size composition, distribution, density, and migrations of rainbow and cutthroat trout in Big Creek and tributaries. The results from this study will be used to supplement past studies done on these two species and to formulate recommendations on the management of both stocks.

Objective 1:

Hypothesis:

Is there an ecological interaction between rainbow and cutthroat trout in Big Creek that spatially separates the two species?

Procedure:

To assess distribution, a skin diver will note the locality of rainbow and cutthroat in Big Creek and tributaries. Sample areas will be randomly selected so as to include some pool and deep run habitat.

Locations of fish will be recorded and transferred to waterproof maps of each sample area. Species of fish and approximate size will also be noted. Measurements of velocity and substrate size at various locations inhabited will be made by size class.

Data Analysis:

Maps will be prepared using the data collected from observations to show the distribution of rainbow and cutthroat trout in sample areas. Statistical tests will be run relating fish size to water velocity and substrate size since Hanson (1977) found that these two factors are the most significant in determining stream position in steelhead and cutthroat trout populations.

Objective 2:

Hypothesis:

Are the densities of rainbow and cutthroat trout in Big Creek different from the densities found in the Middle Fork of the Salmon?

Procedure:

The stock densities of rainbow and cutthroat trout in Big Creek will be determined from total population estimates. The area density

method of estimation will be used to calculate the population of rainbow and cutthroat. Sample sections will be selected at random and the sampling will be stratified so that each habitat type will be proportionately represented.

Data Analysis:

From the data collected, population estimates for rainbow and cutthroat will be made. Confidence intervals will be calculated on each estimate. Stock densities will be found by taking estimates for each species, expanding these estimates to the total stream, and then dividing by total stream area.

Objective 3:

Hypothesis:

Do the rainbow and cutthroat trout in Big Creek contribute to the Middle Fork of the Salmon River fishery or are they overwintering in deeper waters of Big Creek?

Procedure:

To determine the migrations of rainbow and cutthroat trout in Big Creek and tributaries, a tagging study will be initiated. Collection of fish will be by angling. Captured fish will be measured, tagged, and subjected to scale removal before being released. A representative sample of fish will also be weighed to aid in age and size determinations. Circular, monel-metal jaw tags will be used on all fish over 150mm (Rankel 1971). Each tag will bear a serial number and the address of the University of Idaho. Data recorded will include species, location, tag number, date, and length of fish. Total hours spent fishing will also be recorded.

Data Analysis:

Subsequent recaptures of tagged fish noting location of recapture and the date will provide information on migrational patterns of rainbow and cutthroat within the Big Creek drainage. If enough fish are tagged, recoveries in future years will provide valuable growth information by comparing length at tagging to length at recapture. Mallett (1963) found that the majority of fish tagged in the upper reaches of the Middle Fork of the Salmon River, spent the winter months at the mouth of the Middle Fork where it joins the main Salmon. Recaptures of the Big Creek fish in this same area will provide information as to the contribution of Big Creek fish to the Middle Fork fishery.

Objective 4:

Hypothesis:

Are age and growth statistics for rainbow and cutthroat in Big Creek different from those found in previous studies on the Middle Fork of the Salmon?

Procedure:

Age and size composition for rainbow and cutthroat trout will be determined by length relationships and scale analysis. Collection of fish will be by angling methods. All fish will be measured, tagged if over 150 mm, a scale sample taken, and returned to the stream. Scales will be taken above the lateral line below the insertion of the dorsal fin (Averett 1963; Rankel 1971). Scales will be put in coin envelopes and the data recorded will include species, date, location, and length of fish. Weights will also be taken on representative size classes of fish. Scales will be analyzed by examining scale impressions on a scale projector at the University of Idaho.

Data Analysis:

Lengths between individual annuli on scales will be determined and a linear regression run to backcalculate lengths of fish at different ages. Age composition will then be determined by constructing a length-frequency distribution for both species (Averett and MacPhee 1971). Comparisons between steelhead and cutthroat will be made regarding age and size structure.

Objective 5:

Procedure:

Management recommendations useful in maintaining stocks of steelhead and cutthroat trout in Big Creek and tributaries will be made based on the results from objectives 1, 2, 3, and 4.

124
52% COTTON FIBER
BOND
BOND

BUDGET

Travel

Airplane travel

Source of Cost

College of FWR

Lodging

Taylor Ranch Facility

College of FWR

Operating Expenses*

Waterproof paper, collecting jars,
scale envelopes, measuring board,
spring scale

\$ 50.00

Total

\$ 50.00

* Most of these materials are available through the Fishery Resources Department.

LITERATURE CITED

- Averett, R.C. 1963. Studies of two races of cutthroat trout in Northern Idaho. M.S. Thesis, Univ. Idaho, 67 p.
- _____ and C. MacPhee. 1971. Distribution and growth of indigenous fluvial and adfluvial cutthroat trout, St. Joe River, Idaho. Northwest Science. 45(1):38-47.
- Everest, F.H. 1969. Habitat selection and spacial interaction of juvenile chinook salmon and steelhead trout in two Idaho streams. Ph.D. Thesis. Univ. Idaho, 77 p.
- Hanson, D.L. 1977. Habitat selection and spatial interaction in allopatric and sympatric populations of cutthroat and steelhead trout. Ph.D., Thesis. Univ. Idaho, 66 p.
- Mallet, J.L. 1963. Life history and seasonal movements of cutthroat trout in Salmon River. M.S. Thesis. Univ. Idaho, 62 p.
- Ortmann, D.W. 1969. Middle Fork of Salmon River investigations. Idaho Dept. of Fish and Game, Proj. F-56-R-1: 20 p.
- Rankel, G.L. 1971. An appraisal of the cutthroat trout fishery of the St. Joe River, M.S. Thesis. Univ. Idaho, 55 p.
- Stalnaker, C.B. and J.L. Arnette. 1976. Methodologies for the determination of stream resource flow requirements: an assessment. U.S. Fish and Wildl. Ser. Utah State Univ., Logan, 199 p.

BIOGRAPHIC SKETCH OF AUTHOR

Robert James Jateff was born in Akron, Ohio on May 25, 1950. He attended Firestone High School in Akron and graduated from there in June, 1968. Colorado State University, Fort Collins was his choice for college, and he was a student there in fish and wildlife biology from 1968 to 1972. He left school to get married in June, 1972 and worked as a carpenter until January, 1975 when he and his wife moved to Hayden Lake, Idaho. In Hayden Lake, he worked one summer as a research assistant with the Idaho Department of Lands. After that, he again worked as a carpenter while his wife completed school at North Idaho College. After his wife's graduation, he returned to school and enrolled in the University of Idaho during the summer of 1976. He is presently a senior in the College of Forestry, Wildlife and Range Sciences working towards a baccalaureate degree in Fishery Resources.