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PROGRESS REPORT ON BROWN TROUT REMOVAL FROM
4.2 MILES OF THE NORTH BRANCH OF THE AU SABLE
RIVER, 1964 AND 1965¹

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In studies by Beach (1937), Elson (1962), White (1937, 1957), Leonard and Shetter (1937), Salyer and Lagler (1940), and Alexander and Shetter (unpublished) it was well established that the winter diet of American mergansers (Mergus merganser) and brown trout (Salmo trutta) larger than 12.0 inches consisted mainly of smaller salmonids when these predators occupied trout waters. Furthermore, population studies which we have conducted on the North Branch in the fall after the close of the trout season and again the following spring show a large over-winter loss, most of which could be accounted for by these two trout predators. It was hypothesized that there would be a substantial increase in the anglers' creel the following season if the between-season losses of trout were eliminated or reduced by control of predators.

In an attempt to test this general hypothesis, we have reviewed the creel census and population data for 1962-1965 for the 4.2 miles of the North Branch of the Au Sable River between Dam 2 and the County Line in Otsego County.

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Estimates of angling pressure and the annual catch are obtained by counting and interviewing anglers under a schedule of stratified random sampling. Population figures are averages of estimates for three subsections of the experimental water. Fish are captured through the use of d-c electrofishing gear and Petersen-type population estimates are made.

Large brown trout were removed with electrofishing gear in the fall of both 1964 and 1965.

The numbers of American mergansers on the North Branch have been determined by weekly counts from an airplane from about December 15 to April 15 each winter since December, 1961. Pilot Peter VanValin made the counts which numbered 13 to 21 per winter (Table 1). Mergansers were nearly absent during the winter of 1964-65 (due to natural causes not apparent to us).

This paper reports the results of predator control measures carried on to date and some of the tentative conclusions reached after one complete year of reduction in numbers of the two main predators on the North Branch trout populations.

Results

American mergansers

American mergansers on the North Branch from Dam 2 to the County Line have decreased in numbers very noticeably since the winter of 1961-62. The average number of birds seen per flight in the upper section decreased from 2.2 in 1961-62 to 0 in 1964-65. For practical

Table 1. --American mergansers counted during plane flights over experimental sections (upper, middle, lower) of the North Branch of the Au Sable, December 1961-April 1965

Upper - County Line to Dam 2 - 4.2 miles
Middle - Eaman's to County Line - 6.9 miles
Lower - Kellogg Bridge to Eaman's - 8.7 miles

Winter	Number of plane flights	American mergansers observed			Mergansers present per flight		
		Upper	Middle	Lower	Upper	Middle	Lower
1961-1962	21	46	150	100	2.2	7.1	4.8
1962-1963	20	24	73	70	1.2	3.6	3.5
1963-1964	15	6	10	12	0.4	0.7	0.8
1964-1965	13	0	27	34	0.0	2.1	2.6

purposes, it can be said that mergansers were of minor importance as fish predators during the winters of 1963-64 and 1964-65. VanValin's counts were substantiated by several random cruises of the upper river on foot and by canoe.

A decrease in merganser populations from 1961 to 1965 was also noted for the middle and lower portions of the river (Table 1), although not as much as in the upper portion. A reduction in numbers of mergansers entering the Oden Fish Hatchery during this period has also been reported. Oden is some 80 miles northwest of the North Branch near Lake Michigan.

Removal of brown trout larger
than 12.0 inches

Brown trout larger than 12.0 inches, which prey on smaller trout to a considerable degree during the winter months, were removed in the fall of both 1964 and 1965. In the period October 28 to November 3, 1964, a total of 561 brown trout were captured and transferred from the Dam 2-County Line area to Shupac Lake in Crawford County. These fish were 12.0 to 23.9 inches in length and weighed 450 lb. The removal was accomplished by nine men using two d-c electrofishing units and a live car.

At the start of removal of trout from the upper section on October 28, 1964, the population of brown trout over 12.0 inches in length was estimated at 848. The 561 fish, therefore, represented a removal of 66%. To obtain this estimate, we marked 65 large brown trout and released them just prior to the removal operation, and 43 of

the marked fish were recovered during the removal operation. The estimate is simply $561 \times 65/43 = 848$.

During October 27-29, 1965, a similar crew and gear removed 346 12.0- to 25.1-inch brown trout from the upper section. Based on the recovery of 38 out of 60 marked fish present before removal work commenced, it was estimated that the population of large brown trout in the stream on October 27, 1965 was 546; thus the removal took out 63% of these large fish. The length-frequency distribution of brown trout removed during 1964 and 1965 is shown in Figure 1.

Population response

Here we use creel census and population data starting with 1962, because the population estimates were based on more sub-sampling and are presumably more accurate than those for 1961. Data on anglers' catch and on spring and fall populations are given in Table 2. All data are in terms of fish per mile.

Brook trout larger than 9.0 inches apparently increased as a result of predator control. The estimated number in the spring of 1965 (230) was more than twice that of the spring of 1964 (101), and the 1965 fall estimate (171) was approximately twice that of the fall of 1964, despite a large removal of 9.0- to 11.9-inch brook trout by anglers during 1965.

Because of the removal of 561 large brown trout (i. e., 134 per mile) in the fall of 1964, it was to be expected that there would be a smaller number the following spring. Actually the apparent decline noted in the spring of 1965 was greater than could be attributed to fall removal,

Figure 1. --Length-frequency distribution of brown trout larger than 12.0 inches removed from 4.2 miles of the North Branch of the Au Sable River (Dam 2-County Line) in the fall of both 1964 and 1965.

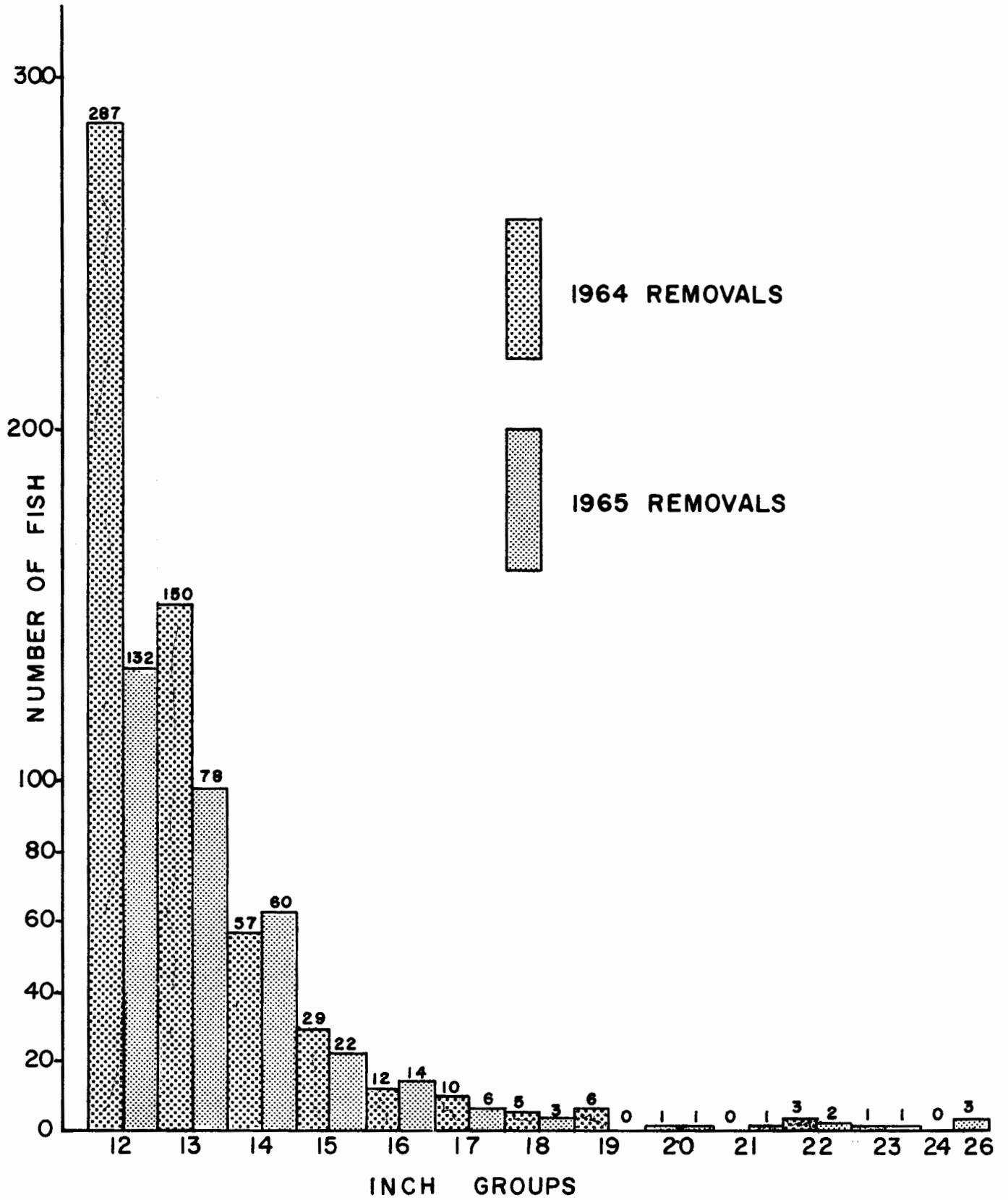


Table 2. --Spring and fall trout populations and anglers' catch, all on a per-mile basis, in the upper section (Dam 2 to County Line) of the North Branch of the Au Sable River, 1962-1965

Species and size group	Item	Year			
		1962	1963	1964	1965
Brook trout, 0-6.9 inches	Spring	-	2,738	2,103	2,268
	Fall	6,218	4,079	3,643	4,750
Brown trout, 0-6.9 inches	Spring	-	498	260	289
	Fall	1,924	618	173	419
Brook trout, 7.0-8.9 inches	Spring	-	216	1,400	500
	Fall	501	498	746	805
Brown trout, 7.0-8.9 inches	Spring	-	16	85	31
	Fall	385	321	175	120
Brook trout, 9.0 inches & larger	Spring	-	15	101	230
	Anglers' catch	68	90	104	156
	Fall	42	23	86	171
Brown trout, 9.0 inches & larger	Spring	-	159	297	125
	Anglers' catch	61	85	320	21
	Fall	404	246	454*	307**

* 134 large brown trout per mile removed

** 82 large brown trout per mile removed

There was a very large decline in numbers of trout between 9.0 and 11.9 inches although fish of this size range had not been included in the removal. The anglers' 1965 catch of brown trout (discussed later) was very low, but the population did rebound to some degree by the time of the 1965 fall population survey. The relationship of mergansers to the population of larger brown trout, at this point, appears to be masked by other factors.

The effects of predator removal on the 7.0- to 8.9-inch trout are not as clear as shown for brook trout over 9.0 inches. The removal may have increased the fall-to-spring survival of brook trout during 1965, but the numbers of both species fluctuated considerably during the immediate past.

Among trout less than 7.0 inches long, brook trout may have been favorably affected by predator control. Over-winter losses have decreased and spring-fall survivors have increased each year during the past 3 years. Brown trout in this size category may have been similarly affected although the data are less reliable for this species.

To summarize, there is a suggestion in the population data that brown trout removal in the fall of 1964, along with decreasing numbers of mergansers during the winters immediately past, increased the population of brook trout larger than 9.0 inches, and may be having a favorable effect on brook trout under 7.0 inches. Except for the obvious reduction of large brown trout caused by the 1964 removal, one would be inclined to say the brown trout were not altered significantly by the control operations.

Effects on angling

The angling estimates are shown in Table 3, and the catch per mile in Table 2. The water in question has been fished since 1961 under special regulations (flies-only, 9.0-inch minimum size limit, 5-fish-daily creel limit). Angling pressure has been relatively light, varying from 1,276 hours (1961) to 3,534 hours (1964). Brook trout catches increased progressively, starting in 1961, with the greatest increase between 1964 and 1965. The catch per hour of brook trout was about three times greater in 1965 than in any other year.

The estimated catches of brown trout also increased after 1961, reached a high of 1,264 per mile in 1964, but then collapsed to 82 per mile in 1965. Only part of this decline in catch in 1965 was due to the removal of 134 large fish per mile in the fall of 1964. Most of the loss was among fish less than 12.0 inches long which were not included in the fall removal.

The records of the census clerk also suggest that in 1965 a higher proportion of the legal brook trout (over 9.0 inches) were over 10.0 inches long than in previous years (14 of 28 in 1965 as compared to a total of 5 out of 32 measured in previous years).

Discussion

At this point, following one complete season of predator "control" on mergansers and large brown trout in the Dam 2-County Line area of the North Branch, there appears to have been some improvement among

Table 3. --Summary of estimated angling pressure and catch, Dam 2-County Line, North Branch Au Sable River, 1961-1965

Year	Hours of angling	Brook trout	Brown trout		Total trout	Catch per hour all trout
		9.0-11.9 inches	9.0-11.9 inches	Over 11.9 inches		
1961	1, 276	155	46	3	204	0.16
1962	2, 440	285	241	15	541	0.22
1963	2, 988	377	337	21	735	0.25
1964	3, 534	438	1, 264	81	1, 783	0.50
1965	1, 751	654	82	4	740	0.42

brook trout larger than 9.0 inches both in the population and the anglers' creel. The possibilities are not excluded that these were chance natural variations, or that the population build-up was, in part, due to angling regulations. We assume that the 1966 creel census and population data, following the 1965 brown trout removal, will shed further light on the question.

While we desire to produce a clear-cut answer to the general hypothesis that predator control will result in a build-up in the trout population, the results are far from being clearly affirmative. We can demonstrate a reduction in merganser numbers in recent years, but we have no assurance that the fish saved from their predation were not consumed later by other forms, such as the otter, mink, weasel, heron, and kingfisher.

Also, we can demonstrate that we reduced the population of large brown trout by approximately two-thirds during the past two fall seasons. But if the remaining one-third of the large brown increase their consumption, the potential gains in the small-trout population could be largely offset; or, again, these small fish might be taken by other predators.

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