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cc: Education-Game
Inst. for Fish. Res.
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MICHIGAN DEPARTMENT OF CONSERVATION
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December 17, 1953

Report No. 1393

# SECOND PROGRESS REPORT ON A TROUT MANAGEMENT STUDY OF THE PINE RIVER, LAKE COUNTY, MICHIGAN



By

Edward E. Schultz

Abstract

During the 1953 trout season, a special regulation that imposes a ten-inch minimum size limit on all species of trout continued in effect on a portion of the Pine River. The first progress report, for the 1952 season, was given in Institute for Fisheries Research Report No. 1355. Locations of the sampling stations and the methods of study in 1953 were the same as those for 1952. All fish collected were taken by a three-man crew using a direct current electric shocker.

Sufficient time has not elapsed to permit definite conclusions. Age and growth analyses have indicated no change in the rate of growth for any species of trout in the ten-inch or seven-inch control areas. Growth of Pine River trout is rapid compared to growth of trout in other Michigan streams. The size-frequency distribution shows an increase in the number of brook and brown trout under seven inches in both the seven- and ten-inch-limit waters, but the increase was appreciably greater under the ten-inch limit. The number of trout taken in the longer length-groups was too

small to show a noticeable trend. There was a slight increase in number of brook and brown trout over ten inches in the ten-inch water.

Rainbow trout under seven inches showed a decline in number in both sections of the river, but the decline was less in the ten-inch water. Rainbows from 7 to 9.9 inches increased slightly in both sections, and two fish over ten inches in length were taken in the seven-inch water. It appears that most rainbow trout migrate downstream before reaching ten inches, and thus are lost to anglers under a ten-inch minimum size limit.

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# SECOND PROGRESS REPORT ON A TROUT MANAGEMENT STUDY OF THE PINE RIVER, LAKE COUNTY, MICHIGAN[1]

By

Edward E. Schultz[2]

## Introduction

During the 1952 and 1953 trout seasons, a special regulation was in effect on a portion of the Pine River that imposes a ten-inch minimum size limit on all trout removed. A description of the area and of study methods is contained in Institute for Fisheries Research Report No. 1355 (Schultz, 1953). Further study has called for corrections on the lengths of the experimental sections given in that report. Corrected lengths, measured on aerial photographs, are 5.8 miles for the ten-inch section and 3.5 miles for the seven-inch control section. The 2,300-foot length of river shocked in the ten-inch water comprises 7.5 percent of the total length of this section, while the 2,585 feet sampled in the seven-inch section is 14.0 percent of the length of that section. The direct-current electric shocker used in taking the samples of fish revealed only a portion of the population

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[1] The field work, analysis of data, and preparation of the report were undertaken with Federal Aid to Fish Restoration funds under Dingell-Johnson Project No. F-2-R-1.

[2] Assistants in the field were Alfred Beeton, Frederick Ohlmacher, Robert Eshenour, Buddy Jacob and George Plummer. The author was the field party leader.

in these areas because the river is wide, with deep holes and a swift current, which adversely affected collecting efficiency.

## Methods

The equipment and methods used by the three-man crew in 1953 were the same as those in 1952. Collections were taken at the same six locations, three in the ten-inch water and three in the seven-inch, two times each in 1952 and 1953. The same D. C. shocker has been used throughout the study.

All trout over four inches in total length were measured, scale-sampled and released. Some fish of sizes below four inches were scale-sampled, and all were measured and released. The scale samples were impressed in plastic and read for age.

## Preliminary Results

Only preliminary conclusions can be drawn at this time regarding the effect of a ten-inch minimum size limit on trout in the Pine River because the experiment has run for a relatively short time. Because of a lack of funds, the creel census was not continued in 1953, hence the results given in this report are based only on samples taken with the shocker.

The age composition and growth of brook, brown and rainbow trout (Table 1) have not changed during the two years, and a comparison of growth rates of trout does not indicate any differences between the two experimental sections. Trout in both experimental sections show a rapid growth rate.

There have been several noticeable changes in the size-frequency distribution of trout in the two sections for the two seasons (Tables 2 and 3). For all three species of trout collectively, the number of trout less than seven inches long has decreased in the control area while trout of this

size group have increased where the ten-inch limit is in effect (Table 3). The same change applies to trout (all species) from 7.0 to 9.9 inches long and for trout over 10.0 inches, although the samples of the latter were small. Table 2 shows that the numbers of brook and brown trout (all sizes combined) increased in both the seven-inch and ten-inch waters, due largely to an increase of fish under 7 inches. Rainbow trout below 7.0 inches in length have decreased in number in both sections, but the decrease was less in the ten-inch water. It is possible that these changes were the result of a poor spawning season this past spring for rainbows, while brooks and browns may have been more successful at spawning in the fall of 1952.

Brook trout that exceeded ten inches increased by one fish (1 and 2 fish in shocker samples) in each area. Brown trout that were over ten inches long decreased in the seven-inch section (from 13 to 8 in samples) and increased in the ten-inch section (2 to 8 in samples). Relatively few rainbow trout reach ten inches in this part of the Pine River. It is likely that most rainbows migrate downstream before reaching ten inches. Only two rainbow trout that exceeded this length, (both in the seven-inch section), have been captured with the shocker since this study began.

The evidence at present seems to indicate that a ten-inch minimum size limit on trout will benefit the reproduction of brooks and browns, but will have no effect on the reproduction of rainbows within the experimental area. Past studies on the Pine River (Shetter, 1938 and 1940; Schultz, 1953) show that rainbows furnish the majority of wild fish in the anglers' creels under a seven-inch limit. In the 1952 creel census, 44 percent of the native trout caught in the seven-inch section were rainbows, while they made up only 16 percent of the catch in the ten-inch limit section. Further observations are necessary to afford a good evaluation of

the results of the experiment as a whole, but it appears quite certain now that a ten-inch minimum size limit on rainbow trout would result in the majority of these fish being lost to anglers on this stream.

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INSTITUTE FOR FISHERIES RESEARCH

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Typed by: P. R. Darling

Table 1. Comparison of age-length relationships of trout in the two experimental sections of the Pine River for 1952 and 1953. (Average total empirical lengths in inches. Number of trout in parenthesis.)

| Species and year collected | Age group 0 | | I | | II | | III | | IV | V |
|---|---|---|---|---|---|---|---|---|---|---|
| | 7-inch area | 10-inch area | 7-inch area | 10-inch area | 7-inch area | 10-inch area | 7-inch area | 10-inch area | 7-inch area | 7-inch area |
| Brook trout | | | | | | | | | | |
| 1952 | ... | 3.8 (12) | 7.2 (9) | 6.7 (25) | ... | 11.2 (1) | ... | ... | ... | ... |
| 1953 | 3.9 (22) | 3.7 (60) | 6.9 (10) | 7.3 (30) | ... | ... | ... | ... | ... | ... |
| Brown trout | | | | | | | | | | |
| 1952 | 4.1 (18) | 3.8 (10) | 8.4 (12) | 8.4 (6) | 12.2 (6) | 10.3 (1) | 15.9 (3) | 15.8 (1) | 19.3 (3) | 22.5 (2) |
| 1953 | 4.1 (59) | 4.3 (67) | 8.9 (8) | 9.2 (6) | 13.2 (5) | 13.3 (4) | 15.5 (1) | 15.8 (1) | ... ... | ... ... |
| Rainbow trout | | | | | | | | | | |
| 1952 | 3.5 (94) | 3.5 (37) | 8.0 (15) | 8.8 (5) | 9.3 (1) | ... | ... | ... | ... | ... |
| 1953 | 4.2 (16) | 3.5 (23) | 8.2 (33) | 8.4 (13) | ... ... | ... ... | ... ... | ... ... | ... ... | ... ... |

Table 2. Size frequency distribution and catch per hour of native trout in the Pine River, Lake County, 1952 and 1953 (D. C. shocker collections)

| Species | Size range, total length (inches) | 1952 | | 1953 | |
|---|---|---|---|---|---|
| | | 7-inch area | 10-inch area | 7-inch area | 10-inch area |
| Brook trout | 2.0 - 2.9 | 0 | 3 | 2 | 11 |
| | 3.0 - 3.9 | 0 | 3 | 13 | 29 |
| | 4.0 - 4.9 | 0 | 4 | 4 | 15 |
| | 5.0 - 5.9 | 2 | 12 | 7 | 12 |
| | 6.0 - 6.9 | 2 | 7 | 3 | 11 |
| | 7.0 - 7.9 | 2 | 0 | 1 | 5 |
| | 8.0 - 8.9 | 3 | 8 | 1 | 1 |
| | 9.0 - 9.9 | 0 | 0 | 0 | 4 |
| | 10.0 - 10.9 | 0 | 0 | 1 | 1 |
| | 11.0 - 11.9 | 0 | 1 | 0 | 1 |
| Total fish | | 9 | 38 | 32 | 90 |
| Shocking time (min.) | | 305 | 282 | 369 | 285 |
| Trout per hour | | 1.8 | 8.1 | 5.2 | 18.9 |
| Brown trout | 2.0 - 2.9 | 0 | 1 | 4 | 1 |
| | 3.0 - 3.9 | 8 | 5 | 28 | 24 |
| | 4.0 - 4.9 | 10 | 4 | 12 | 29 |
| | 5.0 - 5.9 | 1 | 0 | 14 | 13 |
| | 6.0 - 6.9 | 0 | 1 | 1 | 1 |
| | 7.0 - 7.9 | 1 | 0 | 4 | 0 |
| | 8.0 - 8.9 | 6 | 4 | 0 | 1 |
| | 9.0 - 9.9 | 5 | 1 | 2 | 1 |
| | 10.0 - 10.9 | 0 | 1 | 0 | 4 |
| | 11.0 - 11.9 | 1 | 0 | 2 | 0 |
| | 12.0 - 12.9 | 1 | 0 | 3 | 0 |
| | 13.0 - 13.9 | 2 | 0 | 0 | 2 |
| | 14.0 - 14.9 | 2 | 0 | 2 | 0 |
| | 15.0 - 15.9 | 1 | 1 | 1 | 1 |
| | 16.0 - 16.9 | 1 | 0 | 0 | 1 |
| | 17.0 - 17.9 | 0 | 0 | 0 | 0 |
| | 18.0 - 18.9 | 2 | 0 | 0 | 0 |
| | 19.0 - 19.9 | 0 | 0 | 0 | 0 |
| | 20.0 - 20.9 | 0 | 0 | 0 | 0 |
| | 21.0 - 21.9 | 1 | 0 | 0 | 0 |
| | 22.0 - 22.9 | 2 | 0 | 0 | 0 |
| Total fish | | 44 | 18 | 73 | 78 |
| Shocking time (min.) | | 305 | 282 | 369 | 285 |
| Trout per hour | | 8.7 | 3.8 | 11.9 | 16.4 |
| Rainbow trout | 1.0 - 1.9 | 1 | 1 | 0 | 1 |
| | 2.0 - 2.9 | 16 | 5 | 2 | 5 |
| | 3.0 - 3.9 | 54 | 21 | 3 | 12 |
| | 4.0 - 4.9 | 20 | 8 | 7 | 2 |
| | 5.0 - 5.9 | 4 | 2 | 4 | 3 |
| | 6.0 - 6.9 | 1 | 0 | 5 | 1 |
| | 7.0 - 7.9 | 5 | 1 | 9 | 3 |
| | 8.0 - 8.9 | 5 | 1 | 10 | 3 |
| | 9.0 - 9.9 | 4 | 3 | 7 | 5 |
| | 10.0 - 10.9 | 0 | 0 | 2 | 0 |
| Total fish | | 110 | 42 | 49 | 35 |
| Shocking time (min.) | | 305 | 282 | 369 | 285 |
| Trout per hour | | 21.6 | 8.9 | 8.0 | 7.4 |
| All species of trout | | | | | |
| Total fish | | 163 | 98 | 154 | 203 |
| Shocking time (min.) | | 305 | 282 | 369 | 285 |
| Trout per hour | | 32.1 | 20.9 | 25.0 | 42.6 |

Table 3. Catch-per-hour, by D. C. shocker, of sub-legal and legal length trout from the 7- and 10-inch sections of the Pine River, 1952 and 1953

| Species and year | Size range, total length in inches | | | | | |
|---|---|---|---|---|---|---|
| | 0.0 - 6.9 | | 7.0 - 9.9 | | 10.0 and over | |
| | 7-inch area | 10-inch area | 7-inch area | 10-inch area | 7-inch area | 10-inch area |
| Brook trout | | | | | | |
| 1952 | 0.8 | 6.2 | 1.0 | 1.7 | 0.0 | 0.2 |
| 1953 | 4.7 | 16.4 | 0.3 | 2.1 | 0.2 | 0.4 |
| Brown trout | | | | | | |
| 1952 | 3.7 | 2.3 | 2.4 | 1.1 | 2.6 | 0.4 |
| 1953 | 9.6 | 14.3 | 1.0 | 0.4 | 1.3 | 1.7 |
| Rainbow trout | | | | | | |
| 1952 | 18.9 | 7.9 | 2.8 | 1.1 | 0.0 | 0.0 |
| 1953 | 3.4 | 5.0 | 4.2 | 2.3 | 0.3 | 0.0 |
| All trout | | | | | | |
| 1952 | 23.4 | 14.9 | 6.1 | 3.8 | 2.6 | 0.6 |
| 1953 | 17.7 | 35.7 | 5.5 | 4.8 | 1.8 | 2.1 |