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REPORT NO. 350

ANALYSIS OF FISHING AND THE GAME FISH CATCH IN FIFE LAKE, SUMMER OF 1935

The methods involved in taking the Fife Lake census were discussed in some detail in Reports 274 and 319 and will not be repeated here since the methods used during the 1935 season were similar to those used during the previous summer. The census was again taken by crews from the Fife Lake C.C.C. camp under the general supervision of Foreman Erwin Moody assisted by enrollee Joe Barnes. The census blanks used in 1935 were almost identical with those used in 1934. A copy of the 1935 blank is shown in Fig. 1.

CREEL CENSUS—Michigan Department of Conservation

Lake or Stream..... Fisherman's Name.....
Township..... City or Town.....
County..... Sex?..... Approximate Age?.....

SPECIES CAUGHT	LEGAL SIZE		UNDERSIZE	
	Number	Av. Lgth.	Number	Av. Lgth.
Brook Trout				
Rainbow Trout				
Brown Trout				
Large Mouth Bass				
Small Mouth Bass				
Bluegills				
Sunfish				
Yellow Perch				
Pike Perch (Walleyes)				
Northern (Grass) Pike				

(Enter other kinds taken on blank spaces above)

Date..... 193.....

Kind of Fishing:

Ice?..... Still Fishing?.....
Boat?..... Trolling?.....
Shore?..... Casting?.....
No. of persons?..... Total No. of lines?.....
Bait (Check if only one kind of bait used)
How many fish caught with worms?.....
Insects?..... Minnows?..... Spinner?.....
Plug?..... Artificial Fly?.....
If taken with other bait, or by spear, dipnet or other means, state how.....
Weather: Clear?..... Heavy Wind?..... Cold?.....
(Check) Cloudy?..... Light Wind?..... Mild?.....
Rain?..... Calm?..... Warm?.....

TIME FISHED _____ HRS.
A.M. ▶▶ 12 1 2 3 4 5 6 7 8 9 10 11 12
P.M. ▶▶ 12 1 2 3 4 5 6 7 8 9 10 11 12

Draw line through hours and quarter hours fished; double line through indicated time when fishing was best. Make out report whether fish are caught or not.

Fig. 1. Blank used for recording creel census data

More data are included in the 1935 report than were tabulated for the 1934 summer fishing. This is due primarily to the fact that the 1935 figures were compiled for the Institute by the Mathematics Department of the University of Michigan on their sorting and tabulating machines while for the 1934 figures these machines were not used and the time which would be involved in making the many compilations by the usual method was so great that a number of correlations had to be omitted in 1934. The data listed here for 1935 follow, as much as possible, the order used in Report 319 for the summer fishing of 1934. A comparison of fishing during the two seasons is appended.

Unless otherwise stated the figures are for the fishermen actually contacted. Those seen but not contacted are considered only in the final table and are there regarded as having been average in every respect. Of the 3685 fishermen seen on the lake, 91 were not contacted. It is assumed that all of the fishermen were seen with the possible exception of a small number of night fishermen.

The term "fisherman" invariably means one person fishing for one day. If a man fished on two different days, he is here considered as two fishermen. All fishing from June 25th to September 30 is here considered as summer fishing. A summary of the data follows:

Number of fishermen. (See Table 1). Census returns were obtained for a total of 3594 fisherman-days, 2,831 for men, 763 for women. A daily average of 36.7 persons fished the lake, during the 98 day period; during the height of the season the number of fishermen averaged up to 68.7 per day for a one week period. The fishing represents a total of approximately 4½ fisherman days per acre for the entire lake. Since the fishing was probably concentrated in certain areas it is probable that part of the acreage was fished very little while other parts were fished heavily.

Number of fish, catch per hour, fish per fisherman, and average size of all fish. (See Table 2). The 3594 fisherman-days yielded a total of 11,375 fish having an average length of 8.1 inches caught at the rate of 1.27 fish per hour. The fishermen averaged 3.2 fish per day's fishing. Fife Lake produced, on the average, approximately 115 fish per day.

Table 1. Number of fishermen.
Fife Lake, summer of 1935.

Date	Number of fishermen			
	Male	Female	Total	Ave. per day
June 25-30	211	50	261	43.5
July 1-7	383	75	458	65.4
July 8-14	323	80	403	57.6
July 15-21	249	66	315	45.0
July 22-28	233	65	298	42.6
July 29-Aug. 4	224	53	277	39.6
Aug. 5-11	354	127	481	68.7
Aug. 12-18	285	80	365	52.1
Aug. 19-25	284	94	378	54.0
Aug. 26-Sept. 1	139	30	169	24.1
Sept. 2-8	56	11	67	9.9
Sept. 9-15	26	17	43	6.1
Sept. 16-22	45	11	56	8.0
Sept. 23-30	19	4	23	2.9
Totals	2831	763	3594	36.7

Table 2. Number of fish taken, fish per hour, fish per fisherman (per day), and average size of all fish. Fife Lake, summer of 1935.

Date	No. of fish taken	Fish per hour	Fish per angler	Average size of fish (in.)
June 25-30	1592	2.2	6.1	8.6
July 1-7	1165	1.0	2.5	7.9
July 8-14	1155	1.1	2.9	8.2
July 15-21	848	1.2	2.7	7.9
July 22-28	817	1.3	2.7	7.9
July 29-Aug. 4	966	1.4	3.5	7.9
Aug. 5-11	1536	1.4	3.2	7.8
Aug. 12-18	1280	1.3	3.5	8.1
Aug. 19-25	1092	1.0	2.9	7.9
Aug. 26-Sept. 1	484	1.2	2.9	8.5
Sept. 2-8	188	1.1	2.8	7.3
Sept. 9-15	78	0.7	1.8	10.9
Sept. 16-22	108	0.8	1.9	9.3
Sept. 23-30	66	1.5	2.9	9.2
Total or Average	11,375	1.27	3.2	8.1

Analysis of the catch by species (See Table 3). The species were, in the order of abundance in the catch: bluegill (Helioperca macrochira), rock bass (Ambloplites rupestris) perch (Perca flavescens), sunfish (Eupomotis gibbosus), small-mouthed bass (Micropterus dolemieu), large-mouthed bass (Aplites salmoides), walleyes or pike-perch (Stizostedion vitreum), bullheads (Ameiurus, either nebulosus or natalis, or both), northern pike (Esox lucius), and black crappie (Pomoxis sparoides). While there was some fluctuation in average size from week to week, this fluctuation was not great and was ordinarily not uniform. The four largest game fish, large-mouthed bass, small-mouthed bass, walleyes and northern pike represented 12.8% of the entire catch. The weekly and total catch of each species is shown in Table 3 for all species except black crappie.

Total hours fished and average hours fished. The fishermen fished a total of 8971.5 hours, an average of 2.5 hours per fishing day. Obviously fishing on this lake did not occupy the major portion of the fisherman's time.

Method of fishing and kind of bait. (See Tables 4, 5 and 6). More than 90% of the records indicate one method of fishing, either still-fishing, casting or trolling; 69% of the fishing by a single method was by still-fishing, 8% by casting and 23% by trolling. The catch per hour by trolling and casting was almost identical as was the average length of fish caught by these two methods. Still-fishing produced twice as many fish per hour as either of the other two methods but the fish were of a much smaller average size. There is a definite inverse correlation between number of fish taken and size of fish, also a correlation between size of fish and the possibility of catching fish. The method taking the largest fish produced also the fewest fish (per hour) and the method which took the largest fish also was most likely to produce no fish at all in a day's fishing.

Six kinds of baits were listed. A few other baits were used to a very limited extent but were not included in this study. Spinners, used exclusively by 137 reports, produced per hour, 0.5 fish of an average length of 11.2 inches. Plugs, used exclusively by 412 records produced 0.4 fish per hour, average length 12.7 inches. Artificial flies were used very little but were relatively more effective in taking fish than

Table 3. Analysis of the catch. Fife Lake, summer of 1935*

Period	Smallmouth bass			Largemouth bass			Bluegill			Sunfish		
	No.	Ave. size	Per hr.	No.	Ave. size	Per hr.	No.	Ave. size	Per hr.	No.	Ave. size	Per hr.
June 25-30	83	13.5	.12	90	13.9	.13	190	7.5	.26	128	7.2	.18
July 1-7	52	13.4	.05	37	14.4	.03	207	6.8	.18	136	6.8	.12
July 8-14	91	13.3	.09	82	13.0	.08	325	6.9	.31	63	6.7	.06
July 15-21	67	12.6	.09	42	13.1	.06	341	6.7	.46	122	6.4	.17
July 22-28	29	11.6	.05	32	12.6	.05	410	7.1	.64	85	6.5	.13
July 29-Aug. 4	47	11.6	.07	22	13.1	.03	396	7.0	.58	183	6.6	.27
Aug. 5-11	80	13.8	.07	49	13.6	.05	647	7.1	.60	258	6.5	.24
Aug. 12-18	135	13.3	.14	41	14.4	.04	468	7.0	.49	168	6.9	.18
Aug. 19-25	96	14.0	.09	27	13.2	.02	428	6.9	.39	174	6.6	.16
Aug. 26-Sept. 1	58	12.6	.14	24	14.2	.06	169	7.3	.40	31	6.8	.07
Sept. 2-8	9	11.9	.05	2	11.0	.01	95	6.8	.53	39	6.5	.22
Sept. 9-15	16	14.6	.15	8	15.2	.07	4	6.8	.04	17	7.1	.16
Sept. 16-22	17	12.0	.12	9	14.2	.06	10	7.9	.07	13	6.8	.09
Sept. 23-30	2	14.0	.05	5	14.0	.12	6	7.5	.14	1	9.0	.02
Total	782	13.1	.09	470	13.6	.05	3696	7.0	.41	1418	6.7	.16

Period	Rock bass			Perch			Walleye			Northern pike		Bullhead	
	No.	Ave. size	Per hr.	No.	Ave. size	Per hr.	No.	Ave. size	Per hr.	No.	Ave. size	No.	Ave. size
June 25-30	618	8.1	.76	442	7.7	.62	16	19.6	.02	5	24.0	19	10.2
July 1-7	308	7.6	.27	402	7.1	.35	11	23.8	.01	4	24.3	8	9.9
July 8-14	298	7.2	.29	260	7.2	.25	15	22.5	.01	1	20.0	20	8.3
July 15-21	159	7.5	.22	100	7.0	.14	15	19.1	.02	1	24.0	0	0
July 22-28	177	7.2	.28	52	7.0	.08	28	21.3	.04	2	18.5	2	10.0
July 29-Aug. 4	174	6.9	.26	103	7.2	.15	32	22.3	.05	5	22.8	3	12.7
Aug. 5-11	223	6.9	.21	241	7.1	.22	21	21.3	.02	8	22.1	8	10.1
Aug. 12-18	135	7.6	.14	313	7.1	.33	7	19.9	.01	7	23.0	6	12.2
Aug. 19-25	166	7.3	.15	190	7.3	.17	1	25.0	tr.	4	20.0	4	10.0
Aug. 26-Sept. 1	46	7.6	.11	148	7.4	.35	5	18.8	.01	1	17.0	2	11.5
Sept. 2-8	18	7.3	.10	22	6.8	.12	1	26.0	.01	2	21.5	..	...
Sept. 9-15	6	8.3	.06	22	8.2	.21	..	...	...	5	23.4	..	...
Sept. 16-22	39	7.8	.28	14	7.4	.10	..	...	...	6	16.5	..	...
Sept. 23-30	17	9.1	.40	31	7.5	.72	2	16.0	.05	2	16.5	..	...
Total	2384	7.5	.27	2340	7.3	.26	154	21.3	.02	53	21.5	72	10.0

* Black crappies were also taken. They constituted an insignificant portion of the total catch.

Table 4. General data on methods of fishing*, Fife Lake, summer of 1935

Method	Repts. covering each method		Fish taken by each method	Fish per day's fishing	Fish per hour	Ave. length of fish inches	Repts. indicating no fish caught	
	No.	%					No.	%
Trolling	770	23	1095	1.4	0.6	11.2	383	50%
Casting	281	8	339	1.2	0.5	11.3	170	60%
Still-fishing	2346	69	9558	4.1	1.6	7.6	733	31%

*/ This computation does not include those records indicating the use of several methods of fishing in one day or not indicating which method was used.

Table 5. General data on effectiveness of various kinds of bait used. Fife Lake, summer of 1935*

Bait used	No. of records	% getting no fish	Hrs. per fishing day	Catch per hour	No. of fish taken	Ave. size of all fish (in.)
Artificial:						
Spinner	137	52	2.3	0.5	169	11.2
Plug	412	62	2.4	0.4	352	12.7
Art. fly	25	36	1.9	1.1	53	9.4
Natural:						
Minnows	701	34	2.6	1.2	2067	8.9
Worms	1747	28	2.6	1.7	7467	7.4
Insects	14	14	3.3	1.6	77	8.4

*/ Not including those records for which no bait was listed or records indicating use of several baits in one fishing day.

Table 6. Analysis of catch (by species) on various kinds of bait.
Fife Lake, summer of 1935

	All species	Largemouth bass	Smallmouth bass	Rock bass	Bluegills	Sunfish	Perch	Walleyes	Northern pike	Bullheads
ARTIFICIAL BAIT										
Spinner:										
Number caught	169	17	26	66	13	4	17	21	4	1
Average size	11.2	13.3	13.0	7.9	7.2	6.9	7.7	21.2	23.0	8.0
Catch per hr.	0.5	.05	.08	.21	.04	.01	.05	.06	.01	tr.
Plug:										
Number caught	352	126	99	53	28	11	5	19	4	7
Average size	12.7	14.5	13.6	7.8	7.1	7.1	6.8	22.5	20.8	11.0
Catch per hr.	0.4	.13	.10	.05	.03	.01	.01	.02	tr.	.01
Artificial Fly:										
Number caught	53	7	7	1	31	...	4	3	...	...
Average size	9.4	14.5	13.7	8.0	6.3	...	7.0	23.3	...	...
Catch per hr.	1.1	.14	.14	.02	.64	...	.08	.06	...	...
NATURAL BAIT										
Minnows:										
Number caught	2067	121	273	398	377	109	744	17	22	4
Average size	8.9	13.4	13.6	7.7	7.2	6.9	7.6	19.4	23.1	11.2
Catch per hr.	1.2	.07	.15	.22	.21	.06	.42	.01	.01	tr.
Worms:										
Number caught	7467	113	233	1640	2847	1188	1357	26	8	53
Average size	7.4	12.7	12.3	7.5	6.9	6.7	7.1	17.0	16.3	9.8
Catch per hr.	1.7	.03	.05	.37	.64	.27	.30	.01	tr.	.01
Insects:										
Number caught	77	6	1	...	59	5	5	1	...	...
Average size	8.4	12.5	11.0	...	7.9	7.2	7.6	18.0	...	...
Catch per hr.	1.6	.13	.02	...	1.26	.11	.11	.02	...	...

were either of the other two artificial baits. Invariably artificial bait produced, on the average, fewer but larger fish than natural bait.

Minnows were used exclusively by 701 records. They produced fish of an average length of 8.9 inches at the rate of 1.2 fish per hour. Worms were used by 1747 records and produced fish at the rate of 1.7 per hour. The fish had an average length of 7.4 inches. Insects were used very little but were relatively effective in taking fish.

There was a very close correlation between catch per hour and size of fish, the bait producing the most fish per hour produced also the smallest fish; the bait which took the fewest took also the largest.

Several parties almost invariably used gold fish as bait. The release of this fish into the lake and its establishment in the lake might prove quite undesirable.

Large-mouthed bass were most successfully fished for with artificial flies, insects and plugs; small-mouthed bass with minnows and artificial flies, rock bass and sunfish with worms; bluegills with worms and artificial flies; perch with minnows, walleyes with spinner and artificial fly, and northern pike with spinner and minnow.

Relation between fishing and weather (See Table 7). The records indicate three sets of weather condition, with reference to clearness (clear, cloudy, rain), roughness (heavy wind, light wind, calm), and temperature (cold, mild, warm). One item in each category was usually checked. While a large number of combinations of the nine conditions are possible the data were obtained only for each weather condition irrespective of the other conditions. The data with respect to each kind of weather are listed in Table 7.

Fish, in general, were best caught when the weather was mild, when there was a light wind and when the sky was clear. Whether fishing was best on a mild, clear day, with light wind, is not known since the combination of three factors may not necessarily produce good fishing even though each factor may be best when not considered in combination with the other factors.

Table 7. Number of fishermen, catch per hour for all fish and for each species, under various weather conditions. Fife Lake, summer of 1935

Weather	No. of fishermen	Total no. of fish taken	Hours fished	Catch per hr., all fish	Catch per hour: 1. For weather listed; 2. For entire season*																	
					Largemouth Bass		Smallmouth Bass		Rock Bass		Bluegill		Sunfish		Perch		Walleyes		Northern Pike		Bullheads	
					1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Cold	68	156	174¼	.90	.04	.05	.12	.09	.08	.27	.38	.41	.09	.16	.17	.26	Tr.	.02	.04	.01	.01	.01
Mild	2008	6753	4756 3/4	1.42	.07	"	.09	"	.33	"	.44	"	.16	"	.30	"	.02	"	.01	"	.01	"
Warm	1468	4293	3912	1.10	.04	"	.08	"	.20	"	.38	"	.17	"	.21	"	.02	"	.02	"	Tr.	"
Heavy Wind	365	1038	886 3/4	1.17	.04	.05	.09	.09	.20	.27	.48	.41	.14	.16	.19	.26	.01	.02	.01	.01	.01	.01
Light Wind	1962	5954	4896	1.22	.05	"	.08	"	.20	"	.44	"	.17	"	.25	"	.01	"	.01	"	.01	"
Calm	848	2293	2104½	1.09	.04	"	.09	"	.23	"	.39	"	.14	"	.17	"	.03	"	.01	"	Tr.	"
Clear	1929	6354	4897½	1.30	.05	.05	.08	.09	.27	.27	.44	.41	.17	.16	.25	.26	.02	.02	.01	.01	.01	.01
Cloudy	1477	4434	3647¼	1.22	.05	"	.09	"	.25	"	.38	"	.15	"	.27	"	.01	"	.01	"	.01	"
Rain	156	415	363¼	1.14	.07	"	.09	"	.25	"	.29	"	.10	"	.29	"	.01	"	.01	"	.01	"

* Irrespective of weather.

The weather conditions under which each species bit best were:

Large-mouthed Bass: Mild, light wind, rain.

Small-mouthed Bass: Cold, little preference with respect to wind and cloudiness.

Rock Bass: Mild, calm, clear. Bit very poorly in cold weather.

Bluegill: Mild, windy, clear. Bit least in rainy weather.

Sunfish: Warm, light wind, clear. Bit least in cold weather.

Perch: Mild, light wind, rain. Poorest when cold and when calm.

Walleyes: Mild or warm, calm, clear.

Northern Pike: Cold. Number taken were too few to show other preferences.

Bullhead: No apparent preferences. Number too few to permit suitable comparison.

It should be understood that the estimates of temperature are with respect to summer temperature, a "cold" day is not cold in comparison with winter or annual temperature.

A comparison of water temperature and fish catch would probably also show certain interesting correlations. If adequate data were available for each species, they would probably show that species characteristic of young or "middle aged" lakes bit best when the weather was cool while fish characteristic of old lakes bit best when the weather was quite warm. The table suggests that small-mouthed bass bit much better in cold weather, in proportion, than large-mouthed bass. Northern pike bit best in cold weather. Sunfish, common to old lakes, bit best in warm weather. Fish common to middle-aged lakes, in general, bit best in mild weather.

Comparison of men and women as fishermen (See Table 8). It was indicated, last year, that, in proportion, fewer women than men took no fish in Fife Lake during the summer of 1934. While this particular item was not determined for fishing in 1935, the data on the respective catch in terms of fish per hour and size of fish were compiled for 1935. Of the 3594 records, 763 (21.2%) were for women. With the exception of 3 weeks, the women took, on the average more fish per hour than men, except on two weeks when each took the same number. No explanation is given for this difference.

Table 8. Comparison of men and women in catch per hour and average size of fish

Period	Male		Female	
	Catch per hour	Average size	Catch per hour	Average size
June 25-30	2.3	8.8	1.9	7.9
July 1-7	1.0	8.0	1.3	7.6
July 8-14	1.1	8.4	1.3	7.2
July 15-21	1.1	8.0	1.4	7.4
July 22-28	1.2	8.1	1.5	7.4
July 29-Aug. 4	1.5	8.0	0.9	7.4
Aug. 5-11	1.3	8.1	1.9	7.1
Aug. 12-18	1.3	8.3	1.7	7.6
Aug. 19-25	1.0	8.2	1.1	7.0
Aug. 26-Sept. 1	1.2	8.6	1.2	8.0
Sept. 2-8	0.9	7.4	1.8	7.1
Sept. 9-15	0.5	11.8	1.1	10.4
Sept. 16-22	0.8	9.2	0.8	9.8
Sept. 23-30	1.7	8.6	0.8	14.6
Average	1.2	8.3	1.4	7.5

They fished for a slightly shorter fishing period (2.3 and 2.5 hours respectively) but, nevertheless, took more fish (per fisherman-day) from the lake.

With the exception of the last two weeks, when few people fished, the males caught fish of a larger average size. It is probable that the women primarily still-fished (the method which took the most fish and the smallest fish per hour) while a greater proportion of men used other methods and other baits (which took fewer and larger fish). The average size of fish caught by men and women was 8.3 and 7.5 inches respectively.

Relation between fishing by residents and non-residents. Of the 3594 records, 1249 (35%) were for non-residents. The list of states and number of records from each state are:

Ohio - 596	Pennsylvania - 44
Indiana - 318	Minnesota - 3
Illinois - 229	Maryland - 2
Kentucky - 56	Iowa - 1

It will be noted that most of the residents were from three states, Ohio, Indiana and Illinois, with Ohio contributing approximately one-half of the entire number.

Residents from a large number of communities fished the lake. By approximate air-line distance the number represented in each 25 mile "zone" are as follows:

Distance from Fife Lake (Air-line)	Number of records
0 - 25 miles	1117
25 - 50 "	9
50 - 75 "	6
75 - 100 "	12
100 - 125 "	89
125 - 150 "	182
150 - 175 "	122
175 - 200 "	795
200 - 225 "	2
No answer	2
Not determined	9

It is interesting to note that with few exceptions the fishermen either were local or were from 100 or more miles away. Of the large number in the 175-200 mile zone, 704 were from Detroit. Including the non-residents, over half of the fishing on Fife

Lake was by persons living over 175 miles (by air-line, probably over 200 miles by road) from the lake.

A list of the communities and number of fisherman-days from each community follows: Ann Arbor 4, Bad Axe 10, Battle Creek 4, Beulah 2, Big Rapids 2, Byron 2, Cadillac 2, Charlotte 5, Comstock Park 1, Detroit 704, Dowagiac 2, East Jordan 1, East Lansing 3, Eaton Rapids 8, Fife Lake 1037, Flint 44, Gladwin 1, Grand Rapids 60, Greenville 3, Harrison 3, Hartford 3, Highland Park 1, Howard City 4, Hubbardston 2, Ithaca 2, Jackson 5, Kalamazoo 9, Kalkaska 2, Kingsley 8, Lansing 108, Mancelona 1, Manton 52, Marion 2, Mayfield 1, Middleville 2, Monroe 2, Mt. Clemens 13, Mt. Pleasant 3, Muskegon 10, Owosso 5, Pontiac 79, River Rouge 14, Roseville 2, Saginaw 11, Saint Louis 1, Shepherd 2, South Boardman 6, South Lyon 22, Sturgis 4, Summit 2, Traverse City 4, Walton 3, Willis 8, Wyandotte 36, Ypsilanti 7.

Table 9 shows for each week, for residents and non-residents, the number of each, the catch per hour and the average size of fish caught. It will be noted that the catch per hour and average size of fish caught by residents and non-residents were almost identical, the residents having a very slight advantage in both. Many of the none-residents, perhaps most of them, are resorters rather than tourists and have probably fished the lake for a number of seasons. The non-residents took approximately a third of the fish.

Comparison of fishing summers of 1934 and 1935. A comparison of fishing for the two seasons shows that the differences between fishing for two consecutive seasons may be great. Certain changes are to be expected, but the extent of the change was much greater than had been anticipated. It is not known whether or not changes in the catch reflect changes in the fish population, although some relationship probably exists between the two. Some factors with relation to fishing for the two seasons are compared briefly below: The figures refer to summer fishing only.

Number of Fishermen. Including the fishermen seen but not contacted, a total of 2480 fisherman-days are recorded for 1934, 3685 for 1935, an increase of almost 50% in 1935 over the previous season. This change is probably largely attributable to an

Table 9. Number of residents and non-residents, catch per hour and average size of fish caught by each

Period	Residents			Non-residents		
	No. of records	Catch per hr.	Ave. size	No. of records	Catch per hr.	Ave. size
June 25-30	208	2.4	8.4	53	1.6	9.8
July 1-7	278	1.0	8.0	180	1.1	7.8
July 8-14	279	1.0	8.3	124	1.4	8.0
July 15-21	224	1.0	8.3	91	1.4	7.1
July 22-28	247	1.1	8.2	51	2.1	7.4
July 29-Aug. 4	226	1.4	8.0	51	1.5	7.5
Aug. 5-11	251	1.5	7.9	230	1.4	7.6
Aug. 12-18	178	1.7	7.9	187	1.1	8.4
Aug. 19-25	220	1.2	7.7	158	0.7	8.2
Aug. 26-Sept. 1	97	1.1	8.4	72	1.2	8.6
Sept. 2-8	42	0.7	7.5	25	1.5	7.2
Sept. 9-15	33	0.8	10.3	10	0.4	15.9
Sept. 16-22	40	1.0	9.2	16	0.2	11.4
Sept. 23-30	22	1.4	9.4	1	3.6	8.0
Total or Average	2345	1.3	8.2	1249	1.2	8.0

increase in the number of resorters and tourists as a result of improved financial conditions. In 1934 women accounted for 23.5% of the fishing; in 1935, 21.2% of the records were for women.

Hours fished and catch per hour. Records show a total of 6187 3/4 hours of fishing in 1934 and a total of 8971½ hours in 1935. The hours increased slightly less, in proportion, than the number of fishermen, indicating that the fishermen fished for a slightly shorter average period in 1935. (Average 2.6 hours per fishing day in 1934, 2.5 hours in 1935). The total catch was somewhat larger in 1935, consisting of 11375 fish as compared with 10,656 in 1934. The difference in total catch was not nearly so great, in proportion, as the change in number of fishermen and number of hours fished. The total crop was larger in 1935 but the catch per fisherman and catch per hour were lower during that season. The catch per hour in 1934 was 1.72, in 1935 1.27, a decrease of approximately 35% over 1934.

An increase of almost 50% in fishing accounted for an increase of only 5.8% in the total crop. If only a very small per cent of the total fish population were caught annually, it might be anticipated that twice the number of fishermen would take, approximately, twice the number of fish. The fact that a very considerable increase in fishing failed to produce a great increase in the total number of fish taken, suggests the possibility that the lake is being fished to capacity, that the annual crop is large compared with the total population of fish. This is further suggested by the fact that the 1935 caught fish averaged smaller than the 1934 fish (8.1 inches and 8.33 inches, respectively).

Comparison of the catch by species. Differences in the fish catch of the two seasons were relatively great. These differences may be noted by a comparison of the figures given below:

Total number of fish taken

	1934	1935
Small-mouthed Bass	992	782
Large-mouthed Bass	294	470
Bluegill	1970	3696
Sunfish	1016	1418
Rock Bass	2129	2384
Perch	3757	2340
Walleye	119	154
Northern Pike	48	53
Bullhead	303	72

The total number of bass each year was almost the same but the number of small-mouthed bass declined decidedly in 1935, while the number of large-mouthed bass increased decidedly. The number of bluegills almost doubled while the sunfish and rock bass each increased considerably. The perch dropped decidedly in the 1935 catch. The total catch of the four species combined remained somewhat similar for the two seasons (8872 in 1934, 9838 in 1935). In both the bass and the pan fish, there is some evidence in support of the contention that as one species declines another (competing species) increases. The proportion of the four large predator species combined was almost identical for the two seasons. It may be, of course, that these changes in the catch are not in proportion to changes in the actual fish population. Walleyes and northern pike both increased in the catch, but these two species were not taken in abundance either year. The decided change in the figures for bullheads may be of very little significance. Since most bullheads are apparently caught after dark, the catch is dependent on the amount of night fishing for bullheads and the figures are dependent also on the amount of night fishing covered by the census.

Average size of fish taken

	1934	1935
Small-mouthed Bass	12.25	13.1
Large-mouthed Bass	13.5	13.6
Bluegill	7.2	7.0
Sunfish	6.8	6.7
Rock Bass	7.9	7.5
Perch	7.4	7.3
Walleyes	20.1	21.3
Northern Pike	21.8	21.5
Bullheads	10.5	10.0

In general, the average size for each species did not vary much. The small-mouthed bass and walleyes both increased considerably, while pan fish decreased slightly in size. The catch per hour dropped for the fish as a whole; increases and decreases in the per hour catch were, naturally, in proportion to increases and decreases in the total catch.

Methods and baits. There was considerable variation in effectiveness of the different methods and baits and in the number using them, but the two seasons agreed perfectly in one important respect: in both years the method or bait taking the largest fish took also the fewest per hour and was the least likely to take any fish

at all; the reverse was true for the method or bait taking the smallest fish, and similar relationships invariably applied for methods and baits taking fish of intermediate size.

Each year most fishermen still-fished, but trolling and casting increased decidedly in 1935 as compared with 1934. Trolling and casting produced relatively similar results each year in catch per hour, but in 1934 trolling produced the fewest and largest, while in 1935 casting replaced trolling in these respects. The catch per fishing day for trolling and casting was better in 1935 than in 1934, while the catch for still-fishing and for fishing in general declined.

There was considerable change in the use of baits during the two seasons. The use of artificial bait increased decidedly in 1935 as did the use of worms, but minnows were used less extensively in 1935 than in 1934, this despite an almost 50% increase in the fishing. Artificial flies and insects, while relatively effective in taking fish were used by very few fishermen. For comparison the number of records, catch per hour and average size of fish for each bait are shown:

	Number of records		Catch per hour		Average length	
	1934	1935	1934	1935	1934	1935
Spinner	102	137	0.9	0.5	12.5	11.2
Plug	75	412	0.5	0.4	14.5	12.7
Art. fly	10	25	2.3	1.1	8.2	9.4
Minnows	857	701	1.9	1.2	8.4	8.9
Worms	832	1747	1.9	1.7	7.8	7.4
Insects	27	14	1.7	1.6	9.3	8.4

The effectiveness of the various baits in taking fish differed somewhat. Of the four most used baits worms were most effective both years in catching bluegills, sunfish and rockbass, and minnows were most effective both years in taking perch and small-mouthed bass. Large-mouthed bass were best taken on plugs in 1935, on spinners in 1934. Walleyes were best taken on spinners each year. Northern pike bit best on spinners in 1934 and equally well on spinners and worms in 1935.

In Table 10 certain summary data for the two seasons are listed for comparison. This table includes data for the fishermen seen but not contacted as well as for those whose records are available. It is assumed in this table that the fishing of those not contacted was average in every respect.

Table 10

Comparison of all fishing, summers of 1934 and 1935

	1934		1935	
	Total Fishing	Per Acre	Total Fishing	Per Acre
Hours fished	6,676.25	8.3	9,199	11.5
No. of fisherman-days	2,580	3.2	3,776	4.7
Hours per fisherman-day	2.6	...	2.5	...
Number of fish	11,460	14.3	11,666	14.6
Fish per fisherman-day	4.4	...	3.2	...
Fish per hour	1.72	...	1.27	...
Average size of all fish	8.33	...	8.1	...
Perch				
Number	4040	5.1	2399	3.0
Perch per hour	.61	...	.26	...
Average size	7.4	...	7.3	...
Rock Bass				
Number	2289	2.9	2445	3.1
Rock Bass per hour	.34	...	.27	...
Average size	7.9	...	7.5	...
Bluegill				
Number	2118	2.6	3789	4.7
Bluegills per hour	.32	...	.41	...
Average size	7.2	...	7.0	...
Small-mouthed Bass				
Number	1066	1.3	802	1.0
Small-mouthed Bass per hour	.16	...	.09	...
Average size	12.25	...	13.1	...
Sunfish				
Number	1092	1.4	1465	1.8
Sunfish per hour	.16	...	.16	...
Average size	6.8	...	6.7	...
Large-mouthed Bass				
Number	316	.4	481	.6
Large-mouthed Bass per hour	.04	...	.05	...
Average size	13.5	...	13.6	...
Bullhead				
Number	326	.4	73	.1
Average size	10.5	...	10.0	...
Northern Pike				
Number	52	...	53	...
Average size	21.8	...	21.5	...
Walleye				
Number	128	.15	158	.2
Average size	20.1	...	21.3	...
Sucker				
Number	10	...	...	...
Black Crappie				
Number	16	...	6	...

Other data. Other data such as a comparison of residents and non-residents cannot be compared because they were not available for one year or another. It is anticipated that the census will be carried out for another season and that the trend of fishing over the three year period may be noted. Because of the possible comparisons the data become increasingly valuable each year.

The Fife Lake camp and the M.E.C.W. in general are to be congratulated for the manner in which the census was taken. The cooperation of the fishermen was, of course, essential and there is every reason to believe that the fishermen fully cooperated in this project. Their further cooperation is solicited.

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