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Institute for Fisheries  
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**INSTITUTE FOR FISHERIES RESEARCH**  
DIVISION OF FISHERIES  
**MICHIGAN DEPARTMENT OF CONSERVATION**  
COOPERATING WITH THE  
UNIVERSITY OF MICHIGAN

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Report No. 1364

**MANGAGEMENT STUDY, SOUTH BRANCH AU SABLE RIVER;**

PROGRESS REPORT FOR 1952

By

David S. Shetter

Abstract

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During 1952, the South Branch was fished under Commission orders that increased the minimum size of trout to 10 inches, first from 300 feet below Chase Bridge to the mouth. Later, the size restriction was extended to cover that part of the stream from 300 feet below Steckert Bridge to the mouth, and in addition anglers were limited to the use of artificial flies for taking trout between Steckert Bridge and Smith Bridge. The latter set of regulations took effect May 20, 1952.

A partial creel census was operated during the trout season, sampling the fishing on four 10-hour days weekly. During the period April 26 to May 19, in the section from Chase Bridge to the mouth (ten-inch limit) 46 trout were observed in anglers' catches from 115.25 hours of fishing (catch per hour, 0.40 fish). In the water between Steckert Bridge and Chase Bridge, then under a 7-inch limit, 53.25 hours of fishing by 13 anglers observed produced 24 trout (catch per hour, 0.45 fish).

From May 20 to September 14, 287 trips were observed on the "flies only, 10-inch size limit" (Steckert Bridge to Smith Bridge) portion of the stream. These anglers fished 1,410.5 hours and took 23 brook trout, 86 brown trout and 5 rainbow trout. The total catch of 114 trout gave a catch per hour of 0.08 fish. In the experimental area, Smith Bridge to the mouth, where the only restriction was the 10-inch minimum size, 157 angling trips were observed. A total of 96 trout were caught in 738.25 hours of fishing, for a catch per hour of 0.13 fish. The observed catch was 14 brook trout, 77 brown trout and 5 rainbow trout.

The average catch per hour (0.08 fish) in the Steckert Bridge-Smith Bridge section was <sup>essentially</sup> the same as noted in the restricted waters of the North Branch of the Au Sable in 1952 (0.09 fish), where similar restrictions have been in force since 1949.

Violations were observed on both the minimum size restriction and on the lure restriction. Violators were warned and the law enforcement division was notified by the creel census clerk.

The South Branch was sampled at 21 sites during October, 1952 with the DC shocker. A total of 200 brook trout, 607 brown trout, and 6 rainbow trout were examined, measured, scale-sampled and released. The presence of 15 other species of fish, many of them warm-water fish, taken above Steckert Bridge, also was noted. Only 14 brook trout over 7 inches were found among the 200 sampled, and only one of these was larger than 10 inches. The 607 wild brown trout ranged from 2.8 to 23.7 inches and over 25 percent were larger than 10 inches.

It could not be determined if the angling restrictions had yet affected the size distribution of brook trout or brown trout in either of the experimental sections. No comparative data are available for any previous fall.

Examination of the data suggests that less than 10 percent of the 59 mature male brown trout (8.2-23.7 inches) in October, 1952 were smaller than 10 inches, and less than 5 percent of the 73 mature female brown trout were smaller than 10 inches. Mature brook trout males (10) ranged from 5.3 inches to 8.4 inches, mature brook trout females (16) varied in size from 5.4 to 10.1 inches. Protection to the size of 10 inches should permit more trout to spawn at least once, and should increase the numbers of eggs deposited.

Based on experience in the North Branch of the Au Sable where a 10" size limit has been in force since 1949 (coupled with flies only since 1950), it appears possible to increase the brook and brown trout populations of the South Branch in a similar manner, and at the same time provide sport fishing for larger-than-average fish, provided that the South Branch anglers will abide by the restrictions on size and lure now in effect.

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PROGRESS REPORT FOR 1952

By

David S. Shetter

Since the opening day of trout season in 1952, experimental regulations proposed with a view toward perpetuating and improving trout fishing in this well known stream, have been in force. The regulations under which much of the stream will operate until May 20, 1957 are: (a) a minimum size limit of ten inches for all species of trout in that portion of the stream from a point 300 feet downstream from Steckert Bridge to the mouth; and (b) that fishing is restricted to the use of artificial flies only, from 300 feet below Steckert Bridge to Smith Bridge. These regulations were proposed by the Conservation Commission with the hope that an increase in the trout stock will result, similar to that noted on a portion of the North Branch of the Au Sable River, under comparable experimental angling regulations.

A partial creel census, operating on a schedule similar to that used on the North Branch of the Au Sable, was instituted in 1952. Also, an extensive survey of the South Branch trout population was made in October, 1952 with the aid of the DC shocker. In this latter work, data were obtained on the relative abundance of the three species of trout, and the relative numbers of trout in various parts of the river. A large

number of trout were scale-sampled for age and growth analysis. This report will describe briefly the general findings from the random creel census and the shocker studies. A later report will be submitted on age composition of the population and growth rate.

#### Random Creel Census Results, 1952

Because of a change in Commission orders, two sets of special regulations were in force on the South Branch in 1952. From April 26 to May 19 the regulation was: a 10-inch minimum size limit, from 300 feet below Chase Bridge to the mouth (Passed by Conservation Commission, March 12, 1952). This order was superceded on May 20, 1952, by the order described on Page 1 (passed April 16, 1952). Thus during 1952 the stream from Steckert Bridge to Chase Bridge was fished under both a 7- and a 10-inch minimum size limit and by both any lure and with flies only; the stream from Chase Bridge to Smith Bridge was fished during the season under a 10-inch minimum size limit, and by both any lure and flies only; while the Smith Bridge--mouth portion had a 10-inch minimum size limit, and fishing with any lure was permitted during the entire season.

Considerable fishing on the South Branch is done from river-boat and canoe. These craft put in at various sites on the upper river and pull out at any one of several locations between Chase Bridge and the mouth. In addition, there are numerous points of access, both public and private, from Steckert Bridge downstream. These factors, plus the road pattern and the private ownership pattern, made efficient operation of the creel census difficult.

Creel census operations in 1952 were conducted by H. J. Frankl of Prudenville until September 1. During the latter part of the season H. L. Peterson, District Fisheries Supervisor, and Alex McClain

of Grayling, sampled the fishing. Frankl utilized both car and canoe to check the stream on many of the days he was on duty.

Sampling of the fishing was scheduled to include four 10-hour days each week. Saturdays and Sundays were always checked, along with two other, mid-week days. In the period April 26 to May 19, half of the days were spent checking the 10-inch water, and half were spent on the 7-inch portion of the South Branch. After May 20, half the checking was scheduled on the fly water, and half on the "any-lure" part of the stream below Smith Bridge.

The angling results for the period April 26 to May 19 are given in Table 1. The data obtained from 6 days of checking on the 7-inch water upstream from Chase Bridge are compared with records taken during 7 days of creel census on the 10-inch water from Chase Bridge to the mouth.

In the 7-inch portion of the stream, 13 angler-days involving 53.25 hours of fishing were recorded. The total catch observed consisted of 8 brook trout, 13 brown trout and 3 rainbow trout. The catch per hour was 0.45 fish. The average size of the trout was: brook trout, 8.9 inches; brown trout, 10.5 inches; rainbow trout, 12.2 inches. Two hatchery-reared rainbow trout, recently planted and recognizable by the missing right pelvic fins, averaged 10.1 inches in size, all of the others (92 percent) presumably were wild fish. Of the 24 trout captured, 15 were taken on fly, 9 on worms.

In the 10-inch water which was sampled on 7 days, there were 21 angler-days during which 115.25 hours of fishing were listed. The total catch was made up of 3 brook trout, and 43 brown trout, all wild fish. The average size of the brook trout was 8.7 inches (despite the 10-inch minimum size regulation in this part of the stream), of the brown trout, 11.6 inches. The method of capture for the 46 fish was: flies, 20; worms,

Table 1. Partial creel census, South Branch Au Sable River, April 26--May 19, 1952.

Water and regulation	Period	Number of days checked	Total angling trips <sup>+</sup>	Total hours of angling	Trout caught <sup>++</sup>			Total catch	Catch per hour	% Wild trout in catch
					Brook	Brown	Rainbow			
Above Chase Bridge, 7-inch, any lure	April 26-30	3	5 (0)	19.25	3 (9.2)	3 (9.4)	1 (8.0)	7	0.36	86
	May 1-19	3	8 (2)	34.00	5 (8.9)	10 (10.8)	2 (12.2)	17	0.50	94
	Totals	6	13 (2)	53.25	8 (9.0)	13 (10.5)	3 (10.8) <sup>#</sup>	24	0.45	92
Chase Bridge to mouth, 10-inch, any lure	April 26-30	3	4 (0)	11.75	1 (8.5)	7 (11.8)	...	8	0.68	100
	May 1-19	4	17 (6)	103.50	2 (8.8)	36 (11.5)	...	38	0.37	100
	Total	7	21 (6)	115.25	3 (8.7)	43 (11.6)	...	46	0.40	100

<sup>+</sup>Number of unsuccessful trips given in parentheses.

<sup>++</sup>Average size of fish given in inches in parentheses.

<sup>#</sup>Includes two hatchery-reared trout.

24; other, 2. The catch per hour for the 10-inch water was 0.40 fish, very little different from the 7-inch portion of the stream.

The recorded angling pressure is an unknown fraction of the total fishing observed for the 6 days sampled up to May 5. Up to that date Frankl recorded only those anglers contacted who had fish in their creels. Also, an unrecorded number of anglers refused to allow him to check their catches because of the strong, early antagonism to the 10-inch size regulation. Angling pressure probably was at least double the amount recorded in both types of water, and the total catch was likely higher than listed.

Angling records for the Steckert Bridge-Smith Bridge portion of the South Branch after May 20, 1952 are given in Table 2. After May 20, the special regulations here were: flies only and 10-inch minimum size. On 37 days of census activity, 287 angling trips were recorded, of which 220 (or 77 percent) were unsuccessful in taking any 10-inch trout. A total of 1,410.5 hours of fishing were listed. The total catch consisted of 23 brook trout, 86 brown trout and 5 rainbow trout. Except for 5 fin-clipped hatchery trout (4 rainbow trout, 1 brown trout), all were wild fish (96 percent). The average sizes of the wild trout taken were: brook trout, 10.0 inches; brown trout, 11.3 inches, rainbow trout, 9.0 inches. The one hatchery-reared brown trout listed was 9.0 inches; and the four hatchery-reared rainbow trout averaged 10.5 inches. Of the 114 trout caught, 104 were taken on fly, 7 on worms, and 3 by other baits. The catch per hour for the entire season was 0.08 fish.

Based on the records, the best fishing was enjoyed in June and July, when the catch per hour was 0.10 fish.

In that part of the river downstream from Smith Bridge, where the only change in regulations was the 10-inch minimum size, records from 157 angling



Table 2. Partial creel census records, South Branch Au Sable River, May 20-September 14, 1952,  
Steckert Bridge to Smith Bridge. Regulations: 10-inch minimum size limit, flies only.

Period	Number of days checked	Total angling trips <sup>+</sup>	Total hours of angling	Total Trout caught <sup>++</sup>			Total catch	Catch per hour	% Wild trout in catch
				Brook	Brown	Rainbow			
May 20-31	3	36 (26)	186.50	1 (10.5)	10 (11.0)	2 (10.3)	13	0.07	77
June 1-30	9	77 (50)	399.25	1 (9.8)	40 (11.3)	...	41	0.10	100
July 1-31	9	75 (60)	348.00	9 (8.2)	25 (11.2)	2 (10.0)	36	0.10	97
Aug. 1-31	11	82 (69)	400.25	12 (11.2)	8 (11.8)	1 (10.6)	21	0.05	95
Sept. 1-14	5	17 (15)	76.50	...	3 (11.7)	...	3	0.05	100
Totals	37	287 (220)	1410.50	23 (10.0)	86 (11.3) <sup>#</sup>	5 (10.2) <sup>##</sup>	114	0.08	96

<sup>+</sup>Numbers of unsuccessful trips are given in parentheses.

<sup>++</sup>Average total lengths in inches are given in parentheses.

<sup>#</sup>Includes 1 hatchery-reared brown trout.

<sup>##</sup>Includes 4 hatchery-reared rainbow trout.

trips (69 percent unsuccessful) were obtained during 29 days of sampling (Table 3). In 738.25 hours of angling, 96 trout were captured, or 0.13 fish per hour. The catch included 14 brook trout, 77 brown trout, and 5 rainbow trout. The average sizes of the 94 wild trout were as follows: brook trout, 8.2 inches; brown trout, 11.2 inches; rainbow trout, 11.2 inches. The two hatchery-reared rainbow trout taken averaged 10.5 inches. Approximately 98 percent of the observed catch in this lower portion of the river consisted of wild fish. Although any lure was permissible downstream from Smith Bridge, 83 of the fish were taken on flies, and only 13 on worms.

The best fishing, based on catch per hour computations, was enjoyed in July (0.23 fish per hour), next best in June (0.16 fish per hour).

Although there is no good comparative evidence available from the South Branch, it is reasonable to infer that restriction of fishing method to flies only and the increase in the minimum size limit to 10 inches reduced the catch in 1952 very noticeably. Comparison of the 10-inch, flies-only, 1952 records for the South Branch and the North Branch, suggest that angling quality was about the same in the restricted water of both streams (catch per hour, North Branch, 0.09 fish; South Branch, 0.08 fish). When the disparity in stream areas is considered (the 10-inch fly water on the South Branch is approximately 12 miles long as against 7 miles on the North Branch) along with the differences in number of anglers contacted (only about half as many on the South Branch), it is concluded that the total catch of trout from the South Branch experimental water was at least as great and probably greater than for the 10-inch fly water of the North Branch in 1952.

The fact that there were a number of trout smaller than the legal minimum size of 10 inches observed in the catches from the 10-inch water

Table 3. Partial creel census records, South Branch Au Sable River, May 20-September 14, 1952, Smith Bridge to Mouth. Regulations; 10-inch minimum size, any lure permitted.

Period	Number of days checked	Total angling trips <sup>✓</sup>	Total hours of angling	Total trout caught <sup>**</sup>			Total catch	Catch per hour	% wild trout in catch
				Brook	Brown	Rainbow			
May 20-31	4	40 (28)	238.75	...	12 (12.1)	4 (11.0)	16	0.07	94
June 1-30	9	49 (32)	246.00	1 (8.5)	38 (11.1)	1 (10.6)	40	0.16	98
July 1-31	8	33 (19)	127.50	12 (8.3)	17 (10.2)	...	29	0.23	100
August 1-31	8	35 (29)	126.00	1 (7.8)	10 (12.5)	...	11	0.10	100
<b>Totals</b>	29	157 (108)	738.25	14 (8.2)	77 (11.2)	5 (10.9) <sup>#</sup>	96	0.13	98

<sup>✓</sup> Numbers of unsuccessful trips are given in parentheses

<sup>\*\*</sup> Average total lengths in inches are given in parentheses

<sup>#</sup> Includes 2 hatchery-reared rainbow trout

on the South Branch suggests that an unknown fraction of the South Branch anglers are not sympathetic towards the higher minimum size regulation. For example, almost all brook trout taken below Smith Bridge were smaller than 10 inches (average size of 14 fish, 8.2 inches). Not all anglers fishing the "flies only" water between Steckert Bridge and Smith Bridge observed the restriction on lures; it was noted that 10 of the 114 trout caught were taken on worms, or on lures other than flies.

Evidence that the fishing on the South Branch during 1952 provided good sport for those who know the river, despite the new restrictions, is found in volunteer creel census records provided by Earl Madsen of Grayling, Jerry McClain of Grayling, and Jerry Webber of Detroit. Madsen, a local guide, and Webber fished together on 19 days and recorded catches during the period May 1 to June 25 from 225 hours of fly fishing in the 10-inch water. Their total catch of fish larger than 10 inches consisted of 85 wild brown trout, 10 wild brook trout, 1 hatchery-reared brook trout, and 1 hatchery-reared rainbow trout. Their average catch per hour was 0.43 fish.

McClain, also a local guide, made 34 trips, fishing in every month of the season from May on. In 260.5 hours of fishing recorded, he took 156 trout from 10 to 17 3/4 inches long, a catch per hour of 0.70 fish. His total catch was made up of 150 wild brown trout, 3 wild brook trout, and 3 hatchery rainbow trout.

#### Studies With The Direct-Current Shocker

In October, 1952, just about the beginning of the brown trout spawning activities, an extensive collection of trout and other fishes was made in the South Branch. A DC shocker, towed in a plywood boat, was utilized. The particular unit employed has a capacity of 230 volts at

10.9 amperes. All trout captured were returned to the stream alive following removal of a scale sample for age and growth study and/or measurement of size. This fall survey was conducted by the author, assisted by O. M. Corbett, Fisheries Technician A, and Robert Tiffin, Manual Worker C, during the period October 15 to October 24, 1952.

Shocking was conducted at 21 different sites between the mouth of the stream and a point about 1 1/2 miles above Roscommon. At each site, a record was kept of the number of minutes spent shocking, along with a list of the trout and other fishes captured. It is possible to calculate the numbers of various kinds and sizes of trout taken per hour of shocking from these data, and such index figures provide a measure of the relative abundance of trout at the various sites of sampling.

The names and locations of sampling sites, by township, range and section, are given in Table 4, for accurate future reference; locations of sites are also recorded on a map which is on file with the Institute copy of this report.

The catch of trout at the several points is listed in Table 5, along with the amount of time spent shocking and the size ranges of the species. For the river as a whole, 362 minutes of shocking yielded 813 trout divided by species as follows: 200 brook trout (Salvelinus f. fontinalis), 607 brown trout (Salmo trutta fario), and 6 rainbow trout (Salmo gairdneri irideus). Except for 16 brown trout and 1 rainbow trout, all were wild fish. The brook trout captured ranged in size from 2.6 to 10.1 inches; brown trout varied from 2.8 to 23.7 inches; the 6 rainbow trout (except for the one hatchery fish of 10.6 inches) were between 3.8 and 4.8 inches. From the standpoint of numbers, brown trout were dominant over the brook trout in October, 1952 by a ratio of 3:1. The average catch per hour of trout with the DC shocker for the entire river is estimated to have been 135 fish.

Table 4. Name and location of sites sampled with the DC shocker, South Branch  
Au Sable River, October, 1952

Sample number	Name of site*	Township	Range	Section	Date sampled
2	Mouth	26 N.	1 W.	17, NW 1/4	10/15/52
1	Devereaux	26 N.	1 W.	17, SW 1/4	10/15/52
3	Haven	26 N.	1 W.	20, SW 1/4	10/15/52
4	Hooper	26 N.	1 W.	29, NW 1/4	10/16/52
5	Smith Br.	26 N.	1 W.	29, SE 1/4	10/16/52
6	Canoe Harbor	26 N.	1 W.	32, SW 1/4	10/20/52
7	Dogtown	26 N.	1 W.	31, SE 1/4	10/20/52
19	Downey (L)	26 N.	1 W.	6, NW 1/4	10/24/52
14	Downey (U)	26 N.	1 W.	7, NW 1/4	10/22/52
21	Baldy (L)	26 N.	1 W.	7, SW 1/4	10/24/52
20	Baldy (U)	26 N.	1 W.	18, NE 1/4	10/24/52
13	Mar-la-bar	25 N.	2 W.	14, SE 1/4	10/21/52
12	Forest Rest	25 N.	2 W.	23, SW 1/4	10/21/52
8	Chase Br. (L)	25 N.	2 W.	22, SW 1/4	10/20/52
9	Chase Br. (U)	25 N.	2 W.	21, SE 1/4	10/21/52
11	Section Line Rd.	25 N.	2 W.	29, NE 1/4	10/21/52
10	Steckert Br. (L)	25 N.	2 W.	29, SW 1/4	10/21/52
15	Steckert Br. (U)	25 N.	2 W.	30, SE 1/4	10/22/52
16	Mead Ldg.	25 N.	2 W.	31, SE 1/4	10/22/52
17	Roscommon (L)	24 N.	2 W.	5, SW 1/4	10/23/52
18	Roscommon (U)	24 N.	2 W.	5, SE 1/4	10/23/52

\* L means lower site, U means upper site

Table 5. The numbers of brook and brown trout collected, the numbers collected per hour (in parentheses), size range, and numbers of all trout shocked per hour with the DC shocker, at 21 stations along the South Branch Au Sable River, October, 1952.

Location	Minutes of shocking	Brook trout		Brown trout		Ratio of 7.0-9.9" trout to 10+" trout	Total trout collected	Trout shocked per hour
		Number (per. hr.)	Size range, in inches	Number (per. hr.)	Size range in inches			
Mouth	20	1 (3)	7.3	40 (120)	2.8-9.9	8:0	41	123
Devereaux	32	9 (17)	3.2-7.4	40 (75)	3.6-16.4	7:13	53	100 (4 rainbows)
Hooper	16	25 (94)	3.3-9.4	19 (71)	3.8-17.6	8:1	45	169 (1 rainbow)
Haven	27	23 (51)	3.7-7.9	48 (107)	2.9-18.8	9:7	71	158
Smith Br. (U)	27	31 (69)	3.2-6.6	50 (111)	2.8-14.7	3:11	81	180
Canoe Harbor	15	6 (24)	3.9-4.2	23 (92)	2.9-14.2	2:7	30	120 (1 rainbow) ↓
Dogtown	22	37 (101)	3.0-6.4	39 (106)	3.0-15.5	1:2	76	207
Downey (L)	17	12 (43)	3.3-5.9	34 (120)	3.1-15.7	5:7	46	163
Downey (U)	20	1 (3)	7.0	32 (96)	3.5-12.2	4:2	33	99
Baldy (L)	9	1 (7)	4.0	5 (33)	3.8-11.7	0:3	6	40
Baldy (U)	14	1 (4)	6.7	15 (64)	3.0-16.4	2:4	16	68
Mar-la-bar	12	3 (15)	3.1-4.8	32 (160)	2.8-23.7	3:17	35	175
Forest Rest	13	13 (60)	2.6-4.4	30 (139)	3.4-18.7	7:14	43	199
Chase Br. (L)	10	11 (66)	3.2-9.4	51 (306)	4.4-21.7	10:26	62	372
Chase Br. (U)	12	15 (75)	4.0-6.2	47 (235)	3.5-14.9	5:11	62	310
Section Line Rd.	18	2 (7)	4.4	19 (63)	3.7-20.1	5:8	21	70
Steckert Br. (L)	18	8 (27)	3.6-4.8	51 <sup>5</sup> (170)	3.3-17.6	5 <sup>5</sup> :9 <sup>5</sup> ↓	59	197
Steckert Br. (U)	15	1 (4)	10.1	2 <sup>5</sup> (8)	4.8-10.9	0:2 <sup>5</sup> ↓	3	12
Mead Idg.	11	...	...	12 <sup>5</sup> (65)	4.1-14.2	4 <sup>5</sup> :2 <sup>5</sup> ↓	12	65
Roscommon (L)	22	...	...	17 <sup>5</sup> (46)	7.7-12.5	7 <sup>5</sup> :10 <sup>5</sup> ↓	17	46
Roscommon (U)	12	...	...	1 (5)	19.9	0:1	1	5
Totals	362	200 (33)	2.6-10.1	607 <sup>16</sup> (101)	2.8-23.7	95 <sup>12</sup> :157 <sup>4</sup> ↓	813	135 (6 rainbows)

↓<sup>5</sup> etc. Superscript numbers are the numbers of fin-clipped hatchery-reared trout in sample

In addition to the trout captured, the following species of fish were also taken in the course of the investigation: chestnut lamprey (Ichthyomyzon castaneus), bowfin (Amia calva), white sucker (Catostomus commersoni), northern creek chub (Semotilus a. atromaculatus), hornyhead chub (Hybopsis biguttata), western blacknose dace (Rhinichthys a. meleagris), redbelly dace (Chrosomus eos), northern yellow bullhead (Ameiurus n. natalis), northern pike (Esox lucius), yellow perch (Perca flavescens), rock bass (Ambloplites rupestris), blackside darter (Hadropterus maculatus), central Johnny darter (Boleosoma n. nigrum), northern muddler (Cottus b. bairdi), and common slimy muddler (Cottus cognatus gracilis).

The distribution of the species of fish observed furnish a good indication of the better trout water. All of the northern pike (5 fish, 7.6-17.3 inches), yellow perch (4 fish, 2.7-6.6 inches), bowfin (1 fish, 15.7 inches), the one northern yellow bullhead (8.2 inches), and most of the rock bass were captured at the four stations upstream from Steckert Bridge. The presence of these species suggests that the South Branch from Steckert Bridge upstream is relatively marginal trout water, inasmuch as these species are more commonly found in water where the temperature usually exceeds that noted where trout are more abundant. Furthermore, only 6 of 33 trout captured above Steckert Bridge were juveniles or young-of-the-year, which suggests that reproduction in this area is relatively unsuccessful. Although this upper stretch has many good pools and deep runs with log-jams and down timber for cover, a high percentage of the bottom consists of sand, or of silt and organic detritus, or of a mixture of the two materials, and there are many placid reaches where the stream channel has little or no fall.

From Steckert Bridge downstream, the fish fauna was more characteristic of a trout stream. Two or more species of trout were found at all sampling



sites, usually represented by both young-of-the-year as well as immature and adult fish. Associated species were the white sucker, creek chub, blacknose shiner, redbelly dace, and two species of muddlers. An occasional rock bass was noted below Steckert Bridge; also the chestnut lamprey, both adult and larval forms, was not uncommon.

Below Steckert Bridge, although there are occasional areas of placid water, the fall is greater and the stream is swifter. In many sites, except for a narrow margin of silt, detritus and sand along shore, the entire bottom is composed of rubble and gravel, interspersed by not infrequent boulders. Generally we found the greatest number of trout where the cover was most abundant, particularly in the form of sunken logs and log jams. In most instances, this meant that, at low water stage, we caught most of our fish very close to shore. It should be pointed out here that there are numerous stretches of the South Branch which are very deficient as to cover at normal and low waterstages, and are only slightly better at high water. Throughout the entire stream there is very little cover further than 15 feet from the banks.

The average catch per hour of brook trout with the DC shocker was 33 fish, ranging from 0 in the three upper stations to 101 at Dogtown. There appeared to be two areas of better-than-average concentrations of brook trout, using the average catch per hour as a criterion. These areas were from Hooper's to Downey's lower site (with the exception of the Canoe Harbor area), where the catch per hour of brook trout varied from 43 to 101 fish per hour. Brook trout were also quite numerous from Forest Rest upstream almost to the Section Line Road (catch per hour indices ranged from 60 to 75 fish).

Better-than-average numbers of brown trout were found at the mouth (120 fish per hour), from Haven's to Downey's lower site (92-120 fish

per hour), from Downey's upper site to the Section Line Road (96-306 fish per hour), and below Steckert Bridge (170 fish per hour). At the latter site, about 10 percent of the brown trout were fin-clipped survivors from Hatchery plantings of 1952. At the four sampling locations upstream from Steckert Bridge, 11 of 32 brown trout captured, or over 1/3, were marked hatchery fish. As can be noted in the table, the largest numbers of brown trout, and also the highest proportion of larger fish, were found in the vicinity of Chase Bridge in the fall of 1952.

The proportions of large trout (brook trout and brown trout larger than 7 inches) to small trout (smaller than 7 inches) were examined for the portions of the stream which were under different fishing regulations in 1952. In the Smith Bridge--mouth area (where a 10-inch minimum size and any lure were permitted) the ratio of large trout to small trout in shocker samples was 53/205 (25.9 percent). From Steckert Bridge to Smith Bridge (where a 10-inch minimum size and fly fishing only prevailed), the ratio of large trout to small trout was 183/569 (32.2 percent). An adjusted Chi-square test of these ratios indicates little if any difference in the proportion of fish larger than 7 inches found in the two types of water (Chi-square = 2.54, P = 88.5 percent).

However, a significantly higher percentage of trout between 7.0 and 9.9 inches were found in the Smith Bridge--mouth area, than in the Steckert Bridge--Smith Bridge portion of the stream. Below Smith Bridge the ratio of 7.0-9.9 inch trout to all trout was 32/205 (15.6 percent); from Steckert Bridge to Smith Bridge the same ratio was 52/569 (9.1 percent); the difference is significant (Chi-square = 5.87, P = 98.5 percent).

The proportion of 10-inch and larger trout in the total sample was greatest in the water between Steckert Bridge and Smith Bridge (131/269, or

23 percent). Below Smith Bridge, 21 of 205 fish were larger than 10 inches (10.2 percent); the difference between the two ratios is significant (Chi-square = 14.80, P = 99.9 + percent).

Without previous knowledge of the size distribution of the trout population after a season of fishing under a 7-inch size limit, it is impossible to say whether or not the size distributions observed in October, 1952 resulted from the angling restrictions in force, or were more or less normal. Additional sampling with the DC shocker during the next four years should provide information to answer the question.

When the fish were measured and/or scale-sampled, they were examined externally to determine sex and state of maturity. It was possible to identify the sex of the individuals which were spawning or about to spawn, but sex determinations on the immature fish could not be made because the fish were not killed for this purpose.

The data pertaining to sex and size of fish are given in Table 6. Among the 200 brook trout collected, we found 10 mature males (5.3-8.4 inches) and 16 mature females (5.4-10.1 inches). Mature fish made up about 13 percent of the total brook trout observed. Immature brook trout ranged from 2.6 to 6.7 inches in length. Among the 591 wild brown trout, 59 mature males (8.2-23.7 inches) were observed, along with 73 mature females (8.7-21.7 inches), or 22.3 percent of the total sample for the two sexes. Of the 132 mature brown trout noted, only 5 males were smaller than 10 inches (smallest 8.2 inches), and only 3 females were smaller than 10 inches (smallest 8.7 inches). Of 459 immature brown trout, 32 fish were larger than 10 inches (up to 16.4 inches). These observations indicate that even a 10-inch minimum size limit does not protect all brown trout until they have spawned once. However, it obviously protects many more fish through one spawning than does a 7-inch minimum size limit.

Table 6. The proportion of mature brook and brown trout in the October, 1952, shocker samples, South Branch Au Sable, and the range in size of the various classes

Sex	Brook trout		Brown trout	
	Number	Size range, in inches	Number	Size range, in inches
Mature males	10	5.3-8.4	59	8.2-23.7
Mature females	16	5.4-10.1	73	8.7-21.7
Immature, sex?	174	2.6-6.7	463	2.8-16.4
Totals	200	...	595*	...

\* Includes 3 mature males and 1 mature female, shocked for photographic purposes and not listed in Table 5.

The scale samples collected have not yet been analyzed for age and growth. As soon as they are read, a separate report will be forthcoming.

An apparently adequate stock of brown trout, both young and adult, were present in the South Branch in October, 1952. This species should provide reasonably good sport fishing for larger-than-average fish during the coming years under the present restrictions. The wild brook trout population appears to be closely cropped, as evidenced by the rather low size range of the spawning fish, even under the theoretical protection of the 10-inch size limit in 1952.

Based on the experience and records obtained on the restricted waters of the North Branch of the Au Sable since 1949, an increase in the trout population and in anglers' catch of trout under 10 inches and over can be expected in the South Branch in future years, provided the angling public cooperates by adherence to the present size limit and lure restrictions.

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