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

ALBERT S. HAZZARD, PH.D.
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July 20, 1951

Report 1292

CREEL CENSUS

1947-1950

BLACK RIVER, MACKINAC COUNTY

By

Thomas M. Stauffer

Abstract

There has been a special experimental season for rainbow trout on the Black River, Mackinac County since 1947. This experimental season ends in 1951. From the mouth to Peters Truck Trail bridge (3-4 miles) rainbow trout can be taken April 15 to November 30 of each year.

Creel census was taken each year in an attempt to evaluate the effect of the special season on the rainbow trout population spawning in the Black River. Comparison of the creel censuses (1947-50) as an indication of depletion is open to serious question. Since the creel census of 1947-49 was of the general type (cannot be termed random), and that taken in 1950 was of the random type, the creel censuses of the different years may not be directly comparable.

The fishing quality (fish-per-hour) was considerably lower in 1950 than in previous years, which may or may not have significance. If the creel censuses could be safely compared it would be of some significance since 1950 would be the year when the effect of earlier angling would first appear. On the other hand, since it is questionable whether the

censuses can be compared, the drop in fish per hour may have no significance. A population study in August, 1950 produced no young of the year. High and discolored water made this study inconclusive. Studies of rainbow trout taken during the spring, special season of 1950 (April 15 to last Saturday in April), indicated that 76 percent of the rainbows taken were mature. Most of these had not yet spawned. However, it was a late spring.

Minimizing the possibility of depletion was the large upstream fall run of rainbows. A run of some 300 immature and mature fish was estimated, based on a weir catch of 210 and 43 rainbows recorded on creel census. A small escapement at the weir makes up the remainder.

Since adequate data are not available it is not felt that a valid conclusion can be drawn at this time. A more detailed investigation this year of the run, the angler catch, and spawning success should give more conclusive evidence.

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The purpose of this report is to present the results of the 1947-50 creel census on the Black River. Special emphasis is placed on the 1950 census. This creel census was taken in an attempt to find out what effect the special trout season is having on the population of rainbow trout which spawn in the Black River. It is planned to briefly present and discuss the creel census for 1947-49. The 1950 census will be taken up in more detail. For purposes of discussion the yearly creel census will be divided into: spring special season (April 15 to the last Saturday in April), regular trout season, and fall special season.

Beginning with the spring of 1947 the rainbow trout season has opened April 15 on the Black River, downstream from the Peters Truck Trail crossing--a distance of about 3 miles. For some time it has been known that most Great Lakes rainbow trout are unavailable to the angler (under existing regulations) during most of their life cycle. Briefly, they are available to the angler only when they run up the rivers as adults in the spring and fall, and when as immature fish they first return to the

lakes. However, these opportunities are severely limited by existing regulations. Generally, a large portion of the spawning run has spawned and returned to the lakes before the regular trout season opens. In addition the fall run usually does not hit its peak until well after the regular trout season closes. The fall run is usually a small percentage of the total in any year. Parr migrating to the lake are usually under 7 inches. Of 62 rainbow parr taken in the downstream weir trap (on their first trip to the lake) in 1950 only 8, or 13 percent, were of legal size.

The mouth of the Black River is located in T. 44 N., R. 8 W., Section 30. The stream is fairly wide (35-45 ft.) in the lower 1/4 mile. Here the current is sluggish. Depth ranges to at least 5 feet, with a probable mean of 2 to 3 feet. The upper and middle reaches of the Black River contain a fair amount of gravel area which is utilized by rainbow trout, sea lampreys and suckers for spawning purposes. The banks are heavily wooded throughout most of the river's length. The accompanying map illustrates points of access and other pertinent features.

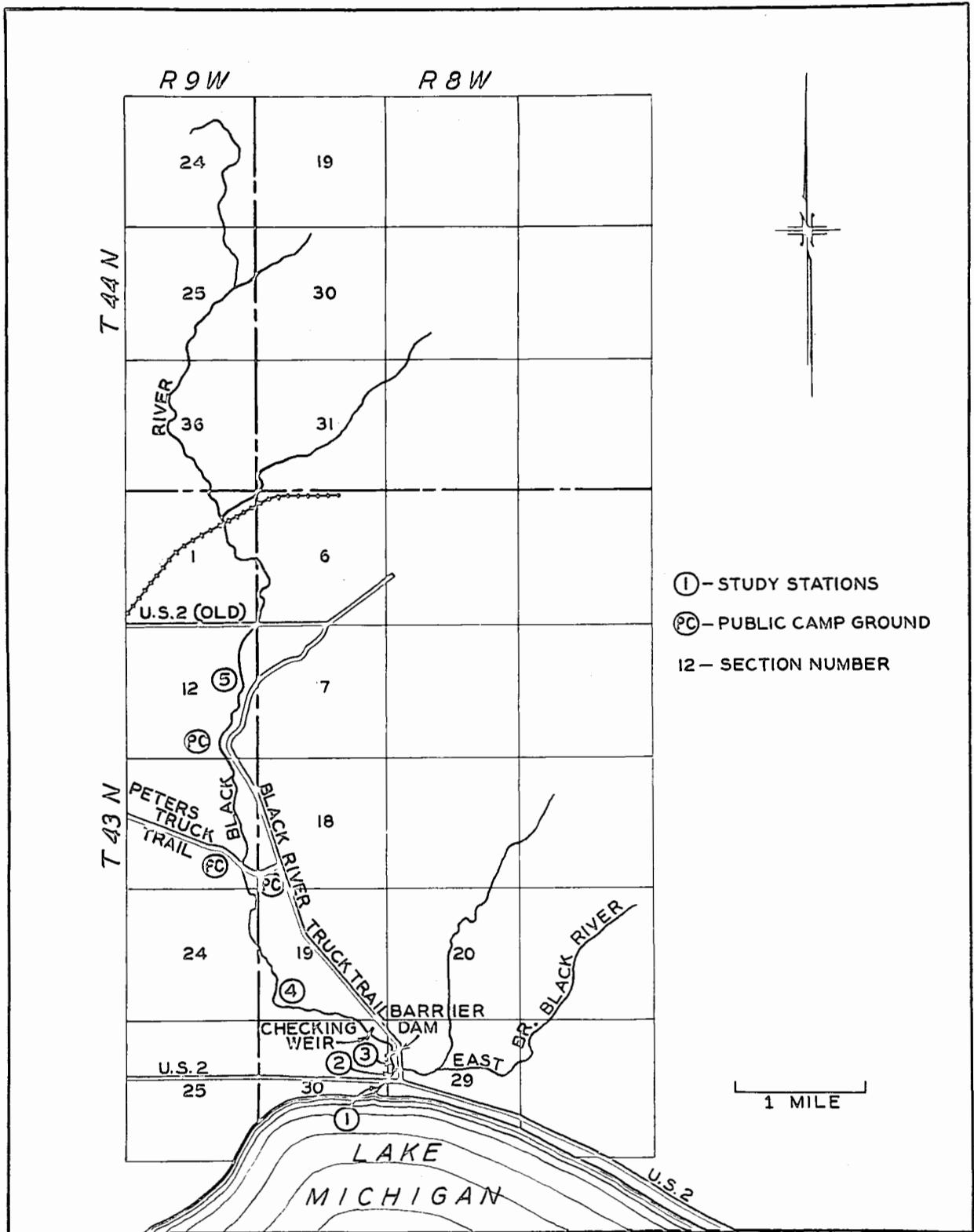


Fig. 1. Map of Black River, Mackinac County, showing stations and landmarks related to the present study.

Table 1
 Creel Census Summary
 1947
 (Regular Season)

Date	April	May	June	July	August	Total
Male anglers	8	38	2	5	1	54
Female anglers	1	5	0	0	0	6
Total	9	43	2	5	1	60
Hours fished	27	250	4	17	4	302
Brook trout	0	0	1	12	2	15
Brown trout	3	1	1	4	0	9
Rainbow trout	12	32	1	0	0	45
Total	15	33	3	16	2	69
Fish/Hour	.555	.132	.750	.941	.500	.228
Rainbow/Hour	.444	.128	.250	0	0	.149

1947 Creel Census

This year, creel census was taken by Charles Vanderstar, Conservation Officer in District 4. It was taken as a part of the general creel census. It was limited to T. 43 N., R. 8 W., Sections 29, 13 and 12; with most (about 75%) of the fishermen being interviewed in Section 29. No census was taken in the special seasons of spring or fall. Of 24 parties interviewed, 23 were successful.

Table 2
 Creel Census Summary
 1948
 (Regular and Fall Season)

Date	Regular season				Fall regular season
	April	May	June	Total	
Male anglers	20	10	10	40	7
Female anglers	0	0	0	0	0
Total	20	10	10	40	7
Hours fished	86	38	7.5	131.5	20
Brook trout	1	1	36	38	0
Brown trout	2	1	0	3	0
Rainbow trout	19	15	0	34	11
Total	22	17	36	75	11
Fish/Hour	.256	.447	4.80	.570	.550
Rainbow/Hour	.221	.395	0	.259	.550

1948 Creel Census

General creel census was again taken by Conservation Officer, Charles Vanderster. The majority of anglers were interviewed in T 43 N., R. 8 W., Sections 12, 13, 24, 29 and 30. A few were interviewed in T. 44 N., R. 8 W., Sections 6, 24 and 36. No census was taken during the spring special season, and that taken in the fall was very limited. It was noted that of 23 parties interviewed, 22 were successful.

1949 Creel Census

One hundred and seven trips were recorded by Cecil Gill of Garnet, Michigan. This apparently was a personal creel census, including other members of his party. Of 50 records (party or self), only in one instance were fish not taken. This suggests that unsuccessful trips were mostly not recorded, and the records therefore are of limited value. Leland Anderson recorded 5 personal trips and 87 trips of other persons, on general creel census forms. Charles Vanderstar recorded 47 trips on general creel census forms. As far as could be determined, almost all of the creel census records were taken below old U. S. 2, i.e., T. 43 N., R. 8 W., Sections 12, 13, 19, 24, 30 and 29. Both the special spring season and regular trout season were well censused. Few anglers were interviewed in the fall. In the fall all those listed were interviewed by Cecil Gill.

There is some information as to size of rainbow trout taken. The catch for opening day (April 15) by 49 fishermen totaled 73 rainbow trout averaging about 17 inches in length and up to 7 pounds in weight (Hazzard, 1950).

Table 3

Creel Census Summary

1949

Spring Special Season

Date	April 15	April 16	April 17	April 18	April 20	April 21	April 22	Totals
Male anglers	54	29	1	1	1	9	1	96
Female anglers	1	0	0	0	0	3	0	4
Totals	55	29	1	1	1	12	1	100
Hours fished	224.5	93.5	1.5	1.0	2.5	44.0	2.0	369.0
Rainbow trout	88	35	1	1	2	4	0	131
Rainbow/Hour	.392	.374	.666	1.00	.800	.0909	0	.355

Table 4

Creel Census Summary

April 23 - September 9

1949

(Regular Season)

Period	April 23 to April 29	April 30 to May 6	May 7 to May 13	May 14 to May 20	May 21 to May 27	May 28 to May 30	June	July	August	September 2 to 7	Total
Male anglers	32	23	15	11	3	6	6	4	14	5	119
Female anglers	1	2	0	0	0	0	0	0	8	0	11
Total	33	25	15	11	3	6	6	4	22	5	130
Hours fished	131	98.5	65.5	41	9	10	17	7.5	39.5	15	434
Brook trout	0	18	26	37	8	13	14	6	0	1	123
Brown trout	0	4	12	3	0	1	0	0	7	1	28
Rainbow trout	32	26	23	10	3	5	6	4	12	6	127
Total	32	48	61	50	11	19	20	10	19	8	278
All fish/Hour	.244	.487	.931	1.22	1.22	1.90	1.18	1.33	.481	.533	.641
Rainbow/Hour	.244	.264	.351	.244	.333	.50	.353	.533	.304	.400	.293

Table 5
Creel Census Summary
October 3 - November 11
1949
(Special Fall Season)

Period	October 3 to October 10	October 20 to October 25	November 13 to November 14	
Male anglers	7	5	6	18
Female anglers	0	0	0	0
Total	7	5	6	18
Hours fished	22	19	15	56
Rainbows	8	10	5	23
Fish/Hour	.364	.526	.333	.410

Table 6

State of Maturity of Spring Run ¹

Rainbow Trout of

Different Lengths

Length class	Immature			Mature ²		
	Male	Female	Total	Male	Female	Total
10.0 - 10.9	1		1			
11.0 - 11.9		3	3	2		2
12.0 - 12.9	1	3	4	2		2
13.0 - 13.9	1	9	10	3		3
14.0 - 14.9	1	5	6			
15.0 - 15.9				1	2	3
16.0 - 16.9		1	1	2	1	3
17.0 - 17.9				1		1
18.0 - 18.9	1		1	1	3	4
19.0 - 19.9				1	1	2
20.0 - 20.9				1	3	4
21.0 - 21.9				1	1	2
22.0 - 22.9				4	2	6
23.0 - 23.9				1	4	5
24.0 - 24.9				1		1
25.0 - 25.9				1		1
26.0 - 26.9						
27.0 - 27.9				1	1	2
28.0 - 28.9						
29.0 - 29.9					1	1
Totals	5	21	26	23	19	42

¹Collected April, May, June, 1950

²Those fish in which the gonads were developed throughout their (gonads) length (not necessarily ripe), and fish which were spent.

Table 7
 Creel Census Summary,
 April 15-28, 1950
 (Special Spring Season)

Period	Saturday 15	Sunday 16	Monday 17	Tuesday 18	Wednesday 19	Thursday 20	Friday 21	April 22-28	Totals
Male angler trips	73	50	6	7	4	0	13	44	197
Female angler trips	4	2	1	0	0	0	0	1	8
Totals	77	52	7	7	4	0	13	45	205
Successful	14	10	0	1	1	0	0	2	28
Unsuccessful	63	42	7	6	3	0	13	43	177
% Successful	18	19	0	17	25	0	0	5	14
Hours fished	315	197.5	37.5	15	6	0	44	158	773
Rainbows taken	30	16	0	1	1	0	0	2	50
Rainbow/Hr.	.095	.081	0	.066	.17	0	0	.013	.062
Rainbow/Hr./Trip	.068	.066	0	.036	.125	0	0	.009	.046
Pound/Hr.	.193	.147	0	.220	.022	0	0	.031	.126

Table 8

Creel Census Summary

April 22 - September, 1950

(Regular Season)

Period	April 29 to May 5	May 6-12	May 13-19	May 20-26	May 27-29	June	July	August & September	Total
Male angler trips	18	24	53	47	36	3	18	10	209
Female angler trips	1	1	4	0	3	0	1	2	12
Totals	19	25	57	47	39	3	19	12	221
Successful	1	2	27	19	13	3	11	2	78
Unsuccessful	18	23	30	28	26	0	8	10	143
% Successful	6	8	47	40	33	100	57	17	35
Hours fished	59.5	46.5	203.5	177.5	116.5	20	46	16.5	686
Brook trout	0	0	7	7	16	2	19	1	52
Brown trout	0	0	4	1	2	2	7	1	17
Rainbow trout	1	3	41	26	10	9	6	0	96
Totals	1	3	52	34	28	13	32	2	165
All fish/Hr.	.017	.065	.256	.192	.240	.650	.696	.121	.240
Rainbows/Hr.	.017	.065	.201	.146	.086	.450	.130	.0	.140
All fish/Hr./Trip	.015	.060	.362	.226	.197	.707	.972	.333	.295
Rainbows/Hr./Trip	.015	.060	.273	.166	.078	.487	.198	.0	.151
Lbs./Hr. ↓	.005	.138	.162	.274	.148	.082	.024	.0	.158

↓ Includes only rainbows

Table 9

State of Maturity of Fall Run ¹

Rainbow Trout of

Different Lengths

Length	Immature			Mature ²		
	Male	Female	Total	Male	Female	Total
10.0 - 10.9						
11.0 - 11.9						
12.0 - 12.9	1		1			
13.0 - 13.9	1		1			
14.0 - 14.9						
15.0 - 15.9	1	2	3			
16.0 - 16.9	1	1	2	1		1
17.0 - 17.9	1		1	3		3
18.0 - 18.9						
19.0 - 19.9		1	1	2		2
20.0 - 20.9				2		2
21.0 - 21.9						
22.0 - 22.9				1		1
23.0 - 23.9						
24.0 - 24.9				1		1
Totals	5	4	9	10	0	10

¹ Collected October, 1950.

² Those fish in which the gonads were developed through most of (gonads) length (not necessarily ripe).

Table 10

Creel Census Summary

September 28 - November 13, 1950

(Special fall Season)

Period	Sept.	Oct. 2-6	Oct. 7-13	Oct. 14-20	Oct. 21-27	Oct. 28- Nov. 3	Nov. 4-10	Nov. 11-13	Total
Male angler trips	3	29	37	19	8	9	11	11	127
Female angler trips	0	3	5	3	2	4	7	0	24
Total	3	32	42	22	10	13	18	11	151
Successful	1	3	13	5	2	3	3	2	32
Unsuccessful	2	29	29	17	8	10	15	9	119
% Successful	.33	.11	.31	.23	.20	.23	.17	.18	.21
Hours fished	4.5	78.5	91.5	72.5	21	26	54	21.5	369.5
Rainbows caught	1	3	17	9	3	6	2	2	43
Rainbows/Hr.	.222	.0382	.186	.124	.143	.231	.0370	.0930	.116
Rainbow/Hr./Trip	.133	.0225	.203	.151	.110	.151	.0188	.0454	.111
Lbs./Hr.	.080	.0549	.438	.176	.205	.537	.0231	.142	.217

1950 Creel Census

Creel census in 1950 was taken exclusively by William Hanson and the writer. It cannot be termed an intensive census because the census was subordinate to the operation of the Black River sea lamprey barrier dam and checking weir. Only a part of the fish taken by anglers were scale sampled. Almost all rainbows caught by anglers were measured to the nearest inch and recorded on the special trout creel census forms.

On the first two days of the spring special season, a rather intensive census was taken. The remainder of the special season creel census was irregular. The weather was cold, with a heavy snow cover. The river was very high the latter half of this period--the natives reported it to be unusually so. Angling was limited to Stations 1, 2, 3 and the extreme lower end of 4. By far the heaviest concentration of anglers was in Station 1 when in many spots anglers were fishing elbow to elbow. This concentration may have been determined by preference on the part of the anglers, or accessibility. The Black River road was not in the best of condition, and Peters Truck Trail was impassable. Other than at U. S. 2 and vicinity, the only way to reach the river was by walking some distance through deep snow.

Natural bait was the predominant lure. Only a few fishermen employed artificials. Worms (includes nightcrawlers) were the most popular bait; 87 anglers used worms to catch 15 fish. Thirty-four anglers used salmon eggs to catch 8 fish. Thirty-two fishermen used spawn bags (rainbow trout eggs tied in a sack made of sheer nylon hose) to take 16 fish. Thirteen anglers employed worms and spawn (separately) to catch 8 fish. Other types of lures and bait used included: minnows, hellgrammites, meat rind, white grubs, white worms, flatfish, dardevle

and a K. B. spoon. Spawn bags seem to have been the most effective, and were much in demand.

The rainbows taken were generally mature. They averaged 18" in length, with weights up to 7 pounds. Thirteen fish taken were 20" or longer. It is interesting to note that two brown trout of 7 lbs. or over were taken and returned to the water on the first day. It is thought that the rainbows had been in the river for some time, as they did not have the brilliant silver sheen of fresh-run fall rainbow. It is not known when the spring-run rainbows came up, but it is suspected that the main run was during the latter part of April or the first two weeks in May.

It would be of value to determine the number of sexually mature rainbow trout taken by anglers. That is, do the anglers take the adult spawners, and if so, how many? Since the state of organs (mature or immature) was not determined for many fish taken by anglers, another indication of sexual maturity must be introduced. The only data available on all fish taken by anglers are lengths. The criterion of sexual maturity is obtained by placing the length and state of maturity of scale-sampled fish, in a rough frequency distribution (Table 6 - p.10). As can be seen, a demarcation line appears, that is, a length below which most of the rainbows are immature and above which most of them are mature. The data used in this table were taken from 76 scale samples of spring-run rainbows obtained at the sea-lamprey, barrier-dam trap and checking weir and a few from anglers. As determined by inspection, the dividing line between immature and mature spring-run rainbows is 15 inches. As determined by this method 76 percent or 38 of the rainbows taken by anglers during the spring special season were mature, 14 percent or 7 were immature, and 10 percent or 5 could not be determined. It should be kept in mind that this method is, at best,

an approximation. Several sources of error are at once apparent. The most important seems to be the smallness of the sample and some variation in size at which sexual maturity is attained due to sex and other factors.

Rainbows caught by anglers were measured for length (to nearest tenth of inch), but only a few of them were weighed. Weight data were available on 89 fish secured mostly at the barrier dam and weir. For the unweighed angler rainbows, their individual weights were calculated by use of the equation for a general parabola:

$$W = cL^n$$

where W = weight in ounces, L = standard length in inches and c and n are constants. (Beckman 1945). The length-weight curve formula is solved on the basis of available weight records. Angler-caught fish, and fish from the dam and weir, were all from the spring run, so that it is valid to compute weights of fish in one category from fish in the other. The estimating equation expressed in logs is

$$\text{Log } W = \text{Log } c + n \text{ Log } L.$$

To solve this equation for W , the constants ($\log c$ and n) must be obtained. The formulae for computing the constants are:

$$\log c = \frac{\sum \log W \cdot \sum (\log L)^2 - \sum \log L \cdot \sum (\log L \cdot \log W)}{N \cdot \sum (\log L)^2 - (\sum \log L)^2}$$

$$n = \frac{\sum \log W - N \cdot \log c}{\sum \log L}$$

where: N = number of samples.

Then, to calculate any weight for a given length, the values for $\log c$ and n are substituted in the estimating equation $\text{Log } W = \log c + n (\log L)$. The weights, used to determine pounds per hour of fish caught by anglers, were individually calculated by this method. The length-weight curves (accompanying figures) were plotted by calculating points at intervals of one inch of length.

Regular Trout Season

Most of the anglers contacted during the regular trout season were interviewed during the latter part of April and May. Beginning May 3, anglers were recorded as to station. Thirteen angler trips were recorded in Station 1; 46 in Station 2; 26 in Station 3; 46 in Station 4; and 45 in Station 5. Ninety trips of anglers were recorded who had fished in one or more stations or were contacted before May 3. The concentration of anglers was somewhat different from the spring special season. The anglers were scattered throughout the length of stream censused. This diffusion was probably due to the better roads and to the fact that the whole stream was then open to fishing.

The spring run-off kept the river high during the latter part of April and the first two weeks in May. After this period there were only short-lived periods of high water. Incidentally the fishing was extremely poor during the spring run-off.

The favorite bait was worms; approximately 169 angler trips recorded the use of worms to catch 108 trout. Thirty-eight angler trips were recorded as using spawn bags to catch 48 fish. Six anglers employed worms or spawn to catch 5 fish. Other baits and lures employed in small amounts included: flatfish, artificial flies, minnows, smelt, spinners, salmon eggs, dardevles, spoons and grasshoppers. The most effective bait or lure seems to be spawn bags. It appeared that the most experienced anglers used spawn almost exclusively when available.

The rainbow trout taken during the regular season averaged 13 inches in length (as calculated from creel census records). The length of 15 fish taken by anglers, which were scale sampled, averaged 12.9 inches. Eleven rainbows were taken that were 20 inches or over in length. This is a somewhat smaller average than the rainbows taken during the spring special season, and is due to the large number of immature fish (7-15") taken.

Fish which were 10-15 inches appeared heavily in the angler's take the latter part of May. Judging from their silvery appearance the immature fish were fresh lake run. Their length ranged from 10-16 inches. From May 27 to June 26, there was a heavy (although sporadic) run of sub-legal and a few legal rainbows downstream. It is believed that these figured heavily in the catch as shown by the limited creel census taken in June. Also at this time (May to June) the adult spawners were returning to Lake Michigan. The majority of the adult rainbows taken in this period were spent. They first were taken on May 31 in the downstream weir trap, and the last spent fish appeared on June 25. From the time (May 27) that the checking weir was put in operation to June 24, stragglers of the upstream spawning run appeared in the upstream weir trap. Of the 96 rainbow trout taken by anglers, 28 percent or 27 were 15 inches or over and were assumed to be mature. Fish less than 15 inches numbered 69, or 72 percent of the total.

Fall Special Season

In the special season of fall, anglers again concentrated within a mile of the mouth of the river. Twenty-one angler trips were recorded in Station 1; 32 in Station 2; 30 in Station 3; and 4 in Station 4. Sixty-four trips were recorded as fishing one or more stations. The first 2 weeks of October saw the most fishermen. These were mostly residents of the Upper Peninsula. The bird season which opened the first of October put a temporary halt to fishing, but when the hunters discovered grouse hard to find they turned to rainbow trout fishing. In November the fishing was done by the natives and a few deer hunters who arrived before the deer season opened. Very few fishermen were present during the open deer season and none were interviewed.

The most effective bait seemed to be spawn bags. Forty-six trips, on which anglers used spawn bags, took 26 fish. Seventy trips of anglers using worms for bait took 8 fish. Seven anglers using spawn and worms took 5 fish. Other baits and lures used included: flatfish, dardevles, flies, salmon eggs and minnows. There is no record of these lures taking any fish. Worms were the predominant bait during the early part of this period, giving way to spawn bags as the season progressed.

The first fall run rainbows (judged so by their fat, silvery condition) were captured in the upstream weir trap on September 8, but were not taken in appreciable numbers until the last of the month. A total of 210 rainbow trout were taken in the upstream weir trap from September 8 to November 23. Forty-three rainbow trout were taken by anglers during the special fall season. As shown by the creel census, these fish averaged 15 inches. The average from scale samples (25) from fish taken by anglers was 17.2 inches. With few exceptions all the rainbows caught were fresh-run lake fish and were in excellent condition.

The rainbow trout taken by anglers during the fall season were recorded to the nearest inch on the creel census forms. The weights of these fish were calculated in the same manner as that for the spring run (see above). The constants used were obtained from a random sample of some 207 scale sampled rainbow trout taken at the checking weir and by anglers. Three samples were taken from each 1-inch size group making a total of 48 samples. It was thought that using the whole 207 fish might unduly influence the curve since there was a large percentage of these fish in the range of 12 to 16 inches. However, as a check, the whole 207 were used to calculate the two constants and the resulting curve was almost identical with that which was obtained using 48 random samples. When the constants were obtained, the weight of each fish whose length was recorded on creel census was

calculated and the pounds/hour derived from this. The length-weight curve was fitted by calculating points at intervals of 1 inch.

It should be noted that this curve (Fig. 2) does not fit the empirical data so well as the curve for the spring run fish. Perhaps another formula would fit this curve better.

Conclusions

The present census over the four years (1947-1950) cannot be used as a measure of depletion of the rainbow run in the Black River, because the creel census taken in 1947 to 1949 was of the general type (cannot be termed random) and that taken in 1950 was more intensive. They cannot be compared with safety. However, assuming for the moment that they could be compared, a tentative hypothesis can be worked out which would account for the sudden drop in catch per hour in 1950. Greeley (1933) determined from scale samples of 97 adult rainbow (taken from streams of western Michigan) that 61, or 62.8 percent, first left the parent stream at the beginning of the third year and usually returned to spawn at the beginning of the fourth year. Thus, most of the rainbows hatched in the spring of 1947 in the Black River would have migrated to Lake Michigan in 1949 and would have returned to spawn in 1950 (if, as is assumed, rainbow return to the "parent stream" to spawn). If, however, many of the adult spawners (1944 year class) were taken before they could spawn (by anglers in the special spring season of 1947), the number of the 1947 year class would be small. This year class (1947) would spawn in 1950. Possibly the catch per hour in 1950 was low because of the scarcity of this year class. It must be borne in mind that this hypothesis rests on a rather questionable basis, because the creel census data were not entirely comparable.

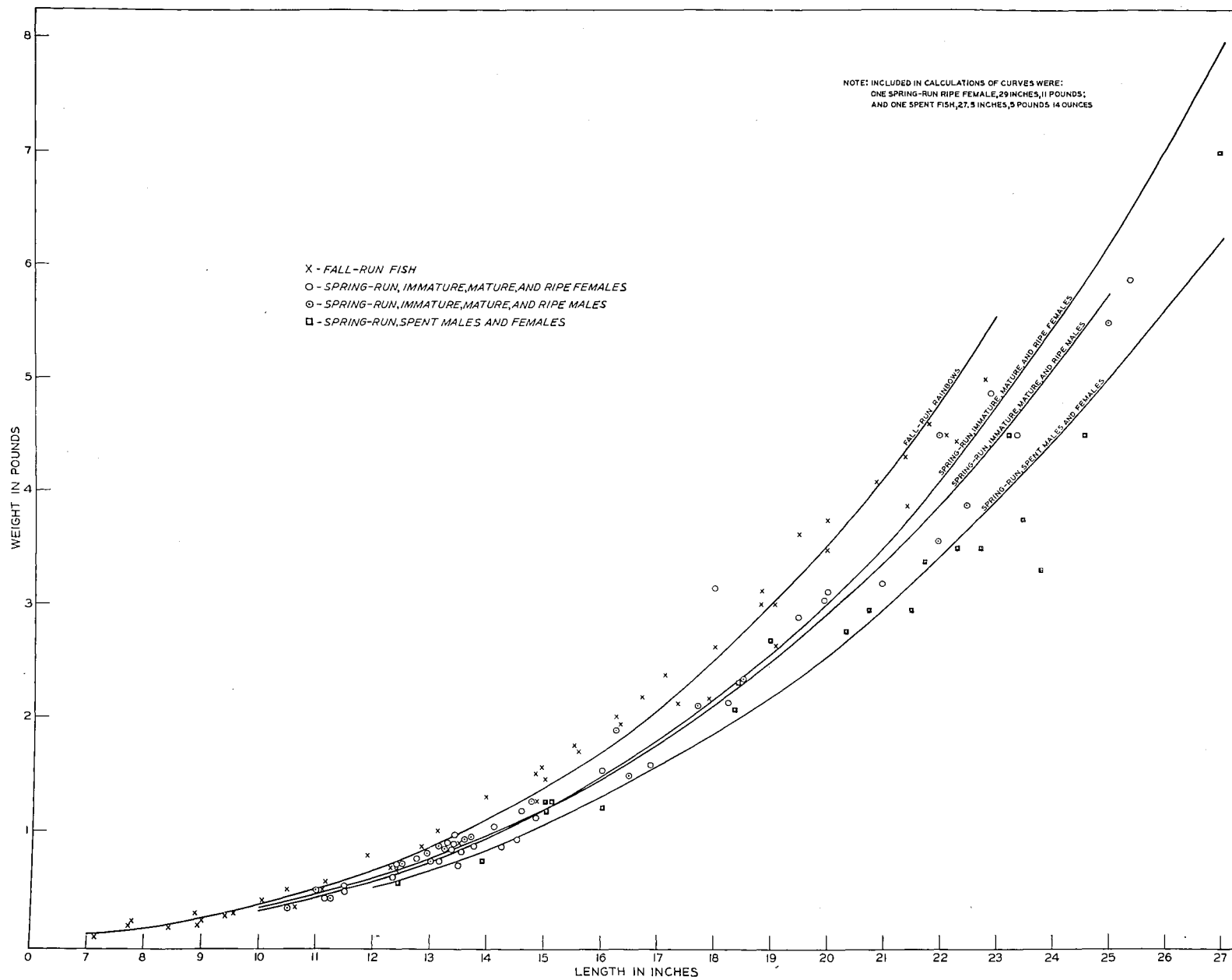


Fig. 2. Length-weight curves for rainbow trout from the Black River, Mackinac County, 1950.

A population study was conducted in August of 1950 by D. S. Shetter, E. H. Andersen and E. L. Cooper (Andersen, 1950). Portions of the stream in T. 43 N., R. 8 W., Sections 12, 13, 29 and 30 were shocked with a direct current shocker. No young-of-the-year rainbows were found. However the river was high and roily at the time.

Data obtained during the 1950 season indicate that in the spring special season 76 percent of the rainbow trout taken by anglers were mature. The majority of these fish had not yet spawned. If this percentage of adult spawners taken can be applied to previous years it can be seen that the number of ripe adult spawners taken is high.

The possibility that the rainbow stock in the Black River has been greatly depleted by the four years of early spring fishing is greatly minimized, as suggested above, in view of the large fall run of rainbows which took place September 8 to November 23, 1950. A total of 253 rainbows were taken in this period--210 at the weir and 43 by anglers. If previous records are indicative (Platte River weir), the percentage of rainbows, out of the total stock in a river, moving into a river in the fall is small (58%). If this holds true for the Black River, then there must have been a large number of spring-run fish.

The foregoing are offered, at this stage, as preliminary conclusions. They are in need of further verification, which is the reason that the field study is being continued during 1951.

Table 11

Creel census on Black River summarized by year

	1947	1948		1949			1950		
	regular	regular	fall	spring	regular	fall	spring	regular	fall
Total angler trips	60	40	7	100	130	18	205	221	151
Hours fished	302	131.5	20	369	434	56	773	686	369.5
Brook trout	15	38	0	0	123	0	0	52	0
Brown trout	9	3	0	0	28	0	0	17	0
Rainbow trout	45	34	11	131	127	23	50	96	43
Total	69	75	11	131	278	23	50	165	43
All fish/Hour	.228	.573	.550	.355	.641	.410	.062	.240	.116
Rainbow/Hour	.149	.259	.550	.355	.293	.410	.062	.140	.116

Table 13

Values of log c and n used in calculating length-weight curves

Classification	log c	n	N [↓]
Spring run males ²	-2.298	3.048	17
Spring run females ³	-2.510	3.224	32
Spring run spent ⁴	-2.350	3.046	21
Spring run (all) ⁵	-2.349	3.076	89
Fall run ⁶	-2.452	3.231	48
Fall run ⁷	-2.482	3.258	208

¹ N = number of items used to calculate log c and n values.

² Includes ripe, mature and immature males.

³ Includes ripe, mature and immature females.

⁴ Includes both spent males and females.

⁵ Includes spring run males, females, spent fish and 19 fish which could not be classified.

⁶ A random sample

⁷ Includes all fish scale sampled in the fall.

Table 14

Average length and weight of rainbows in spring and fall runs[↓]

Size Class	Spring			Fall		
	Average Length	Average Weight Lbs. Oz.	Number	Average Length	Average Weight Lbs. Oz.	Number
7.0 - 7.9	7.4	2	6	7.5	2	9
8.0 - 8.9	8.4	3	4	8.7	3	4
9.0 - 9.9			0	9.4	4	12
10.0 - 10.9	10.6	7	2	10.3	6	6
11.0 - 11.9	11.3	8	5	11.5	10	8
12.0 - 12.9	12.6	11	8	12.4	12	18
13.0 - 13.9	13.4	14	15	13.5	1	19
14.0 - 14.9	14.5	1	7	14.6	1	23
15.0 - 15.9	15.2	1	4	15.5	1	27
16.0 - 16.9	16.3	1	8	16.4	2	21
17.0 - 17.9	17.8	2	1	17.4	2	23
18.0 - 18.9	18.2	2	6	18.4	2	8
19.0 - 19.9	19.2	2	12	19.6	3	12
20.0 - 20.9	20.3	2	15	20.3	3	8
21.0 - 21.9	21.4	3	2	21.5	4	3
22.0 - 22.9	22.4	4	0	22.4	4	4
23.0 - 23.9	23.4	4	0	23.5	5	1
24.0 - 24.9	24.6	4	8	24.9	4	1 [↘]
25.0 - 25.9	25.2	5	11			
26.0 - 26.9						0
27.0 - 27.9	27.2	6	7			2
28.0 - 28.9						0
29.0 - 29.9	29.0	11	1			1
Total			89			207

[↓] Original data from scale samples.[↘] This fish found dying with lamprey attached. It was in poor condition.

Literature Cited

Andersen, Edward H.

1950. Results of shocking Black River, August, 1950. (Unfinished Institute report)

Beckman, William C.

1948. The length-weight relationship, factors for conversions between standard and total lengths, and coefficients of condition for seven Michigan fishes. Trans. Am. Fish. Soc., Vol. 75 (1945), pp. 237-256.

Greeley, John R.

1933. The growth rate of rainbow trout from some Michigan waters. Trans. Am. Fish. Soc., Vol. 63, 1933, pp. 361-378.

Hazzard, A. S.

1950. The rainbow problem. Mich. Conserv., Vol. 19, No. 2, pp. 12-14, 33-34.

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