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AN EVALUATION OF CATCHABLE TROUT MOVEMENT USING TWO MARKING TECHNIQUES

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ABSTRACT

Two marking techniques, freeze branding and subcutaneous tags, were used to evaluate movement of catchable rainbow trout (*Salmo gairdneri*) stocked into Rich Creek, West Virginia. These marks proved to be a valuable tool in studies requiring both rapid recognition of marked fish and identification of individuals. In general, there was a marked movement of trout downstream from the point of release, even during periods of low water conditions. Mean distances moved in both directions were 465 meters downstream and 197 meters upstream, respectively.

INTRODUCTION

Stocking of catchable sized trout has become a common practice throughout most of the United States. In 1965 over 73,000,000 catchable trout were stocked at a cost of about $20,000,000. By the year 2000, production of all hatchery trout is expected to exceed 550,000,000 annually (United States Fish and Wildlife Service, 1968). Annual production costs could exceed $100,000,000.

With the increase in production costs comes a need to more efficiently utilize the fish produced. Current stocking policies in the Southeast are based on practices established in other areas of the United States (Butler and Borgeson, 1965; Newel, 1957). No comprehensive study of trout stocking in the Southeast is generally available. Each region needs to develop stocking policies based on evaluations conducted in their own areas. This study evaluates movement of stocked catchable rainbow trout (*Salmo gairdneri*) in Rich Creek, West Virginia.

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We wish to express our thanks to the West Virginia Department of Natural Resources, particularly Dave Robinson and Harvey Beall, for their valuable assistance and cooperation. We also thank the Bureau of Sport Fisheries and Wildlife, specifically Mike Hendrix and his staff at White Sulfur Springs National Fish Hatchery, for their cooperation and assistance in marking and stocking the fish.

MATERIALS AND METHODS

Study Area

Rich Creek, West Virginia, originates in a mountainside spring 17.7 km (11 miles) above its confluence with the New River. The creek drains 84.95 km^2 (52.8 miles^2) of the western slope of Peters Mountain in Monroe County, West Virginia. Rich Creek is a marginal trout stream with an associated centrarchid-cyprinid fauna. The water temperature ranged from 4° C in February to 24° C in mid-July.

Land use along the creek is primarily agricultural. The only creekside domestic and/or commercial land use is within the town of Peterstown. Agricultural use involves grazing and corn silage production. A private fishing club maintains a trout hatchery at the headwaters of Rich Creek. This hatchery diverts a portion of the stream through their raceway system.

Heavy rains and resulting high water forces the hatchery to bypass excess water with a loss of brown (*Salmo trutta*), rainbow (*Salmo gairdneri*), and eastern brook (*Salvelinus fontinalis*) trouts into the stream system.

Marking

The two marks used in this study are: (1) a subcutaneous tag, which consisted of a vinyl plastic tag inserted between the skin and masculature on the ventral surface, described by Butler (1957); and (2) a cold brand on the dorsal and ventral surfaces as described by Raleigh et al. (1973).

The fish were anesthetized with tricane methane sulfonate (MS - 222) during the marking operation.

Movement

Twenty-four hundred rainbow trout from White Sulfur Springs National Fish Hatchery were stocked into Rich Creek. At each stocking 600 fish were distributed among three stocking locations. Fish were stocked in February, March, April and May, 1973. No apparent differences exist among location and stocking time, therefore the data has been pooled. The fish were branded and tagged following the procedures described above. Creel census was taken 14 days per month. All weekend days and 6 week days were included in each creel census period of 28 days duration. All brands and tags observed during the creel census were recorded.

Fish were sampled 24 days after each stocking by electrofishing 460 meters (1500 feet) upstream and downstream from the initial stocking location. Summer carryover was determined by electrofishing 12.8 of the 15.5 km of Rich Creek in West Virginia 4 months after the last stocking date. Distance moved, direction of movement, and individual marks of fish were recorded. In addition to sampling and creel census, three check stations were established at local businesses, and fishermen were asked to turn in tags and indicate date and location of catch at these points.

RESULTS & DISCUSSION

Retention of the two types of marks did not differ significantly during this study. Retention is here used to indicate the presence, but not necessarily distinguishability, of a mark. Readability, the ability to distinguish individual marks, differed between the two types of marks. Fourteen hundred and eighty two of the original 2400 subcutaneous tags have been returned (Fig. 1). Tag loss slightly exceeded brand disappearance. Subcutaneous tags were retained in 97.3% of the trout returned whereas 99.5% of the trout returned had visible brands. All trout recaptured by electrofishing had visible brands, but 8% had lost their tags.

Brands on the dorsal surface were retained throughout the duration of the study while brands on the ventral surface usually disappeared within two weeks. These findings are in contrast to the reports by Raleigh et al. (1973); however, no attempt was made to vary hue as recommended in their report.

Retention times to date for both marking techniques range from 31-207 days. Experience of the brander definitely affects retention times. From field observation it was apparent that there was varied retention and readability of marks left by various branders. Readability between the two marking techniques varied significantly. Twenty seven of the 50 fish taken in the monthly sampling had tags that were readily readable under field conditions. Fifty fish had readable brands. Tags are more difficult to read than brands because of the opaque skin covering the tag. Fish returned in the creel census and at check stations could not be used in this comparison because their tags were removed.

Mortality during the marking of the 2400 fish totaled 17 fish. Eleven of these were sexually mature males. Only 1 fish died after the initial marking operation. A group of 600 fish were held in a raceway for 21 days post marking with no observed mortality.

Identification of individuals is essential in any type of movement or migration study. Therefore, double marking techniques utilizing both methods is recommended for subsequent studies. If care is taken at the time of tagging to insure tag visibility, readable tags can be expected for at least 6 months. Most cold brands are also reliable for at least 6 months. Brands are quickly and easily read in the field but may fade in a short period. Tags are permanent and allow identification of individuals but may have to be removed to be read. A crew of four can tag and brand about 100 fish per hour.

There was a net downstream movement of trout from the point of introduction (Fig. 2). Downstream movement occurred in 75.5% of the trout that moved from the point of introduction; average distance moved was 465 meters. The minimum distance moved was 15.3 meters and the maximum was 2,740 meters. Butler and Borgeson (1965) reported that fish in poor condition generally drift downstream after stocking. Fish used in this study were apparently in excellent condition. Seegrist and Gard (1972) stated that flooding has little or no effect on trout movement, but trout have also been reported to over compensate and move slightly upstream during high water (Seegrist and Gard, 1972; Miller, 1957). However, during high water from March 17-20, 1973, fish in our study moved downstream.

Cooper (1953) demonstrated that rainbow trout and brook trout moved downstream immediately after stocking when water temperatures were 10°C or less. We found no significant difference in movement of fish stocked at water temperatures of 4°C on February 23, 1973 or 18°C on May 18, 1973.

Upstream movement averaged 197 meters and occurred in 24.5% of the fish that moved. However, only 4 fish moved more than 304 meters upstream while 6 fish moved less than 100 meters upstream. The farthest upstream movement recorded was 428 meters.

Summer carry over consisted of 6 fish, as determined by electrofishing nearly the entire length of Rich Creek. Distances moved by these fish over a 7 month period are similar to those of fish captured in the monthly sampling.

Understanding movement, survival and catch rate of stocked trout is important for efficient utilization of our hatchery resources. We recommend consideration of movement characteristics of trout for more optimal angler utilization. Further studies in the southeastern United States are certainly warranted.

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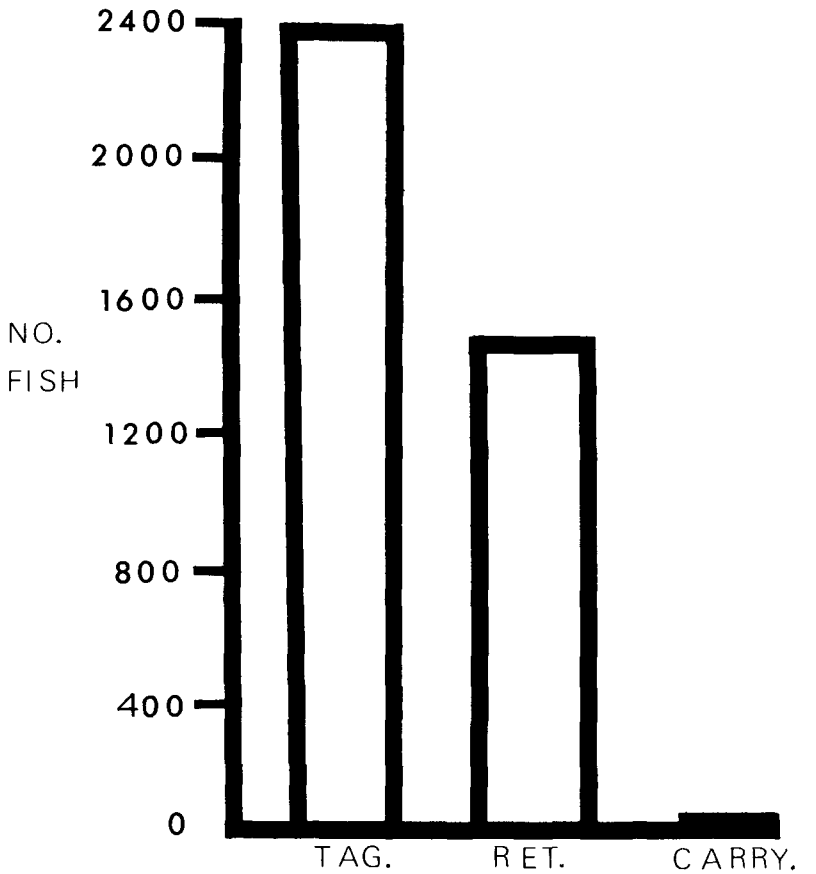

Figure 1. Number of fish marked and stocked (Tag.), number of tags returned (Ret.), and summer carry over (Carry.).

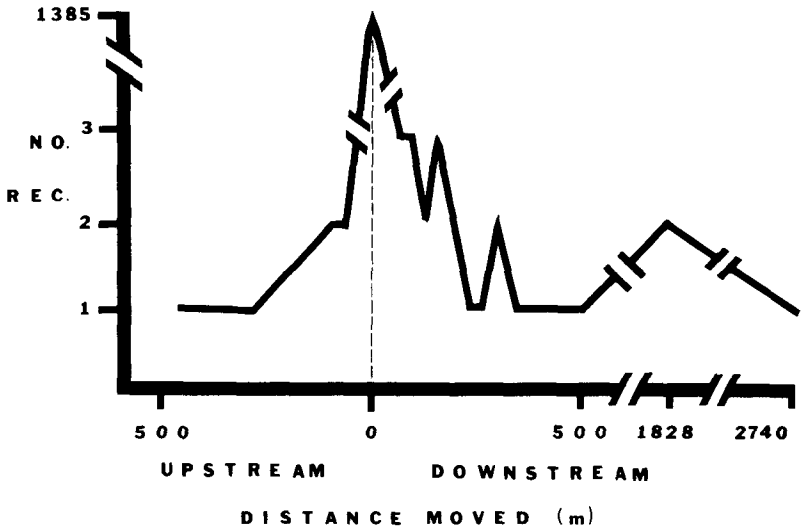

Figure 2. Diagramatic representation of distances and numbers of trout moved from point of introduction. No. Ret. = number recaptured by electrofishing.

SEASONAL VARIATION IN FOOD AND DIEL PERIODICITY IN FEEDING OF NORTHERN LARGEMOUTH BASS, *MICROPTERUS S. SALMOIDES* (LACEPEDE), IN AN OKLAHOMA RESERVOIR[1]

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ABSTRACT

Food habits of 810 northern largemouth bass, 91-2724 g total weight (age groups 0-7) were determined from collections made June 1968 through November 1969 in an 808-hectare, Oklahoma reservoir. Bass were collected by traversing the shoreline with an electrofishing apparatus and bass stomach contents observed with a gastroscope. Fifty-five percent of all bass stomachs were empty. Similar observations over a wide geographic area were reviewed and the suggestion was made that 56% occurrence of empty stomachs may be

[1]Presented at the Southern Division, American Fisheries Society, Hot Springs, Arkansas, October 1973 (27th Ann. Conf., S. E. Assoc. Game & Fish Comm.).

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