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May 6, 1954

Report No. 1420

FISHING VALUES IN IMPOUNDMENTS, WITH SPECIAL REFERENCE TO SHALLOW-WATER FLOODING PROJECTS

By

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The purpose of this report is to summarize some of the creel census data in the files of the Institute for Fisheries Research for an appraisal of fishing values in impounded waters, especially in shallow-water flooding projects. Special interest in this subject, at present, results from a plan to flood a group of lakes in T. 15 and 16 N., R. 7 and 8 W., Mecosta County, known as the Martiny Flooding Project. Presumably the question of fishing values will receive consideration in pending litigation involving this project.

The quality of fishing in any proposed impoundment cannot be predicted with absolute certainty; such a prediction must be a matter of opinion based on a knowledge of fishing quality experienced in impoundments already established and based on a knowledge of fish and habitat in the waters and area to be impounded. Furthermore, biologists are somewhat handicapped in predicting fishing values for impoundments because of the lack of before-and-after studies on such waters--a detailed study of fishing values of the waters prior to flooding as compared to values after the flooding. Very few such studies have been made anywhere, and to our knowledge none has been made in Michigan.

What is available for some of the impoundments in Michigan is information on angling, collected by conservation officers and to some extent by creel census clerks of the Fish Division.

The creel census by conservation officers has been known as the General Creel Census. It has been in operation continuously since 1927. Each officer, during his regular tour of patrol duty, contacts a sample of the anglers in his county, and keeps individual records on the waters fished, date, number of fish caught, time spent fishing, and related information. Records obtained by the officers are analyzed by staff members of the Institute for Fisheries Research. The General Creel Census does not provide a basis for computing total amount of fishing or total catch for any particular water; rather it provides an index (it gives a sample) of the kinds of fish and of fishing quality in terms of number of fish caught per hour by anglers. Adequacy of sampling for individual waters on a year-by-year basis is highly variable between different waters; where an officer has obtained something over 50 or 100 records for a particular water and where these records are distributed throughout the fishing season, the sample is quite adequate to indicate species of fish and angling quality in terms of catch per hour; smaller numbers of samples are proportionately less reliable.

General Creel Census data are summarized herewith for certain Michigan impoundments on which a considerable number of records are available. These include Michigamme Reservoir and Peavy Pond in Iron County, Seney Ponds on the federal waterfowl refuge in Schoolcraft County, Fletcher Pond in Alpena and Montmorency counties, Reedsburg Pond in Roscommon and Missaukee counties, Haymarsh Lake in Mecosta County, and Pontiac Lake in Oakland County. Haymarsh, Seney, Pontiac and Reedsburg are low-dam, shallow-water

flooding projects and therefore are probably more comparable in potential fishing values to the proposed Martiny project, than are Way, Peavy and Fletcher which are large hydro-electric projects. Presumably the seven impoundments, for which data are here presented, represent quite well the range in fishing quality which is experienced on Michigan impoundments generally, although there remains the possibility that some other impoundments may have poorer, and some may have better, fishing quality than any of these seven.

Michigamme Reservoir is formed by a 38-foot concrete and steel dam built in 1940 by the Wisconsin-Michigan Power Company.

Peavy Pond has a 95-foot concrete and steel dam built in 1943 by the Wisconsin-Michigan Power Company.

Seney Ponds are small and shallow, waterfowl refuge ponds formed by dikes and low dams, owned by the U. S. Fish and Wildlife Service.

Fletcher Pond has a 12-foot dam built in 1930 by the Alpena Power Company.

Reedsburg Pond has an 8-1/2 foot concrete dam built in 1940 by the Conservation Department (Game Division) as a wildlife flooding project.

Haymarsh Lake was formed by an 8-foot, earth-fill dam built in 1949 by the Conservation Department as a wildlife and fisheries flooding project. Several small lakes in the area were flooded by the impoundment.

Pontiac Lake, of 585 acres in area, is the result of a 25-foot dam built in 1924 by the Vantine Real Estate Company. The U. S. G. S. Topographic map (edition of 1907) shows a Lime Lake (area computed at 18.7 acres) within the present basin of Pontiac Lake, so that Pontiac Lake is largely an impoundment.

General Creel Census data for Michigamme Reservoir and Peavy Pond are given in Tables 1 and 2, respectively. On Michigamme, for the eleven

years of 1943-1953, the officers obtained records on 2,311 angler days representing a total of 12,330 hours of fishing. The total catch was 6,207 fish, and the grand average catch per hour was 0.50 fish. The 6,207 fish included: 2,096 yellow perch, 1,974 crappies, 1,608 northern pike, 317 walleyes, and 212 bass (smallmouth plus largemouth). On Peavy Pond, corresponding figures were 788 angler records, 3,368 hours of fishing, 2,242 fish, and a catch per hour of 0.67 fish. The above figures have been enumerated in detail so that data in the several tables included in this report are readily understandable. Similar data for the remaining five impoundments considered here are given in Tables 3-7.

The General Creel Census data for all non-trout lakes in Michigan for the ten-year period 1944-1953 are summarized according to the three geographic regions of Michigan (I, II and III) in Tables 8-10. For example, for the Upper Peninsula (Region I) officers contacted a total of 34,982 anglers who had fished 110,651 hours, and caught 100,178 fish at a rate of 0.91 fish per hour (Table 8).

A comparison of fishing quality may be made between the catch-per-hour averages for impoundments and the corresponding averages for all non-trout lakes, and this comparison probably is most significant if done on a geographic, or regional, basis, as in the following:

Impoundments	Average catch per hour	Average catch per hour in non-trout lakes, by Region
Michigamme	0.50	Region I, 0.91
Peavy	0.67	
Seney	0.35	
Fletcher	0.50	Region II, 1.15
Reedsburg	0.61	
Haymarsh	3.78	
Pontiac	1.77	Region III, 1.56

Fishing quality in terms of catch per hour in the three large power-project impoundments (Michigamme, Peavy, and Fletcher) has been poorer, on the

average, than for all non-trout lakes in the respective regions. In the four, smaller flooding projects (Seney, Reedsburg, Haymarsh and Pontiac), fishing quality has varied from much poorer (Seney and Reedsburg) to better (Pontiac) and much better (Haymarsh) than in non-trout lakes generally. An important factor also to be considered is the species composition of the catch. In Fletcher (Table 4) the catch has been mostly northern pike, and in Seney (Table 3) it has been almost entirely that species. Since pike taken by anglers are considerably larger, on the average, than fish caught in non-trout lakes generally (the latter being predominantly pan fish--see Table 18), the poundage of fish taken from Fletcher and Seney by anglers would compare more favorably (than indicated by the catch-per-hour figures) with the poundage taken from all non-trout lakes.

Generally, impoundments tend to be more favorable habitats for certain game species (especially for the northern pike and to some extent for the black crappie) and less favorable habitats for certain other game species (especially the bluegill) as compared to natural lakes, and this difference has to be taken into consideration in any evaluation of fishing in impoundments as compared to natural lakes. This difference between impoundments and natural lakes is readily illustrated by a summary of figures for the seven impoundments (Tables 1 to 7) as compared to the species composition of anglers' catches in all non-trout lakes (Table 18). For the seven impoundments as a whole, northern pike made up 31 percent of all fish recorded, crappie 11 percent, bluegill 24 percent, perch 16 percent; whereas, in natural lakes pike (1% to 19%) and crappies (3% to 9%) made up a smaller percentage of the total catch, and bluegills (12% to 69%) and perch (12% to 58%) make up a larger portion of the total catch.

In predicting the possible fishing values for the Martiny project impoundment, available data (Table 6) for the nearby Haymarsh impoundment (also in Mecosta County) probably are the best guide which we have. During a fifteen-year period prior to 1949 when the impoundment was completed, officers obtained records on 77 anglers on the original lakes, whose average catch per hour was 3.26 fish; in four years following the impoundment, records were obtained on 272 anglers whose average catch per hour was 4.00 fish. It is safe to conclude that fishing quality during the first four years after impoundment was at least as good, if not better than prior to impoundment.

For the thirteen lakes in the Martiny project area, General Creel Census data are available for six of them (Tables 11-16), and the data for these six lakes are summarized in Table 17. From 1935 to 1953, officers contacted 781 anglers on these six lakes and their average catch per hour was 2.01 fish. This was significantly higher than the average (1.15) for all non-trout lakes in Region II (Table 9) which means that the Martiny lakes have given better-than-average fishing quality in the past. Whether, after impoundment, the Martiny lake area would produce as good fishing quality as these lakes have been producing, or whether it would be as good as on the Haymarsh area after impoundment, must be purely a matter of opinion.

The importance of sport fishing as a recreational industry in Michigan, and the degree of increase in interest in this sport in recent years, are evident in the Department's records of sales of sport fishing licenses, summarized in Table 19. A non-resident fishing license was first required in 1914 when 16,931 were sold to anglers, and a resident trout license was first required in 1928 (56,705 sold). The number of licenses has increased to the extent that 1,150,180 licenses were sold in 1952.

Table 1.--General Creel Census data for Michigamme Reservoir, Iron County

Year	Number anglers	Hours fished	Fish caught	Catch per hour	S.M. bass	L.M. bass	Crappie	Yellow perch	Wall-eye	Northern pike
1943	6	18	12	0.67	3	...	...	...	2	7
1944	86	553	296	0.54	17	116	54	10	...	99
1945	812	6,128	1,538	0.25	19	11	163	605	218	522
1946	44	218	70	0.32	...	...	...	38	6	26
1947	104	528	41	0.08	...	...	...	...	1	40
1948	340	1,480	1,148	0.78	3	...	548	430	40	127
1949	396	1,560	1,285	0.82	23	12	473	556	23	198
1951	142	452	509	1.13	1	1	226	215	7	59
1952	143	472	551	1.17	6	...	429	42	17	57
1953	238	921	757	0.82	...	...	81	200	3	473
Total	2,311	12,330	6,207	0.50	72	140	1,974	2,096	317	1,608

Table 2.--General Creel Census data for Peavy Pond, Iron County

Year	Number anglers	Hours fished	Fish caught	Catch per hour	Brook trout	S.M. bass	L.M. bass	Blue-gill	Crappie	Yel-low perch	Wall-eye	North-ern pike	Bull-head	Suckers
1944	3	33	12	0.36	...	...	...	...	...	...	...	12	...	...
1945	143	775	426	0.55	...	31	...	...	162	20	22	190	1	...
1946	123	564	175	0.31	...	9	...	...	41	3	5	117	...	...
1947	99	327	143	0.44	...	...	...	...	51	1	5	86	...	...
1948	82	412	265	0.64	1	4	21	...	168	31	7	14	...	19
1949	67	308	432	1.40	...	24	1	...	323	56	14	14	...	...
1950	74	427	431	1.01	...	28	...	...	354	14	13	22	...	...
1951	61	234	120	0.51	...	7	...	...	100	...	4	9	...	...
1952	101	218	199	0.91	...	3	1	6	137	24	16	12	...	...
1953	35	70	39	0.56	...	...	2	...	22	4	2	9	...	...
Total	788	3,368	2,242	0.67	1	106	25	6	1,358	153	88	485	1	19

Table 3.--General Creel Census data for Seney Ponds, Schoolcraft County

Year	Number anglers	Hours fished	Fish caught	Catch per hour	Yellow perch	Northern pike
1942	12	31	21	0.68	...	21
1943	3	6	7	1.17	...	7
1944	8	31	12	0.39	...	12
1946	58	221	63	0.29	...	63
1947	71	226	103	0.46	...	103
1948	69	222	43	0.19	...	43
1949	26	122	25	0.20	...	25
1950	9	13	16	1.23	...	16
1951	71	239	69	0.29	1	68
1952	128	337	125	0.37	5	120
1953	6	24	30	1.25	...	30
Total	461	1,472	514	0.35	6	508

Table 4.--General Creel Census data for Fletcher Pond, Alpena and Montmorency Counties

Year	Number anglers	Hours fished	Fish caught	Catch per hour	Rain-bow trout	S.M. bass	L.M. bass	Blue-gill	P'seed	Rock bass	Crap-pie	Yel-low perch	Wall-eye	North-ern pike	Bull-head	Sucker
1935	7	24	4	0.17	...	...	...	...	...	...	...	...	...	4	...	...
1938	12	49	151	3.08	...	...	...	...	16	...	...	...	...	15	120	...
1939	37	176	372	2.11	...	2	...	...	...	7	...	...	...	63	300	...
1940	37	164	9	0.05	...	...	...	...	...	...	...	...	...	9	...	...
1941	163	449	193	0.43	...	...	...	...	6	...	...	1	...	84	102	...
1942	356	1,535	326	0.21	...	...	...	...	6	...	...	2	3	293	22	...
1943	129	647	279	0.43	...	...	...	...	...	...	...	...	...	239	40	...
1944	335	1,975	1,087	0.55	...	2	1	...	...	...	...	...	...	649	435	...
1945	414	2,180	836	0.38	...	...	...	...	...	...	...	...	18	648	170	...
1946	46	205	30	0.15	1	...	...	...	...	...	...	...	...	29	...	...
1947	216	684	189	0.28	...	...	1	...	...	...	...	...	...	178	10	...
1948	1,620	4,267	2,485	0.58	...	3	...	...	13	81	...	1,136	...	1,182	70	...
1949	1,984	6,260	2,858	0.46	...	34	38	51	9	86	36	401	...	1,743	459	1
1950	653	2,733	1,355	0.50	...	15	84	7	147	91	...	241	...	729	41	...
1951	1,144	3,708	1,223	0.33	...	48	178	11	55	143	10	126	...	601	50	1
1952	1,168	4,667	3,149	0.67	...	212	398	74	720	39	2	185	...	1,442	76	1
1953	1,052	3,670	2,010	0.55	...	24	185	100	361	21	2	79	...	1,169	60	9
Total	9,373	33,393	16,556	0.50	1	340	885	243	1,333	468	50	2,171	21	9,077	1,955	12

Table 5.--General Creel Census data for Reedsburg Pond, Muskegon River

(Impounded before 1941)

Year	Number anglers	Hours fished	Fish caught	Catch per hour	S.M. bass	L.M. bass	Blue-gill	P'seed	Rock bass	Crappie	Yel-low perch	Wall-eye	North-ern pike	Bull-head	Sucker	Bowfin
1945	63	172	24	0.14	...	...	...	1	1	1	5	...	11	5	...	...
1947	223	506	13	0.03	...	...	...	...	3	2	1	...	6	...	1	...
1948	366	1,014	845	0.83	50	...	18	125	61	17	482	...	89	...	...	3
1949	85	179	34	0.17	...	...	1	1	...	4	4	...	24	...	...	...
1950	143	291	384	1.32	1	1	3	3	1	347	10	...	18	...	...	...
1951	134	238	55	0.23	9	5	2	1	...	7	14	3	14	...	...	...
1952	71	132	101	0.77	2	...	...	1	18	...	11	2	14	...	53	...
1953	60	122	167	1.37	...	...	...	4	23	5	...	...	29	...	106	...
Total	1,145	2,672	1,623	0.61	62	6	24	136	107	383	527	5	205	5	160	3

Table 6.--General Creel Census data for Haymarsh Lake, Mecosta County (Before and after impoundment)

Year	Number anglers	Hours fished	Fish caught	Catch per hour	L.M. bass	Blue-gill	P'seed.	Rock bass	Black crappie	Yellow perch	Northern pike
1934	31	87	352	4.05	49	46	213	...	...	28	16
1935	26	88	333	3.78	16	4	285	4	...	17	7
1936	18	59	91	1.54	...	...	22	...	...	12	57
1940	2	6	7	1.17	7	...	...	...	...	...	...
Total, before impoundment	77	240	783	3.26	72	50	520	4	...	57	80
1950*	7	23	98	4.26	...	60	27	...	...	11	...
1951	95	191	898	4.70	12	190	69	4	14	541	68
1952*	79	183	1,161	6.34	...	1,058	66	33	...	4	...
1953	91	229	344	1.50	...	65	69	5	22	35	148
Total, after impoundment	272	626	2,501	4.00	12	1,373	231	42	36	591	216
Grand total	349	866	3,284	3.79	84	1,423	751	46	36	648	296

*All data collected during the ice season.

Table 7.--General Creel Census data for Pontiac Lake, Oakland County

Year	Number anglers	Hours fished	Fish caught	Catch per hour	S.M. bass	L.M. bass	Blue-gill	P'seed	Rock bass	Crappie	Yel-low perch	Wall-eye	North-ern pike	Bull-head	Carp
1929	1	5	2	0.40	...	...	...	...	...	...	1	...	1	...	...
1930	15	93	161	1.73	...	4	133	5	...	...	12	...	6	1	...
1932	26	146	468	3.21	...	9	449	5	...	...	3	...	...	2	...
1933	6	27	88	3.27	...	...	87	...	...	...	1	...	...	...	...
1934	70	330	981	2.97	44	30	807	10	...	...	74	8	...	8	...
1935	20	125	134	1.07	...	76	40	18	...	...	...	...	...	...	...
1936	39	158	499	3.16	...	25	423	44	...	7	...	...	...	...	...
1938	6	61	41	0.67	...	3	37	...	...	...	1	...	...	...	...
1939	75	314	314	1.00	...	11	270	28	...	...	3	...	...	1	1
1940	77	219	533	2.43	22	35	384	10	...	14	68	...	...	...	...
1941	58	213	521	2.45	...	64	293	25	15	41	83	...	...	...	...
1942	312	1,134	1,936	1.71	...	63	1,639	22	...	106	102	...	4	...	...
1943	222	789	841	1.07	...	120	644	5	5	35	31	...	1	...	...
1944	261	1,002	1,381	1.38	...	41	1,131	28	7	84	87	...	3	...	...
1945	169	629	1,302	2.07	...	24	972	86	17	50	151	...	1	1	...
1946	44	141	325	2.30	...	...	165	1	22	45	90	...	2	...	...
1947	46	104	167	1.61	...	...	147	3	...	13	3	...	1	...	...
Total	1,447	5,490	9,694	1.77	66	505	7,621	290	66	395	710	8	19	13	1

Table 8.--General Creel Census data for all non-trout lakes in Region I (Upper Peninsula)

Year	Number of anglers	Total hours fished	Total fish caught	Catch per hour
1944	3,496	13,862	8,907	0.64
1945	2,941	14,077	7,266	0.52
1946	3,248	11,929	8,800	0.74
1947	1,816	5,483	3,124	0.57
1948	4,210	12,459	12,159	0.98
1949	3,931	11,905	11,260	0.95
1950	3,676	9,409	12,114	1.29
1951	3,755	10,738	10,924	1.02
1952	4,151	10,759	13,136	1.22
1953	3,758	10,030	12,488	1.25
Total	34,982	110,651	100,178	0.91

Table 9.--General Creel Census data for all non-trout lakes in Region II (northern half of Lower Peninsula)

Year	Number of anglers	Total hours fished	Total fish caught	Catch per hour
1944	11,930	33,689	32,426	0.96
1945	10,286	31,959	29,671	0.93
1946	11,767	35,295	27,937	0.79
1947	10,551	27,813	31,739	1.14
1948	23,109	49,332	52,524	1.06
1949	21,314	48,052	51,324	1.07
1950	18,494	42,523	67,766	1.59
1951	17,251	38,432	48,357	1.26
1952	16,564	36,525	47,244	1.29
1953	18,665	38,550	50,598	1.31
Total	159,931	382,170	439,586	1.15

Table 10.--General Creel Census data for all non-trout lakes in Region III (southern half of Lower Peninsula)

Year	Number of anglers	Total hours fished	Total fish caught	Catch per hour
1944	13,291	38,383	57,773	1.51
1945	12,387	38,181	57,345	1.50
1946	10,213	28,786	39,241	1.36
1947	8,302	20,957	29,891	1.43
1948	13,618	30,246	46,131	1.53
1949	17,984	43,062	70,730	1.64
1950	14,453	32,903	60,588	1.84
1951	11,327	27,236	48,102	1.77
1952	12,681	27,281	43,769	1.60
1953	20,722	52,229	76,034	1.46
Total	134,978	339,264	529,604	1.56

Table 11.--General Creel Census data for Boom Lake, Mecosta County

(T15N, R8W, Sec. 11, 12)

Year	Number anglers	Hours fished	Fish caught	Catch per hour	S.M. bass	L.M. bass	Blue-gill	P'seed	Rock bass	Crappie	Yel-low perch	North-ern pike	Bull-head
1944	5	25	48	1.92	...	...	48	...	...	...	...	...	...
1950	31	64	121	1.89	...	1	30	9	47	8	26	...	...
1951	54	74	142	1.92	1	...	89	...	8	17	23	2	2
1952	33	58	114	1.97	...	...	69	12	...	...	33	...	...
1953	5	10	24	2.40	...	...	12	2	...	2	8	...	...

Table 12.--General Creel Census data for Diamond Lake, Mecosta County
(T 15 N, R 7, 8 W, Sec. 1, 6)

Year	Number anglers	Hours fished	Fish caught	Catch per hour	S. M. bass	L. M. bass	Blue-gills	P'seed	Yellow perch
1935	1	9	38	4.22	...	4	34	...	...
1942	2	4	10	2.50	...	...	10	...	...
1950	10	15	42	2.80	3	...	20	2	17

Table 13.--General Creel Census data for Evans Lake, Mecosta County

(T15,16N, R8W, Sec. 2, 35)

Year	Number anglers	Hours fished	Fish caught	Catch per hour	S.M. bass	L.M. bass	Blue-gill	P'seed	Rock bass	Crappie	Yel-low perch	North-ern pike	Bull-head
1940	8	26	44	1.69	...	8	18	8	7	...	...	3	...
1941	6	24	51	2.13	...	2	29	...	...	20	...	...	...
1942	9	36	57	1.58	...	...	30	...	...	...	...	...	27
1946	13	56	128	2.29	...	...	112	...	...	16	...	...	...
1949	3	9	5	0.56	...	...	...	...	3	...	...	2	...
1950	95	209	375	1.79	1	3	248	9	33	20	57	4	...
1951	67	135	184	1.36	2	3	118	7	1	37	11	5	...
1952	43	89	175	1.97	...	...	82	10	3	64	16	...	...

Table 14.--General Creel Census data for Lower Evans Lake, Mecosta County (T 15 N, R 8 W, Sec. 2, 11)

Year	Number anglers	Hours fished	Fish caught	Catch per hour	Blue-gill	P'seed	Crappies	Yel-low perch	North-ern pike
1944	2	6	35	5.83	...	...	35	...	...
1950	2	6	3	0.50	...	...	....	3	...
1951	24	73	59	0.81	6	1	49	...	3
1952	23	50	76	1.52	37	8	24	6	1

Table 15.--General Creel Census data for Upper Evans Lake, Mecosta County (T 16 N, R 8 W, Secs. 35, 36)

Year	Number anglers	Hours fished	Fish caught	Catch per hour	Blue-gills	P'seed	Crap-pie	Yel-low perch	North-ern pike
1942	1	3	8	2.67	8	...	...	...	...
1949	3	11	9	0.82	...	...	9	...	...
1950	1	4	24	6.00	14	...	7	3	...
1952	62	155	271	1.75	136	10	103	21	1

Table 16.--General Creel Census data for Tubbs Lake, Mecosta County (T 15 N, R 7, 8 W, Sec. 1, 6, 7, 12)

Year	Number anglers	Hours fished	Fish caught	Catch per hour	S. M. bass	L. M. bass	Blue-gill	P'seed	Rock bass	Crappie	Yellow perch	Northern pike	Sucker
1944	14	49	123	2.51	...	3	99	2	...	14	1	2	2
1946	3	9	30	3.33	...	...	28	...	...	2	...	...	...
1948	53	118	561	4.75	...	28	503	27	...	3	...	...	...
1949	13	34	52	1.53	...	...	...	...	...	48	...	4	...
1950	47	103	330	3.20	...	...	227	21	29	7	45	1	...
1951	64	141	266	1.89	...	5	42	7	4	152	42	14	...
1952	37	109	74	0.68	...	1	31	9	...	21	4	8	...
1953	47	115	189	1.64	1	1	109	9	1	38	23	7	...

Table 17.--Summary of General Creel Census data for six of the thirteen Martiny lakes, Mecosta County

Lake	Number anglers	Hours fished	Fish caught	Catch per hour	S. M. bass	L. M. bass	Blue-gills	P'seed	Rock bass	Crap-pie	Yel-low perch	North-ern pike	Bull-head	Sucker
Boom	128	231	449	1.94	1	1	248	23	55	27	90	2	2	...
Diamond	13	28	90	3.21	3	4	64	2	...	...	17	...	...	...
Evans	244	584	1,019	1.74	3	16	637	34	47	157	84	14	27	...
Lower Evans	51	135	173	1.28	...	...	43	9	...	108	9	4	...	...
Upper Evans	67	173	312	1.80	...	...	158	10	...	119	24	1	...	...
Tubbs	278	678	1,625	2.40	1	38	1,039	75	34	285	115	36	...	2
Totals	781	1,829	3,668	2.01	8	59	2,189	153	136	696	339	57	29	2

Table 18.--Species composition (by percentage) of the catch of fish from non-trout lakes, for the years 1945 and 1952 as representative examples, by geographic regions. Totals are actual numbers of fish recorded in the General Creel Census.

Species	Region I		Region II		Region III	
	1945	1952	1945	1952	1945	1952
Brook trout	1	1	*	*	...	...
Brown trout	...	...	*	*	...	...
Rainbow trout	*	*	*	*	*	*
Largemouth bass	5	1	2	2	3	2
Bluegill	16	12	35	33	69	68
Smallmouth bass	6	2	1	1	*	*
Pumpkinseed	3	2	6	7	3	5
Yellow perch	26	58	30	34	12	16
Rock bass	2	3	4	5	1	1
Walleye	14	7	2	1	*	*
Black crappie	6	5	3	9	9	7
Northern pike	19	9	7	4	1	1
Smelt	...	...	6	1	...	...
Suckers	*	*	1	*	*	*
Bullheads	1	*	1	1	*	*
Carp	...	...	...	*	*	*
Cisco	*	*	1	*	*	*
Catfish	...	...	*	*	*	*
Redhorse	...	...	*	...	...	*
Lake trout	*	...	1	*	...	*
Muskellunge	...	*	*	*	*	...
White bass	...	...	...	*	1	*
Sheepshead	...	...	...	*	...	...
Bowfin	...	*	*	*	*	*
Gar	...	...	...	*	...	...
Shiners	...	...	...	...	...	*
Sturgeon	...	...	...	*	...	...
Warmouth	...	...	...	...	*	*
Saugers	...	*	...	...	...	...
Whitefish	*	...	*	...	...	...
Totals	7,266	13,136	29,671	47,244	57,345	43,769

* Less than 1 percent

Table 19.--Annual sales of sport fishing licenses in Michigan, compiled by Fish Division, April 19, 1951, with records for 1950-1952 supplied later.

Year	Resident	Non-resident
1914	...	16,931
1915	...	19,194
1916	...	24,881
1917	...	27,509
1918	...	25,624
1919	...	35,681
1920	...	52,338
1921	...	55,534
1922	...	49,240
1923	...	61,747
1924	...	53,027
1925	...	62,005
1926	...	61,654
1927	...	60,666
1928	56,705	59,480
1929	70,928	64,795
1930	87,540	54,996
1931	81,571	39,715
1932	44,767	19,947
1933	290,055	61,589
1934	445,408	92,683
1935	478,798	115,292
1936	520,922	148,236
1937	586,909	181,150
1938	665,733	189,304
1939	656,559	201,803
1940	557,264	215,981
1941	600,814	242,810
1942	589,761	214,163
1943	531,801	134,132
1944	542,624	160,209
1945	599,755	198,876
1946	725,612	263,721
1947	780,052	283,957
1948	813,398	293,350
1949	819,072	282,170
1950	788,528	267,000
1951	845,103	283,139
1952	852,319	297,861

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