MONTANA STATE DEPARTMENT OF FISH AND GAME
FEDERAL AID IN FISH RESTORATION SECTION
HELENA, MONTANA

JOB COMPLETION REPORT
INVESTIGATIONS PROJECTS

State of Montana

Project No. F-9-R-2 Work Plan No. I Job No. I-A

Title of Job: Contribution of Hatchery-Reared Trout to Total Catch.

Abstract:

A study was conducted in the years 1950, 1951, 1952, and 1953 on Rock Creek, below Red Lodge, Montana. This section of Rock Creek is predominantly a brown trout stream. The study was designed to measure the contribution of hatchery-reared trout to the total catch.

Approximately 20,000 yearling marked rainbows, averaging 5.4 inches in length, were planted each year prior to the opening of the fishing season in the years 1950, 1951, and 1952. These plants contributed 4 to 5 percent to the creel in the year planted and 7 to 8 percent to the creel the year after liberation. In 1953 approximately 9,000 marked rainbows, averaging 7 inches in length, were planted after the start of the fishing season. The fish were liberated at points of access throughout the fishing season. This plant contributed 20 percent to the total fish caught during the 1953 season.

Objectives:

In the face of ever-increasing fishing pressure, it is imperative that available waters be managed to provide fishing for the angling public. It is extremely desirable to know the contribution of the hatchery trout to the anglers' catch so that the hatchery product can be used to its maximum potential. It was desired in this study to learn the relative contribution of the hatchery plants to the total catch and not the total return of the hatchery fish.

Techniques Used:

Hatchery rainbows were planted in the lower 25 miles of Rock Creek near Red Lodge, Montana. The fish used in this study were from eggs taken at the Willow Creek Reservoir, near Harrison, Montana; hatched at the Big Timber trout hatchery; and then reared at the Bluewater rearing station, where they were held until planted. The fish were anesthetized by the use of urethane (ethyl carbamate) and marked by fin clipping. A different fin clip was used each year. A summary of the plants is given in Table 1.

In the first three years, the planted trout were distributed along the study section of the stream. This is the procedure that has been used in the State of Montana for the last 25 years. The 1953 rainbows were planted at points of access and areas receiving the heaviest fishing pressure within the 25-mile study section.

Creel census was conducted by Deputy Game Wardens Vern Waples and Clyde Christensen. The Project Leader and Assistant Project Leader assisted in the creel census during the years 1952 and 1953. The number of creels checked during the four years of the study is as follows:

Year	Number Creels Checked	Checker
1950	221	Waples
1951	57	Christensen
1952	234	Waples and Opheim
1953	358	Waples, Nelson, Opheim

Findings:

The catch per hour for the four years of the study range from a low of 0.65 fish in 1950 to 1.2 fish in 1951. The following is the catch per hour over the entire study period: 1950, 0.65; 1951, 1.20; 1952, 0.91; 1953, 0.76. The high catch per hour in 1951 is believed due to the method used in taking creel census. During this year the information was obtained by having resident fishermen record their own catch throughout the season.

Table 2 represents the percentage species composition of these creels over this four-year period.

In 1950 the catch was predominantly rainbow. Ten percent of the rainbows caught in 1950 were from the yearling rainbows planted in May of 1950. In 1951 the planted yearling rainbows made up 24 percent of that species appearing in the creel. In 1952 the plant made up 28 percent of the rainbow catch. In 1953 the planted rainbow made up 65 percent of the rainbows appearing in the creel. During this four-year period the planted rainbow have increased their contribution to the rainbow catch from 10 to 65 percent. The catch of brown trout in 1950 made up 42 percent of the total creel. The contribution of this species to the creel has increased steadily over this four-year period, contributing 57 percent of the fish taken from Rock Creek during the 1953 season. The percent contribution to the creel of yearling rainbow planted in Rock Creek is shown in Table 3.

There was a total of 69,991 yearling trout planted over this four-year period. The 1950 plant contributed 5 percent to the creel in 1950. In 1951, 12 percent of the fish in the creel were hatchery plants. Eight of this 12 percent was contributed by the 1950 plant. In 1952 the hatchery plants contributed 11 percent to the total catch. Seven of the 11 percent contribution was by the 1951 plant. In the 1953 season 23 percent of the fish appearing in the creels were hatchery rainbow. Three percent of this contribution was from plants made prior to the 1953 season.

Recommendations:

The cutthroat and the rainbow trout have been planted extensively in Rock Creek since planting was undertaken in the early 20's. While the brown trout has never been planted to any degree, they undoubtedly are in predominance now.

According to records of the Big Timber Hatchery, the brown trout was first introduced into Rock Creek in April, 1945. Prior to this time they had

Table 1. Plants made in Rock Creek, 1950, 1951, 1952, and 1953.

Year	Month	Day	Number	Fin Clip	Size of Sample	Length (inches) Range	Mean Length
1950	May April	13 25	20,684	Right Ventral	659	2.4 - 9.4	5.3
1951	June July	26 2	20,033	Left Ventral	369	3.2 - 9.7	5.3
1952	May	14-15	19,591	Adipose	321	4.5 - 8.0	5.6
1953	May June Aug.	22 26-27 9	3,240 5,643 800 9,683	Adipose & Left Ventral	463	6.8 - 9.0	7.1

Table 2. Species composition of creels in percent, 1950, 1951, 1952, 1953

Year	Number Creels Checked	Species			
		Rainbow	Brown	Eastern Brook	Whitefish
1950	221	49	42	7	2
1951	57	50	45	5	0
1952	234	41	52	4	3
1953	358	36	57	5	4

Table 3. Contribution to the creel of rainbow plants in Rock Creek, 1950, 1951, 1952, 1953.

Date of Plant	Number	Fin Clip	Number Appearing In Creel	Percent contribution to catch of marked fish		
				From Plant	From Previous Plants	Total
1950, April	20,684	RV	18 RV	5	0	5
1951, July	20,033	LV	18 RV, 9 LV	4	8	12
1952, May	19,591	AD	43 LV, 27 AD	4	7	11
1953, Season	9,683	LV& AD	4 LV, 26 AD 167 LV & AD	20	3	23

been planted quite extensively in the Clarks Fork of the Yellowstone, a stream into which Rock Creek empties, approximately 20 miles below the study section. Mr. Forest Keller, Superintendent of the Big Timber Hatchery stated that prior to the planting of brown trout in Rock Creek, the species was present and contributing in significant numbers to the creel.

Random shockings indicate that the population in 1952 was 81 percent brown trout. This predominance is due undoubtedly to the brown trout's ability to cope with the changing habitat. The study indicates that while the efforts of the plantings are to increase the rainbow population the brown trout is steadily on the increase. The reason for this increase may be due to one or more of the following factors: They are extremely wary and hard to catch by the present system of fishing employed by the average Montana fisherman, as illustrated by the findings of the Prickley Pear Creel Census (Opheim, 1952). They spawn in the fall of the year while the streams are low and clear and have a minimum of silt-laden irrigation waters returning to them. Fishing pressure during this spawning period is at its lowest, due to adverse weather conditions and decrease in fishing interest. They are primarily a nocturnal feeder and present regulations prohibit fishing after 9:30 p.m. (Simon, 1946).

As was noted under "Findings", rainbow trout planted in Rock Creek by the procedure followed through the first three years of the study may be expected to contribute 4 to 5 percent to the creel in the year planted and 7 to 8 percent the year after liberation. It is evident that the contribution of a given plant to the creel is dependent to a large extent on the number which carry over to the second year. This undoubtedly results from the greater proportion of the plant being under 7 inches (Table 1) and, therefore, unavailable to the anglers until they have increased in size. The small percentage contributions to the catch can very likely be attributed, then, to large mortalities which the planted fish suffer prior to attaining legal size (7 inches).

The high in-season contribution to the creel made by the rainbows planted throughout the 1953 season indicates the importance in time, size of fish, and method of planting. These 9,683 fish made a 20 percent contribution to the 1953 creel, as compared with 4 percent, the total in-season contribution made by the 60,308 hatchery rainbows planted in the seasons 1950, 51, and 52.

It is reasoned that contribution to the creel is important, as well as total survival of hatchery trout. If only 2 percent of the fish planted survived but constituted 60 percent of the catch, plantings would be important. On the other hand, were the planted hatchery trout all to survive and be caught and yet constitute only 5 percent of the catch, the efforts of planting would be hardly missed if discontinued.

The planting of legal trout is not management, but the creation of an artificial resource. The factors that influence the return of these hatchery plants to the creel are as follows: fishing pressure, size of fish, time of plant, and places where planted.

The brown trout has been introduced into many drainages in the State of Montana, and while the brown trout is a desirable fish in many respects, because of its extreme wariness it is not too popular with the average fisherman.

It is, therefore, recommended that no further introductions of brown trout be made into any drainage of the State of Montana before a thorough investigation has been made as to what effect these introductions will have on the fishery.

It is also recommended that studies be undertaken to determine the feasible way of increasing the brown trout's catchability.

It is recommended that any plant of hatchery rainbow made into a brown trout stream be made so that the maximum return to the fishermen's creel may be expected. Some of the stipulations should be:

1. That fish be of adequate size to constitute a desirable size from the standpoint of the fishermen.

2. That these planted rainbow be placed throughout the fishing season at locations readily accessible and used by the angling public.

3. That plants should not be made until after the opening of the fishing season and after the high water period, with no plants being made later than August 1.

4. That the number of fish planted in any stream shall be dependent upon the fishing pressure exerted upon the stream.

5. Streams warranting plants of fish shall be stocked each year.

6. Continued plants of fish in any brown trout stream should be dependent and based upon a reasonable return of the planted fish to the creel.

Summary:

A four-year study was conducted on the lower 25 miles of Rock Creek below Red Lodge, Montana. This section of Rock Creek is predominantly a brown trout stream. The study was designed to measure the contribution of hatchery-reared trout to the total catch. Approximately 20,000 yearling marked rainbows, averaging 5.4 inches in length, were planted each year prior to the opening of the fishing season in the years 1950, 1951, and 1952. These plants contributed 4 to 5 percent of the creel in the year planted and 7 to 8 percent of the creel the year after liberation. In 1953 approximately 9,000 marked rainbows, averaging 7 inches in length, were planted after the start of the fishing season. These fish were liberated at points of access throughout the fishing season. This plant contributed 20 percent of the total fish caught during the 1953 season.

Data and Reports:

The data and reports are with the project leader at Bozeman, Montana.

Literature Cited:

Opheim, Boyd R.
1952. "Fishing Pressure and the Relation of the Angler Catch to the Actual Stream Fish Population, Prickley Pear Creek." Job Completion Report, Federal Aid in Fish and Wildlife Restoration Acts.

Simon, James R.
1946. "Wyoming Fishes". Wyoming Game and Fish Department. Bulletin No. 4, Cheyenne, Wyoming.

Prepared by Boyd R. Opheim Approved by _____

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