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

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January 29, 1953

Report No. 1355

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

By

Edward E. Schultz

Abstract

During the 1952 trout season a ten-inch minimum size limit was placed, by Conservation Commission order, on brook, brown, and rainbow trout taken from a 3.84-mile section of the Pine River. This section extends from Poplar Creek outlet up to Lincoln Bridge. The adjacent section, from Lincoln Bridge to Walker Bridge, a distance of 2.92 stream miles, was used as the control area and regulations were not changed. Information on trout was gathered in both areas by use of a partial creel census and samples taken with a direct current shocker.

Fewer trout were taken, by anglers, in the ten-inch section than in the seven-inch section; however, shocking indicated that the two areas had a similar population density. Fishing in 1952 was comparable to that of the 1938 and 1939 season except for the increase of brown trout.

A comparison of age and growth, as determined by reading scale samples, did not show any difference between the two parts of the river. The majority of trout were from 2.0 to 6.9 inches; this size range included all of age group "0" and part of the age group "I". In age group "I", many trout reached

seven inches, but only three rainbows reached ten inches. Most of the ten-inch trout were in age group "II". The largest fish taken was a 22.7-inch brown trout that was in its sixth year of life.

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Introduction

At the March, 1952, meeting of the Michigan Conservation Commission a special regulation imposing a ten-inch minimum size limit on trout taken from a portion of the Pine River, Lake County, was approved. The section of the river designated for the experiment starts where Poplar Creek flows into the Pine and ends upstream at Lincoln Bridge, a stream distance of 3.84 miles. Adjacent to this section is the control area in which all fishing regulations remain the same as in previous years (i.e., a seven-inch minimum limit on trout). This control area starts at Lincoln Bridge, where the ten-inch section ends, and proceeds upstream to Walker Bridge, a stream distance of 2.92 miles. These two portions of the stream are in Newkirk Township, T. 20 N., R. 12 W., in Sections 24, 13, 12, 11, 2, and 3 (in downstream sequence). All regulations except the minimum size limit remain the same for the two parts of the river. The possession limit at this time is ten trout per day.

Objectives

The principle object of this experiment is to test one of the methods of trout management--preserving the stock by means of a minimum legal

size limit. It is believed that rapid growth in stream trout permits removal of them from the river before they have spawned. Cooper (1951) has shown this to be true in the North Branch of the Au Sable River. By imposing a ten-inch minimum limit on trout, the study will eventually indicate whether or not such a change will result in a greater production of trout between 7 and 10 inches in length in the stream, as well as of trout over 10 inches, and an improvement in angling quality in terms of some fish over 10 inches and many trout under 10 inches which anglers might catch but must release. Also to be determined will be the effect of such a limit on the growth rate of trout, as it relates to production of legal fish.

Methods

A partial creel census was made on the experimental and control areas of the Pine River during the trout season of 1952. The clerk, Roy Hamlett, was on duty four days a week for ten hours a day. A schedule was prepared so he would spend half of his time on the ten-inch water and the other half on the seven-inch water. Because of a misunderstanding only successful anglers were contacted for information except during the last sixteen days of the season. All trout observed by the clerk were measured for total length and scale sampled. This information has been compared to the 1938 and 1939 intensive creel census records on the same section (from Poplar Creek to Walker Bridge) of the Pine River (Shetter, 1938; and Shetter, 1940).

Although a complete population estimate of the trout has not been made, a stretch of 2,585 feet at three locations, or 16.8 percent of the seven-inch water, was checked with an electric direct current shocker. In the ten-inch water, a total of 2,300 feet of stream at three locations, or 11.3 percent, was checked with the same crew and equipment. This was accomplished twice during 1952. The check was not complete because the river is wide, deep and swift. The shocker was a gas-driven generator manufactured by Homelight.

It produced 10.9 amperes at 230 volts. This was carried in a small boat with equipment for holding captured fish. The negative electrode was a metal strip on the bottom of the boat. One man was in charge of the boat, motor, and fish while two additional men each had a positive electrode and a scap net.

All the trout captured were measured for total length (in inches and tenths) and were scale sampled. The time spent shocking at each station was recorded and indices to population density were based upon the number of fish shocked per hour of effort for the three-man crew.

Preliminary Results

The results of 1952 are tabulated on the following pages. A weekly summary of the creel census data indicates that, except for the opening week of trout season, the anglers were quite evenly spread out over the entire season. This also applies to the numbers of fish caught and the catch per hour, a slight increase being noticed after the release of hatchery trout in the 7-inch section. No planting was done in the 10-inch water.

The summary of the 1952 season (Table 1) shows many expected differences between the two areas. More legal fish were caught in the seven-inch area than--in the ten-inch, 323 as compared to 44; and the catch per hour was higher--0.9 in the seven and 0.4 in the ten. Forty-six percent of all trout caught were hatchery-reared rainbow trout, the next most caught were native rainbows, followed by brown trout and then brook trout. Bait was the favorite lure, and the majority of the trout were hooked on bait. Fishermen came to fish in the Pine River from twenty-four counties in Michigan and one other state (Indiana). The heaviest concentration was from Kent County.

Table 2 gives a comparison of the creel census records from 1938 and 1939, with the 1952 census. Actually, only the seven-inch section should

be compared because the past records were made with a seven-inch limit. The outstanding feature in this comparison is the rise in numbers of brown trout. In 1952 the average brown trout was larger and the catch per hour for these species was much higher than in 1938 and 1939. Rainbow trout were larger in 1952, but the catch per hour was lower. There was little change in the average size of brook trout, with the catch per hour apparently slightly lower in 1952.

Comparisons of trout growth between the seven-inch and ten-inch sections based on 1952 data, and any comparisons of the 1952 averages with future data, must take into count the differences which might be due to methods and seasons of collecting. Growth averages based on creel-trout especially for the younger age groups, are subject to bias because anglers liberate the sub-legal fish which therefore are not included in the growth records. Thus, based on this factor, creel-fish should average larger than shocker-fish. On the other hand, the shocking during 1952 was done in the fall (September-October) which creel-fish were caught mostly during the summer (June-August), and therefore the shocker-fish had the advantage of a longer period of growth during 1952 and as a result of this source of bias, the shocker fish should average larger than the creel-fish. The growth records for 1952 (Table 3) show some tendency for the two sources of bias cited above: somewhat larger size for creel-fish in age group "I," and somewhat larger size for shocker-fish in age groups "II" and above. For future comparisons, these differences should be taken into account, either by obtaining combined collections in a manner similar to that in 1952, or by comparing creel-fish only, or by comparing only shocker-fish from fall collections.

The comparison of age and growth of trout in the two sections, as shown by samples taken by anglers and the shocker (Table 3), does not indicate any significant difference. This was to be expected because 1952 was the first

season with the ten-inch limit in effect.

At present only limited conclusions can be made from the records on size-frequency distribution and the catch per hour of trout taken with the shocker.(data in Table 4). These figures will be used for a comparison with future collections made at the same stations in the Pine River. The collections do show that more brook trout per hour of shocking were taken in the ten-inch water than in the seven-inch water, while the reverse was true for brown and rainbow trout. When all trout are put together, more per hour were taken from the seven-inch section (32.1 per hour in the seven-inch water; 20.9 per hour in the ten-inch); the difference is quite large but may not be significant because catch by the shocker was highly variable from one habitat site to another.

Literature Cited

Cooper, Edwin L.

1951. Brook trout Management study North Branch Au Sable River progress report. Institute for Fisheries Research Report No. 1271, 14 pages (unpublished).

Shetter, David S.

1938. The Pine River creel census for the 1938 trout season--including results from legal-sized plantings. Institute for Fisheries Research, Report No. 521, 18 pages (unpublished).

1940. Results of the intensive trout stream creel censuses on the Pine, Pigeon, North Branch of the Au Sable, Little Manistee, Canada Creek, and White rivers for the 1939 trout season. Institute for Fisheries Research, Report No. 599, 79 pages (unpublished).

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

Game fish		10-inch area	7-inch area
Brook trout	Salvelinus fontinalis	X	X
Brown trout	Salmo trutta	X	X
Rainbow trout	Salmo gairdneri	X	X
Largemouth bass	Micropterus salmoides	X	X
Coarse fish			
White sucker	Catostomus commersoni	X	X
Forage fish			
Creek chub	Semotilus atromaculatus		X
Blacknose dace	Rhinichthys atratulus	X	X
Longnose dace	Rhinichthys cataractae	X	X
Redbelly dace	Chrosomus eos	X	
Blacknose shiner	Notropis heterolepis	X	
Bluntnose minnow	Pimephales notatus	X	X
Northern muddler	Cottus bairdi	X	X
Slimy muddler	Cottus cognatus	X	X
American brook lamprey	Lampetra lamottei	X	X

* All scientific names follow Hubbs and Lagler, 1947, except for recent approved changes in name endings.

Table 1. Results of creel census on the Pine River, Lake County, 1952 season

Items of analysis	Successful anglers only				Last 16 days of season; includes both unsuccessful and successful anglers		
	10-inch area	7-inch area	Total	Percent in 10" area	10-inch area	7-inch area	Total
Length of season, days	142	142	...	...	142	142	...
Number of days checked	41	41	82	50	6	6	10*
Hours checked	410	410	820	50	50	50	100
Female anglers	0	11	11	0	3	3	6
Male anglers	28	93	121	23	18	40	58
Total anglers	28	104	132	21	21	43	64
Native trout							
Brook	2	29	31	6	1	9	10
Brown	8	39	47	17	1	3	4
Rainbow	32	89	121	26	7	9	16
Hybrid brook x brown	0	1	1	0	0	0	0
Total	42	158	200	21	9	21	30
Hatchery rainbow trout	2	165	167	1	0	7	7
Total fish caught	44	323	367	12	9	28	37
Percent hatchery fish	5	51	46	...	0	25	19
Percent anglers taking hatchery fish	7	55	45	...	0	2	2
Total hours fished	121.5	357.0	478.5	25	80.0	158.5	238.5
Catch per hour of fishing	0.36	0.90	0.77	...	0.11	0.18	0.16
Number of anglers using:							
Bait	24	85	109	22	21	35	56
Fly	0	12	12	0	1	7	8
Flatfish	3	5	8	37	0	1	1
Other	1	2	3	33	0	0	0
Number of fish caught on:							
Bait	39	258	297	13	7	23	30
Fly	0	43	43	0	0	5	5
Flatfish	4	17	21	19	0	0	0
Other	1	5	6	17	0	0	0
Number successful anglers	...	...	...	...	6	12	18
Percent successful anglers	...	...	...	...	29	28	28

* On some days when fishing pressure was low, the census taker checked both areas.

Table 2. Creel census of 1952 compared with the creel censuses of 1938 and 1939; Pine River, Lake County. Successful anglers only (1938 and 1939 creel censuses from D. Shetter 1938 and 1940

Items of analysis	1938 census	1939 census	1952 10-inch	1952 7-inch	1952 total
Average number of trout caught per angler*	3.8	3.0	1.6	3.1	2.8
Catch per hour of angling					
Brook trout	0.15	0.11	0.02	0.08	0.06
Brown trout	0.0006	0.0017	0.07	0.11	0.10
Rainbow trout	0.56	0.72	0.26	0.25	0.25
Hatchery brook trout	0.10	0.071	...	...	...
Hatchery rainbow trout	0.10	0.043	0.02	0.46	0.35
All trout*	0.92	0.94	0.36	0.90	0.77
Average size of trout taken					
Brook trout	8.2	7.9	11.4	8.2	8.5
Brown trout	9.2	8.9	14.3	12.1	12.5
Rainbow trout	8.2	8.3	10.7	9.6	9.9
Hatchery brook trout	8.1	...	...	...	...
Hatchery rainbow trout	8.5	...	...	...	8.3
All fish*	8.2	8.2	11.5	10.0	10.3
Trout planted before and during the season					
Hatchery brook trout	2,798	1,536	0	0	0
Hatchery rainbow trout	2,000	499	0	1,920	1,920

*These figures include all hatchery fish

Table 3. Age and growth of native trout from the Pine River, Lake County, 1952 (No. = number of fish; T.L. = total length in inches and tenths).

Species and source of records	Total fish	Age group 0		I		II		III		IV		V	
		No.	Av. T.L.	No.	Av. T.L.	No.	Av. T.L.	No.	Av. T.L.	No.	Av. T.L.	No.	Av. T.L.
Brook trout													
Creel, 7-inch water	25	....	...	21	7.7	3	9.7	1	14.1	...	...	...	...
Shocker, 7-inch	9	...	...	9	7.2	...	...	...	...	...	...	...	...
Total, 7-inch	34	...	...	30	7.6	3	9.7	1	14.1	...	...	...	...
Creel, 10-inch	2	...	...	1	8.6	1	14.3	...	...	...	...	...	...
Shocker, 10-inch	38	12	3.8	25	6.7	1	11.2	...	...	...	...	...	...
Total, 10-inch	40	12	3.8	26	6.7	2	12.8	...	...	...	...	...	...
Grand total	74	12	3.8	56	7.2	5	10.9	1	14.1	...	...	...	...
Brown trout													
Creel, 7-inch	36	...	...	7	7.6	12	9.6	11	14.1	5	18.2	1	21.8
Shocker, 7-inch	44	18	4.1	12	8.4	6	12.2	3	15.9	3	19.3	2	22.5
Total, 7-inch	80	18	4.1	19	8.1	18	10.5	14	14.4	8	18.6	3	22.3
Creel, 10-inch	9	...	...	...	...	3	10.2	4	15.1	2	18.9	...	...
Shocker, 10-inch	18	10	3.8	6	8.4	1	10.3	1	15.8	...	...	...	...
Total, 10-inch	27	10	3.8	6	8.4	4	10.2	5	15.2	2	18.9	...	...
Grand total	107	28	4.0	25	8.2	22	10.4	19	14.6	10	18.7	3	22.3
Rainbow trout													
Creel, 7-inch	94	...	...	34	7.7	57	10.7	3	11.5	...	...	...	...
Shocker, 7-inch	110	94	3.5	15	8.0	1	9.3	...	...	...	...	...	...
Total, 7-inch	204	94	3.5	49	7.8	58	10.7	3	11.5	...	...	...	...
Creel, 10-inch	33	...	...	6	9.7	24	10.7	3	13.1	...	...	...	...
Shocker, 10-inch	42	37	3.5	5	8.8	...	...	...	...	...	...	...	...
Total 10-inch	75	37	3.5	11	9.3	24	10.7	3	13.1	...	...	...	...
Grand Total	279	131	3.5	60	8.1	82	10.7	6	12.3	...	...	...	...

Table 4. Size frequency distribution, age composition and catch per hour of native trout in the Pine River, Lake County, 1952. (D.C. Shocker collections only)

Species	Size range, total length in inches	Number of fish	
		7-inch area	10-inch area
Brook trout	2.0-2.9	0	3
	3.0-3.9	0	3
	4.0-4.9	0	4
	5.0-5.9	2	12
	6.0-6.9	2	7
	7.0-7.9	2	0
	8.0-8.9	3	8
	9.0-9.9	0	0
	10.0-10.9	0	0
	11.0-11.9	0	1
Total fish	...	9	38
Shocking time, minutes	...	305	282
Trout per hour	...	1.8	8.1
Brown trout	2.0-2.9	0	1
	3.0-3.9	8	5
	4.0-4.9	10	4
	5.0-5.9	1	0
	6.0-6.9	0	1
	7.0-7.9	1	0
	8.0-8.9	6	4
	9.0-9.9	5	1
	10.0-10.9	0	1
	11.0-11.9	1	0
	12.0-12.9	1	0
	13.0-13.9	2	0
	14.0-14.9	2	0
	15.0-15.9	1	1
	16.0-16.9	1	0
	17.0-17.9	0	0
	18.0-18.9	2	0
	19.0-19.9	0	0
	20.0-20.9	0	0
	21.0-21.9	1	0
	22.0-22.9	2	0
Total fish	...	44	18
Shocking time, minutes	...	305	282
Trout per hour	...	8.7	3.8
Rainbow trout	1.0-1.9	1	1
	2.0-2.9	16	5
	3.0-3.9	54	21
	4.0-4.9	20	8
	5.0-5.9	4	2
	6.0-6.9	1	0
	7.0-7.9	5	1
	8.0-8.9	5	1
	9.0-9.9	4	3
Total fish	...	110	42
Shocking time, minutes	...	305	282
Trout per hour	...	21.6	8.9
All Species of trout			
Total fish	...	163	98
Shocking time, minutes	...	305	282
Trout per hour	...	32.1	20.9

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