

INSTITUTE FOR FISHERIES RESEARCH
MICHIGAN DEPARTMENT OF CONSERVATION

April 19, 1954

Report No. 1417

THE RATE OF GROWTH OF BROOK, BROWN AND RAINBOW TROUT IN MICHIGAN STREAMS

By

Edward E. Schultz

Abstract

Records and scale samples of trout have been collected and retained in the Institute for Fisheries Research since 1930. All the specimens from streams in Michigan have been aged, by reading the annuli on the scales, and the average total length for each age group determined. The average length for each age group of species was calculated for each stream, and the averages for streams were combined into state-wide averages.

The preliminary results indicate that brook and brown trout in small streams, under twenty feet wide, grow more slowly than the same species in large streams, over twenty feet wide. Rainbow trout living in streams grow ~~much~~ more slowly than those that migrate to the Great Lakes and return to the streams for spawning.

The averaged total lengths of all trout (9,394) recorded and aged, through December 31, 1953, are as follows:

Species	Age group								
	0	I	II	III	IV	V	VI	VII	VIII
Brook trout	2.6	5.8	8.2	10.4	13.9				
Brown trout	3.0	6.4	9.1	11.7	15.4	19.2	21.3	23.6	
Rainbow trout	2.3	6.3	9.5	13.7	24.9	26.3	27.8	30.7	31.8

The study will continue as more trout are captured and aged. Any changes made will probably not be large, but more fish are needed in the older age groups.

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Introduction

In 1949 Beckman published a paper giving the rate of growth for seven Michigan game fish, but trout were not included. Growth rate data are needed for all game fish, and the Institute for Fisheries Research has continued to gather samples for this purpose. Given here are the preliminary figures for brook, brown and rainbow trout. Information has been used from the files of the Institute dating back to 1930.

Methods

A great variety of gear was used to capture these trout, including weirs, seines, alternating- and direct-current electric shockers, hook and line, trap-nets and poison. The samples were from streams in all parts of Michigan; however, only a few fish were available from the southern half of the Lower Peninsula because of the lack of trout streams in this area. The majority of trout were collected between April and November; only a few were taken in winter. All trout known to have been of hatchery origin were excluded from the samples.

¹This paper was presented at the annual meeting of the Michigan Academy of Science, Arts, and Letters, March 26, 1954, but was not submitted for publication.

²Some of the collecting, the analysis of data, and preparation of this report were undertaken largely with Federal Aid to Fish Restoration funds under Dingell-Johnson Project Number F-2-R-2.

For each species of trout from a particular stream, the average total length of each age group was found. The stream averages were then combined into state-wide averages which were not weighted according to numbers of specimens. Calculating unweighted state-wide averages was necessary because the samples included unusually large numbers of fish from some streams such as the Au Sable River, Hunt Creek, and Pigeon River.

Prior to 1950 the practice was to mount scales on microscope slides in a medium of gelatin or water. Scales of small trout, under five inches, are still mounted in gelatin, but all other scales are now impressed in plastic. A micro-projector was used in the study of scale mounts or impressions. The fish were assigned ages by the number of annuli on the scales except when they were captured between January first and the time of annulus formation in the spring when a spring annulus was assumed at the edge of the scale.

This study is limited to the age and total length of the trout at the time of capture; that is, back calculations from scale measurements are not involved. A constant body-scale ratio is necessary for such calculations to be accurate; whereas, it was found by Cooper (1949) that the body-scale relationship differs with sex, with populations, and with the position of the scale on the body of the fish.

Nearly all of the fish collected were returned to their habitat alive, so sex determinations could not be made. Apparently male and female trout grow at about the same rate, judging from the literature available. Therefore inclusion of both sexes in one average seems justified.

Growth rates have been separated into two types of habitat for each species. For brook and brown trout the division is the width of the stream--streams narrower than twenty feet wide are called small, and streams over twenty feet wide are called large. Although all rainbow trout start life in a stream, many eventually migrate to the Great Lakes and later return to the streams for spawning.

THE RATE OF GROWTH FOR BROOK, BROWN, AND RAINBOW TROUT IN MICHIGAN

BROOK TROUT

	0	I	II	III	IV	V	VI	VII	VIII
<u>Small Streams</u>		<u>95 Streams, 3,853 Trout</u>							
Average length	2.5	5.7	8.1	10.1	13.7				
Size range	1.1-5.2	2.7-9.0	3.3-11.7	5.9-13.0	12.0-14.6				
Number of fish	1,705	1,498	540	106	4				
<u>Large Streams</u>		<u>18 Streams, 1,690 Trout</u>							
Average length	3.2	6.5	8.5	11.4	14.8				
Size range	2.2-4.5	3.7-10.3	4.9-16.1	8.0-14.1	13.6-15.9				
Number of fish	538	898	220	26	7				
<u>All Brook Trout</u>		<u>113 Streams, 5,543 Trout</u>							
Average length	2.6	5.8	8.2	10.4	13.9				
Size range	1.1-5.2	2.7-10.3	3.3-16.1	5.9-14.1	12.0-15.9				
Number of fish	2,243	2,396	760	132	11				

BROWN TROUT

<u>Small Streams</u>		<u>57 Streams, 1,750 Trout</u>							
Average length	2.9	6.1	8.8	11.5	15.0				
Size range	1.3-5.3	3.1-9.5	5.2-16.2	8.3-16.7	12.8-17.8				
Number of fish	617	706	300	97	21				
<u>Large Streams</u>		<u>16 Streams, 1,804 Trout</u>							
Average length	3.2	7.2	9.9	12.3	15.9	19.1	21.5	23.6	
Size range	1.9-6.1	4.7-11.3	6.6-16.2	10.0-17.8	13.3-21.1	15.8-22.7	17.5-26.0	19.0-28.7	
Number of fish	443	382	579	298	70	22	6	3	
<u>All Brown Trout</u>		<u>73 Streams, 3,554 Trout</u>							
Average length	3.0	6.4	9.1	11.7	15.4	19.2	21.3	23.6	
Size range	1.3-6.1	3.1-11.3	5.2-16.2	8.3-17.8	12.8-21.1	15.8-23.5	17.5-26.0	19.0-28.7	
Number of fish	1,060	1,088	879	395	91	29	8	3	

RAINBOW TROUT

	0	I	II	III	IV	V	VI	VII	VIII
<u>Stream Living</u>	<u>48 Streams, 1,987 Trout</u>								
Average length	2.3	6.3	8.5	10.5					
Size range	1.0-5.7	3.4-10.6	5.4-13.2	6.3-13.1					
Number of fish	1,001	748	209	29					
<u>Great Lakes Migrants 12 Locations, 624 Trout</u>									
Average length				19.3	24.9	26.3	27.8	30.7	31.8
Size range				16.4-27.7	17.0-30.4	19.0-33.9	25.0-32.8	26.2-34.3	31.3-33.1
Number of fish				78	219	160	94	62	5
<u>All Rainbow Trout</u>	<u>60 Locations, 2,611 Trout</u>								
Average length	2.3	6.3	9.5	13.7	24.9	26.3	27.8	30.7	31.8
Size range	1.0-5.7	3.4-10.6	5.4-26.5	6.3-27.7	17.0-30.4	19.0-33.9	25.0-32.8	26.2-34.3	31.3-33.1
Number of fish	1,001	748	215	107	219	160	94	62	5

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 Contribution from the Institute for Fisheries Research
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Therefore, the division for rainbow trout is whether they have migrated to the lakes or have lived in a stream until the time of capture.

Because of the small numbers of specimens in the older age groups, this report must be considered preliminary. Fish captured in the future will be aged and included in the averages, but only small changes in the averages are anticipated.

Results

The state-wide averages for rate of growth of brook, brown and rainbow trout are given in the accompanying table. Each species of trout is subdivided into three groups, two based on habitat and the third on over-all average. The number of streams from which samples were taken and the total number of fish are included for each group. Age groups are designated in Roman numerals. For each age group the average, maximum, and minimum total lengths, and the number of trout used to obtain the figures, are shown.

Literature Cited

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