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CREEL CENSUS ON THE LOWER NORTH BRANCH BEAVER CREEK, 1975

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Fish Management Section Report Number 89
May, 1976

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CONTENTS

Introduction	1
Methods.	2
Results.	4
Fishing Pressure.	4
Angler Characteristics.	5
Harvest and Catch Rate.	7
Discussion	10
Literature Cited	13

ABSTRACT

A random stratified creel census was conducted during the 1975 trout season on the lower 2.8 miles of the North Branch Beaver Creek located in Marinette County, Wisconsin. Anglers spent 2,405 hours (458 angler hours/acre) fishing the study area and harvested 529 trout (101 trout/acre). Catch composition was 63% native brown trout, 5% native brook trout, and 32% stocked brown trout. Exploitation of brown trout stocked early in the season was calculated to be 23%. The highest daily angling pressure (32 hours/day) occurred on the opening weekend, but the two-day total accounted for only 3% of the season angling pressure. Seventy percent of the total pressure occurred on weekdays compared to 30% on weekends.

INTRODUCTION

The North Branch of the Beaver Creek is located in the southwestern part of Marinette County in northeastern Wisconsin (Fig. 1). It drains about 23 square miles of the Beaver Township. The 8.7-mile stream has a 14.7-foot average width, moderate velocity, and a base flow of approximately 15 cubic feet per second. The flow is generally stable as most of the watershed is forest and shrub marsh land. Approximately 20 percent of the watershed is under agricultural usage; however, fencing projects along the stream sections grazed by livestock protect the banks. The State owns 4.7 miles of the stream, and an additional 2.3 miles are in land easements to provide public fishing rights.

Ten incorporated cities and villages lie within 20 miles of the North Branch Beaver Creek. However, six of these have populations under 1,000, and Marinette, the largest, has only 12,700 inhabitants. Major metropolitan areas lie to the south, at least 40 miles away. A U.S. highway provides a direct route from these more populated areas to Marinette County.

A stream survey (Meyers, 1974) indicated 141 pounds per acre (1006 trout/mile) of native brown and brook trout in the upper reaches of the stream. However, the lower portion had inadequate natural reproduction with a native population of 14.8 pounds per acre (53 trout/mile). The lower 2.3 miles is considered Class II trout water and has exhibited good survival and growth of stocked brown trout. The upper 6.4 miles is considered Class I trout water and is not stocked.

A creel census was conducted in the lower 2.8 miles (study area) of the North Branch Beaver Creek during the 1975 trout season. The purpose of this census was to measure: (1) exploitation of the stocked and native trout, (2) catch of carryover stocked trout, and (3) fishing pressure on an inland trout stream in this area.

METHODS

In recent years the lower 2.3 miles of the North Branch Beaver Creek has been annually stocked with holdover trout. In 1974, 600 brown trout were stocked in this section, all with adipose fins clipped for identification. In 1975, 600 brown trout measuring eight inches were stocked with clipped right ventral fins. This release was made 14 days following the opening of the season, after spring runoff water had subsided.

Public access is available via four road crossings over the study area of this navigable stream (Fig. 2). About one-half of the stream mileage in this section is in public fishing grounds. A census clerk is able to check the number of vehicles at these sites within minutes. Methods used in this creel census are for a random stratified census as described by Lambou (1961).

During the first and last weekend of the trout season, complete vehicle counts were made every 2 hours from 0700 to 2100 hours each day. Between vehicle counts, fishermen were interviewed for information such as the number in the party; number, size and origin of fish caught; bait used; length of fishing trip; and residence of the anglers.

During the remainder of the season, vehicle counts and interviews were made at randomly selected 2 hour intervals from 0700 to 2100 hours (Table 1). More census effort was placed on the month of May, weekend days, and early morning and evening census periods than on the remainder of the season, weekdays or midday periods. Holidays were considered the same as weekend days.

Thirty percent of the May periods were sampled compared to 16% of the sample periods for the remainder of the season. Data collected in May were analyzed separately from the remainder of the season's data. Approximately 38% of the weekend periods were sampled versus 10% of the weekday periods. These data were also analyzed separately.

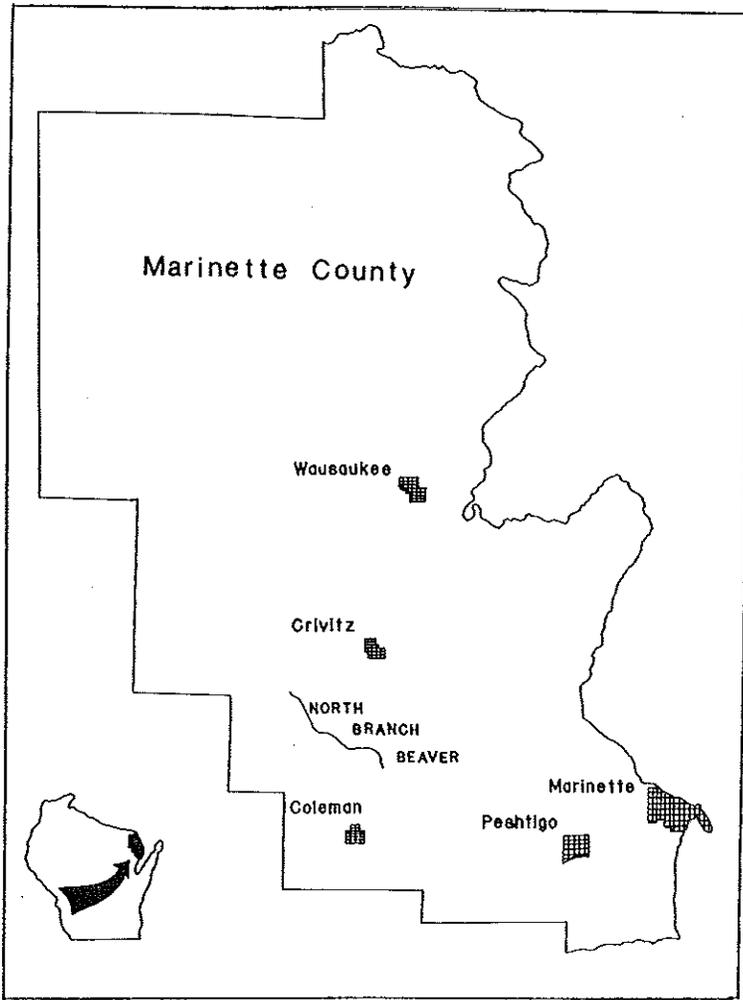


Figure 1. Location of North Branch Beaver Creek within Marinette County

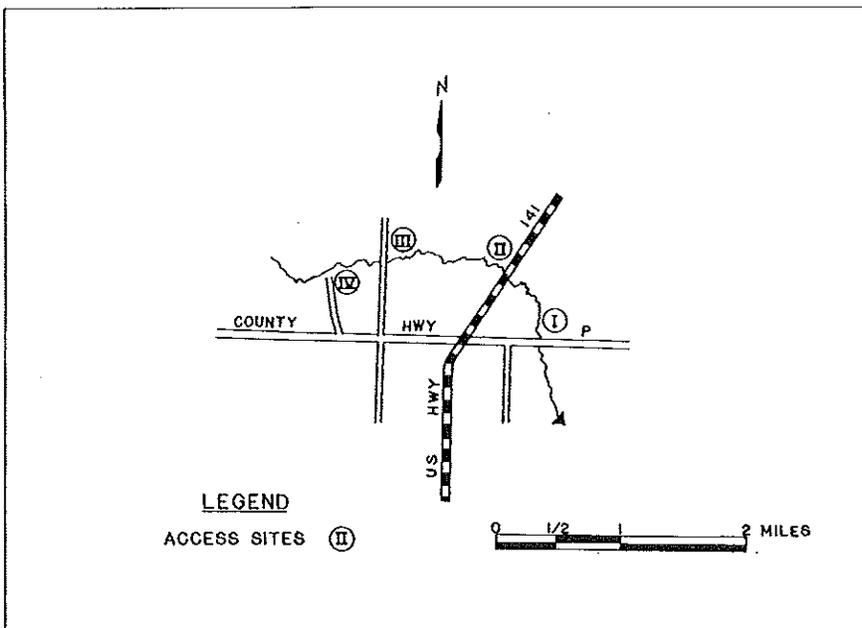


Figure 2. Location of public access sites on the lower North Branch Beaver Creek.

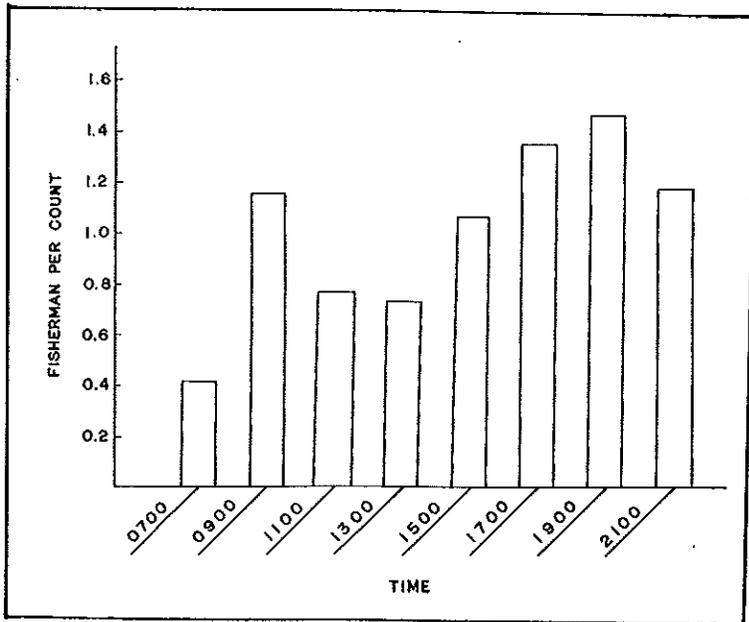


Figure 3. Number of fishermen per census count at various hours throughout the creel census day.

TABLE 3. Access site popularity in the study area of the North Branch Beaver Creek.

	Vehicle Counts	Vehicles Per Count			
		Site I	Site II	Site III	Site IV
Opening Weekend	16	.25	.25	.19	.25
May Weekends	28	.11	.25	.07	.46
May Weekdays	28	.11	.07	.00	.14
Remainder Weekends	96	.09	.07	.09	.25
Remainder Weekdays	54	.06	.09	.09	.39
Last Weekend	16	0	0	0	.31
1975 Season	238	.09	.11	.08	.30

TABLE 4. Distance anglers travelled to fish the North Branch Beaver Creek, 1975.

Miles Travelled	Number of Fishermen	Percent of Fishermen
0-20	101	58
20-40	2	1
40-60	44	25
60-80	3	2
80-100	3	2
Over 100	17	10
Out of state	3	2
TOTAL	173	100

Based on complete fishing trips, 19% of the fishermen were successful (Fig. 4). Fifty-three percent of the successful anglers caught more than one trout. Only 1% caught their limit. Sixty percent of the successful anglers resided within 20 miles of the stream.

Live bait was used by 85% of the anglers interviewed. Spinning artificials were used by 13% while 2% used flies. It appeared that anglers using artificials were more successful than the live bait anglers as 33% were successful at a rate of 0.84 trout per hour compared to 19% success for bait fishermen at a rate of 0.23 trout per hour.

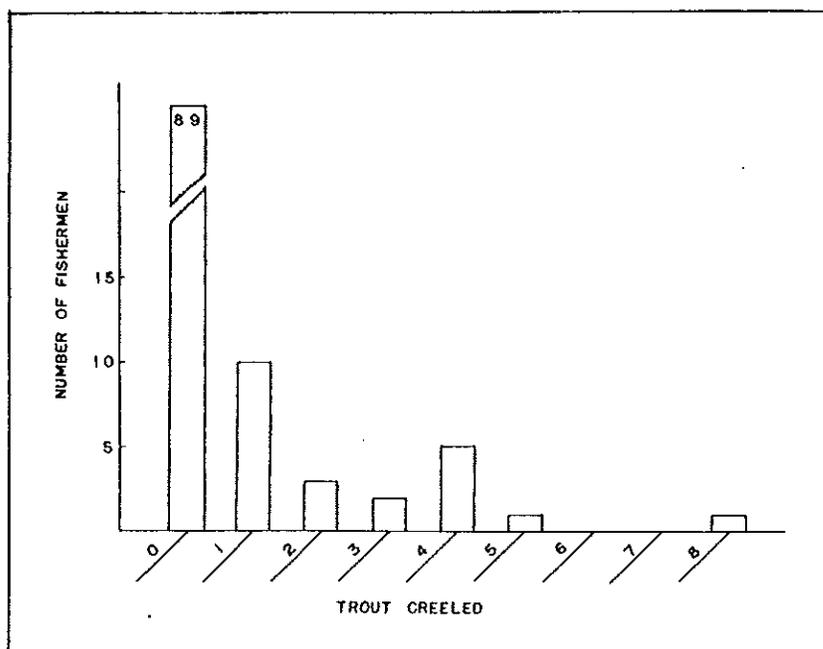


Figure 4. Fishing success in the study area of the North Branch Beaver Creek.

Harvest and Catch Rates

An estimated 529 trout were harvested from the 2.8 mile section of the lower North Branch Beaver Creek (101 trout/acre, or 189 trout/mile). Of this total, 335 (63%) were native brown trout, 27 (5%) were native brook trout and 167 (32%) were stocked brown trout. Of the stocked trout, 135 were definitely stocked in 1975. Four of the trout were carry-overs from the 1974 planting. Twenty-eight of the stocked trout were of undetermined origin.

Exploitation of the 1975 stocked brown trout was calculated at 23% whereas the 1975 angler exploitation of the 1974 plant was 0.5%.

The catch rate for the season was 0.275 trout per hour. Brown trout stocked in 1975 contributed considerably to the catch rate (Fig. 5). One percent of the season's catch was taken during the first 13 days. After brown trout were stocked on May 16, the catch rate increased, and by the end of June, 50% of the catch had been taken. Newly stocked trout were caught at access sites I and II whereas native trout were usually taken at sites III and IV (Table 5). The catch rate was higher on weekends (0.33 trout/hour) than weekdays (0.15 trout/hour). The rate varied from morning to evening hours (Table 6).

Trout taken during the 1975 creel census ranged from 7.5 to 19.0 inches in length (Fig. 6). Of the 69 trout measured, 23 (33%) were 12.0 inches or over.

The September shocker survey indicated that 100 of the 600 (17%) brown trout stocked in 1975 were still in the stream, along with 12 of the 600 (2%) brown trout stocked in 1974. There was no evidence of migration out of the study area by the stocked brown trout.

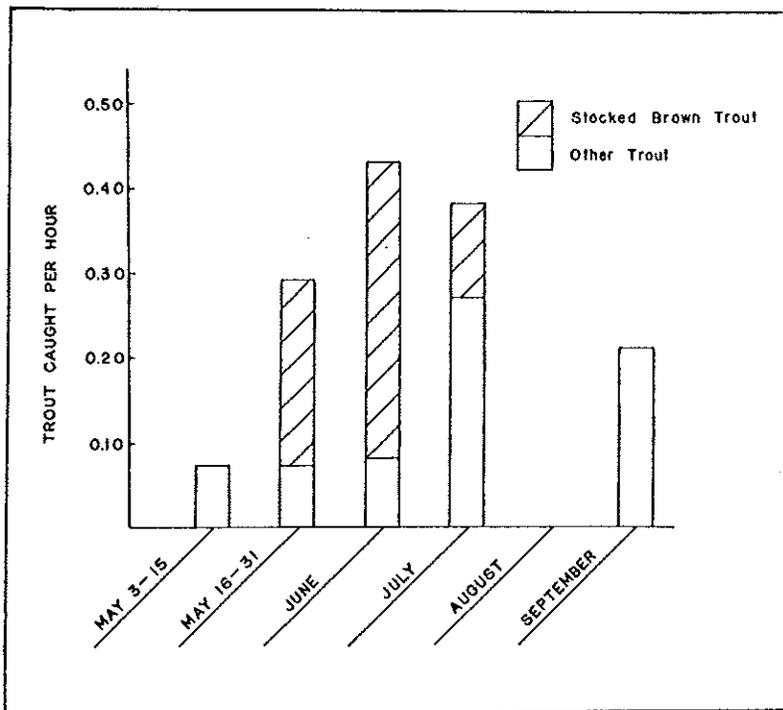


Figure 5. Catch rate of trout during various time periods on the North Branch Beaver Creek.

TABLE 5. Origin of trout measured by the census clerk.

Access Site	Stocked Fish	Native Fish	Total Number Fish Caught	Percentage of Fish Caught
I	6	2	8	12
II	27	4	31	45
III	0	4	4	5
IV	<u>2</u>	<u>24</u>	<u>26</u>	<u>38</u>
TOTAL	35	34	69	100%

TABLE 6. Catch rate variation over the average 16 hour fishing day.

	Time								Totals
	0700	0900	1100	1300	1500	1700	1900	2100	
Actual Angler Hours	10.3	32.6	20.2	23.5	39.6	36.15	48.7	42.3	253.3
Trout Creeled	2.0	7.0	5.0	3.5	14.0	9.5	13.0	15.0	69.0
Catch Rate	0.19	0.22	0.25	0.15	0.35	0.26	0.27	0.36	0.27

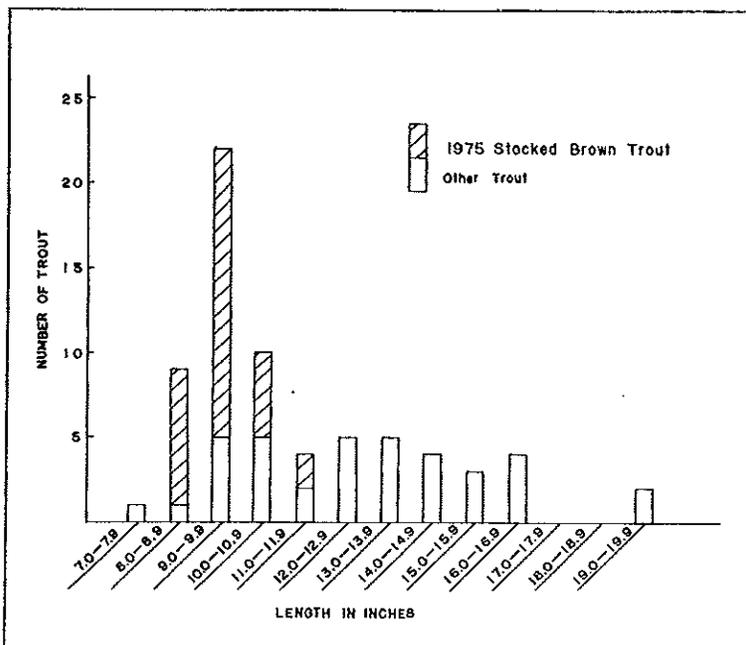


Figure 6. Length-frequency of trout caught in the study area of the North Branch Beaver Creek.

DISCUSSION

The limitations of this creel census should be kept in mind while analyzing the results. The angler pressure and harvest are estimates calculated from a minimal sample (28.5 census days (19%) of a 151-day season). It is probable that these estimates could have actually been higher or lower. However, since the census followed generally accepted methods (Lambou, 1961), the data collected is statistically sound.

Assumptions from limited data have been made in the past about angling pressure and harvest on trout streams in this area. These include: opening weekend accounts for the highest angling pressure; most of the pressure and harvest occurs early in the season; daily pressure is highest during the early morning and evening hours; and the majority of the total pressure occurs on weekends and holidays. These assumptions were used to weight the census effort during various periods of the season.

The highest daily angling pressure (32 hrs/day) occurred on the opening weekend in the study area on the North Branch Beaver Creek. However, the two-day total accounted for only 3% of the season angling pressure. Over the first 13 days, 200 angler hours (8% of the total) were expended with only 1% of the catch taken.

During the month of May, weekend angling pressure was higher than the weekday pressure (24.5 hrs/day versus 7.5 hrs/day). However, this trend reversed over the remainder of the season with the weekday pressure being higher than the weekend (18 hrs/day versus 13 hrs/day). Overall, weekday fishermen accounted for 1,672.5 hours of the total pressure and weekend anglers 732.5 hours. The high weekday pressure contradicts the assumption upon which the weight of the census effort was determined.

A majority of the weekday angling pressure in the study area of the North Branch Beaver Creek occurred after the usual working hours, between 5:00 p.m. and 10:00 p.m. Fishermen residing within 20 miles of the stream were responsible for 76% of the weekday pressure. It is difficult to explain the high pressure occurring at 9:00 a.m. on the weekdays.

The possibility of error in the weekday sample also exists. After the first month of the season, there were 85 fishing days remaining in the weekday sample period. Although 25% of the total sampling effort was expended during this period, only 8% of the time was censused. This period was responsible for the highest estimated pressure (63.5% of the total). The data collected in this period showed a high degree of variance, indicating a wide confidence interval. In future creel censuses of this type, more effort should be placed on the weekday sample.

A review of the literature reveals few documented reports of angling pressure on trout streams (Table 7). A creel census of this nature has never been accomplished on an inland stream in this part of Wisconsin. Therefore, it is difficult to compare the results of this study to others.

The estimated angler pressure was higher than anticipated on a stream in this area although it is similar to those on southern and western Wisconsin trout streams. It is difficult to determine how the angling pressure is affecting the trout population. There are many variables to consider, prior to a determination. Some of these include the species of trout, whether the stream is stocked, and the size of the stream.

The North Branch Beaver Creek is considered one of the heavier fished streams in the area, possibly because of its proximity to urban centers (Marinette and Green Bay), ease of access (public fishing grounds), and existence of a stocking program on the stream. Forty percent of the fishermen travelled over 40 miles to fish the North Branch Beaver Creek in 1975. Surprisingly, 25% were from the Green Bay area (40-60 miles), possibly because of the lack of trout streams in that area.

The catch rate of 0.275 trout per angler hour is, on the average, lower than that found in other studies (Table 8). However, the low catch rate on the trout taken from the study area may not be a valid indication of the angler success or harvest. Fewer trout were available to the angler because the population density in the study area appeared to be lower than other streams. Yearling brown trout had been stocked at 214 per mile. The 1974 stream survey indicated no natural reproduction in the study area, and a low native population (53 trout/mile). The majority of the native trout were 2 and 3 year old brown trout recruited from the upstream spawning areas. The hatchery-reared trout released at 8.0 inches in May were returned to the angler at an average of 9.5 inches. The native trout taken during the creel census averaged 13.4 inches. Apparently, the low catch rate was offset by the return of larger fish to the angler. Marshall and MacCrimmon (1970) stated that the lower reaches of some streams have low population densities and larger fish than the upper reaches and therefore will have lower catch rates. Future creel censuses of this nature should measure length and weight of the fish. This would allow an estimate of the weight per unit effort.

Due to unfavorable stream conditions early in the 1975 season, the brown trout were not released until May 16, fourteen days after opening day. Following the release of the hatchery-reared brown trout, the catch rate increased significantly, and by the end of June, 50% of the total catch had been taken in 919 angler hours (38% of the total pressure). The newly stocked trout provided the majority of the early season harvest, whereas the natives contributed more to the late season catch.

Anglers exploited 23% of the 600 brown trout released in 1975, and 0.5% of the 600 browns that had been released in the spring of 1974. Based on a planting cost of one dollar per pound, the cost to the fisherman was approximately one dollar per fish for the 1975 plant.

An estimate made in September, three weeks prior to the close of the 1975 season, calculated 17% of the 1975 plant and 2% of the 1974 plant still remaining in the study area. The presence of the 1974 plant in this survey and the creel census verified over-winter survival of the hatchery-reared fish.

Table 7. Angler pressure on various trout streams.

Stream	Reference	Trout Species	Angler Hours/Acre	Angler Hours/Mile
Big Flatbrook, New Jersey	Pyle & Soldwedel, 1971	Stocked Brooks, Browns, Rainbow		
Rog Tract			783	2564
Haney's Mills Tract			399	2496
Bohemian Valley Creek	Fassbender & Churchill, 1967	Native & Stocked Browns	563	815
Hunt Creek, Michigan	Shetter, 1967	Native Brooks & Stocked Rainbows	---	653
Lawrence Creek, Wisconsin	McFadden, 1961	Native Brooks	455	1295
MacKenzie, Creek, Wisconsin	Lowry, 1971	Native Browns		
1963			149	362
1957			170	413
North Branch Ausable River, Michigan	Shetter & Alexander, 1965	Native Brooks & Browns	---	1007
North Branch Beaver Creek, Wisconsin	This Report	Native Browns, Brooks & Stocked Browns	458	859
Pigeon River	Cooper, 1952	Native Browns & Brooks	265	---
Seas Branch Creek, Wisconsin	Avery, 1974	Domestic Browns, Brooks, Rainbows		
1974			132	254
1972			219	421
1971			209	402
Upper Syhenham River, Ontario	Marshall & MacCrimmon, 1970	Native Brooks & Browns	904	390

Table 8. Catch rate on trout streams.

Stream	Reference	Trout Species	Catch Rate
Augusta Creek, Michigan	Lemmen et. al., 1947	Stocked Browns & Rainbows	0.23 - 0.45
Bohemian Valley Creek, Wisconsin	Fassbender & Churchill, 1967	Native Browns, Stocked Browns	0.16 0.85
Crystal Creek, New York	Schuck, 1942	Native Browns	0.19 - 0.28
Horokiwi Stream, New Zealand	Allen, 1951	Browns	0.61
McKenzie Creek, Wisconsin	Lowry, 1971	Native Browns	0.42 - 0.49
North Branch Beaver Creek, Wisconsin	Present Report	Native Browns, Brooks & Stocked Browns	0.275
Upper Sydenham River, Ontario	Marshall & MacCrimmon, 1970	Native Brooks & Browns	0.34

Sixty percent of the 1975 plant was absent from the study area in September, due to reasons other than angler exploitation. The absence can be attributed to either out-migration or natural mortality. The electrofishing survey in September did not reveal any significant movement out of the study area by the stocked brown trout. Natural mortality must be responsible for most of the loss. Therefore, if stream conditions are favorable the yearling brown trout should be released just prior to the season in order to maximize angler exploitation. In the future, if natural mortality remains high and the angler exploitation stays the same, then a reduction in the stocking quota should be tested.

A comparison of the results of the 1975 electrofishing survey with those of the 1974 survey in the lower North Branch Beaver Creek did not indicate any drastic change in the native trout population that can be attributed to angler harvest. If anglers exploited 23% of the 1975 plant, then the exploitation rate of the wary native fish should be less. There may be continual replacement of the creel native trout by natural recruitment from the upper reaches of the stream. However, there is not sufficient information on the native trout in the North Branch of the Beaver Creek to substantiate this possibility.

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ACKNOWLEDGMENTS

The authors wish to acknowledge the people who assisted in gathering the data presented in this report, the individuals who worked irregular hours collecting creel census information and those who helped with the stream survey work.

Special thanks go to Bob Carline of the Bureau of Research for his guidance in setting up the study and reviewing the results. Thanks also to Betty Cherry for typing the manuscript.

Edited by Betty Les.

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Dist.: List 2 + Opt.
Fish Mgt. Personnel
Area Fish Mgrs.
Fish Mgrs.