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

ALBERT S. HAZZARD, PH.D.  
DIRECTOR

June 5, 1953

ADDRESS  
UNIVERSITY MUSEUMS ANNEX  
ANN ARBOR, MICHIGAN

Report No. 1374

CREEL CENSUS, 1952, BLACK RIVER, MACKINAC COUNTY AND  
A COMPARISON WITH PREVIOUS YEARS

By

Thomas M. Stauffer

Abstract

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AUG 27 1953  
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Creel census has been taken on the Black River since 1947. The purpose of this census has been to determine the effect of the special spring and fall seasons on the population of migratory rainbow trout spawning in the Black River. The census of 1947 to 1949 is not strictly comparable with that of 1950 to 1952 because of difference in methods. The latter census was taken in connection with operating an experimental sea lamprey barrier dam and checking weir.

The statistical t test was applied to the rainbow/hr./trip catch figures (number of fish) for the years 1950, 1951 and 1952. The figure for 1952 (yearly total) was found to be significantly lower than for 1950 and 1951. Counts of silvery, immature, lake-run fish in 1952 indicate that this group was noticeably deficient in numbers as compared to the runs of 1950 and 1951. Counts of downstream migrating spent adults give concrete evidence that the spring run of adults in 1952 was considerably smaller than the spring run in 1951. Other evidence points toward the hypothesis that the spring run of 1952 was

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also smaller than that of 1950. The cause of the drop in numbers of fish entering the river in 1952 is unknown. It may have been due to the very heavy angling pressure during the spring special season or it may be a natural fluctuation in the population. The investigations will be continued in an effort to determine if natural cycles are present or if there is a continued downward trend in the population.

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Creel census has been taken on the Black River since 1947. The purpose of this creel census is to determine the effect of the special spring and fall seasons on the population of migratory rainbow trout spawning in the Black River.

The special spring season in 1952 opened the lower portion of the river on the second Saturday in April (April 12) to the taking of rainbow trout only. This was two weeks before the regular trout season opened. Formerly the spring special season opened on the 15 of April. The special fall season extends from the end of the regular trout season to November 30 for rainbows only and also includes only the lower portion of the stream. These special seasons have been in effect since the spring of 1947. Their purpose is to more fully utilize a rainbow population which is generally unavailable to the angler (I.F.R. Report No. 1323) because many are not in the streams during the regular trout season and few can be caught in the Great Lakes.

Although creel census was taken from 1947 to 1949, it is felt that these records are not comparable with those of 1950 to 1952. From 1947

to 1949 the census was secured by Conservation Officers and other interested parties. Examination of these records indicate that for the most part only successful anglers were interviewed. As such, these records cannot be compared with those of 1950 to 1952 when a "partial" census was taken. This report will deal only with the records of 1950 to 1952 and particularly with those of 1952. More detailed information on the creel censuses of 1950 and 1951 are available in I.F.R. Report Numbers 1292 and 1323. In association with the creel census, a sea lamprey barrier dam (see I.F.R. Reports numbers 1280, 1314, and 1323) <sup>and</sup> a two-way checking weir a short distance above the barrier have been operated from 1950 to 1952. While the purpose of these structures was to block or to capture sea lampreys, they have also provided additional data concerning the relative abundance of rainbow trout in the Black River.

No rainbow trout have been planted during the period of study (1947 to 1952) with the exception of 500 tagged rainbows stocked on October 20, 1952. None of these have entered the catch as yet.

#### Special Spring Season

The creel census over this period was of the partial type and was taken by Albert Vincent, Merle Galbraith and the writer. Anglers were contacted while fishing so records for partial angler trips were recorded. It is not felt that all anglers were contacted, but an estimated 40 to 60% were interviewed. The census was taken every day in the morning (8:00 to 10:00 a.m.) and in the late afternoon at about 5:00 p.m. It extended only from the mouth of the river to a short distance above the barrier dam. The barrier dam is located about one-half mile upstream from the mouth. Other points of entry were impossible to reach because of snow and muddy roads. The anglers were also concentrated between the barrier

dam and the mouth of the river. When possible, the length, weight, sex, state of organs, color, number of lamprey scars, a stomach sample and a scale sample were taken from each fish caught; occasionally dressed weights were recorded. For the calculation of pounds/hour, these weights were converted to live weights by means of a length-weight curve calculated from fish of a similar nature taken in 1951.

The angling pressure remained extremely high, despite the fact that a few other streams were open to early rainbow fishing. Angling trips numbered 622 or 159 more than in 1951. Forty-five percent of the angler trips were recorded from the lower peninsula or other states.

The catch consisted mostly of adults, since the run of silver immatures which usually accompanies that adult spawning run was small this year. Fifty-six of the rainbows taken by anglers were scale sampled. Of these 4 (7%) were parrs (fish which had spent all their lives in the stream), 12 (21%) were immature lake-run females, 5 (9%) were immature lake-run males, 15 (27%) were lake-run ripe females and 20 (36%) were lake-run ripe males. Of the total scale sampled and sexed 35 (63%) were adults. None of the fish had spawned prior to capture. This percentage of ripe fish is considerably higher than that (46%) of the spring special season of 1951. The difference is probably due to the smaller number of lake-run immatures in the river during the spring special season of 1952. This may also account for the lower rainbow/hour/trip figure in 1952.

#### Regular Season

During this period, creel census was taken mostly by Albert Vincent. It was conducted in the same manner as that described for the special spring season. However, it was extended to cover 3 to 4 miles of the stream during the morning census. The late afternoon and early evening

Table 1. Summary of Creel Census Data, Special Spring Season, 1952.

Date (April)	Number angler trips			Total hours fished	Number unsuc- cessful anglers	Successful anglers		Rainbow trout caught			
	Male	Female	Total			Number	Percent	Number	Number/hr.	Number/hr./trip	Pounds/hr. <sup>↓</sup>
12-Saturday	115	4	119	523.0	102	17	14.3	19	.036	.050	.104
13-Sunday	35	1	36	118.5	30	6	16.7	7	.059	.104	.183
14-Monday	64	4	68	174.5	61	7	10.3	11	.063	.044	.185
15-Tuesday	51	2	53	144.0	49	4	7.5	4	.028	.016	.080
16-Wednesday	42	0	42	156.5	40	2	4.8	2	.013	.009	.021
17-Thursday	44	5	49	145.5	48	1	2.0	1	.007	.014	.024
18-Friday	32	3	35	103.0	31	4	11.4	6	.058	.051	.139
19-Saturday	65	8	73	323.5	71	2	2.7	2	.006	.005	.030
20-Sunday	69	5	74	233.5	71	3	4.0	4	.017	.017	.083
21-Monday	13	0	13	34.0	13	0	0	0	0	0	0
22-Tuesday	13	0	13	33.0	13	0	0	0	0	0	0
23-Wednesday	18	0	18	49.0	17	1	5.6	2	.041	.028	.040
24-Thursday	12	2	14	56.5	13	1	7.1	1	.018	.009	.053
25-Friday	15	0	15	43.5	13	2	13.3	2	.046	.030	.122
Totals	588	34	622	2138.0	572	50	8.0	61	.028	.030	.085

↓ For this calculation, fish not weighed or measured were assigned the average weight (2.99<sup>lbs.</sup>) of those (40) which were weighed during the period.

Dressed weight of two fish were recorded on creel census. The live weight of these fish was obtained from a length-weight curve calculated from 312 rainbows taken in the Black River in the spring of 1951.

Table 2. Summary of Creel Census Data, Regular Season, 1952

Period	Number angler trips			Total hours fished	Number unsuccessful anglers	Successful anglers		Total trout catch			
	Male	Female	Total			Number	Percent	Brook	Brown	Rainbow	Total
April 26-May 2	82	5	87	316.5	77	10	11.5	7	2	11	20
May 3-9	69	13	82	323.5	68	14	17.1	15	1	14	30
May 10-16	23	2	25	53.0	16	9	36.0	3	2	6	11
May 17-23	13	2	15	35.0	9	6	40.0	1	2	4	7
May 24-30	16	0	16	21.0	14	2	12.5	1	0	1	2
May 31-June 6	8	2	10	23.5	9	1	10.0	1	1	0	2
June 7-13	12	3	15	35.0	12	3	20.0	0	0	3	3
June 14-20	9	3	12	27.5	9	3	25.0	2	0	2	4
June 21-27	19	6	25	55.0	15	10	40.0	1	2	16	19
June 28-July 4	30	5	35	68.0	29	6	17.1	0	1	6	7
July 5-11	76	10	86	175.5	74	12	14.0	3	1	24	28
July 12-18	61	16	77	119.5	67	10	13.0	4	1	9	14
July 19-25	17	4	21	59.0	17	4	19.0	1	0	3	4
July 26-August 1	15	1	16	17.0	14	2	12.5	7	0	0	7
September 1-5	9	5	14	22.5	12	2	14.2	0	0	2	2
September 6-12	35	5	40	114.5	34	6	15.0	0	0	6	6
September 13-14	19	0	19	55.5	16	3	15.7	0	0	4	4
<b>Total</b>	<b>513</b>	<b>82</b>	<b>595</b>	<b>1,521.5</b>	<b>492</b>	<b>103</b>	<b>17.6</b>	<b>46</b>	<b>13</b>	<b>111</b>	<b>170</b>

<sup>1</sup> For this calculation, rainbows not weighed were assigned the average weight (236 lbs.) of those weighed (67) during the period. Dressed weights of 11 rainbows were recorded on the creel census. The live weight of these fish was obtained from a length-weight curve calculated from 312 rainbows taken in the spring of 1951 in the Black River.

Table 2. (continued)

Number/hr.	Number/hr./trip	Rainbow catch		Pounds/hr. ✓
		Number/hr.	Number/hr./trip	
.063	.062	.035	.044	.094
.093	.094	.043	.042	.098
.208	.283	.113	.176	.335
.200	.378	.114	.211	.150
.095	.156	.048	.031	.110
.085	.080	0	0	0
.086	.056	.086	.056	.207
.145	.292	.076	.208	.249
.345	.428	.291	.368	.680
.103	.063	.088	.052	.245
.160	.138	.137	.080	.286
.117	.100	.075	.057	.148
.068	.051	.051	.047	.085
.412	.500	0	0	0
.088	.054	.088	.054	.105
.052	.072	.052	.072	.142
.072	.019	.072	.019	.270
.111	.133	.072	.077	.172



census included that portion of the river from the mouth to a short distance above the checking weir. After the first two days of this season the number of anglers dropped off sharply. The anglers were dispersed generally along the whole river during the early part of the season, but as the spent rainbows migrated down to the checking weir, which apparently was a partial barrier to them, the anglers concentrated above the weir and made some large catches of these ill-conditioned fish. During the first two weeks in September the anglers returned to the area of the river below the barrier dam to fish for the fresh fall-run rainbows which entered the river about September 1. Seventy-two percent of the angler trips for this season were recorded from the lower peninsula or other states.

Sixty-nine rainbows caught by anglers were scale sampled. Of these, 17 (25%) were parrs, 5 (7%) were immature lake-run females, 1 (1%) was an immature lake-run male, 8 (12%) were ripe lake-run females, 23 (33%) were spent lake-run females, 4 (6%) were ripe lake-run males and 11 (16%) were spent lake-run males.

#### Special Fall Season

The census during this period was conducted mostly by Albert Vincent and was taken in exactly the same manner as described for the spring special season. It was taken from September 15 to November 14. Anglers concentrated in the lower 1/2 mile of stream, since apparently few rainbow ascent the river farther than the barrier dam during the fall. An unusual feature of this fall season was the not inconsiderable number of deer hunters fishing during the first week of deer season. Although these trips were not recorded on creel census, several

nice catches of immature lake-run fish were known to have been taken. In the special fall season 87% of the angler trips were recorded from the lower peninsula, other states or foreign countries.

Forty-eight rainbows taken by anglers were scale sampled. Of these 2 (4%) were parrs, 12 (25%) were immature lake-run females, 9 (19%) were immature lake-run males, 12 (25%) were lake-run maturing females and 13 (27%) were maturing lake-run males.

#### Discussion

The t test was applied to the average rainbow/hour/trip figures of the various seasons and years to determine if there were statistically significant differences. The formula for t and associated formulae are as follows:

$$t = \frac{X_1 - X_2}{\sqrt{\frac{\sigma^2}{x_1} + \frac{\sigma^2}{x_2}}}$$

$$X = \text{mean} = \frac{\sum X}{N}$$

where: X = rainbow/hour/trip

N = total numbers of trips

$$\frac{\sigma^2}{X} = \frac{\sigma^2}{N} = \text{standard error of mean squared}$$

A significant difference was found between the spring seasons of 1950 and 1951, and the spring seasons of 1951 and 1952. There was no significant difference between the spring seasons of 1950 and 1952. It then appears that the rainbow/hour/trip figure for the spring season of 1951 was significantly higher than those of the spring seasons of 1950 and 1952. Two factors which could conceivably account for the better fishing in the spring of 1951 would be a larger number of fish

Table 3. Creel census summary, Special Fall Season, 1952.

Period	Number angler trips			Total hours fished	Number unsuc- cessful anglers	Successful anglers		Rainbow trout caught			
	Male	Female	Total			Number	Percent	Number	Number/hr.	Number/hr./trip	Pounds/hr. ↓
September 15-19	29	0	29	109.0	27	2	6.9	2	.018	.011	.067
September 20-26	20	2	22	53.0	21	1	4.5	1	.019	.045	.042
September 27- October 3	54	12	66	147.5	58	8	12.1	9	.061	.008	.153
October 4-10	34	3	37	77.5	35	2	5.4	2	.026	.021	.104
October 11-17	7	1	8	11.0	6	2	25.0	2	.182	.375	.855
October 18-24	5	2	7	12.5	6	1	14.3	1	.080	.071	.044 ↓
October 25-31	2	1	3	14.0	3	0	0	0	0	0	0
November 1-7	2	3	5	9.5	4	1	20.0	1	.105	.100	.247
November 8-14	34	8	42	63.0	37	5	11.9	8	.127	.289	.134
<b>Total</b>	187	32	219	497.0	197	22	10.0	26	.052	.116	.123

↓ For this calculation fish not weighed were assigned the average weight (2.35 lbs.) of those weighed (19).

Table 4. Summary of Data Pertaining to Relative Abundance of Rainbow Trout

	1950	1951	1952
<b>Rainbow/hr./trip</b>			
Spring special season	.046	.122	.030
Regular season	.151	.124	.077
Fall special season	.111	.087	.116
Averages	.103	.112	.063
<b>Pounds of rainbow/hr.</b>			
Spring special season	.126	.235	.085
Regular season	.158	.109	.172
Fall special season	.217	.214	.123
	.156	.190	.122
<b>Average size in inches (from creel census)</b>			
Spring special season	18.0 (50)	17.12 (123)	18.99 (40)
Regular season	12.9 (15) <sup>1</sup>	14.02 (56)	17.77 (67)
Fall special season	17.2 (25) <sup>1</sup>	17.37 (49)	16.74 (19)
<b>Minimum count of adults from anglers catch (those scale sampled)</b>			
Spring special season	...	82	35 <sup>2</sup>
Regular season	...	35	46
Fall special season	11	21	26
<b>Minimum count of silver immatures entering stream (those scale sampled from anglers catch)</b>			
Spring special season	...	89 <sup>2</sup>	17
Regular season	...	21 <sup>2</sup>	16
Fall special season	10	5	20
Count of downstream run parrs	432 <sup>3</sup>	472	629
Count of downstream run spent adults	58 <sup>3</sup>	161	108

<sup>1</sup> From fish caught by anglers and scale sampled

<sup>2</sup> Figures do not agree with IFR Report No. 1323 because 11 fish were found not to be lake-run upon scale examination.

<sup>3</sup> Entire run not captured because of frequent undercutting of weir.

Table 5. Values of t and P in comparing numbers of rainbow trout caught per hour (based on data in Table 4).

Samples compared	$N \downarrow$	<u>t</u>	<u>P</u> $\downarrow$	Interpretation of <u>P</u>
Spring 1950 Spring 1951	205 463	3.707	<0.01	highly significant difference
Spring 1950 Spring 1952	205 622	1.273	0.2	no significant difference
Spring 1951 Spring 1952	463 622	5.165	<0.001	highly significant difference
Regular 1950 Regular 1951	221 348	0.921	0.3	no significant difference
Regular 1950 Regular 1952	221 595	2.644	0.01	highly significant difference
Regular 1951 Regular 1952	348 595	1.811	.05-.02	significant difference
Fall 1950 Fall 1951	151 244	0.836	0.6	no significant difference
Fall 1950 Fall 1952	151 219	0.082	> 0.9	no significant difference
Fall 1951 Fall 1952	244 219	0.629	0.4	no significant difference
Total 1950 Total 1951	577 1,055	0.596	0.6	no significant difference
Total 1950 Total 1952	577 1,436	2.688	<.01	highly significant difference
Total 1951 Total 1952	1,055 1,436	3.979	<.001	highly significant difference

$\downarrow$  Number of angler trips

$\downarrow$  Level of significance

present and/or better fishing conditions. Table number 4 indicates that a larger percentage of lake-run immature fish were taken in the spring season of 1951 than in 1952. Although scale samples were not taken in the spring of 1950, the creel census records indicate that few lake-run immatures were taken in that period. The lake-run immatures were noticeably scarce both during the spring and regular season of 1952 and during the spring season of 1950. It therefore seems quite apparent that one of the reasons for the higher rainbow/hour/trip figure for the spring season of 1951 was due to a larger number of fish in the river, especially the lake-run immatures. Other measurable factors which could have influenced the catch during the spring seasons were water temperature and water level. The figures for rainbow/hour/trip show no apparent correlation with average daily mid-point water temperatures. However, there may be some correlation between water level and the figures for rainbow/hour/trip. The average morning water levels for the spring season of 1950 (25.8 inches) and 1952 (34.4 inches) were relatively high compared to that of 1951 (12.1 inches). The higher water level may have had the effect of dispersing the fish over a larger area, making them less readily exploited. The lower water level of the spring season of 1951 presumably would have the opposite effect. It is concluded that the higher rainbow/hour/trip figure for the spring season of 1951 was due to more fish being present and possibly to a lower water level.

The regular season rainbow/hour/trip figure of 1952 differed from those of 1950 and 1951, being significantly lower. The figures for the regular seasons of 1950 and 1951 were not significantly different. The rainbow/hour/trip figure for 1950 was higher than that of 1952, probably because of the lateness of the run in 1950, resulting in more fish.

being present during the regular season of 1950. This also probably accounts for the low figure for the spring of 1950. Notes taken in 1950 indicate that lake-run immature fish were being caught in some numbers as late as May 15. This differs markedly from the usual time that these fish are in the river (usually during April). The 1951 rainbow/hour/trip figure for the regular season was also higher than that of 1952, and was probably due to the fact that more fish were present in the river in 1951. It then appears that the higher rainbow/hour/trip figures for the regular seasons of 1950 and 1951 were due to more fish having been present.

There was no significant differences between the rainbow/hour/trip figures for the three special fall seasons.

The yearly rainbow/hour/trip figure for 1952 differed significantly from those of 1950 and 1951. There was no significant difference between 1950 and 1951. The yearly rainbow/hour/trip figure for 1952 was significantly lower than those of 1950 and 1951. Since the fall season rainbow/hour/trip figures are about the same, differences in the spring run of lake-run rainbows were the cause of the differences in the yearly rainbow/hour/trip figures. It seems apparent that the lake-run immature spring run in 1952 was quite small as compared to those of 1950 and 1951. Since these fish usually make up a large portion of the catch, the absence of these fish could conceivably cause a reduction in the rainbow/hour/trip figure in 1952. The downstream weir catch of spent adults in 1951 and in 1952 also indicates that there was a larger spring run in 1951 than in 1952. The downstream weir catch of 1950 is minimal and therefore cannot be used for comparison.

The average size of the rainbows caught during the spring seasons varied but little. The slightly lower figure (17.12 inches) for 1951 is probably a reflection of the large number of silver, immature lake-run fish taken. The high figure (18.99 inches) for 1952 probably reflects the relative absence of this same group. The averages for the regular seasons show little variation except for 1952. This high figure (17.77 inches) is due to the large number of spent adult rainbows caught by anglers above the checking weir. The checking weir had a blocking action on the downstream migrating rainbows and anglers fished mostly above the checking weir during the latter part of the regular season. Some were also taken in 1951 above the checking weir, but in smaller numbers, which accounts for the lower figure for 1951. No apparent differences in average size are apparent for the fall special seasons.

For the three years of study involved, counts have been made of the downstream migrating parrs by use of the checking weir. These counts give an indication of the success of spawning. Most of these fish are presumably migrating to Lake Michigan for their first time. In 1950 an incomplete count only was obtained due to serious undercutting of the weir. The count is therefore minimal. In 1951, the count was nearly complete and practically all parrs taken were scale sampled. The majority of these (81%) were fish of year class 1949 (age group II). This is in accordance with the general belief that most rainbow trout parrs migrate to the lake or ocean at the beginning of the third growing season. However, in 1952 the downstream migrating parrs were found to be 80% year class 1951 (age group I). This probably indicates that 1951 is a dominant year class. This dominant year class may have resulted from the large spring spawning run of 1951. If 1951 is a dominant year



class and can be traced through the following years, perhaps some predictions can be made as to the runs and fishing quality in future years.

Counts of downstream migrating spent adults indicate that there was a larger spawning run in 1951 than in 1952. The checking weir in 1951 was in operation from May 8 to July 5, while in 1952 it was operated from May 9 to July 22. It is not felt that all the downstream migrants were captured in either year, since the downstream migrating adults were somewhat wary of the weir and some may have remained upstream. However, in view of the fact that the 1951 checking weir operation took more adult spent rainbow trout in a shorter time, it appears obvious that the spawning run in 1951 was larger than that of 1952. The checking weir in 1950 trapped only an unknown percentage of the total run, due to frequent undercutting. The number taken therefore is unsuitable for purposes of comparison with 1951 and 1952.

In summary, it appears as if the run of 1952 was somewhat smaller in numbers than those of 1950 and 1951. Substantiating this theory is the significantly lower average rainbow/hour/angler trip figure for the year 1952. The downstream weir catches of spent adults of the years 1951 and 1952 give concrete evidence that the spawning run of 1951 was greater than that of 1952. There also appears to be a noticeable lack of immature lake-run fish in 1952 as compared to 1950 and 1951.

The cause of the drop in numbers of fish entering the river in 1952 is unknown. It may be a drop in population caused by the heavy angling pressure during the special spring season or it may be a natural fluctuation in the population. The investigations will be continued in an effort to determine if natural cycles are present or if there is a continued downward trend in the population and if greater protection is needed.

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