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cc: Educ.-Game
Inst. for Fish. Res.
J. A. Scully
M. G. Galbraith
Marquette Fish. Res. Sta.
D. S. Shetter
Emil Miller

INSTITUTE FOR FISHERIES RESEARCH
DIVISION OF FISHERIES
MICHIGAN DEPARTMENT OF CONSERVATION
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GERALD P. COOPER PH.D.
DIRECTOR

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RETURNS TO ANGLERS DURING 1956-1958 FROM FALL PLANTINGS
OF HATCHERY BROOK TROUT OF DIFFERENT SIZES IN THREE
LAKES IN MARQUETTE COUNTY, MICHIGAN

By

Merle G. Galbraith, Jr.

This is the second report on a study, begun in 1953, to assess by means of a creel census the benefits derived from planting brook trout of different sizes (3-inch fingerlings, 6-inch sublegals, and 7.5-inch legal-size) in lakes. Catch, by number and by weight, percentage of return to the angler, and quality of the fishing during the second three-year period of study are evaluated.

In order to avoid unnecessary duplication, many details have purposely been omitted. For such details see Institute Report No. 1581.¹

Plan of study

The fall plants during 1955-1957 were of sub-legal brook trout in Swanzy Lake, legal-size in Airport, and fingerling in Moccasin. For later identification all trout were given a distinctive fin-clip. State-wide fishing regulations for trout lakes (7-inch minimum size, 5-fish creel limit) were in effect throughout the investigation. The replication of the 1953-1955 study was carried out in order to eliminate the influence of a particular lake on the results. The

¹Galbraith, Merle G., 1959. Returns to anglers during 1953-1955 from fall plantings of hatchery brook trout of different sizes in three lakes in Marquette County, Michigan. Institute for Fisheries Research Report No. 1581.

stocking schedule in 1955-1957 was arranged so that each lake received trout of a different size than were planted in it from 1952-1954. Table 1 gives the stocking record for the three lakes.

A creel census was used to obtain estimates of the amount of fishing (pressure), total harvest, fishing quality, and other information such as baits used and residence of anglers who fished on the lakes. Cost was not used as a criterion because no figures on production costs to time of planting for 3-inch, 6-inch, and 7.5-inch trout were available.

The creel census

A stratified random sampling procedure was used to obtain creel census data on Swanzy, Airport, and Moccasin lakes. The census clerk visited each lake on a prearranged schedule which allotted more time to Saturdays, Sundays, and holidays (heavy fishing pressure) than it did to weekdays (lighter pressure). Two procedures were used by the clerk for obtaining the basic information desired: anglers fishing on the lakes were counted at hourly intervals (anglers in boats were counted separately from those fishing from shore) and many of the anglers were interviewed by the clerk at the conclusion of their fishing trip. The counts of anglers were used to estimate the amount of fishing, and from the interviews the clerk was able to obtain information on the duration of the fishing trip (hours), fishing methods (boat or shore, type of bait used), number, size, and marking of fish caught, and residence of angler. Approximately equal coverage was given to each lake; during the 3-year period the sample included about 36 percent of the estimated hours of fishing on Swanzy Lake, 27 percent on Airport Lake, and 32 percent on Moccasin Lake. Since fishing effort (pressure) and fishing quality were not uniform, the season was divided into 4 periods during 1956 and 1957 and into six periods in 1958 as shown in Table 2.

Table 1.--Record of brook trout plantings in Swanzy, Airport, and Moccasin lakes, Marquette County, Michigan
1955-1957

Lake	Season and year	Number planted	Average length (inches)	Number per acre	Pounds per acre	Age ¹ (months)
Swanzy	Fall, 1955	5,100	6.1	250	18.3	11-22 ²
	Fall, 1956	5,100	6.3	250	20.5	22
	Fall, 1957	5,100	6.4	250	17.2	21
Airport	Fall, 1955	337	8.1	50	11.2	22
	Fall, 1956	337	7.4	50	6.9	22
	Fall, 1957	337	7.8	50	8.1	22
Moccasin	Fall, 1955	3,150	4.3	500	21.0	11
	Fall, 1956	3,150	4.3	500	16.0	10
	Fall, 1957	3,150	3.9	500	10.6	8

¹Age in months after hatching.

²347 fish were 11 months old, the balance were 22 months.

Table 2.--Duration of the periods in the creel census

1956-1957	1958
1. First week end	1. Opening day (April 26)
2. Next 17 days	2. Remaining days of the first two week ends
3. Midseason	3. Weekdays of the first week
4. Last two or three weeks	4. Week-end days and weekdays 10 May - 5 July
	5. Week-end days and weekdays 6 July - 24 August
	6. Week-end days and weekdays 25 August - 14 September

Total fishing pressure was the sum of the estimated pressures, for each seasonal strata, and total catch (harvest) was the sum of the catches, for each seasonal strata. Catch for each stratum was the product of angler-hours and the mean catch per hour (as obtained from anglers interviewed in that stratum). Fishing quality was measured in terms of catch per hour as determined from interviews. The data secured in the census were subjected to statistical analyses. Detailed information on procedures and methods of computation are not given here; for such, see Institute Report No. 1581.

Amount of fishing

Estimates of total fishing pressure and total catch, by lake and by year, are presented in Table 3. Because the divisions of the season differed in 1956-1957 from those of 1958 (see Table 2), periods 2, 3, and 4 were not of exactly

Table 3.--Estimated hours of fishing (boat and shore fishermen separately) and total catch of brook trout during each of four seasonal periods at Swanzy, Airport, and Moccasin lakes, 1956-1958

Period 1--first week end of trout season
 Period 2--the next 17 days
 Period 3--midseason
 Period 4--the last 2 to 4 weeks of the season

Lake and period ¹	1956			1957			1958 ¹		
	Shore hours	Boat hours	Catch	Shore hours	Boat hours	Catch	Shore hours	Boat hours	Catch
Swanzy									
1	838.6	44.5	826	1142.0	141.8	952	956.3	64.5	563
2	1256.4	44.3	453	715.5	104.6	408	463.0	19.5	229
3	961.7	216.7	255	896.1	144.0	409	1292.1	99.8	160
4	233.5	39.9	55	129.8	27.0	19	67.1	36.2	0
Totals	3,635.6	1,589		3,300.8	1,788		2,998.5		957
Confidence limits ²	±17.7%	±22.0%		±20.4%	±26.1%		±19.6%		±29.2%
Hours per acre	178.2	...		161.8	...		147.0		...
Airport									
1	45.2	0.0	25	196.5	28.2	168	160.6	15.0	53
2	243.5	8.8	27	226.5	16.2	74	137.4	7.0	21
3	297.3	232.2	81 ³	214.3	17.5	80 ³	370.3	273.5	74 ³
4	47.2	49.1		17.5	12.2		20.7	8.7	
Totals	923.3	133		935.9	322		993.2		148
Confidence limits ²	±22.9%	±39.1%		±30.0%	±45.7%		±35.6%		±54.1%
Hours per acre	13.8	...		14.0	...		14.8		...
Moccasin									
1	222.3	4.0	31	521.3	70.9	124	379.2	19.0	138
2	308.2	13.6	14	189.0	9.4	11	153.3	13.0	5
3	742.4	530.4	802	763.1	272.0	536	1048.7	231.9	481
4	184.6	83.3	157	53.6	57.8	32	323.0	151.9	116
Totals	2,088.8	1,004		1,936.9	703		2,320.0		740
Confidence limits ²	±22.3%	±31.0%		±22.5%	±34.3%		±24.0%		±35.1%
Hours per acre	331.6	...		307.4	...		368.3		...

¹The 2nd, 3rd, and 4th periods in 1958 are not directly comparable to the 1956 and 1957 periods, see Table 2.

²With 95 percent confidence limits expressed in terms of percentage of the estimate.

³Denotes combined catch for periods 3 and 4.

the same length and differed from each other by 5 to 9 days. In the 1958 season, the limits of the various periods were: (1) first two week-end days; (2) next twelve days; (3) midseason (May 10-Aug. 24); and (4) the last three weeks. For the 1956-1957 periods, the time limits are shown in Table 3. This disparity in time was not great enough to invalidate the comparisons of effort and catch between periods for the different years. From Table 3 it is evident that fishing pressure varied from lake to lake, and by year and seasonal period at each lake. Pressure, in terms of hours per acre, was lightest at Airport Lake because anglers knew that only some 300 fish were planted in Airport Lake and they felt that the lake was "fished out" after the first few days of the season. The heaviest fishing pressure was recorded at Moccasin Lake (the smallest lake). At Swanzy Lake the pressure ranged from about 3,000 hours (147 hours per acre) in 1958 to 3,600 hours (178 hours per acre) in 1956. At Airport Lake pressure ranged from 920 hours (14 hours per acre) in 1956 to about 990 hours (15 hours per acre) in 1958. Fishing pressure at Moccasin Lake ranged from 1,950 hours (307 hours per acre) in 1957 to 2,300 hours (368 hours per acre) in 1958. At Swanzy Lake over 50 percent of the fishing was done in the first three week ends of the season, while at Moccasin and Airport lakes an average of only 30 and 38 percent (respectively) of the fishing occurred during the first three week ends of the season. Little fishing was done during the last month of the season. At Swanzy and Airport lakes, during the last period, the average fishing pressure was only 5.4 percent of the total annual pressure and at Moccasin Lake it amounted to 13.5 percent of the total pressure.

Fishing pressure at the three lakes was closely associated with the quality of fishing available. The relationship between pressure and fishing quality was particularly evident at Moccasin Lake during the third period of the season, when fishing effort increased markedly. During this period the fingerling trout which were planted the previous fall were just reaching legal size and thus stimulated fishing effort.

The catch and fishing quality

Total estimated catch (by number and weight) and percentage of return are summarized in Table 4. Average sizes of the trout in the catch are given in Table 5. In Table 6 estimated returns from each lot of planted trout are shown along with year of recapture. Data (catch per hour, fish per trip, etc.) obtained in interviews of anglers at the three lakes are presented in Table 7.

Fingerlings.--Plants each year of 3,150 brook trout fingerlings in Moccasin Lake from 1955 to 1957 provided a return of 1,081, 716, and 580 trout, for an average of 792 trout per plant. Average percentage of return for three plantings of fingerling brook trout was 25.2 percent. ↘

By weight, fingerlings provided a good return. For the three-year period fingerlings provided a harvest of 1.5 pounds for each pound planted (Table 4). At recapture, the average trout from fingerling plantings was 7.9 inches long and weighed 0.19 pound (Table 5).

At Moccasin Lake the average catch per hour was 0.31 fish (Table 7), and 27.6 percent of the anglers succeeded in catching at least one trout; fishing success remained approximately the same for each of the three years.

The fingerlings planted in Moccasin Lake in the fall entered the catch at the latter half of the first season following planting, and provided fair fishing during the first few weeks of the second season (Table 6). In 1955-1958 the average quality of fishing provided by plants of fingerlings was similar to that provided by plants of legal-size trout but somewhat poorer than was provided by sublegal trout. The average catch per hour and fish per trip did not fluctuate very much during the three-year period (Table 7).

↘ Returns from the 1957 plant of fingerling trout are not all in yet; additional trout from this plant are expected to be recovered during the 1959 season. Returns in 1959 will probably change the averages for length and weight of the recaptured fish.

Table 4.--Estimated catch (number and pounds) and percentage return from trout of three sizes planted in Swanzy, Airport, and Moccasin lakes, Marquette County, 1955-1958

Size of fish, and year	Lake	Planting record				Catch record					
		Number	Rate per acre	Average length (inches)	Total weight (pounds)	Number caught ¹	Percent-age returned	Total pounds	Pounds per acre	Pounds caught per pound planted	
Sublegal											
1955	Swanzy	5,100	250	6.1	373	1,405	±21.1	27.7	231.1	11.3	0.6
1956	Swanzy	5,100	250	6.3	418	1,674	±26.2	32.8	222.2	10.9	0.5
1957	Swanzy	5,100	250	6.4	351	941 ²		18.5	133.4	6.5	0.4
Total or average		15,300	250	6.3	1,142	4,020		26.3	586.7	9.6	0.5
Legal											
1955	Airport	337	50	8.1	75	156	±36.5	46.3	73.2	10.9	1.0
1956	Airport	337	50	7.4	46	299	±45.2	88.7	78.0	11.6	1.7
1957	Airport	337	50	7.8	54	139 ²		41.2	41.5	6.2	0.8
Total or average		1,011	50	7.8	175	594		58.8	192.7	9.6	1.1
Fingerling											
1955	Moccasin	3,150	500	4.3	132	1,081	±28.7	34.3	207.2	32.9	1.6
1956	Moccasin	3,150	500	4.3	101	716	±32.7	22.7	131.8	20.9	1.3
1957	Moccasin	3,150	500	3.9	67	580 ²		18.4	108.0	17.1	1.6
Total or average		9,450	500	4.2	300	2,377		25.2	447.0	23.6	1.5

¹With 95 percent confidence limits expressed in terms of percentage of estimate.

²Returns not complete until 1959.

Table 5.--Length and weight of brook trout caught by anglers in Swanzy, Airport, and Moccasin lakes, Marquette County, 1956-1958

Size of fish, and year	Planting record			Catch record		
	Lake	Number	Average length (inches)	Number	Average length (inches)	Average weight (pounds)
Sublegal						
1955	Swanzy	5,100	6.1	1,405	7.8	0.16
1956	Swanzy	5,100	6.3	1,674	7.5	0.16
1957	Swanzy	5,100	6.4	941	7.2	0.14
Average		5,100	6.3	1,340	7.5	0.16
Legal size						
1955	Airport	337	8.1	156	10.7	0.47
1956	Airport	337	7.4	299	8.9	0.26
1957	Airport	337	7.8	139	9.2	0.30
Average		337	7.8	198	9.4	0.32
Fingerling						
1955	Moccasin	3,150	4.3	1,081	8.0	0.19
1956	Moccasin	3,150	4.3	716	7.9	0.18
1957	Moccasin	3,150	3.9	580 ¹	7.8	0.19
Average		3,150	4.2	792	7.9	0.19

¹Returns not complete until 1959.

Table 6.--Yearly distribution of returns from each lot of trout planted in
Swanzy, Airport, and Moccasin lakes
(Estimated weight in pounds in parentheses)

Size of fish, and lake	Planting record			Number recaptured, by year			
	Year	Number of trout	Average length (inches)	1956	1957	1958	Total
Sublegal Swanzy	1955	5,100	6.1	1,282 (173.2)	123 (57.9)	...	1,405 (231.1)
Swanzy	1956	5,100	6.3	...	1,658 (216.9)	16 (5.3)	1,674 (222.2)
Swanzy	1957	5,100	6.4	...	...	941 (133.4)	.....
Legal Moccasin ¹	1954	750	7.6	...	3 ¹ (3.4)	...	.....
Airport	1955	337	8.1	124 (42.8)	32 (30.4)	...	156 (73.2)
Airport	1956	337	7.4	...	290 (70.3)	9 (7.7)	299 (78.0)
Airport	1957	337	7.8	...	...	139 (41.5)	.....
Fingerling Swanzy ¹	1954	2,971	4.2	...	2 ¹ (2.6)	...	.....
Moccasin	1955	3,150	4.3	937 (158.6)	144 (48.6)	...	1,081 (207.2)
Moccasin	1956	3,150	4.3	...	556 (78.6)	160 (52.8)	716 (131.8)
Moccasin	1957	3,150	3.9	...	...	580 (108.0)	.....

¹Returns from these lakes entered only as a matter of record. They were not included in the report for 1953-1955.

Table 7.--Summary of creel census data for anglers interviewed on Swanzy, Airport, and Moccasin lakes, 1956-1958

Type of angler, lake, and year	Anglers interviewed	Angling hours		Catch of brook trout					Percentage of anglers successful
		Total	Average per trip	Number	Average length (inches)	Average weight (pound)	Trout per trip*	Catch per hour*	
Shore anglers									
Swanzy									
1956	693	1,327.5	1.92	632	...	...	0.91	....	...
1957	558	1,211.0	2.17	640	...	...	1.15*	....	...
1958	306	625.5	2.04	234	...	....	0.76	....	...
Airport									
1956	151	189.5	1.25	33	...	...	0.22	....	...
1957	176	276.5	1.57	154	...	...	0.88*	....	...
1958	81	116.5	1.43	26	...	...	0.32*	....	...
Moccasin									
1956	312	557.0	1.79	140	...	...	0.45	....	...
1957	341	694.0	2.04	155	...	...	0.45	....	...
1958	188	407.5	2.17	118	...	...	0.63	....	...
Boat anglers									
Swanzy									
1956	80	142.0	1.77	53	...	...	0.66	....	...
1957	99	208.0	2.10	54	...	...	0.55	....	...
1958	17	31.0	1.82	15	...	...	0.88	....	...
Airport									
1956	28	63.5	2.27	11	...	...	0.39	....	...
1957	36	70.0	1.94	12	...	...	0.33	....	...
1958	17	42.5	2.50	1	...	...	0.06	....	...
Moccasin									
1956	68	184.5	2.71	110	...	...	1.62*	....	...
1957	69	152.5	2.21	87	...	...	1.26*	....	...
1958	28	62.0	2.21	18	...	...	0.64	....	...

(Table concluded next page)

*Under "Shore anglers," figures on fish per trip and catch per hour which are marked by an asterisk are statistically different from corresponding figures for "Boat anglers." Likewise, figures for fish per trip under "Boat anglers" which are marked by an asterisk are statistically different from "Shore anglers." In the section under "All anglers," figures on fish per trip, which are marked by an asterisk are statistically different from corresponding annual figures for the same lake.

Table 7, concluded

Type of angler, lake, and year	Anglers inter-viewed	Angling hours		Catch of brook trout					Percentage of anglers successful	
		Total	Average per trip	Number	Average length (inches)	Average weight (pound)	Trout per trip*	Catch per hour*		
All anglers										
Swanzy										
1956	773	1,469.5	1.90	685	8.3	0.21	0.89	0.47	33.9	
1957	657	1,419.0	2.16	694	7.7	0.15	1.06*	0.49	40.9	
1958	323	656.5	2.03	249	7.7	0.15	0.77	0.38	27.9	
Airport										
1956	179	253.0	1.41	44	8.8	0.33	0.25	0.17	15.1	
1957	212	346.5	1.63	166	8.8	0.26	0.78*	0.48	30.7	
1958	98	159.0	1.62	27	9.4	0.32	0.28	0.17	14.3	
Moccasin										
1956	380	741.5	1.95	250	8.5	0.31	0.66	0.34	25.0	
1957	410	846.5	2.06	242	8.4	0.23	0.59	0.29	29.8	
1958	216	469.5	2.17	136	8.9	0.26	0.63	0.29	28.2	
<hr/>										
All anglers (1956-1958)										
Swanzy	1,753	3,545.0	2.02	1,628	...	....	0.92	0.46	35.4
Airport	489	758.5	1.56	237	...	....	0.48	0.31	21.6
Moccasin	1,006	2,057.5	2.05	628	...	....	0.62	0.31	27.6

*Under "Shore anglers," figures on fish per trip and catch per hour which are marked by an asterisk are statistically different from corresponding figures for "Boat anglers." Likewise, figures for fish per trip under "Boat anglers" which are marked by an asterisk are statistically different from "Shore anglers." In the section under "All anglers," figures on fish per trip, which are marked by an asterisk are statistically different from corresponding annual figures for the same lake.

Sublegals.--Sublegal brook trout were planted at Swanzy Lake at the rate of 5,100 trout each year (1955-1957). These plants gave a return of 1,405, 1,674, and 941 trout (Table 5) for an average of 1,340 trout per plant. On the average, anglers recaptured 26.3 percent of each plant.

The three plantings of sublegal (6.1 to 6.4-inch) trout gave the lowest yield in terms of weight caught for weight planted. For every pound planted, only 0.5 pound of trout was returned (Table 4). The fish had an average length of 7.5 inches, and an average weight of 0.16 pound (Table 5).

At Swanzy Lake anglers caught 0.46 trout per hour, and 35.4 percent of the anglers caught one or more trout; fishing success and catch per hour remained quite uniform throughout the three-year period (Table 7). However, the number of fish caught per trip in 1957 was significantly greater than in either 1956 or 1958 (Table 7).

Many of the trout from sublegal plants attained legal size by the opening of the season following planting. Although the majority of the trout were caught during the first three to four weeks of the season, the sublegal plants provided a substantial catch through June.

Typically, few fish survived to be recovered in the second season following planting; less than 9 percent of the total number of recaptures from any one planting were recovered during the second season following planting (Table 6).

Legal size.--Legal-size trout were planted in Airport Lake at the rate of 337 fish each year. From these plants there was a return of 156, 299, and 139 trout, or an average of 198 trout per plant. The average percentage of return was 58.8 percent.

From each stocking of legal-size trout anglers caught 1.1 pounds for each pound stocked. The trout caught averaged 9.4 inches in length and weighed an average of 0.32 pound.

The average catch per hour at Airport Lake was 0.31 trout, and 21.6 percent of the anglers were successful. The catch per hour over the three-year period was very erratic, and anglers caught more fish per trip in 1957 than in either 1956 or 1958 (Table 7). Inclement weather at the beginning of the 1956 season probably accounted, in part, for the disparity in quality of fishing that year. During the opening two days of the 1956 season, when anglers usually harvest a large number of trout, the lake was completely ice covered and it was necessary to break holes in the ice in order to fish. At the start of the 1958 season cold weather and low water temperatures again prevailed although the lake was free of ice. The small number of fish planted during the three years gave Airport Lake a poor reputation, and this, coupled with inclement weather at a time when much of the annual fishing pressure is expended, probably explains the fluctuations in fishing quality.

A few fish survived to the second year of planting and for the first time in several years a few trout were recovered as late as the third season after planting (Moccasin Lake, Table 6). The catch in general was spread out over the first three periods of the season; little fishing was done in the last month of the season and none of the anglers interviewed had caught any trout.

Comparison of returns from plantings of fish of different sizes.--Analysis of the returns from the 1955 to 1957 plants indicate that fingerlings gave about the same percentage of return to the creel as sublegal trout. The average percentage of return to the creel from legal-size plants was approximately twice that for fingerling and sublegal plants. However, for every pound of fish planted, returns from fingerling plants averaged 1.5 pounds; sublegals, 0.5 pound; and legal-size trout, 1.1 pounds.

Fingerling plants provided about the same quality of fishing as provided by legal-size plants. Although the average catch per trip was higher from

fingerling plants than from legal-size plants, anglers spent more hours per trip in order to catch trout which were planted as fingerlings.

Sublegal trout plants at Swanzy Lake provided as good or better fishing (fish per trip, catch per hour, percentage of anglers successful) than plants of fingerling and legal-size trout in Moccasin and Airport lakes during the three-year period. This is even more significant when considering the fact that Swanzy Lake is much larger in area than the other two lakes and therefore harder to fish.

Although the weight returned from sublegal plants averaged much higher per plant than the weight returned from plants of fingerling and legal-size trout, the average size and weight of the trout recovered from sublegal plants was not as large. Most of the trout planted as sublegals were caught during the first few weeks of the season before they had enough time to put on much weight. More important perhaps, is the possibility that the lake was stocked at too high a rate. The downward trend of the average size of the total annual catch, and of the average length at recovery from each planting, 1955 to 1957 (Tables 5, 7), perhaps substantiates the notion of overstocking.

Fingerling trout provided fishing of better quality in June, July, and August, than either legal-size or sublegal trout. In addition, fingerlings provided a sizeable stock of trout for the opening of the second season following planting; these trout were fairly large, 9.0 to 10.0 inches long.

Fishing methods and types of lures used

At Swanzy Lake there was little difference in fishing success between shore anglers and boat anglers. The only significant difference was in 1957 when shore anglers were more successful. At Airport Lake in 1957 and 1958 shore anglers had better fishing than boat anglers, and expended less effort per trip.

At Moccasin Lake in 1956 and 1957, the catch per trip for boat anglers was much higher than for shore anglers, and boat anglers spent slightly more hours per trip.

Types of lures used (worms, flies, plugs or combinations thereof, and insects) were recorded for each angler interviewed (Table 8). Over 83 percent of the anglers used worms or a combination of baits, and only 11 percent (or fewer) used flies exclusively.

Residence and sex of the anglers

Information on residence and sex of anglers is summarized in Table 9. More than 93 percent of the anglers who fished the lakes were from the Upper Peninsula, and more than 80 percent were residents of Marquette County. Less than 5 percent of the anglers were out-of-state residents. More than 90 percent of the anglers were men.

Table 8.--Number of anglers using each type of lure at Swanzy, Airport, and Moccasin lakes, 1956-1958

Year, and lure used	Lake		
	Swanzy	Airport	Moccasin
1956			
Worms	461	117	229
Combination	55	0	43
Flies	13	3	21
Plugs	244	59	87
Total	773	179	380
1957			
Worms	362	136	238
Combination	56	2	41
Flies	29	8	15
Plugs	208	62	116
Insects	2	4	0
Total	657	212	410
1958			
Worms	215	56	133
Combination	18	1	12
Flies	17	5	3
Plugs	73	36	68
Total	323	98	216

Table 9.--Residence (by county in Michigan) and sex of the anglers interviewed by the creel census clerk, at Swanzy, Airport, and Moccasin lakes, 1956-1958

Residence and sex	Swanzy			Airport			Moccasin		
	1956	1957	1958	1956	1957	1958	1956	1957	1958
Michigan (Upper Peninsula)									
Alger	1	30	...	2	2	...	5	...	1
Baraga	...	...	...	...	...	...	...	1	...
Chippewa	...	...	2	...	...	...	3	...	...
Delta	33	5	12	5	5	3	44	51	16
Dickinson	11	...	...	1	...	...	1	1	...
Gogebic	...	...	...	...	...	...	1	...	...
Houghton	...	...	1	1	...	...	...	2	...
Iron	...	...	1	...	...	...	...	...	1
Keweenaw	...	...	...	1	...	...	...	...	...
Marquette	681	569	286	157	183	87	302	328	188
Menominee	7	5	...	...	4	3	1	3	3
Schoolcraft	...	...	...	1	...	...	...	...	...
U. S. Air Base	5	26	2	1	4	...	2	7	...
Michigan (Lower Peninsula)									
Alpena	...	...	...	...	...	...	...	2	...
Calhoun	1	...	...	...	...	...	...	...	...
Eaton	...	2	4	...	...	...	1	...	...
Grand Traverse	...	1	...	...	...	...	...	...	...
Gratiot	...	...	...	...	...	...	2	...	...
Hillsdale	...	...	...	1	...	...	...	...	...
Ingham	...	...	...	...	...	...	...	1	...
Kent	...	...	...	...	...	...	...	5	2
Lapeer	...	...	...	1	...	...	...	...	...
Macomb	...	...	1	...	...	...	...	...	...
Midland	...	...	3	...	...	...	...	...	...
Muskegon	...	...	...	...	2	...	...	...	...
Oakland	2	...	...	...	...	...	...	...	...
Ogemaw	...	...	...	...	2	...	...	...	...
Osceola	...	...	1	...	...	...	...	...	...
Roscommon	1	1	...	...	...	1	...	...	...
Saginaw	...	...	...	1	...	...	...	...	...
Sanilac	...	...	...	...	...	...	2	...	...
Tuscola	...	...	...	...	...	...	...	2	...
Washtenaw	1	2	...	2	...	...	...	...	...
Wayne	2	3	3	...	...	1	4	1	5
Alaska	...	...	...	...	...	...	1	...	...
California	...	...	3	...	...	...	...	1	...
Illinois	1	1	3	1	1	1	2	1	...
Minnesota	...	1	...	...	3	...	1	...	...
Mississippi	1	...	...	...	...	...	...	...	...
Missouri	...	...	...	1	...	...	...	...	...
Ohio	1	...	...	...	...	...	...	2	...
Pennsylvania	...	...	...	2	...	...	2	...	...
New York	...	1	...	...	...	...	...	...	...
Wisconsin	16	8	1	1	6	2	6	2	...
Males	719	596	293	176	200	94	355	387	196
Females	54	61	30	3	12	4	25	23	20
Total	773	657	323	179	212	98	380	310	216

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INSTITUTE FOR FISHERIES RESEARCH

Merle G. Galbraith, Jr.

Report approved by G. P. Cooper

Typed by M. S. McClure