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THE EIGHTH ANNUAL CREEL CENSUS, PIGEON RIVER

TROUT RESEARCH STATION,

1956

by

Thomas F. Waters

The Pigeon River Trout Research Station was established in 1949 on the site of the former Pigeon River Forest Headquarters, 13 miles east of Vanderbilt in Otsego County. The experimental trout waters of the station include seven small pot-hole lakes (Ford, Section 4, Hemlock, Lost, West Lost, North Twin, and South Twin) and, at the time of the station's establishment, included 4.8 miles of the Pigeon River. This portion of the stream was divided into four experimental sections (A, B, C, and D), each approximately 1.2 miles in length (Fig. 1). In 1953, a fifth experimental section (E), also approximately 1.2 miles long, was added at the upstream end of the controlled area. This addition increased the total length of experimental stream to about 6 miles. Table 1 presents the physical features of the experimental stream sections.

Since 1949 a compulsory permit system has been in effect on the experimental waters. Each angler is required to obtain a free, one-day permit before proceeding to his selected water, whether experimental section of the stream or individual lake, and is also required to report on his trip and to allow examination of his catch by station personnel.

MICHIGAN DEPARTMENT OF CONSERVATION
FISH DIVISION
PIGEON RIVER TROUT RESEARCH AREA
OTSEGO AND CHEBOYGAN COUNTIES

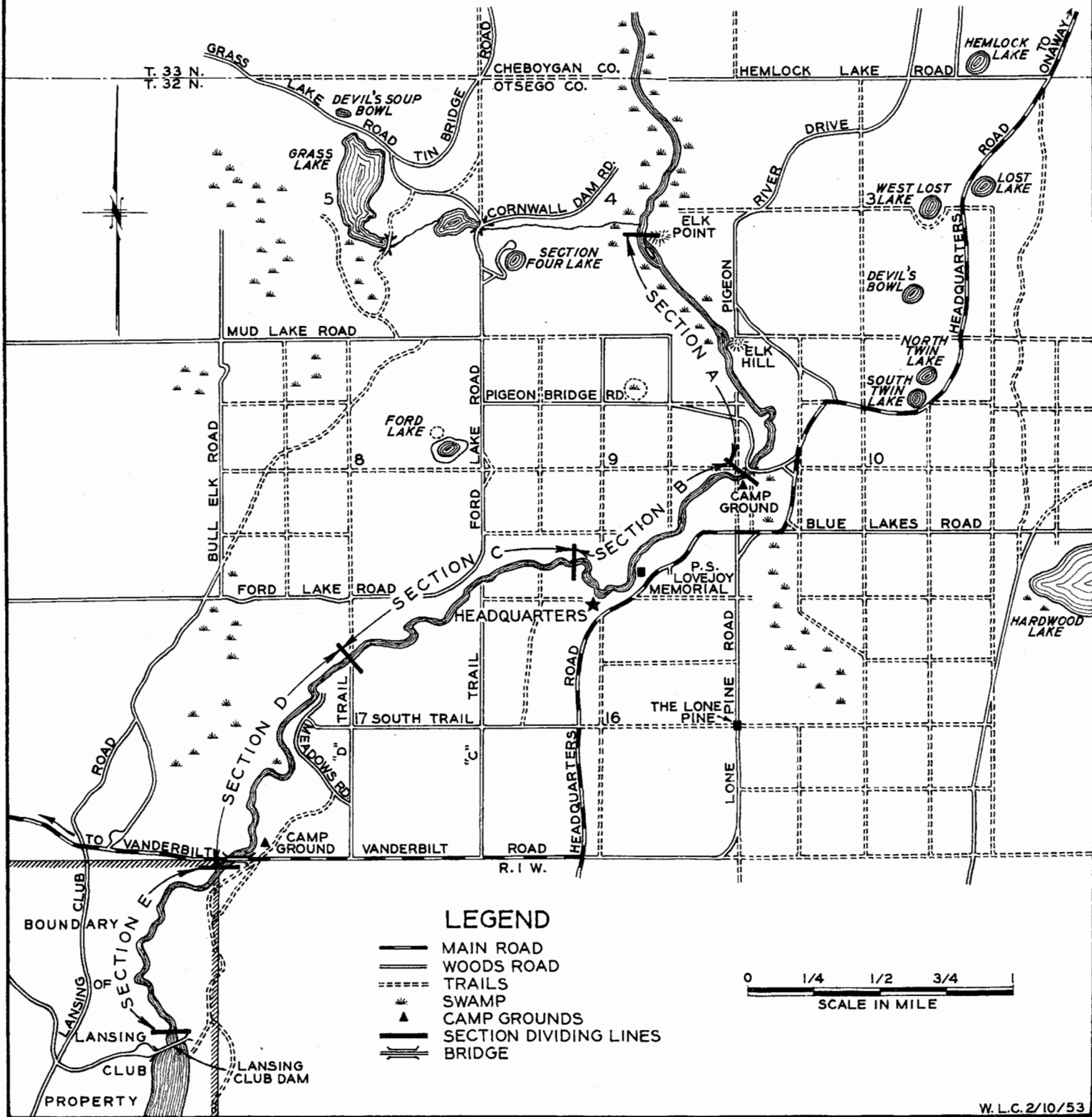


Figure 1

THE PIGEON RIVER TROUT RESEARCH AREA

This research and experimental area is located in the northeastern corner of Otsego County and a small portion of Cheboygan County in the Pigeon River State Forest. Here five and one-half miles of the Pigeon River and seven trout lakes have been designated as experimental waters for studies on brook, brown, and rainbow trout. This program, as is also true with other functions of the Fish Division, is financed solely from the sale of fishing licenses and trout stamps. Its success depends to a large extent on the cooperation of the fishing public in supplying the information needed to maintain and improve trout fishing.

The Pigeon River in this experimental area is divided into five convenient fishing sections as indicated on the reverse side of this sheet. Seven trout lakes of unusual character are included in the trout research program. These lakes are believed to have been formed geologically through the solution of underlying limestone by ground water, and a settling of the surface layer of sand and gravel, producing cone-shaped pot holes, some with nearly vertical banks 50 to 60 feet high.

In order to obtain a complete record of the fishing in this area, each fisherman is required to register daily at the checking station, obtain a free permit to fish in any lake or portion of the stream and report back to the checking station before fishing in another lake or stream section or before leaving the area. Some experimental changes in the usual regulations governing trout fishing in Michigan are made from time to time in order to learn how necessary such restrictions are and whether changes may improve the angling quality. The special regulations will be stated on the fishing permit.

In addition to the information on fishing success collected from persons in the area, many other research projects are being followed by department personnel. Periodic estimates are made of the trout populations and information on rate of growth of the fish and their success in spawning is obtained. Studies of the returns from hatchery plantings are being made to determine their value and need.

The correct stocking programs for lakes of the type found in the Pigeon River Research Area, which lack natural spawning facilities, are being determined by plantings of different species of varying size and at different seasons of the year.

Table 1.--Morphometry of experimental stream sections, Pigeon River
Trout Research Station[✓]

Section	Length (miles)	Average width (feet)	Area (acres)
A	1.31	45	7.16
B	1.19	41	5.90
C	1.13	40	5.39
D	1.18	40	5.65
E	1.17	40	5.67

[✓]*Data for sections A, B, C, and D from Cooper, 1953. Length of Section E from E. H. Bacon, unpublished; average width of Section E was estimated.

The creel census serves as a tool in evaluation of experimental methods of trout management, such as special regulations, methods of planting, etc. Because a compulsory permit system was in effect, insuring a complete, or nearly complete, census, information could be secured which could not otherwise be obtained. Previous annual creel census reports have appeared as Institute for Fisheries Research Reports Numbers 1250, 1288 (Cooper, 1950, 1951) 1512 and 1521 (Waters, 1957a, 1957b).

It is the primary purpose of this report to record certain features of special interest concerning the trout fishing in the research area so that the data may serve, with limitations, as indices of general trout fishing success in Michigan. These features are: fishing success according to experimental section of the stream and to individual lake, according to lure used, according to time of season, and according to the frequency of trips of individual anglers; the various classes of anglers using the area; the residence of anglers; the age composition of the catch; and fishing success through the years since the establishment of the research station. Data are also presented on the annual post-season fall population estimate made in the experimental area of the stream in order that the degree of exploitation by anglers may be noted.

In addition to the creel census, the activities of the research station personnel are concerned with research projects of special interest, some of which may not utilize the creel census as a research tool, and some of which are conducted on waters outside the creel-censused area. The results of these special projects will be given in separate reports, inasmuch as the projects often continue over a number of years. Since the experimental plantings of hatchery fish in the stream are special projects, the data recorded in this report for the creel census do not include records of hatchery fish, but wild trout only. Likewise, since the entire fisheries in the lakes are the result of hatchery plantings involved in special projects, the results of the lake fishing have

been, in general, reserved for separate reports, except for certain features of general interest which are included in this report.

During 1956, the research station was under the supervision of Gerald F. Myers (January-June) and the author (July-December), while the rest of the permanent staff consisted of Harold H. Brado, John M. MacGregor, and Doyle E. Edson. During the post-season fall population study, additional assistance was received from Theodore H. Turppa and George Smith, Jr. Supervisory assistance was provided by Gerald P. Cooper and David S. Shetter.

Creel census

Since the establishment of the research station certain special regulations have been in effect. These regulations will be evaluated in separate reports; however, they are summarized in Table 2, so that a more proper interpretation of the creel census results may be made by the reader.

Table 3 presents the catch statistics for 1956 for the stream sections; fishing pressure, catch, and fishing quality were slightly lower than in 1955. In 1956 (as in previous years) over half of the total trout catch was from Section E, and in this section brook trout made up the great bulk of the catch. Fishing quality, as measured by catch per hour per trip, was poorer in Sections C and D than in the other sections, probably because of the higher minimum size in effect in these two sections; the total catch also was less in these two sections, as was particularly the catch of brook trout.

Table 4 presents the catch statistics in the Pigeon River lakes, where the fishery consists entirely of hatchery brook trout planted as fingerlings in the fall. Fishing success was consistently better in the lakes than in the experimental stream sections.

In both Tables 3 and 4, catch per hour per trip, which is determined by taking a simple average of the catch-per-hour for fishing trips, was computed so that statistical tests may be made for the evaluation of special projects.

Table 2.--Experimental regulations, Pigeon River and
Pigeon River lakes, 1949-1956

Water and regulations ^{1/}								
Years	Stream sections						Lakes	
	A, B		C, D		E ^{2/}		Creel limit (trout per day)	Minimum legal length (inches)
Creel limit (trout per day)	Minimum legal length (inches)	Creel limit (trout per day)	Minimum legal length (inches)	Creel limit (trout per day)	Minimum legal length (inches)	Creel limit (trout per day)			Minimum legal length (inches)
1949-50	5	7	15	7	...	...	5	7
1951-52	5	7	2	9	...	...	5	7
1953-54	5	7	2	9	10	7	5	7
1955-56	5	7	5	9	10	7	5	7

^{1/}No lure or bait restrictions were in effect in the stream sections; in the lakes, minnows were prohibited (state-wide restriction on all designated trout lakes), and in addition the lure was restricted to artificial flies only in Ford Lake in 1955-1956.

^{2/}Section E was added in 1953.

Table 3.--Results of creel census on experimental stream sections,
Pigeon River Trout Research Station, 1956

Stream section	Number of trips	Percentage successful	Anglers' catch								Hours fished	Average catch per hour per angler (number of fish)
			Brook trout		Brown trout		Rainbow trout		Total			
			Number	Weight (pounds)	Number	Weight (pounds)	Number	Weight (pounds)	Number	Weight (pounds)		
A	365	21.1	107	17.93	40	19.43	4	1.42	151	38.78	882.0	0.17
B	440	23.2	103	17.59	79	26.89	6	2.85	188	47.33	1,046.5	0.17
C	305	18.0	135	9.70	41	21.18	4	2.57	80	33.45	930.0	0.08
D	436	11.0	23	8.02	39	18.81	0	0.00	62	26.83	1,300.0	0.05
E	433	48.3	601	122.54	67	37.36	1	0.15	669	160.05	1,368.5	0.45
Total	1,979	24.8	869	175.78	266	123.67	15	6.99	1,150	306.44	5,527.0	0.19

Table 4.--Results of creel census on Pigeon River lakes, 1956

Lake	Number of trips	Percentage successful	Anglers' catch (brook trout)	Hours fished	Average catch per hour per angler (number of fish)
Ford	243	43.6	310	576.0	0.54
Section 4	173	48.6	228	498.5	0.46
Hemlock	336	64.0	737	974.5	0.75
Lost	151	29.8	103	365.5	0.30
West Lost	535	52.7	864	1,453.5	0.59
North Twin	257	43.2	303	649.5	0.49
South Twin	291	44.3	378	772.0	0.39
Total	1,986	48.9	2,923	5,289.5	0.54

When fishing success was evaluated according to type of lure used, it was noted that stream anglers using flies were more successful than those using other lures (Table 5); likewise, flies were responsible for a greater total catch than any other single type of lure. Conclusions drawn from these data, however, should be viewed with caution, since the greater degree of success may be only indirectly related to the type of lure. In the lakes, fishing quality with flies was about the same as with worms, but flies were responsible for only a small part of the catch.

Table 6 shows the catch statistics for the stream by weekly periods through the trout season, and Table 7 presents the variation in average and total weight, by species, among weekly periods. It can be noted that fishing success decreased rather sharply after the first week in July.

Table 8 shows fishing success arranged according to the number of times fished by individual anglers. It cannot be definitely concluded that anglers fishing the area the most often are the most skilled and therefore enjoy greater fishing success (note the anglers who fished 14, 10 and 9 times); however, it would appear that anglers fishing 1, 2, 3, or 4 times were, in general, the least successful. From the data included in Table 8, it was possible to compute the following: Approximately one-third of the anglers caught nine-tenths of the fish, while approximately 2.5 percent of the fishermen caught 50 percent.

Table 9 shows the age composition of the anglers' catch, and also the average length and weight of each age group. For all three species, two-year-old fish made up the major proportion of the anglers' catch, with one-year-olds placing second. Cooper's (1953) appraisal of the age composition of brook and brown trout in the Pigeon River was again supported, in that very few individuals were observed to live to their fifth summer. The first one-year-old brook trout appeared

Table 5.--Fishing success according to lure used, Pigeon River
Trout Research Station, 1954

Lure	Number of trips	Percentage successful	Number of trout caught				Hours fished	Average catch per hour per angler
			Brook	Brown	Rainbow	Total		
S T R E A M								
Worms	538	24.5	229	65	6	300	1,443.0	0.17
Flies	666	26.6	294	139	6	439	1,834.5	0.24
Worms and spinner	449	26.3	222	30	2	254	1,207.0	0.19
Other [*]	326	19.6	124	32	1	157	1,042.5	0.14
Total for stream	1,979	24.8	869	266	15	1,150	5,527.0	0.19
L A K E S								
Worms	912	53.6	1,468				2,484.0	0.58
Flies	77	32.5	88				161.0	0.59
Worms and spinner	562	47.5	805				1,508.0	0.50
Other [*]	192	44.3	252				560.5	0.40
Ford Lake (flies)	243	43.6	310				576.0	0.54
Total for lakes	1,986	48.9	2,923				5,289.5	0.54

^{*}Other--refers to (1) baits other than worms, flies, or worms and spinner, (2) combinations of worms and flies, (3) combinations of worms or flies with other lures, and (4) two or more lures used successively on same trip.

Table 6.--Fishing success by weekly period,
Pigeon River, 1956

Week	Number of trips	Percentage successful	Total catch	Hours fished	Average catch per hour per angler
Apr. 28-May 4	123	21.1	73	276.0	0.18
May 5-May 11	66	31.8	50	193.0	0.23
May 12-May 18	79	36.7	69	185.0	0.31
May 19-May 25	72	41.7	66	182.5	0.32
May 26-June 1	146	31.5	125	445.5	0.26
June 2-June 8	134	28.4	89	400.5	0.20
June 9-June 15	97	24.7	38	308.5	0.11
June 16-June 22	149	27.5	141	478.0	0.28
June 23-June 29	124	20.2	79	279.5	0.28
June 30-July 6	183	29.0	134	537.0	0.25
July 7-July 13	143	20.3	53	371.0	0.12
July 14-July 20	94	11.7	35	263.0	0.09
July 21-July 27	92	16.3	28	257.5	0.09
July 28-Aug. 3	94	21.3	32	242.5	0.15
Aug. 4-Aug. 10	72	13.9	11	214.0	0.05
Aug. 11-Aug. 17	45	13.3	12	155.5	0.14
Aug. 18-Aug. 24	58	22.4	24	157.5	0.16
Aug. 25-Aug. 31	60	33.3	45	162.5	0.22
Sept. 1-Sept. 7	116	23.3	37	346.0	0.13
Sept. 8-Sept. 9	32	21.9	9	72.0	0.15
Total	1,979	24.8	1,150	5,527.0	0.19

Table 7.--Average and total weight of anglers' catch
by weekly period, Pigeon River,
1956

Week	Brook trout			Brown trout			Rainbow trout		
	Num- ber	Total weight (pounds)	Average weight (pounds)	Num- ber	Total weight (pounds)	Average weight (pounds)	Num- ber	Total weight (pounds)	Average weight (pounds)
Apr. 28-May 4	59	11.95	0.20	13	4.57	0.35	1	1.13	1.13
May 5-May 11	45	9.82	0.21	5	1.57	0.31	0	....	....
May 12-May 18	51	9.85	0.19	18	14.24	0.79	0	....	....
May 19-May 25	51	10.23	0.20	15	4.86	0.32	0	....	....
May 26-June 1	86	17.86	0.21	28	12.61	0.45	1	0.41	0.41
June 2-June 8	70	12.93	0.18	19	7.82	0.41	0	....	....
June 9-June 15	29	6.14	0.21	9	4.33	0.48	0	....	....
June 16-June 22	117	25.95	0.22	23	15.52	0.67	1	0.55	0.55
June 23-June 29	50	10.15	0.20	28	12.83	0.46	1	0.54	0.54
June 30-July 6	105	21.30	0.20	26	13.29	0.51	3	1.28	0.43
July 7-July 13	32	6.53	0.20	20	7.72	0.39	1	0.14	0.14
July 14-July 20	26	5.17	0.20	9	6.92	0.77	0	....	....
July 21-July 27	24	4.74	0.20	4	1.83	0.46	0	....	....
July 28-Aug. 3	24	5.58	0.23	8	4.59	0.57	0	....	....
Aug. 4-Aug. 10	10	2.50	0.25	1	0.52	0.52	0	....	....
Aug. 11-Aug. 17	8	1.18	0.15	3	0.37	0.12	1	0.19	0.19
Aug. 18-Aug. 24	13	2.78	0.21	10	2.22	0.22	1	1.12	1.12
Aug. 25-Aug. 31	30	5.94	0.20	13	2.77	0.21	2	1.07	0.54
Sept. 1-Sept. 7	23	3.76	0.16	11	4.42	0.40	3	0.56	0.19
Sept. 8-Sept. 9	6	1.42	0.24	3	0.67	0.22	0	....	....
Total	869	175.78	0.20	266	123.67	0.46	15	6.99	0.47

Table 8.--Fishing success according to frequency of fishing trips,
Pigeon River, 1956

Frequency	Number of anglers	Number of trips	Total catch	Average catch per hour per angler
40	1	40	48	0.42
39	1	39	34	0.32
29	1	29	47	0.58
22	3	66	184	0.90
21	1	21	24	0.45
18	1	18	9	0.30
17	1	17	7	0.24
16	2	32	36	0.46
15	1	15	15	0.48
14	2	28	13	0.12
13	4	52	71	0.49
12	2	24	54	0.61
11	1	11	17	0.58
10	4	40	26	0.15
9	3	27	3	0.04
8	2	16	24	0.48
7	5	35	26	0.17
6	9	54	48	0.27
5	22	110	87	0.28
4	27	108	42	0.15
3	58	174	78	0.13
2	154	308	112	0.13
1	715	715	145	0.06
Total	1,020	1,979	1,150	0.19

Table 9.--Age composition of anglers' catch and average length and weight of age groups, Pigeon River, 1956*

Species	Age group	Number	Average length (inches)	Average weight (pounds)
Brook	I	94	7.3	0.13
	II	684	8.2	0.20
	III	70	9.9	0.33
	IV	7	12.2	0.56
Brown	I	45	7.6	0.15
	II	171	9.9	0.35
	III	32	12.2	0.78
	IV	12	14.9	1.32
	V	4	18.2	2.16
	VIII	1	27.3	6.63
Rainbow	I	6	8.0	0.17
	II	8	11.4	0.60
	IV	1	14.6	1.13

*The ages of 15 trout were not determined.

in the catch on April 28, and the first one-year-old brown trout appeared on June 30; however, yearlings did not appear in substantial numbers until about the first week in July.

The length and weight data of Table 9 suggest that the growth of brown and rainbow trout was somewhat more rapid than that of brook trout; the difference, in fact, may be even greater than indicated by the data since Cooper (1953) has shown that angling exerts a greater bias in favor of the faster-growing individuals among brook than among brown trout. The differential in size between one-year-old fish and two-year-old fish is also probably greater than indicated in Table 9 because the yearlings were taken during the later part of the year after most of the season's growth had been attained, whereas the two-year-old fish were caught throughout the season.

Cooper (1952) determined the rates of exploitation of brook and brown trout in the Pigeon River by comparing the catch with the legal fish estimated (in the fall population study) to remain in the stream at the end of the trout season. He stated that, for brook trout, three fish were caught for each one remaining in the stream after the season, and for brown trout, one fish was caught for each three remaining after the fishing season. In previous annual reports data were given in support of these conclusions; a similar presentation is offered in Table 10 where the rates of exploitation have been calculated for all three species, separating the experimental sections into two groups with different minimum size regulations. For the seven-inch-minimum sections, Cooper's rates of exploitation appear generally to be confirmed. The principal effect of the higher minimum size upon rate of exploitation appears to be that, for brown trout, the rate was accelerated and for brook trout, reduced. It would be normally expected that a higher minimum size would reduce the rate of exploitation since larger trout should be wiser and less susceptible to capture; the reason for the increased rate in the case of brown trout is probably related to the attraction of the higher-minimum-size waters for anglers

Table 10.--Exploitation of wild trout, Pigeon River, 1956

Sections A, B, and E (7-inch minimum)	Species of trout		
	Brook	Brown	Rainbow
Number caught by anglers (7.0 inches and larger)	811	186	11
Population estimate, September (7.0 inches and larger)	114	266	1
Percentage exploitation	87.68	41.15	91.67

Sections C and D (9-inch minimum)	Brook	Brown	Rainbow
Number caught by anglers (9.0 inches and larger)	58	80	4
Population estimate, September (9.0 inches and larger)	14	74	0
Percentage exploitation	80.56	51.95	100.00

who specialized in fishing for larger brown trout. In the 9-inch-minimum-size sections, approximately one legal brown remained in the stream for each one caught. Too few data regarding rainbows were obtained to justify a generalized conclusion.

The classes of anglers visiting the area are shown in Table 11. The figures given are in terms of angler-trips, rather than individual anglers, since this means of expression lends greater accuracy to the interpretation of results in terms of fishing pressure. Approximately 75 percent of the anglers fishing the stream and 65 percent of those fishing the lakes were licensed. Among the stream fishermen, 86 percent were Michigan residents, whereas among lake fishermen, 94 percent were residents.

The greatest amount of fishing pressure in the Pigeon River was supplied by residents of the Detroit-Lansing area, with local fishermen (Otsego and adjoining counties) placing second; few fishermen came from other parts of the state (Table 12). Only two angler-trips were recorded from the Upper Peninsula. This predominance of eastern-Michigan anglers (and also the predominance of Ohio residents among out-of-state anglers) is probably (as noted by Cooper, 1951) the result of convenient access by highway to the Pigeon River from these areas. The distribution of residences of lake fishermen was similar to that of the stream fishermen (Table 13).

Table 14 is offered to show annual trends in fishing pressure and fishing success. Since various experimental management methods have been tested during these years, it would be difficult to interpret the data per se. However, it would appear that fishing quality has successively decreased since 1954 (apparently a particularly favorable year).

Post-season fall population estimate

The method used for estimating the trout population in the experimental stream area of the Pigeon River Trout Research Station is basically the Petersen method of mark-and-recapture. Electrofishing with a direct-current shocker, two

Table 11.--Classes of anglers using the Pigeon River experimental waters, 1956*

	Licensed males	Licensed females	Wives	Minor males	Minor females	Total
S T R E A M						
Resident	1,302	2	186	192	23	1,705 (86.2)
Non-resident	209	13	...	33	19	274 (13.8)
Stream total	1,511 (76.3)	15 (0.8)	186 (9.4)	225 (11.4)	42 (2.1)	1,979
L A K E S						
Resident	1,222	12	269	314	58	1,875 (94.4)
Non-resident	81	7	...	18	5	111 (5.6)
Lake total	1,303 (65.6)	19 (1.0)	269 (13.5)	332 (16.7)	63 (3.2)	1,986

*Percentages in parentheses.

Table 12.--Residence of anglers fishing Pigeon River, 1956

County	Angler trips	County	Angler trips	County or State	Angler trips
Otsego	361	Kent	8	Newaygo	2
Wayne	322	Montmorency	7	St. Joseph	2
Bay	171	Ottawa	7	Allegan	1
Oakland	118	Van Buren	7	Branch	1
Washtenaw	103	Charlevoix	6	Clare	1
Ingham	95	Clinton	6	<u>Wexford</u>	<u>1</u>
Genesee	79	Arenac	5	Total resident	1,705
Shiawassee	50	Emmet	5	Michigan	1,705
Muskegon	41	Jackson	5	Ohio	191
Saginaw	33	Montcalm	5	Indiana	51
Macomb	29	Crawford	4	Illinois	11
St. Clair	28	Gladwin	4	Massachusetts	4
Cheboygan	22	Livingston	4	Wisconsin	4
Midland	21	Mecosta	4	Missouri	3
Alpena	18	Berrien	3	Pennsylvania	3
Gratiot	18	Lenawee	3	New Jersey	2
Presque Isle	18	Monroe	3	New York	2
Barry	15	Sanilac	3	Florida	1
Kalamazoo	15	Tuscola	3	Kansas	1
Calhoun	13	Alcona	2	Maryland	1
Eaton	9	Delta	2		
Isabella	9	Grand Traverse	2	Total	1,979
Roscommon	9	Hillsdale	2		

Table 13.--Residence of anglers fishing Pigeon River lakes, 1956

County	Angler trips	County	Angler trips	County or State	Angler trips
Otsego	298	Emmet	11	Arenac	2
Wayne	228	Antrim	10	Grand Traverse	2
Oakland	144	Jackson	10	Huron	2
St. Clair	133	Monroe	9	Lake	2
Shiawassee	122	Montcalm	7	Newaygo	2
Kalamazoo	118	Branch	6	Clinton	1
Genesee	97	Lapeer	6	Crawford	1
Bay	85	Lenawee	6	Eaton	1
Ingham	61	Mecosta	6	Manistee	1
Cheboygan	59	Oceana	6	Ogemaw	1
Presque Isle	59	Tuscola	6	<u>Roscommon</u>	<u>1</u>
Saginaw	56	Barry	5	<u>Total resident</u>	<u>1,875</u>
Muskegon	54	Benzie	5	Michigan	1,875
Washtenaw	43	Berrien	5	Ohio	81
Charlevoix	33	Ottawa	5	Indiana	16
Gratiot	32	Gladwin	4	Illinois	8
Midland	28	Hillsdale	4	Pennsylvania	2
Macomb	25	Kalkaska	4	Wisconsin	2
Isabella	19	Sanilac	4	Massachusetts	1
Kent	14	Cass	3	<u>Ontario</u>	<u>1</u>
Livingston	12	Montmorency	3	Total	1,986
Calhoun	11	St. Joseph	3		

Table 14.--Results of creel census, Pigeon River, 1949-1956

Year	Number of trips	Percentage successful	Trout caught				Hours fished	Catch per hour ^{***}
			Brook	Brown	Rainbow	Total		
1949	2,233	26.3	793	198	57	1,048	6,817.0	0.15
1950	2,160	27.3	917	255	18	1,190	6,195.0	0.19
1951 [†]	2,850	15.4	453	228	10	691	7,066.0	0.10
1952 [†]	1,453	24.5	463	128	47	638	3,957.5	0.16
1953 [†] [†]	1,943	25.0	742	203	88	1,033	5,689.5	0.18
1954 [†]	2,427	32.8	1,435	437	66	1,938	6,584.5	0.29
1955 [†]	2,039	25.3	961	250	33	1,242	5,775.5	0.22
1956 [†]	1,979	24.8	869	266	15	1,150	5,527.0	0.21

[†] Annual reports on the Pigeon River creel census were not completed in 1951-1953, years when a senior biologist was not assigned to the Pigeon River Station. Data presented here are tentative, pending the completion of the more detailed reports for these years (currently being prepared).

[†] Section E added in 1953.

^{***} Data necessary to compute "catch per hour per trip" are not available for early years.

runs were made through the 6 miles of stream (5 experimental sections). Trout were marked by clipping the top corner of the caudal fin on the first run and the appropriate data recorded so that estimates could be made for each species, size group, and experimental section. A detailed description of the method used was given in Institute for Fisheries Research report No. 1512 (Waters, 1957a).

Table 15 presents the results of the fall population estimate. The data are grouped into the original size classifications in which four basic computations were made. The estimate showed a total of 8,753 brook, 1,703 brown, and 157 rainbow trout, of all sizes, for the six miles of stream, representing a total of 17.8 pounds per acre.

The post-season population of trout in the Pigeon River showed a trend toward an increase from 1949 to 1954, with a maximum in 1954, and successive decreases from 1954 to 1956 (Table 16).

Table 15.--Results of post-season population estimate (wild trout only),
Pigeon River, 1956

Stream section	Species of trout	Total length (inches)										Pounds per acre
		0-3.9		4.0-6.9		7.0-9.9		> 9.9		All sizes		
		Number	Weight (pounds)	Number	Weight (pounds)	Number	Weight (pounds)	Number	Weight (pounds)	Number	Weight (pounds)	
A	Brook	430	6.0	184	11.3	29	4.7	5	3.8	648	25.8	3.6
	Brown	189	2.7	61	3.8	33	6.4	22	19.5	305	32.4	4.5
	Rainbow	6	0.1	0	0.0	1	0.2	0	0.0	7	0.3	0.1
	Total	625	8.8	245	15.1	63	11.3	27	23.3	960	58.5	8.2
B	Brook	635	8.3	200	12.3	22	4.1	0	0.0	857	24.7	4.2
	Brown	315	4.4	75	4.0	78	14.4	29	44.4	497	67.2	11.4
	Rainbow	34	0.4	1	0.1	0	0.0	0	0.0	35	0.5	0.1
	Total	984	13.1	276	16.4	100	18.5	29	44.4	1,389	92.4	15.7
C	Brook	1,769	24.1	563	33.1	30	13.5	1	0.7	2,413	71.4	13.2
	Brown	268	3.8	56	3.0	117	20.9	36	36.2	477	63.9	11.9
	Rainbow	57	0.8	2	0.2	12	1.9	0	0.0	71	2.9	0.5
	Total	2,094	28.7	621	36.3	209	36.3	37	36.9	2,961	138.2	25.6
D	Brook	1,559	20.8	500	33.8	97	16.4	1	0.9	2,157	71.9	12.7
	Brown	53	0.8	44	3.1	124	21.6	29	26.1	250	51.6	9.1
	Rainbow	38	0.5	1	0.1	5	0.8	0	0.0	44	1.4	0.2
	Total	1,650	22.1	545	37.0	226	38.8	30	27.0	2,451	124.9	22.1
E	Brook	1,990	26.3	630	39.3	52	9.5	6	3.1	2,678	78.2	13.8
	Brown	43	0.4	27	2.0	85	14.7	19	19.7	174	36.8	6.5
	Rainbow	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0.0
	Total	2,033	26.7	657	41.3	137	24.2	25	22.8	2,852	115.0	20.3
All sections	Brook	6,383	85.5	2,077	129.8	280	48.2	13	8.5	8,753	272.0	9.1
	Brown	868	12.1	263	15.9	437	78.0	135	145.9	1,703	251.9	8.5
	Rainbow	135	1.8	4	0.4	18	2.9	0	0.0	157	5.1	0.2
	Total	7,386	99.4	2,344	146.1	735	129.1	148	154.4	10,613	529.0	17.8

Table 16.--Post-season population estimate of wild trout,
Pigeon River, 1949-1956

Year	Number	Weight (pounds)	Pounds per acre	Number	Weight (pounds)	Pounds per acre	Number	Weight (pounds)	Pounds per acre
	Section A			Section B			Section C		
1949	585	48.2	6.7	1,373	91.7	15.5	3,287	148.4	27.5
1950	930	61.2	8.5	2,334	140.9	23.9	2,460	141.2	26.2
1951	1,380	74.7	10.4	3,063	134.8	22.9	4,322	180.7	33.5
1952	1,454	85.3	11.9	3,714	117.8	20.0	6,406	234.1	43.4
1953	2,249	127.3	17.8	3,287	173.2	29.4	5,022	354.9	65.8
1954	2,285	90.3	12.6	4,005	218.2	37.0	5,011	307.7	57.1
1955	1,545	100.6	14.1	1,888	107.2	18.2	3,523	192.1	35.6
1956	960	58.4	8.1	1,389	92.3	15.7	2,961	138.2	25.6
	Section D			Section E			All sections		
1949	2,491	135.6	24.0	...	...	...	7,736	423.9	17.6
1950	4,525	231.2	40.9	...	...	...	10,249	574.5	23.8
1951	5,746	336.8	59.6	...	...	...	14,511	727.0	30.2
1952	5,348	266.0	47.1	...	...	...	16,922	703.2	29.2
1953	4,080	304.0	53.8	3,681	229.2	40.4	18,319	1,188.6	39.9
1954	4,503	286.3	50.7	5,313	226.1	39.9	21,117	1,128.6	37.9
1955	2,749	200.2	35.4	2,705	156.0	26.0	12,410	756.1	25.4
1956	2,451	124.8	22.1	2,852	114.8	20.3	10,613	528.5	17.8

Section E added in 1953.

Literature cited

Cooper, Edwin L.

1950. Pigeon River Trout Research Area, Initial report of fishing, 1949. Mich. Inst. for Fish. Res., Report No. 1250, unpublished, 53 pp.
1951. Pigeon River Trout Research Area, Second annual report of fishing, 1950. Mich. Inst. for Fish. Res., Report No. 1288, unpublished, 81 pp.
1952. Rate of exploitation of wild eastern brook trout and brown trout populations in the Pigeon River, Otsego County, Michigan. Trans. Am. Fish. Soc., 81 (1951):224-234.
1953. Growth of brook trout (Salvelinus fontinalis) and brown trout (Salmo trutta) in the Pigeon River, Otsego County, Michigan. Pap. Mich. Acad. Sci., Arts, and Lett., 38 (1952): 151-162.

Waters, Thomas F.

- 1957a. Report of sixth annual creel census, Pigeon River Trout Research Station, 1954. Mich. Inst. for Fish. Res., Report No. 1512, unpublished, 33 pp.
- 1957b. The seventh annual creel census, Pigeon River Trout Research Station, 1955. Mich. Inst. for Fish. Res., Report No. 1521, unpublished, 27 pp.

Appendix

Special research projects in progress

Since detailed treatment of all special research projects will be made in separate reports, no experimental data or conclusions are given here. However, brief descriptions of special projects in progress at the Pigeon River station during 1956 follow:

1. Testing of a higher minimum size in the Pigeon River. A nine-inch minimum has been in effect in Section C and D since 1951. The effects of the special regulation will be evaluated through the creel census and fall population studies. Scheduled date of completion: not definite.

2. Testing of trout trained by Psychological Research Services. Plantings of trained trout were begun in the Pigeon River experimental area in 1953, with plantings being made in both the stream and lakes. No plantings were made during 1956 relative to this project. For results, see Michigan Institute for Fisheries Research Report No. 1510.

3. Fingerling trout planting--Pigeon River lakes (project 30f). This project was initiated in 1952 to determine the survival to the creel of fingerling brook trout planted in the lakes in the fall. Lakes included in this project are South Twin, North Twin, Lost, West Lost, Ford, and Hemlock. Since the advent of pellet feeding in the hatcheries and the consequent increase in growth of hatchery trout, the size of trout planted in the fall was increased this year (1956) to 5 to 6 inches, rather than fingerling size. Scheduled date of completion: not definite.

4. Planting of sub-legal brook and brown trout to compensate for lack of natural spawning (project 27k). This project was initiated in 1952 with the stocking of fingerling brook and brown trout in Section A of the experimental area where natural reproduction had been extremely low. Plantings of 2,500 brook and 500 brown trout have been made each year from 1952 through 1955. Returns are still to be expected in the 1957 anglers' catch, after which a report will be prepared.

5. Effects of stream improvement on density of trout populations (project 26b). Stream improvement structures were constructed in Section A of the experimental area in 1953; this section of stream had previously been wide and shallow, with shifting sand and little natural cover. Evaluation of the structures will be made by comparisons of anglers' catch and population estimates before and after construction (report being prepared).

6. Pool construction as a tool for trout management (project 26c). A series of pools was dredged in 1953 in the Pigeon River immediately upstream from the Red Bridge (Cheboygan County, east of Wolverine) in an area of stream that previously had few pools and little natural cover. Evaluation of the method will be made by population estimates before and after the dredging to determine the effects of pool construction on the density of trout populations (see I.F.R. Report No. 1528).

7. Spring plantings of sub-legal trout in streams (project 27n). This project, designed to determine if sub-legal trout planted in the spring would contribute to the anglers' catch during the same or succeeding seasons, was initiated on Gamble Creek (Rifle River Area), and Hunt and Fuller creeks (Hunt Creek station) as well as on Section E of the Pigeon River, in the spring of 1953. In Section E of the Pigeon River,

equal numbers of brook and rainbow trout, half fin-clipped and half with serially numbered jaw tags, were planted in the springs of 1953, 1954 and 1955. Evaluation of the method will be made through creel census and fall population estimates (report being prepared).

8. Kidney-disease in trout in Michigan (project 6h). A portion of the field phase of this project, supervised by Dr. Leonard N. Allison, was initiated during 1955 on this area with the planting in South Twin Lake of fingerling brook trout known to be infected with kidney-disease. This planting was made in lieu of the regular fingerling planting in this lake to investigate the possibility of establishment of kidney-disease in lakes by stocking diseased fish. Kidney-disease-infected brook trout were also planted in 1956, which completed the plantings relative to this project at this station.

9. Effect of fly-fishing-only regulations on brook trout in lakes (project 29j). In 1955, a special regulation of "artificial flies only" was imposed on Ford Lake to determine if this special regulation would increase the anglers' catch. In the fall of 1956, population studies were conducted in Ford Lake and in Hemlock Lake, where other lures are permitted, to compare the mortalities in these two lakes with and without "artificial flies only" regulations. Population estimates will continue to be made in the fall and in the spring to determine the source of the mortality. Scheduled date of completion: not definite.

10. Growth, survival and harvest of brook trout fry planted in a lake (project 27s). A planting of 3,000 brook trout fry has been made each spring since 1952 in Section 4 Lake. In 1956, the collection of samples for growth, fall population studies, and scale collections from the anglers' catch were initiated. Scheduled date of completion: not definite.

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