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THE NINTH ANNUAL CREEL CENSUS, PIGEON RIVER TROUT
RESEARCH STATION, 1957

By

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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 limestone sinks or 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 about 1.2 miles long, was added at the upstream end of the controlled area. This addition increased the total length of the experimental area 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. He may fish each day in as many sections of the river or individual lakes as he desires, so long as he reports back at the end of fishing in each water.

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

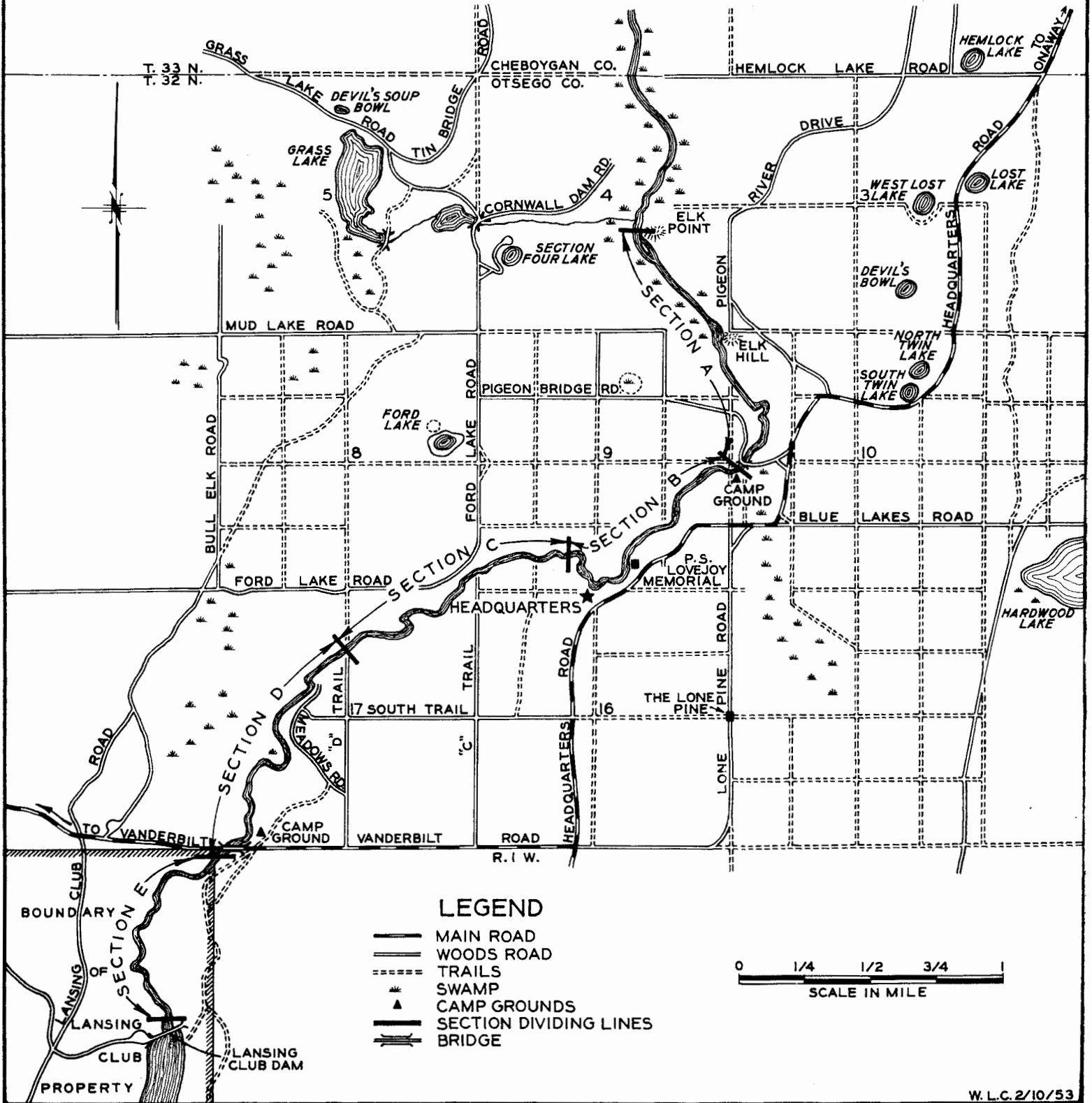


Figure 1

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 Bacon, Shetter and Cooper, 1958. Width of Section E was estimated by Waters (1957a).

The creel census serves as a tool in evaluation of experimental methods of trout management, such as special regulations, methods of planting, etc., as well as providing information concerning the basic biology of trout. 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, 1521, 1527 (Waters, 1957a, 1957b, 1957c) and 1544 (Bacon, Shetter and Cooper, 1958).

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 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 special research projects, some of which may or may not utilize the creel census as a research tool, and some of which are conducted on waters outside the area under creel census. The results of these special projects are 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 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 here.

During 1957, except for the last three weeks of December, the research station was under the supervision of Thomas F. Waters. Gerald F. Myers supervised the station during the remainder of the year. The rest of the permanent staff consisted of Harold H. Brado and Doyle E. Edson. Additional assistance was provided during the opening two days of the fishing season and post-season fall population study by Gayle D. Betts. Most of the tables in this report were partially prepared by Dr. Waters before he left to become an assistant professor of zoology in the University of Minnesota; they were completed by Mr. Myers. Supervisory assistance, in 1957, 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. The regulations will be evaluated in separate reports; however, they are summarized in Table 2, to aid in an interpretation of the creel census results.

On May 15, 1957, the earthen dam, located on the privately owned Pigeon River Falls property at the upstream-end of Section E, washed out after a heavy rain. A floating log jammed the spillway gate and, although station personnel helped the caretaker remove the log as quickly as possible, the dam could not be saved. The water from the 65-acre impoundment flooded the Pigeon River. Some 300 acre-feet of water washed through the six miles of experimental stream in about six

Table 2.--Experimental regulations, Pigeon River and
Pigeon River lakes, 1949-1957

Years	Water and regulations ^{1/}							
	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)		
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
1955-57	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 1955-1957.

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

hours, at 10 to 20 times the normal flow of the river. The U. S. Geological Survey recording stream-level gauge, four miles downstream, reached its maximum, more than four feet above normal. Later, it was calculated that the water at this gauge reached a height of 6.8 feet. In many places large areas of sod were peeled back from the river's edge. Stumps, logs and huge uprooted trees were piled on the banks high above normal water level. Much natural cover was ripped out, as well as numerous stream improvement devices. Layers of sand and silt were deposited on the inside of the bends of the river, and Section E, the bottom of which before was mostly gravel, was practically covered with shifting sand.^{1/} Some of the immediate effects that the flood had on the trout population and the fishing are noted below. Only in the future will the long term effects on fishing, the fish population and the experiments in progress become apparent.

Table 3 presents the catch statistics for 1957 for the stream sections. Fishing pressure and catch were considerably lower than in any year since 1953, the year that Section E was added to the experimental water. The fishing quality was only slightly lower than in 1956; the average catch per hour per angler in 1957 was 0.18, as compared to 0.19 in 1956. In previous years over half of the total trout catch was from Section E (brook trout predominate in this section) but in 1957 only 39 percent of the catch was from there. Undoubtedly, the lower total catch for the entire 6 miles of experimental water was influenced by low fishing pressure and poor fishing conditions after the flood. The largest portion of the catch is usually made during late spring and early summer, the time when the effects of the flood were most apparent upon the stream. The total catch in the week following the flood was only two fish, while the average catch

^{1/}Most of the above paragraph was taken from a 1958 unpublished report of the flood by Thomas F. Waters.

Table 3.--Results of creel census on experimental stream sections,
Pigeon River Trout Research Station, 1957

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	336	33.0	221	39.66	30	13.98	7	1.46	258	55.10	848.5	0.28
B	447	23.9	143	27.80	46	19.18	9	1.84	198	48.82	931.5	0.19
C	202	11.4	18	7.98	10	5.55	0	0.00	28	13.53	614.5	0.04
D	371	9.2	26	10.03	16	10.88	1	0.42	43	21.33	1,015.5	0.05
E	343	35.0	313	76.83	18	12.61	0	0.00	331	89.44	1,080.0	0.28
Total	1,699	23.2	721	162.30	120	62.20	17	3.72	858	228.22	4,490.0	0.18

in that week for the previous three years was 85. The catch made during the four weeks in 1957 following the flood was 175 while the average for the corresponding four weeks during the previous three years was 395; likewise the number of hours fished in 1957 for the four-week period was only 890 as compared to the average of 1,415 for the same period of the past three years. When post-season estimates of numbers of fish left in the stream were made, there was no indication of a decrease in the total population in the experimental waters (see below).

Further perusal of Table 3 shows that the fishing quality and total catch were again poorer in Sections C and D than in other sections, probably due to the higher minimum size in effect in these two sections.

Table 4 presents the catch statistics for the Pigeon River lakes. The fishery consists entirely of hatchery brook trout planted as fingerlings in the fall, with the exception of Section 4 Lake where brook trout fry are planted in the spring. Fishing success was slightly below that of 1956, but still much better than in the experimental stream sections.

In both Tables 3 and 4, catch per hour per angler was determined by taking a simple average of the catch per hour for each fishing trip.

When fishing success was evaluated according to type of lure used, it was noted that stream anglers using flies had a slightly greater catch per hour than those using other lures (Table 5), but worms were used most frequently and were responsible for a greater part of the catch than any other lure. The lesser catch by the fly fishermen is a contradiction of data from previous years. Probably this can also be attributed to poor fly fishing conditions in the stream immediately after the flood, which occurred at a time of year when fly fishing is at its best. In the lakes, worms were used most frequently, and with greater success than flies, both in terms of total catch and catch per hour.

Table 4.--Results of creel census on Pigeon River lakes, 1957

Lake	Number of trips	Percentage successful	Anglers' catch (brook trout)	Hours fished	Average catch per hour per angler (number of fish)
Ford	175	40.0	199	417.5	0.43
Section 4	168	25.6	110	408.5	0.21
Hemlock	383	46.5	579	992.5	0.61
Lost	179	33.5	160	408.5	0.34
West Lost	204	36.8	185	500.0	0.31
North Twin	333	58.0	538	900.5	0.61
South Twin	426	37.6	446	921.0	0.56
Total	1,868	41.7	2,217	4,548.5	0.49

Table 5.--Fishing success according to lure used, Pigeon River

Trout Research Station, 1957

Lure	Number of trips	Percentage successful	Number of trout caught				Hours fished	Average catch per hour per angler (number of fish)
			Brook	Brown	Rainbow	Total		
S T R E A M								
Worms	610	17.4	203	30	4	237	1,521.0	0.12
Worms and spinner	316	26.3	161	17	3	181	957.0	0.16
Flies	496	29.2	231	57	7	295	1,207.5	0.25
Minnows	15	26.7	12	0	0	12	49.5	0.20
Insects	10	40.0	5	1	0	6	19.5	0.23
Artificials ¹	37	21.6	9	5	1	15	93.5	0.21
Natural baits ²	3	33.3	1	0	0	1	11.0	0.10
Other ³	211	20.8	99	10	2	111	630.0	0.17
Unknown	1	0.0	0	0	0	0	1.0	0.00
Total for stream	1,699	23.2	721	120	17	858	4,490.0	0.18
L A K E S								
Worms	996	45.2	1,331				2,430.5	0.56
Worms and spinner	365	40.0	410				885.5	0.46
Flies	82	40.2	67				188.0	0.37
Minnows	...	....	...				....	....
Insects	2	100.0	4				6.5	0.65
Artificials ¹	39	20.5	16				85.5	0.17
Natural baits ²	18	11.1	2				37.0	0.05
Other ³	191	35.6	188				498.0	0.33
Unknown	...	....	...				....	....
Ford Lake (flies)	175	40.0	199				417.5	0.43
Total for lakes	1,868	41.7	2,217				4,548.5	0.49

¹Artificial lures other than flies.

²Natural baits other than worms, minnows or insects.

³Other refers to a combination of the above lures, two or more lures used successively on same trip or a lure other than listed above.

Table 6 gives the catch statistics for the stream by weekly periods, and Table 7 gives the number of trout, average weight and total weight, by species, for weekly periods. In addition to the usual decrease in fishing success in July, these tables show a decrease in fishing success for about two weeks immediately following the May 15 flood.

Table 8 shows fishing success arranged according to the number of times that individual anglers fished. With few exceptions (note anglers fishing 25 and 19 times) anglers who fished many times were more successful than those who fished only once or twice. Computing from Table 8, 29 percent of the anglers caught 79 percent of the fish, and 8 percent of the fishermen caught 51 percent of the fish.

Table 9 gives the age, length and weight of fish in the anglers' catch. Two-year-olds predominated among brook and brown trout, one-year-olds among rainbow trout. 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 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 anglers catch more of the faster-growing individuals among brook trout than among brown trout. Also, the differential in size between one-year-old and two-year-old fish is probably greater than indicated in Table 9 because most of the one-year-olds were taken during the later part of the fishing season after most of the season's growth had taken place, whereas the catch of the two-year-old fish was spread more uniformly throughout the season.

Cooper (1952) determined the rates of exploitation of brook and brown trout in the Pigeon River by comparing the season's catch with the population

Table 6.--Fishing success by weekly period,
Pigeon River, 1957

Week	Number of trips	Percentage successful	Total catch of trout	Hours fished	Average catch per hour per angler (number of fish)
Apr. 27-May 3	116	18.1	59	297.5	0.15
May 4-May 10	109	36.7	122	305.5	0.34
May 11-May 17	44	34.1	27	126.5	0.20
May 18-May 24	30	6.7	2	47.0	0.04
May 25-May 31	102	16.7	43	263.5	0.14
June 1-June 7	128	35.2	101	395.5	0.29
June 8-June 14	75	14.7	29	184.0	0.17
June 15-June 21	68	23.5	35	149.5	0.21
June 22-June 28	59	27.1	47	153.5	0.29
June 29-July 5	128	26.6	73	307.5	0.19
July 6-July 12	122	27.0	62	355.0	0.19
July 13-July 19	75	36.0	56	205.0	0.26
July 20-July 26	105	17.1	30	226.5	0.11
July 27-Aug. 2	59	15.2	11	129.5	0.09
Aug. 3-Aug. 9	103	17.5	24	300.5	0.08
Aug. 10-Aug. 16	103	17.5	28	284.5	0.10
Aug. 17-Aug. 23	78	23.1	35	203.5	0.16
Aug. 24-Aug. 30	105	18.1	33	316.0	0.09
Aug. 31-Sept. 6	74	16.2	26	191.5	0.12
Sept. 7-Sept. 8	16	37.5	15	48.0	0.34
Total	1,699	23.2	858	4,490.0	0.18

Table 7.--Average and total weight of anglers' catch by weekly period, Pigeon River, 1957

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. 27-May 3	53	11.36	0.21	6	2.28	0.38	0	...	...
May 4-May 10	110	22.72	0.21	12	5.90	0.49	0	...	...
May 11-May 17	23	4.20	0.18	4	1.40	0.35	0	...	...
May 18-May 24	0	...	...	1	0.21	0.21	1	0.12	0.12
May 25-May 31	35	13.18	0.38	8	4.00	0.50	0	...	...
June 1-June 7	92	24.39	0.27	9	4.06	0.45	0	...	...
June 8-June 14	27	5.78	0.21	2	1.82	0.91	0	...	...
June 15-June 21	32	5.94	0.19	2	0.45	0.22	1	0.18	0.18
June 22-June 28	41	8.18	0.20	5	2.12	0.42	1	0.42	0.42
June 29-July 5	58	13.10	0.23	14	6.21	0.44	1	0.17	0.17
July 6-July 12	46	10.04	0.22	13	5.79	0.45	3	0.62	0.21
July 13-July 19	46	10.28	0.22	9	7.84	0.87	1	0.23	0.23
July 20-July 26	25	3.93	0.16	3	1.56	0.52	2	0.44	0.22
July 27-Aug. 2	8	1.68	0.21	2	2.89	1.44	1	0.24	0.24
Aug. 3-Aug. 9	16	3.34	0.21	7	3.37	0.48	1	0.16	0.16
Aug. 10-Aug. 16	24	5.06	0.21	4	1.30	0.32	0	...	...
Aug. 17-Aug. 23	26	6.14	0.24	7	6.44	0.92	2	0.42	0.21
Aug. 24-Aug. 30	25	5.98	0.24	8	1.62	0.20	0	...	...
Aug. 31-Sept. 6	23	4.84	0.21	2	2.58	1.29	1	0.32	0.32
Sept. 7-Sept. 8	11	2.13	0.19	2	0.37	0.18	2	0.40	0.20
Total	721	162.27	0.22	120	62.21	0.52	17	3.72	0.22

Table 8.--Fishing success according to frequency of fishing trips,
Pigeon River, 1957

Frequency	Number of anglers	Number of trips	Total catch	Average catch per hour per angler (number of fish)
25	1	25	8	0.08
24	1	24	28	0.61
20	2	40	50	0.36
19	1	19	9	0.12
15	1	15	10	0.17
14	1	14	30	1.04
13	4	52	36	0.25
12	4	48	32	0.26
11	3	33	30	0.26
10	3	30	22	0.46
9	3	27	27	0.59
8	5	40	6	0.10
7	6	42	34	0.28
6	11	66	47	0.16
5	7	35	10	0.11
4	20	80	56	0.24
3	41	123	101	0.26
2	151	302	145	0.14
1	684	684	177	0.09
Total	949	1,699	858	0.18

Table 9.--Age composition of anglers' catch and average length and weight of age groups, Pigeon River, 1957*

Species	Age group	Number	Average length (inches)	Average weight (pounds)
Brook	I	322	7.5	0.16
	II	331	8.4	0.24
	III	57	10.6	0.50
	IV	2	13.8	1.15
Brown	I	38	7.8	0.17
	II	56	10.4	0.44
	III	20	13.9	1.11
	IV	4	14.4	1.32
	V	2	16.2	1.74
Rainbow	I	16	8.3	0.21
	II	1	10.5	0.42

*The ages of 9 brook trout were not determined.

left at the end of the season (fall population count by shocker). He found that three brook trout were caught for each one remaining in the stream at the end of the season, and that one brown trout was caught for each three remaining. The greater angler exploitation of brook trout than of brown trout in the Pigeon River was confirmed by records for the 1954-1956 seasons (annual reports by Waters). For 1957, rates of exploitation were calculated separately according to prevailing minimum size limits (Table 10). For Sections A, B and E combined, with a seven-inch limit, anglers caught three brook trout for each one left, and one brown trout for each two left. However, under the nine-inch limit in Sections C and D, the exploitation ratio for brook trout was one to one, and for brown trout still one to two. Too few data for rainbows were obtained to justify a general conclusion (Table 10).

Table 11 gives the percentages of the fishing done by licensed anglers, and by non-licensed anglers, i.e., wives or minors, in terms of angler-trips. Licensed anglers accounted for approximately 75 percent of the angling on streams, and slightly more than 65 percent of that on the lakes. The rest of the fishing was done by non-licensed anglers. Among stream fishermen, 86 percent of the fishing was by Michigan residents; among lake fishermen, 95 percent was by Michigan residents.

The greatest amount of fishing pressure in the Pigeon River was supplied by residents of the Detroit area (Wayne County), with local fishermen (Otsego County) placing second (Table 12). Only one angler-trip was recorded for Upper Peninsula residents. Of the 83 counties in Michigan, 53 were represented by at least one angler. Ohio and Indiana contributed most of the out-of-state anglers.

Table 13 shows the place of residence of anglers who fished on the lakes. The distribution is similar to that on the stream, except that Otsego County residents did the most fishing.

Table 10.--Exploitation of wild trout, Pigeon River, 1957

Sections A, B and E (7-inch minimum)	Species of trout		
	Brook	Brown	Rainbow
Number caught by anglers (7.0 inches and larger)	677	94	16
Population estimate, September (7.0 inches and larger)	249	158	14
Percentage exploitation	73.11	37.30	53.33
<hr/>			
Sections C and D (9-inch minimum)			
Number caught by anglers (9.0 inches and larger)	44	26	1
Population estimate, September (9.0 inches and larger)	36	63	1
Percentage exploitation	55.00	29.21	50.00

Table 11.--Classes of anglers using the Pigeon River experimental waters, 1957

Percentages are given in parentheses

	Licensed males	Licensed females	Wives	Minor males	Minor females	Total
S T R E A M						
Resident	1,068	7	161	196	21	1,453 (85.5)
Non-resident	172	17	...	36	21	246 (14.5)
Stream total	1,240 (73.0)	24 (1.4)	161 (9.5)	232 (13.7)	42 (2.5)	1,699
L A K E S						
Resident	1,163	14	233	307	50	1,767 (94.6)
Non-resident	71	14	...	12	4	101 (5.4)
Lake total	1,234 (66.1)	28 (1.5)	233 (12.5)	319 (17.1)	54 (2.9)	1,868

Table 12.--Residence of anglers fishing Pigeon River, 1957

County	Angler trips	County	Angler trips	County or State	Angler trips
Wayne	385	Gladwin	8	Wexford	2
Otsego	184	Kalamazoo	8	Branch	1
Genesee	141	Berrien	7	Clare	1
Bay	118	Charlevoix	7	Keweenaw	1
Oakland	84	Grand Traverse	7	Lapeer	1
Ingham	66	Montmorency	6	Montcalm	1
Washtenaw	61	Eaton	5	Newaygo	1
Macomb	53	Emmet	5	Oscoda	1
Isabella	41	Clinton	5	<u>Sanilac</u>	<u>1</u>
Midland	32	Monroe	5	<u>Total resident</u>	<u>1,453</u>
Shiawassee	32	Alpena	4	Michigan	1,453
Muskegon	28	Huron	4	Ohio	164
Saginaw	21	Livingston	4	Indiana	35
Kent	18	Gratiot	3	Illinois	24
Lenawee	15	Ionia	3	Wisconsin	9
St. Joseph	12	Tuscola	3	Pennsylvania	5
Cheboygan	11	Van Buren	3	Louisiana	3
Jackson	10	Allegan	2	California	3
St. Clair	9	Calhoun	2	Florida	1
Ottawa	9	Crawford	2	Kentucky	1
Arenac	8	Manistee	2	<u>New York</u>	<u>1</u>
Barry	8	Roscommon	2	Total	1,699

Table 13.--Residence of anglers fishing Pigeon River lakes, 1957

County	Angler trips	County	Angler trips	County or State	Angler trips
Otsego	266	Kent	18	Oscoda	3
Wayne	249	Livingston	13	Sanilac	3
Oakland	126	Emmet	12	Branch	2
St. Clair	100	Alpena	12	Calhoun	2
Genesee	99	Barry	9	Clare	2
Bay	94	Jackson	9	Huron	2
Shiawassee	89	Hillsdale	7	St. Joseph	2
Presque Isle	79	Lenawee	7	Tuscola	2
Ingham	66	Mecosta	7	Alcona	1
Muskegon	58	Montcalm	7	Berrien	1
Kalamazoo	54	Montmorency	7	Grand Traverse	1
Cheboygan	48	Van Buren	7	<u>Ottawa</u>	<u>1</u>
Saginaw	46	Crawford	6	<u>Total resident</u>	<u>1,767</u>
Charlevoix	42	Oceana	6	Michigan	1,767
Midland	34	Benzie	5	Ohio	62
Gratiot	32	Clinton	5	Indiana	20
Macomb	31	Iosco	5	Illinois	16
Washtenaw	29	Lapeer	5	California	2
Isabella	26	Roscommon	5	<u>Missouri</u>	<u>1</u>
Eaton	21	Allegan	4	Total	1,868

Table 14 gives annual totals of fishing pressure and fishing success for the Pigeon River (experimental waters) since 1949. Since various experimental management methods have been tested during these years, interpretation of the data is somewhat complicated. However, it would appear that fishing quality has successively decreased since 1954 (apparently a particularly favorable year) and, of course, the 1957 catch was adversely affected by the flood.

Post-season fall population estimate

The fall population of trout in the experimental area of the Pigeon River is determined by the Petersen method of mark-and-recapture (see Waters, 1957a). Two runs with a direct-current shocker are made through the 6 miles of stream (5 experimental sections). Trout caught on the first run are marked by clipping the top corner of the caudal fin; length is recorded and they are liberated where they are caught. Records of marked and unmarked fish from the second run enable one to estimate the population by species, size group and experimental section.

Table 15 presents the results of the 1957 fall population estimate, by stream section, species, and four length groups of fish. The total population for the six miles of river was 8,844 brook, 1,943 brown and 40 rainbow trout, or 17.5 pounds of trout per acre.

We now have some observations on the effect of the May 15 flood on trout in the Pigeon River. Immediately after the flood subsided, station personnel walked several miles of stream bank and found only one dead trout. Fortunately a population estimate had been made on a portion of Section E during April of 1957; an estimate on the same part of Section E was repeated shortly after the flood occurred. About the same density of trout was found but the study did not include young-of-the-year fish which were too small to collect.²

²Above facts taken from a 1958 unpublished report of the flood by Thomas F. Waters.

Table 14.--Results of creel census, Pigeon River, 1949-1957

Year	Number of trips	Percentage successful	Trout caught				Hours fished	Average catch per hour per angler (number of fish)
			Brook	Brown	Rainbow	Total		
1949	2,233	26.2	793	198	57	1,048	6,817.0	0.15
1950	2,160	27.3	917	255	18	1,190	6,195.0	0.18
1951	2,846	15.4	453	228	10	691	7,076.0	0.10
1952	1,450	24.5	464	127	47	638	3,957.5	0.16
1953↓	1,943	24.9	742	203	88	1,033	5,689.0	0.23
1954↓	2,427	32.8	1,435	437	66	1,938	6,584.5	0.30
1955↓	2,039	25.3	959	250	33	1,242	5,775.5	0.20
1956↓	1,979	24.8	869	266	15	1,150	5,527.0	0.19
1957↓	1,699	23.2	721	120	17	858	4,490.0	0.18

↓Section E added in 1953.

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

Pigeon River, 1957

Stream section	Species of trout	Total length (inches)										
		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)	Pounds per acre
A	Brook	327	4.3	125	5.9	44	8.0	...	...	496	18.2	2.5
	Brown	351	4.8	51	2.2	37	7.6	24	28.0	463	42.6	6.0
	Rainbow	2	0.1	1	0.1	8	1.6	...	...	11	1.8	0.3
	Total	680	9.2	177	8.2	89	17.2	24	28.0	970	62.6	8.8
B	Brook	811	10.7	170	9.3	28	4.3	4	2.9	1,013	27.2	4.6
	Brown	637	8.7	76	2.9	42	7.9	24	23.3	779	42.8	7.2
	Rainbow	2	0.1	1	0.1	4	0.8	...	...	7	1.0	0.2
	Total	1,450	19.5	247	12.3	74	13.0	28	26.2	1,799	71.0	12.0
C	Brook	2,189	30.3	524	28.4	210	36.5	3	1.3	2,926	96.5	17.9
	Brown	359	5.1	63	2.4	50	10.1	23	19.9	495	37.5	7.0
	Rainbow	10	0.1	...	...	5	1.0	...	...	15	1.1	0.2
	Total	2,558	35.5	587	30.8	265	47.6	26	21.2	3,436	135.1	25.1
D	Brook	1,729	23.4	615	41.8	203	34.1	16	10.1	2,563	109.4	19.4
	Brown	76	1.1	25	1.0	29	6.5	27	27.8	157	36.4	6.4
	Rainbow	2	0.1	1	0.1	1	0.2	1	0.7	5	1.1	0.2
	Total	1,807	24.6	641	42.9	233	40.8	44	38.6	2,725	146.9	26.0
E	Brook	1,107	14.9	566	43.5	166	27.9	7	2.9	1,846	89.2	15.7
	Brown	8	0.1	10	0.5	18	3.8	13	12.3	49	16.7	2.9
	Rainbow	...	...	...	...	2	0.4	...	...	2	0.4	0.1
	Total	1,115	15.0	576	44.0	186	32.1	20	15.2	1,897	106.3	18.7
All sections	Brook	6,163	83.6	2,000	128.9	651	110.8	30	17.2	8,844	340.5	11.4
	Brown	1,431	19.8	225	9.0	176	35.9	111	111.3	1,943	176.0	5.9
	Rainbow	16	0.4	3	0.3	20	4.0	1	0.7	40	5.4	0.2
	Total	7,610	103.8	2,228	138.2	847	150.7	142	129.2	10,827	521.9	17.5

Another source of information on the effect of the May 15 flood is the 1956 and 1957 fall population figures for all experimental sections of river. There were more legal-size trout in the river in September of 1957 than in September of 1956 (989 compared to 883), and young-of-the-year were more numerous in 1957 than in 1956 (7,610 as compared to 7,386). Thus the flood did not decimate the trout in the six miles of experimental stream. However, there was a considerable reduction of trout in Section E where the flood had the greatest physical effect on the river. The trout population in Section E had 955 (918 young-of-the-year) fewer trout in 1957 than in 1956. The decrease in Section E may have been caused by a flushing of fry downstream, or by fish leaving a poor habitat where productive gravel had been covered by shifting sand. It has been clearly demonstrated that a trout population may not be immediately damaged by a major flood, but what the long-term results will be is yet to be seen. Presumably, the covering of much of the gravel with shifting sand will be injurious to spawning and to food production, and the removal of much of the cover may be deleterious to the trout population.

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 until 1957 (Table 16).

Table 16.--Post-season population estimate of wild trout,
Pigeon River, 1949-1957

Year	Number	Weight (pounds)	Pounds per acre	Number	Weight (pounds)	Pounds per acre	Number	Weight (pounds)	Pounds per acre
	<u>Section A</u>			<u>Section B</u>			<u>Section C</u>		
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
1957	970	62.6	8.8	1,799	71.0	12.0	3,436	135.1	25.1
	<u>Section D</u>			<u>Section E</u>			<u>All sections</u>		
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 ¹	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	39.4	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
1957	2,725	146.9	26.0	1,897	106.3	18.7	10,827	521.9	17.5

¹Section E added in 1953.

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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 1957 follow:

1. Testing of a higher minimum size in the Pigeon River (project 296). A nine-inch minimum size limit 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 for the period 1951-1957.

2. 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 in 1956 to 5 to 6 inches, rather than fingerling size. In 1957, the planting rate was reduced from 500 per acre to 100 per acre in the hopes that better growth and greater survival would result. Scheduled date of completion: not definite.

3. 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 trout and 500 brown trout were made each year from 1952 through 1955. The 1957 anglers' catch was the last probable opportunity for returns. Report to be prepared.

4. 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. A preliminary evaluation of the structures was made by comparisons, using anglers' catch and population estimates, of the years 1949-53 (before improvement) with the years 1954-56 (after improvement). See Michigan Institute for Fisheries Research Report No. 1541 by Thomas F. Waters. After data for the 1958 season are compiled, a report will be prepared to cover the years 1949-53 (before improvement) and 1954-58 (after improvement). The study is to be continued. The plan is to remove all man-made improvement structures from Section A during the spring of 1959, and study the effects on trout.

5. 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 the flies-only regulation. Population estimates were made in the spring and fall of 1957, and will be continued, in order to determine the source of the mortality. Scheduled date of completion: not definite.

6. Growth, survival and harvest of brook trout planted as fry in a lake (project 27s). A planting of 3,000 brook trout fry has been made each spring since 1952 in Section 4 Lake. Scale samples from trout caught by anglers are used to identify year of planting. Scheduled date of completion: not definite.

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6. Growth, survival and harvest of brook trout planted as fry in a lake (project 27s). A planting of 3,000 brook trout fry has been made each spring since 1952 in Section 4 Lake. Scale samples from trout caught by anglers are used to identify year of planting.

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