

Original: Fish Division ✓
cc: Fish Division
Education-Game
C. T. Yoder
E. H. Andersen
E. E. Schultz
Inst. for Fish. Res.

INSTITUTE FOR FISHERIES RESEARCH
DIVISION OF FISHERIES
MICHIGAN DEPARTMENT OF CONSERVATION
COOPERATING WITH THE
UNIVERSITY OF MICHIGAN

ALBERT S. HAZZARD, PH.D.
DIRECTOR

ADDRESS
UNIVERSITY MUSEUMS ANNEX
ANN ARBOR, MICHIGAN

July 13, 1955

Report No. 1452

EXAMINATION OF A PART OF THE LITTLE SOUTH BRANCH OF THE PERE
MARQUETTE RIVER, LAKE AND NEWAYGO COUNTIES, TO DETERMINE ITS
SUITABILITY FOR AN EXPERIMENT WITH RESTRICTIVE REGULATIONS. ✓¹

By

Edward E. Schultz ✓²

Introduction

The experiment proposed here is to determine the effect on brown trout of an increased minimum legal size limit, a daily creel limit of five trout and the use of flies only. This experiment requires that a stream contain native trout in fair numbers, be large or open enough to be fly-fished and that it be fished by a number of anglers. In order to examine the fish in the stream it must be small enough for a direct-current electric shocker to obtain a large number of fish. The Little South Branch of the Pere Marquette River fulfills these requirements.

Methods

During June and July, 1954, a three-man crew examined the Little South Branch of the Pere Marquette River and collected fish with a D. C. Shocker. Six stations

✓ The biological study of this river, analysis of data and preparation of the report were undertaken with Federal Aid to Fish Restoration funds under Dingell-Johnson Project Number F-2-R-3.

✓ Assistants in the field were Alfred M. Beeton and James C. Wiese. The Author was the field party leader.

were marked off in the stream and a fish collection was made in each. All fish captured were recorded and trout were measured, scale-sampled and returned to the stream. Identical procedures were followed at each of the six stations, although there was some variation in the amount of time and length of stream shocked. Each collecting station commenced at an accessible bridge and shocking proceeded upstream until, at the end of about one hour, a suitable landmark was located at which to terminate collecting. Station number 6, at Carlson Bridge, lasted only 43 minutes because obstructions in the stream stopped further shocking. Each collecting station is designated by an arbitrarily assigned collection number and the name of the bridge that was the downstream boundary of the station.

All figures and terms given in the tables refer to the river within the boundaries of the collecting stations. However, the stations are typical of the stream as a whole.

Plastic impressions were made of the scales of all trout captured except young-of-the-year. This age group could be identified by size alone. The fish were assigned ages by determining the number of annuli on the scales using a scale projection machine for magnification. The figures on lengths for the various age groups of trout given in Table 4 are simple averages. These lengths and all others in this report are total lengths in inches.

In tables 2 and 5 the fish shocked per hour are given. These figures were calculated by direct proportion from the actual number of fish captured and the length of time involved in their capture. For all collections the fish were taken with the aid of a 230-volt, 10.9-ampere direct-current electric shocker. Two positive electrodes and two scap nets were manned by two crew members while the third took care of the boat and shocker motor and looked after the captured fish. All fish, except a few large brown trout, were kept in a tub of water until the shocking at one station was completed. The large fish were too active to keep in the tub and were measured, scale-sampled and released immediately. Upon completion of shocking at a station the entire crew cooperated in measuring and scale-sampling fish.

Thus fish were returned to the water with little delay.

Results

Tables 1 to 5 summarize data of a part of the Little South Branch of the Pere Marquette River from Kennedy Bridge in Lake County (T. 17 N., R. 13 W., Sec. 22) upstream to McDuffee Creek in Newaygo County (T. 16 N., R. 12 W., Sec. 21). Fish collections were made in six places. The physical data and locations of the six stations are given in Table 1. The remaining four tables give the accumulated data on the fish.

Table 2 gives the species of fish that were captured per hour of shocking. All figures have been converted to catch per hour to permit a comparison of the various collections. These collections show that the most abundant fish in the Little South Branch of the Pere Marquette River is the brown trout. The only other common game fish is the rainbow trout. Three other common species of fish were the blacknose dace and the northern and slimy sculpins. The size ranges of these fish and most of the others captured are given in Table 3.

The average length for each age-class of trout was determined and tabulated in Table 4. A comparison with the averages for the state as a whole shows that the trout in this stream are making rapid growth. Young-of-the-year trout show a slow growth when compared to the average for the state because they were captured early in the summer before they had grown very much. Many young rainbow trout were so small they fell through the meshes of the scap nets and could not be counted in the catch per hour or used to determine age and growth.

The average length of brown trout in age-group II in the third year of life was 10.0 inches. Because most brown trout first spawn at the end of their third year it is quite obvious that under the seven-inch limit these fish can be legally removed from the stream by anglers before they have ever reproduced.

The survey shows that the Little South Branch of the Pere Marquette River has a good population of trout. A total of 312 brown trout were captured from 6,930 feet

of stream in 359 minutes. This is 52.1 brown trout per hour of shocking. For the same length of stream and time 73 rainbow trout were taken making 12.2 per hour. The total catch for all trout in this section of stream was 385 trout or 64.3 trout per hour of shocking.

Recomendations

Some of the figures in the five tables were presented to the Conservation Commission during the summer of 1954, and the stream was recommended for experimental use. A commission order, effective January 1, 1955, increased the minimum legal size limit to ten inches, decreased the creel limit to five trout and restricted lures to flies only. This applies to the Little South Branch of the Pere Marquette River from Carlson Bridge on the line between Sections 9 and 16, T. 16 N., R. 12 W., Newaygo County, downstream to Oxbow Bridge in Section 31, T. 17 N., R. 12 W., Lake County. As measured on aerial photographs the order places 5.5 miles of the stream under experimental restrictions. The part of the river with restrictive regulations includes stations numbered 2, 3 and 4, or, the stations at Curtis, Brown and Oxbow bridges. The stations without restrictions to be used as controls are 1, 5 and 6, or, the stations at Kennedy, Taylor and Curtis bridges.

The restrictive regulations are to be in effect for five years. During this period each of the six stations should be checked at least once each year using equipment and methods employed in this study.

INSTITUTE FOR FISHERIES RESEARCH

Edward E. Schultz

Approved by: A. S. Hazzard

Typed by: A. D. Waterbury

List of fishes found in the study area with common and scientific³ names referred to in this report.

Game fish

Brown trout

Salmo trutta

Rainbow trout

Salmo gairdneri

Northern pike

Esox lucius

Pumpkinseed

Lepomis gibbosus

Bluegill

Lepomis macrochirus

Coarse fish

White sucker

Catostomus commersoni

Burbot

Lota lota lacustris

Obnoxious fish

Bowfin

Amia calva

Sea lamprey

Petromyzon marinus

Forage fish

Creek chub

Semotilus atromaculatus

Blacknose dace

Rhinichthys atratulus

Common shiner

Notropis cornutus

Blacknose shiner

Notropis heterolepis

Blackchin shiner

Notropis heterodon

Bluntnose minnow

Pimephales notatus

Mudminnow

Umbra limi

Johnny darter

Etheostoma nigrum

Northern sculpin

Cottus bairdi

³All scientific names follow "Check List of the Fishes of Michigan," 1955 (mimeographed), by Reeve M. Bailey, Curator of Fishes, Museum of Zoology, University of Michigan.

Slimy sculpin

Cottus cognatus

Brook stickleback

Eucalia inconstans

American brook lamprey

Lampetra lamottei

Table 1.--Locations, physical features and conditions affecting shocking at the collecting stations in the Little South Branch of the Pere Marquette River, 1954.

Stream Unit (Bridge)

| | Kennedy | Taylor | Oxbow | Brown | Curtis | Carlson |
|----------------|---------|--------|--------|--------|--------|---------|
| Station number | 1 | 5 | 4 | 3 | 2 | 6 |
| Town N. | 17 | 17 | 17 | 16 | 16 | 16 |
| Range W. | 13 | 13 | 12 | 12 | 12 | 12 |
| Section | 22 | 20 | 31 | 8 | 9 | 16 |
| Month | June | July | June | June | June | July |
| Day | 29 | 1 | 30 | 30 | 29 | 1 |
| Width-feet | 35 | 25 | 25 | 35 | 30 | 40 |
| Depth-inches | 4 | 5.5 | 6 | 4.5 | 4 | 4.5 |
| Trout cover | Good | Fair | Fair | Fair | Good | Poor |
| Vegetation | Sparse | Sparse | Sparse | Sparse | Sparse | Sparse |
| Current | Rapid | Rapid | Rapid | Rapid | Rapid | Rapid |
| Bottom soils | | | | | | |
| Clay | 5 | 5 | 1 | - | - | 1 |
| Silt | 3 | 5 | 4 | 2 | 5 | - |
| Sand | 55 | 70 | 70 | 40 | 75 | 75 |
| Gravel | 37 | 20 | 20 | 50 | 10 | 14 |
| Rubble | - | - | 5 | 8 | 10 | 10 |
| Length shocked | 1,200 | 1,550 | 1,100 | 1,350 | 980 | 750 |
| Time shocked | 67 | 63 | 60 | 63 | 63 | 43 |
| Efficiency | Good | Fair | Fair | Fair | Fair | Fair |

Table 2.- Number of fish caught by shocker, converted to catch-per-hour, Little South Branch of the Pere Marquette River, 1954.

Stream Unit (Bridge)

| | Kennedy | Taylor | Oxbow | Brown | Curtis | Carlson |
|------------------------|---------|--------|-------|-------|--------|---------|
| Station number | 1 | 5 | 4 | 3 | 2 | 6 |
| Shocking time | 67 | 63 | 60 | 63 | 63 | 43 |
| Length of stream | 1,200 | 1,550 | 1,100 | 1,350 | 980 | 750 |
| Brown trout | 65 | 67 | 37 | 50 | 37 | 57 |
| Rainbow trout | 21 | 17 | 4 | 23 | 2 | 3 |
| Northern pike | -- | -- | -- | 3 | -- | 1 |
| Pumpkinseed | 7 | 2 | 2 | 15 | 2 | 3 |
| Bluegill | 4 | -- | -- | 5 | -- | 1 |
| White sucker | 4 | 3 | 4 | 13 | 4 | 4 |
| Burbot | 1 | -- | -- | -- | -- | -- |
| Bowfin | -- | -- | 1 | -- | -- | -- |
| Sea lamprey | -- | -- | 2 | -- | -- | -- |
| Creek chub | 2 | 4 | 1 | 10 | 3 | 27 |
| Blacknose dace | 19 | 62 | -- | 18 | 7 | 123 |
| Common shiner | 1 | 1 | 1 | 1 | -- | -- |
| Blacknose shiner | 5 | 8 | 18 | 1 | -- | 3 |
| Blackchin shiner | 1 | -- | -- | -- | -- | -- |
| Bluntnose minnow | 3 | -- | -- | -- | -- | -- |
| Mudminnow | 2 | 1 | -- | 1 | 1 | -- |
| Johnny darter | 1 | 11 | -- | 1 | 1 | 1 |
| Northern sculpin | 32 | 40 | 21 | 19 | 26 | 42 |
| Slimy sculpin | 15 | 27 | 30 | 16 | 25 | 51 |
| Brook stickleback | 1 | 1 | -- | -- | -- | -- |
| American brook lamprey | 9 | 3 | 3 | 4 | 5 | -- |

Table 3.--Size ranges of some of the fish captured in the Little South Branch
of the Pere Marquette River, 1954.

Stream Unit (Bridge)

| Species | Kennedy | Taylor | Oxbow | Brown | Curtis | Carlson |
|------------------|----------|----------|----------|----------|-----------|----------|
| Brown trout | 1.2-20.2 | 2.0-15.7 | 2.1-14.0 | 2.1-13.2 | 1.9-13.6 | 2.1-15.0 |
| Rainbow trout | 1.0- 6.1 | 1.4- 7.0 | 1.6- 7.2 | 1.6- 8.5 | 7.7- 9.1 | 6.5- 6.7 |
| Northern pike | - - - - | - - - - | - - - - | 3.9- 5.4 | - - - - | 5.7 |
| Pumpkinseed | 1.8- 3.3 | 1.8- 3.2 | 1.4- 1.5 | 1.6- 2.1 | 1.8- 1.9 | 1.6- 2.2 |
| Bluegill | 2.3- 3.6 | - - - - | - - - - | 2.8- 3.6 | - - - - | 3.2 |
| White sucker | 3.2-17.3 | 2.9-15.2 | 3.7-13.5 | 2.7- 7.0 | 12.5-15.3 | 3.4- 4.5 |
| Creek chub | 2.9- 3.1 | 1.5- 3.3 | 2.3 | 1.9- 3.7 | 1.7- 2.9 | 1.7- 5.0 |
| Blacknose dace | 1.7- 3.5 | 1.6- 3.1 | - - - - | 1.3- 3.2 | 1.5- 3.0 | 1.5- 3.0 |
| Blacknose shiner | 1.9- 2.1 | 1.3- 1.6 | 1.7- 2.3 | 2.0 | --- - - | 1.4- 1.8 |
| Northern sculpin | 2.0- 3.5 | 2.0- 3.7 | 1.9- 3.4 | 2.2- 3.7 | 2.1- 3.7 | 2.0- 3.6 |
| Slimy sculpin | 2.0- 3.9 | 2.4- 3.6 | 2.0- 3.9 | 2.2- 4.1 | 0.7- 3.5 | 2.2- 3.9 |

Table 4.--Average lengths for each age group of trout captured in the Little South Branch of the Pere Marquette River, 1954.

| Species and Stream unit | Age Group | | | | | | | | | | | | | |
|-------------------------|-----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--|--|
| | 0 | | I | | II | | III | | IV | | VII | | | |
| | Number | Length | Number | Length | Number | Length | Number | Length | Number | Length | Number | Length | | |
| Brown trout | | | | | | | | | | | | | | |
| State average | | 3.2 | | 7.2 | | 9.9 | | 12.3 | | 15.9 | | 23.6 | | |
| Kennedy | 58 | 2.5 | 3 | 7.8 | 8 | 10.2 | 2 | 12.1 | -- | -- | 1 | 20.2 | | |
| Taylor | 52 | 2.7 | 6 | 6.9 | 8 | 10.4 | 3 | 13.6 | 1 | 15.7 | -- | -- | | |
| Carlson | 11 | 2.6 | 21 | 7.0 | 6 | 10.4 | 2 | 13.8 | -- | -- | -- | -- | | |
| Control ¹ | 121 | 2.6 | 30 | 7.0 | 22 | 10.3 | 7 | 13.2 | 1 | 15.7 | 1 | 20.2 | | |
| Oxbow | 21 | 2.6 | 8 | 6.4 | 3 | 9.3 | 5 | 12.1 | -- | -- | -- | -- | | |
| Brown | 19 | 2.5 | 18 | 7.3 | 12 | 10.3 | 3 | 11.7 | -- | -- | -- | -- | | |
| Curtis | 5 | 2.2 | 15 | 6.8 | 4 | 9.5 | 13 | 12.1 | -- | -- | -- | -- | | |
| Experiment ² | 45 | 2.5 | 41 | 6.9 | 19 | 10.0 | 21 | 12.1 | -- | -- | -- | -- | | |
| Total brown trout | 166 | 2.6 | 71 | 7.0 | 41 | 10.1 | 28 | 12.4 | 1 | 15.7 | 1 | 20.2 | | |
| Rainbow trout | | | | | | | | | | | | | | |
| State average | | 2.3 | | 6.3 | | 8.5 | | | | | | | | |
| Kennedy | 17 | 1.6 | 6 | 5.9 | -- | -- | | | | | | | | |
| Taylor | 16 | 1.7 | 2 | 6.7 | -- | -- | | | | | | | | |
| Carlson | -- | -- | 2 | 6.6 | -- | -- | | | | | | | | |
| Control | 33 | 1.6 | 10 | 6.2 | -- | -- | | | | | | | | |
| Oxbow | 2 | 1.8 | 2 | 6.8 | -- | -- | | | | | | | | |
| Brown | 6 | 1.9 | 18 | 7.0 | -- | -- | | | | | | | | |
| Curtis | -- | -- | 1 | 7.7 | 1 | 9.1 | | | | | | | | |
| Experiment | 8 | 1.9 | 21 | 7.0 | 1 | 9.1 | | | | | | | | |
| Total rainbow trout | 41 | 1.7 | 31 | 6.7 | 1 | 9.1 | | | | | | | | |

¹ The control consists of the collections made at Kennedy, Taylor and Carlson bridges.

² The experimental water consists of the collections made at Oxbow, Brown and Curtis bridges.

Table 5.--Trout per hour of shocking in the Little South Branch of the Pere Marquette River, 1954.

Length Groups

| Species | 0.0 to 6.9 | | | 7.0 to 9.9 | | | 10.0 and over | | | All sizes | | |
|---------------|------------|------------|------|------------|------------|------|---------------|------------|------|-----------|------------|------|
| | Control | Experiment | Both | Control | Experiment | Both | Control | Experiment | Both | Control | Experiment | Both |
| Brown trout | 46.6 | 21.3 | 33.2 | 8.7 | 10.3 | 9.5 | 8.7 | 10.0 | 9.4 | 63.9 | 41.6 | 52.1 |
| Rainbow trout | 14.6 | 5.5 | 9.9 | 0.3 | 4.2 | 2.3 | - - | - - - | - - | 14.9 | 9.7 | 12.2 |
| Both species | 61.1 | 27.8 | 43.3 | 9.0 | 14.5 | 11.9 | 8.7 | 10.0 | 9.4 | 78.8 | 51.3 | 64.3 |