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TROUT IN THE LITTLE SOUTH BRANCH OF THE PERE MARQUETTE RIVER DURING THE SECOND YEAR OF EXPERIMENTAL REGULATIONS[1]

By

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Experimental regulations have been in effect for two years on a 5.5-mile stretch of the Little South Branch of the Pere Marquette River that extends from Oxbow Bridge in Section 31, T. 17 N., R. 12 W., Lake County, upstream to Carlson Bridge on the section line between Sections 9 and 16, T. 16 N., R. 12 W., Newaygo County. This section of stream is included in Figure 1. The regulations that have been in effect since January 1, 1955, by order of the Conservation Commission are: a minimum legal size limit of ten inches for trout, fishing permitted with artificial flies only, and a daily creel limit of five trout.

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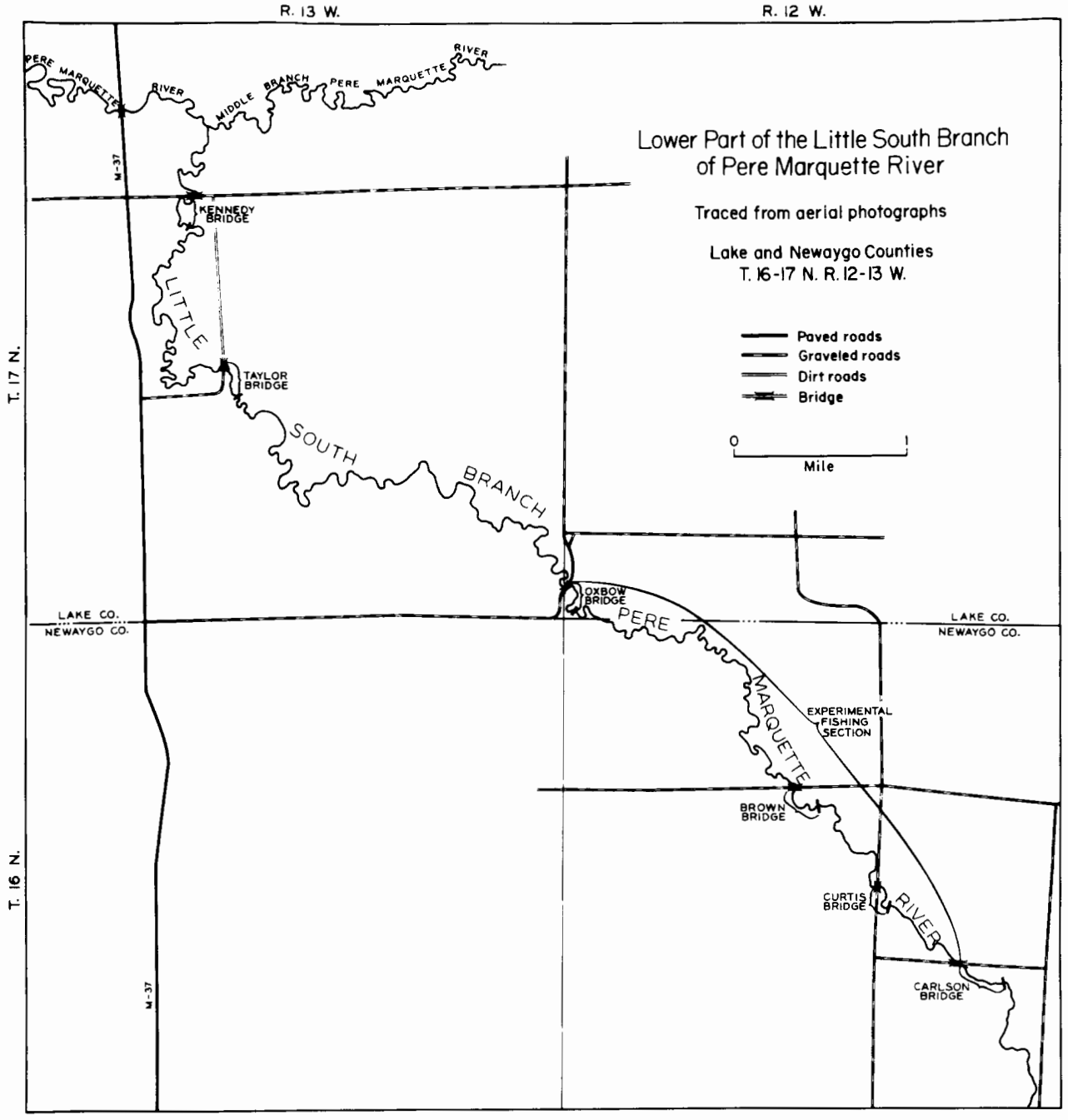
[1] The biological study of this river, analysis of data and preparation of the report was undertaken with Federal Aid to Fish Restoration funds under Dingell-Johnson Project Number F-2-R.

[2] Assistants in the field in 1956 were Fisheries Research Technicians Eugene B. Welch and Donald J. Goyette. The author was the field party leader.

Fig. 1. Lower part of Little South Branch of Pere Marquette River showing the section where experimental fishing regulations are in effect. The six collection stations are identified by the names of bridges. Each bridge is the downstream boundary of the portion of river where fish were collected.


R. 13 W.
R. 12 W.
T. 17 N.
T. 16 N.
PERE MARQUETTE RIVER
MIDDLE BRANCH PERE MARQUETTE RIVER
M-37
KENNEDY BRIDGE
LITTLE
TAYLOR BRIDGE
SOUTH BRANCH
OXBOW BRIDGE
PERE MARQUETTE RIVER
LAKE CO.
NEWAYGO CO.
EXPERIMENTAL FISHING SECTION
BROWN BRIDGE
CURTIS BRIDGE
CARLSON BRIDGE
Lower Part of the Little South Branch of Pere Marquette River
Traced from aerial photographs
Lake and Newaygo Counties
T. 16-17 N. R. 12-13 W.
Paved roads
Graveled roads
Dirt roads
Bridge
0
1
Mile

Investigation of 1954

A crew from the Institute for Fisheries Research in 1954 surveyed the Little South Branch of the Pere Marquette River from its confluence with the Middle Branch upstream to a point about 2,000 feet above Carlson Bridge to determine the suitability of this stretch of water for experimental regulations. Fish were captured from six sample stations with a direct-current electric shocker. The fish were identified, counted, measured for length, and scale samples were taken from the trout. The age of each trout was determined from scales. The information obtained from this survey was given in I. F. R. Report No. 1452 (Schultz, 1955a).

The survey of 1954 showed that the most abundant fish in the Little South Branch of the Pere Marquette River was the brown trout. The rainbow trout ranked second in abundance. Both brown and rainbow trout were growing at rates more rapid than the state average growth rates of these species. The data (see Table 2) indicated that it was unlikely that brown trout less than ten inches in length were old enough to spawn. Therefore, a recommendation for a minimum size limit of ten inches was made to protect the brown trout from being removed from the stream by anglers before they had the opportunity to spawn at least once.

The flies-only restriction resulted from experiments by Shetter and Allison (Hazzard, 1954; Shetter and Allison, 1955) which showed that worm-baited hooks killed 13.6 times more released trout than did artificial flies. On the basis of their figures, about 97 percent of the sub-legal trout caught on an artificial fly and returned to the stream would survive, whereas only about 63 percent of the trout caught

on a baited hook would survive. If a ten-inch minimum size limit for trout is used to protect them until they are old enough to spawn, then only flies should be used in angling to prevent excessive hooking mortality among the sub-legal fish.

The physical features of the Little South Branch of the Pere Marquette River (moderate width and depth, and adequate electrical conductivity of the water) were well suited to the use of a direct-current electric shocker for fish population evaluations. Access to the stream was available for the boat and shocker at several points.

Investigation in 1955

The experimental regulations were in effect for the first time during the trout season of 1955. In September of 1955 a direct-current electric shocker was used to capture trout at three sampling stations in the experimental section, two control stations downstream of that area and one upstream, as shown in Figure 1. The results, given in I. F. R. Report No. 1457 by Schultz, 1955b, showed an increase over 1954 in the number of brown trout captured per hour of shocking in both experimental and control sections of the stream. Brook trout are scarce in this part of the river, and nearly all rainbow trout migrate downstream to Lake Michigan before they grow to ten inches. The overall increase in numbers of fish caught in 1955 was probably due to improved collecting conditions which resulted from changes in two physical aspects of the stream. Below-normal rainfall during the summer of 1955 resulted in a low water level, making the fish more vulnerable to the shocker. Rain water, a poor conductor of electricity,

entered the stream in far smaller quantity in 1955 than in 1954 or 1956. Improved conductivity of the river water in 1955 increased the effective collecting range of the electrodes. Although captures increased in both the experimental and control sections of the stream, the increase was greater in the experimental water.

Investigation in 1956

The experimental regulations on the Little South Branch were in effect for the second season in 1956. An Institute crew made another check during August of 1956 at the six sampling stations that were investigated in 1954 and 1955. The locations of these stations and some of their physical features are given in Table 1. A 230-volt, 10.9-ampere direct-current shocker and similar collecting methods have been used in the investigations each year. The physical features of the stations have shown little change from 1954 to 1956, except for an abnormally low water level in 1955.

The catch of trout per hour in 1956 was less than in 1955, probably as a result of more efficient shocking effort in 1955. Low water, due to sub-normal rainfall, contributed to high efficiency in 1955. Also, higher electrical conductivity that resulted from lack of rain around the time of collecting that year favored efficiency.

The experimental regulations have been in effect for too short a period to permit conclusions at this time. Brook trout are too scarce to be considered in the experiment. One brook trout was captured in 1956, seven in 1955, and none in 1954. Also, no conclusions can be made regarding the rainbow trout because of their marked tendency to migrate to Lake Michigan when they are about two years old. This movement is indicated by the extreme scarcity in the collections of rainbow

Table 1.--Locations, physical features and conditions affecting shocking at the collecting stations in the Little South Branch of the Pere Marquette River, 1956

	Control stations[1]			Experimental stations[1]		
	Kennedy	Taylor	Carlson	Oxbow	Brown	Curtis
Station number	15	17	13	18	14	16
County	Lake	Lake	Newaygo	Lake	Newaygo	Newaygo
Town, North	17	17	16	17	16	16
Range, West	13	13	12	12	12	12
Section	22	26	16	31	8	9
Month	Aug.	Aug.	Aug.	Aug.	Aug.	Aug.
Day	14	15	10	15	13	14
Average width, feet[2]	35	25	40	25	35	30
Average depth, inches[2]	4	5.5	4.5	6	4.5	4
Trout cover	Good	Fair	Poor	Fair	Fair	Good
Vegetation	Sparse	Sparse	Sparse	Sparse	Sparse	Sparse
Bottom soils, %						
clay	5	5	1	1	...	...
silt	3	5	...	4	2	5
sand	55	70	75	70	40	75
gravel	37	20	14	20	50	10
rubble	...	...	10	5	8	10
Length shocked, feet	1,200	1,550	1,580	1,100	1,350	980
Time shocked, minutes	66	58	68	65	57	62
Efficiency	Fair	Fair	Fair	Fair	Fair	Fair
Trout captures						
brown	94	44	159	109	140	123
rainbow	59	10	30	69	30	4
brook	...	...	1	...	...	...

[1] Field stations are identified by names of bridges, each of which is the lower limit of the station.

[2] Based on transect measurements.

trout that were two years old or over ten inches in length. Some change in the brown trout population is indicated by the data of 1956 but it is too early to evaluate its significance. All three size groups of brown trout in the special regulation area have apparently increased in number since 1954, as shown in Table 2. There was a slight increase at the control stations in captures per hour of brown trout in 1956 over the comparable figure for 1954 in the two larger size groups, 7.0 to 9.9 inches, and 10.0 inches and over, but a decrease in the group 6.9 inches and under.

The age-length relationship in both brown and rainbow trout has not shown any appreciable change. The average length for each age group has varied slightly from year to year, but no consistent variation is evident, as shown in Table 3. Age and length data on brown trout show that the average trout is about 10.5 inches long near the end of its second year of life.

A study similar to this one was initiated in 1949 on the North Branch of the Au Sable River in Crawford County (Cooper, 1951; 1952; Shetter, 1954). The experimental regulations which applied to that stream from 1950 through 1955 were the same as those on the Little South Branch of the Pere Marquette River except that the daily creel limit was ten trout on the former stream and only five on the latter. The study of the North Branch of the Au Sable River has given evidence that the restrictions have enabled greater spawning success as shown by an increase in the number of trout under five inches in length. The purpose of the present study is to see if an increase in trout production will also be attained in the Little South Branch of the Pere Marquette River.

Table 2.--Trout per hour of shocking in control and experimental sections of the Little South Branch of the Pere Marquette River, 1954, 1955, and 1956

Species and year	Length groups, inches							
	2.0 - 6.9		7.0 - 9.9		10.0 and over		All sizes	
	Control	Experiment	Control	Experiment	Control	Experiment	Control	Experiment
Brown trout								
1954	46.6	21.3	8.7	10.3	8.7	10.0	63.9	41.6
1955	73.8	72.8	62.9	83.6	16.4	44.2	155.4	200.5
1956	32.5	27.7	41.9	44.7	18.4	48.9	92.8	121.3
Rainbow trout								
1954	14.6	5.5	0.3	4.2	...	...	14.9	9.7
1955	53.2	60.0	4.8	12.7	...	1.0	58.0	73.7
1956	24.7	19.9	6.2	13.7	...	...	30.9	33.6
Brook trout								
1954	...	...	...	...	...	...	...	...
1955	1.3	0.3	0.6	0.3	...	...	1.9	0.6
1956	...	...	0.3	...	...	...	0.3	...
All trout								
1954	61.1	27.8	9.0	14.5	8.7	10.0	78.8	51.3
1955	130.6	133.1	68.4	96.6	16.4	45.1	215.4	274.8
1956	57.2	47.6	48.4	58.4	18.4	48.9	124.1	154.9

Table 3.--Comparison of average lengths in relation to age of trout in the control and experimental sections of the Little South Branch of the Pere Marquette River for 1954, 1955, and 1956. (Number of fish in parentheses)

Species and year	Age groups											
	0		I		II		III		IV		V	
	Control	Exp.	Control	Exp.	Control	Exp.	Control	Exp.	Control	Exp.	Control	Exp.
Brown trout												
1954	2.6	2.5	7.0	6.9	10.3	10.0	13.2	12.1	15.7	...	...	...
	(121)	(45)	(30)	(41)	(22)	(19)	(7)	(21)	(1)	...	...	...
1955	4.2	4.3	8.3	7.6	11.9	11.5	13.6	14.3	14.9	16.0	18.0	...
	(224)	(200)	(101)	(111)	(16)	(31)	(11)	(25)	(2)	(11)	(1)	...
1956	3.7	3.5	7.7	8.1	11.1	10.8	13.4	13.9	16.7	15.4	...	18.1
	(81)	(64)	(149)	(130)	(45)	(124)	(16)	(29)	(3)	(15)	...	(2)
Rainbow trout												
1954	1.6	1.9	6.2	7.0	...	9.1						
	(33)	(8)	(10)	(21)	...	(1)						
1955	3.5	3.9	7.5	8.5	...	12.5						
	(161)	(188)	(19)	(44)	...	(1)						
1956	2.6	2.7	7.1	7.7	...	...						
	(61)	(56)	(38)	(47)	...	...						

On August 14, 1956, Circuit Judge Max E. Neal declared that the flies-only order on the Little South Branch of the Pere Marquette River was illegal. This decision followed the arrest and conviction of Mr. Thomas E. Carnahan in 1955 for fishing with worms in the special-regulation section of the stream. Mr. Carnahan appealed the case to the Lake County circuit court and was declared not guilty because the court decided that the Commission Order had not been properly published. As a result of the court decision, the special-regulation section of the river was open to angling with worms and other bait for a period of twenty-seven days, from August 14 to September 9, 1956, the end of the 1956 trout season. It is doubtful that many anglers fished with worms in this section of the stream during that period because fishing pressure for trout is low during this part of the season.

The Conservation Commission, at its meeting in March, 1957, renewed the order on that portion of the Little South Branch of the Pere Marquette River between Carlson Bridge in Newaygo County and the Newaygo-Lake county line (the short experimental section in Lake County was not included). The new order again specifies flies only, a 10-inch size limit, and a five-fish creel limit, and is in effect for three years beginning April 15, 1957.

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