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# FISHING IN TWELVE MICHIGAN LAKES UNDER EXPERIMENTAL REGULATIONS

by

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## HISTORY OF REGULATIONS

The earliest legislation pertaining to fishing in inland waters of Michigan was concerned with the use of seines and other types of "continuous" nets. One of the first of such laws was Act No. 198, Laws of Michigan 1859 (Public Acts), which listed twelve counties of the extreme southern part of the Lower Peninsula where the use of seines and continuous nets was prohibited. Many of these earlier laws pertained to individual waters. For example, in 1869, Whitmore Lake in Washtenaw and Livingston counties was closed to fishing with "seines or with any species of continuous nets or with any form of spears or with any description of firearms," and it was not lawful "between the first day of December in each year and the first day of April next succeeding, to fish with hook (and) or line or in any manner...." (Whitmore is one of the "test" lakes currently under study of experimental regulations.)

Fishing laws during the period of 1870 to 1890 gave attention to more waters throughout the state and became more specific as to closed seasons and types of gear. Act No. 159, Laws of Michigan (Public Acts), made illegal the use of any device other than hook and line for taking fish on all the lakes of the state. The year 1897 saw the passage of an act which made legal the spearing of any or all kinds of fish except trout and black bass during the months of December, January, February and March. In 1899 an act was passed which opened most of the lakes in Livingston County to spearing, but that portion of Whitmore Lake lying within Livingston County remained closed to spearing. In 1901 ice fishing with not more than ten "bob" lines was allowed in Livingston County, thereby opening Whitmore Lake to winter fishing for the first

time since 1869. The act preventing the spearing of fish in that portion of Whitmore Lake lying in Livingston County was repealed in March of 1903.

A closed season on black bass was established in 1901, the closed season to extend from the first day of April through the twentieth day of May of each year.

One of the first creel limits (an act passed in 1903) applying to the entire state was fifty fish per day (possession limit of 10[illegible] fish) of any of the following species: "brook trout, speckled trout, landlocked salmon, grayling, California trout, Loch Leven trout or steelhead trout,.... muskallonge,....black, strawberry, green or white bass or sturgeon."

The variety of present-day closed seasons, creel limits, and size limits on warm-water species had its beginning in Act No. 59, Laws of Michigan 1909 (Public Acts). This provided for a closed season from the first day of February through the fifteenth day of June on "small-mouthed black bass, big-mouthed black bass, silver, calico, white or strawberry bass...." The Act also established a ten-inch minimum size limit and a bag and possession limit of ten on the black basses, as well as a seven-inch size limit and a bag and possession limit of twenty on "strawberry bass, white bass, silver or calico bass."

In 1915, the closed season on largemouth and smallmouth bass and on walleyes was from March 1 through June 15, and the creel limit on the black basses was ten fish. There was a creel limit of twenty-five fish on the walleye, bluegill, sunfish, rock bass, white bass, calico bass, perch and crappies. There was a size limit of five inches on the bluegill, sunfish, perch and crappies; six inches on rock bass, white bass or calico bass; and ten inches on the walleye.

A revision of the closed seasons on largemouth and smallmouth bass and walleyes, and a creel limit on "pickerel," were passed by the legislature in 1917. The new closed seasons were: for smallmouth bass, March 1 through July 1; largemouth bass, March 1 through June 15; and walleye, February 1 to May 1. The creel limit placed on "pickerel" was ten per day. The closed season for smallmouth bass was amended again in 1919 so as to run concurrently with that for the largemouth bass.

The six-inch size limit on bluegills and sunfish, which existed until 1949, was put into effect in 1921, and at the same time the size limit on rock bass, white bass, calico bass, perch and crappies was raised to seven inches. A creel limit of thirty perch and a possession limit of fifty perch were also enacted.

In 1923, the closed season on largemouth and smallmouth bass was revised to January 1 through June 15.

Act No. 165, Laws of Michigan 1929 (Public Acts), with subsequent revisions, is the law which governs our sport fishing on inland waters at the present time. It was this law which closed all lakes other than designated "pike" lakes to any and all fishing from April 1 through June 24; subsequent revisions have opened all lakes to year-round fishing.

A general outline of these early laws controlling sport fishing in Michigan is presented in Table 1; and some of the more important details are listed chronologically in the following:

1820. Territorial law. Illegal to obstruct passage of fish up or down streams.

1865. Board of Supervisors in each county given right to regulate fishing.

1872. Thirteen northern counties closed to fishing except with hook and line.

Table 1

Generalized historical outline of sport fishing regulations in Michigan.

Individual entries are for the beginning of specific regulations which were continued until the next change indicated.

| Year of Legislative Act | Fishing license | Fishing gear | Closed seasons | | | | Size limits | | | | Creel limits | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Trout | Bass | Pike(P) Muskie(M) Walleye(W) | Panfish | Trout | Bass | Pike(P) Muskie(M) Walleye(W) | Panfish | Trout | Bass | Pike(P) Muskie(M) Walleye(W) | Panfish |
| 1865 | None | Nets and weirs limited | None | None | None | None | None | None | None | None | None | None | None | None |
| 1873 | | | Oct.1-Apr.1 | | | | | | | | | | | |
| 1875 | | Hook and line only (for trout) | Sept.1-May 1 | | | | | | | | | | | |
| 1879 | | Nets outlawed | | | | | | | | | | | | |
| 1881 | | | | | | | 6" | | | | | | | |
| 1885 | | Explosives, poisons outlawed | | | | | | | | | | | | |
| 1889 | | Hook and line only (for bass) | | | | | | | | | | | | |
| 1891 | | Hook and line only (all species) | | | | | | | | | | | | |

(continued)

Table 1 (continued)

| Year of Legislative Act | Fishing license | Fishing gear | Closed seasons | | | | Size limits | | | | Creel limits | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Trout | Bass | Pike(P) Muskie(M) Walleye(W) | Panfish | Trout | Bass | Pike(P) Muskie(M) Walleye(W) | Panfish | Trout | Bass | Pike(P) Muskie(M) Walleye(W) | Panfish |
| 1901 | | | | Apr.1-May 20 | | | | | | | | | | |
| 1903 | | | | | | | 7" | | | | 50 | 50 | 50(M) | |
| 1907 | | | Aug.15-Apr.15 | | | | | | | | | | | |
| 1909 | | | Sept.1-May 1 | Feb.1-Je.15 | | | | 10" | | 7" (part) | | 10 | | 20 (part) |
| 1913 | Non-resident | | Sept.15-May 1 | | | | | | | | 35 | | | |
| 1915 | | | Sept.1-May 1 | Mar.1-Je.15 | Mar.1-Je.15(W) | | | | 10"(W) | 5"-6" | | | 25(W) | 25 |
| 1917 | | | | | Feb.1-May 1(W) | | | | | | | | 10(W) | |
| 1921 | | | | Apr.1-Je.15 | | Apr.1-Je.15 (in part) | | | | 6"-7" | | | | |
| 1923 | | | | Jan.1-Je.15 | | | | | | | 25 | | | |
| 1927 | Resident trout | | | | | | | | | | | | | |
| 1929 | | | | Jan.1-Je.24 | Apr.1-Je.24 | Apr.1-Je.24 | | | 14"(P,W) 30"(M) | | 15 | 5 | 5(P,W) | |

Table 1 (continued)

| Year of Legislative Act | Fishing license | Fishing gear | Closed seasons | | | | Size limits | | | | Creel limits | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Trout | Bass | Pike(P) Muskie(M) Walleye(W) | Panfish | Trout | Bass | Pike(P) Muskie(M) Walleye(W) | Panfish | Trout | Bass | Pike(P) Muskie(M) Walleye(W) | Panfish |
| 1931 | | | Sept.8-Apr.30 | | | | | | | | | | | |
| 1933 | Resident | | | | May 1-Je.24 | May 1-Je.24 | | | | 6" | | | | |
| 1935 | | | Sept.3-Apr.26 | | | | | | | | | | | |
| 1937 | Resident trout | | | | Apr.1-Je.24 | Apr.1-Je.24 | | | | | | | | |
| 1939 | Resident (all fish) | | | | | | | | | | | | | |
| 1941 | | | | | | Mar.1-Je.24 | | | | | | | | Not over 15 bluegill |
| 1947 | Trout stamp | | Sept.15-Apr.25 | | Mar.16-May 14 | | | | | | | | | |
| 1949 | | | | | | Apr.1-Je.24 | | | 13"(W) | None | | | | |
| 1951 | | | | Je.21-Dec.31 | Mar.14-Apr.25 | Apr.1-Apr.25 | | | | | 10 | | | |

+Additional regulations:

Lakes closed to fishing Apr.1-June 24, from 1929 to 1945; only lakes south of M-46 closed from Apr.1-June 24 from 1945 to 1951; then no lakes closed to fishing.

Sturgeon, no open season 1929 to 1947, open to spearing in 1947, to hook-and-line fishing in 1951.

Grayling protected starting in 1919.

1879. Spears, firearms and nets (except dip nets) illegal, March-May.

1887. First game and fish warden.

1889. Muskellunge by hook and line only.

Largemouth, smallmouth and white bass, and crappie by hook and line only.

Explosives, fish toxins, seines and traps illegal.

Spears illegal, March 1-July 1.

1891 Hook and line only legal tackle.

1893. All fish subject to regulations are property of state.

1897. Legal to spear (except trout and bass), December 1-March 31.

1901. Closed season on largemouth and smallmouth bass, April 1-May 20.

1903. Sturgeon by hook and line only.

Creel limit of fifty bass, sturgeon and muskellunge.

1907. Illegal to sell largemouth, smallmouth or white bass.

1909. Closed season, largemouth, smallmouth and silver bass, and crappie, February 1-June 15.

Ten-inch size limit and creel limit of ten on largemouth and smallmouth bass.

Seven-inch size limit and creel limit of twenty on crappie and white bass.

1913. Non-resident license--All fish except trout, $1.00; All fish $3.00.

1915. All fish declared property of state.

Spearing season reduced to January 1-February 28 (29).

Closed season on walleye and largemouth and smallmouth bass, March 1-June 15.

Age limit of twenty-one on non-resident license.

Creel limit of twenty-five each on bluegill, sunfish, rock bass, white bass, perch, walleye and crappie.

Size limit of five inches on bluegills, sunfish, perch, white crappie.

Size limit of six inches on rock bass, white bass, black crappie.

Size limit of ten inches on walleye.

1917. Revised closed seasons: smallmouth, March 1-July 1; largemouth, March 1-June 15; walleye, February 1-May 1.

Creel limit, pike, ten per day.

Increased fee for non-resident "all fish" license to $5.00.

Creel limit, largemouth and smallmouth bass, ten fish combined.

1919. Revised closed season, largemouth and smallmouth bass, March 1-June 15.

1921. Revised closed season on all kinds of bass, and added bluegills to the list, April 1-June 15.

Age limit reduced to eighteen for non-resident license. Fees revised: General license $4.00, special license (non-trout) $2.00.

1923. Revised closed season, largemouth and bass, January 1-June 15.

Illegal to spear walleyes.

Revised fee for non-resident general license, $5.00.

1927. Trout license for male residents over twenty-one, $1.00.

1929. The Inland Fishing Law.

1933. Resident fishing license (over eighteen), $0.50. No special trout license.

1937. Resident fishing license $1.00. Resident non-trout license $0.50.

1939. Illegal to fish through the ice for bluegills or sunfish between 6:00 P.M. and 6:00 A.M., E.S.T.

1941. Illegal to take more than fifteen bluegills.

1945. Year-round fishing on lakes north of State Highway M-46.

1947. Resident license raised from $1.00 to $1.50.

1949. No size limits on bluegills, sunfish or other pan fish.

Bluegill and sunfish season open until March 31 instead of February 28.

1951. All lakes open to year-round fishing for species not protected by a closed season.

Bluegills, sunfish, pike and walleye open last Saturday in April.

## MANAGEMENT PROCEDURES

The proposal to discontinue wholesale planting of warm-water fishes, and the reasons for so doing, have been discussed by Westerman (1945) and Hazzard (1945). Investigations on reproductive potential (Carbine, 1944, 1948) and on growth rate (Beckman, 1949) of warm-water species have indicated that a greater harvest of the pan fishes would not deplete the population to a serious degree. It might, instead, enable the remaining fish to grow at a better rate and provide larger fish for the creel, while still maintaining ample brood stock to perpetuate the fishing. In lakes with stunted populations, caused by overcrowding, the majority of pan fish never reach a size attractive to anglers and are lost by natural mortality. The above is regarded as circumstantial evidence that pan fishes do not need protection on their spawning beds, a question investigated on six of the "test" lakes.

## EXPERIMENTAL REGULATIONS ON "TEST" LAKES

Studies of experimental regulations on "test" lakes were made possible by a legislative amendment, in 1945, of the "Discretionary Power Act" (Act 230, P. A. 1925). Under this amendment the Conservation Commission was granted "authority to establish the seasons, size limits, creel

limits and methods of taking fish in certain designated inland lakes not to exceed 20 in number and not more than 1 lake in any county during the 5 year period of research work...., during the time when special fisheries research is being carried on."

Acting under authority of this law, the Conservation Commission in the spring of 1946 designated twelve lakes (Figure 1) upon which experiments would be conducted for a period of five years to test the effect of liberalization of regulations. The regulation changes were:

(1) Open six lakes south of Highway M-46 to fishing for species upon which there is no closed season (interpreted to include a May 15 opening on pike and walleye).

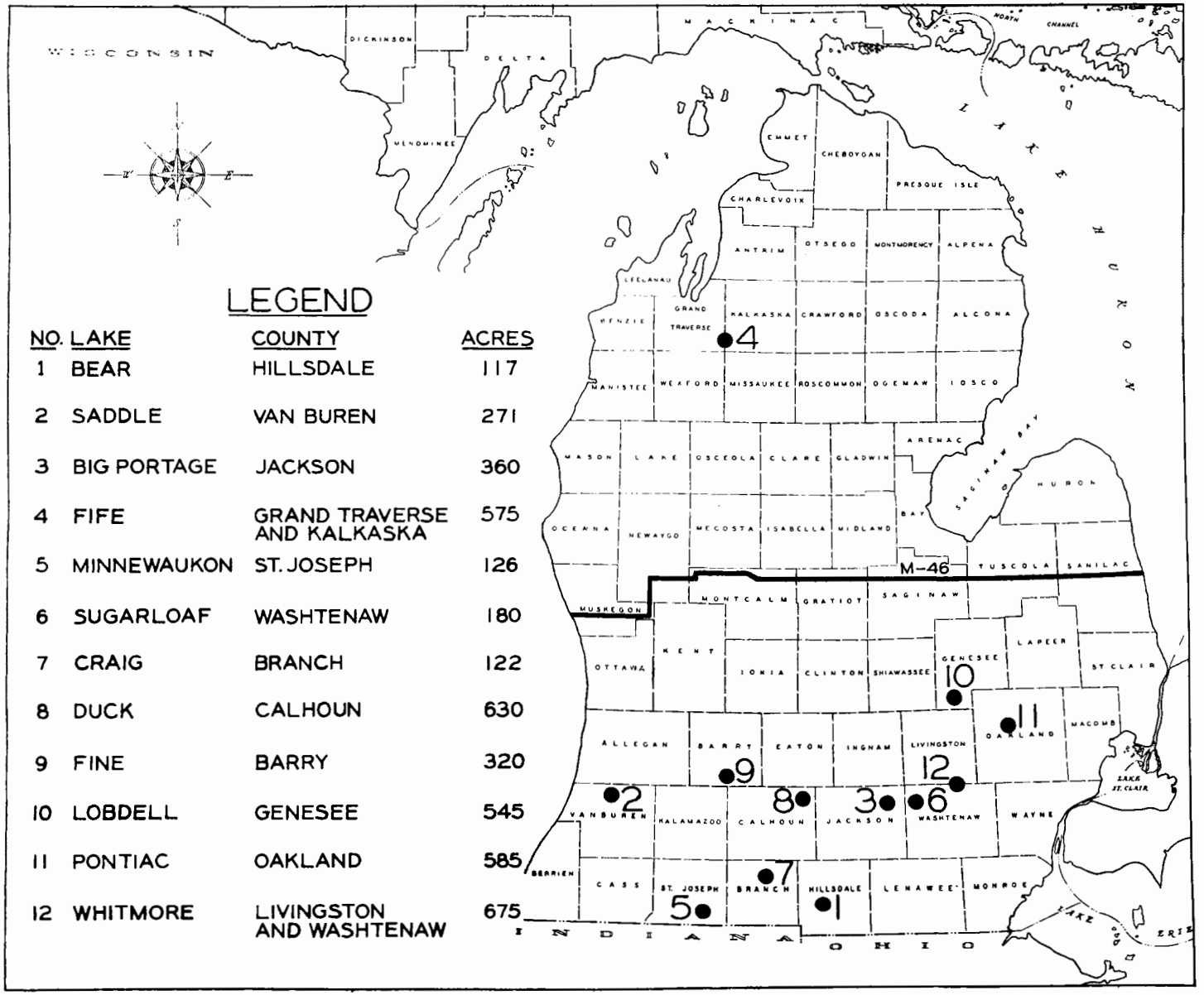
(2) Open four lakes to year-round fishing for bluegills and sunfish (this also was interpreted to mean that the lakes were open to fishing for those species not protected by a closed season, and for pike and walleye from May 15 to March 15).

(3) Open two lakes to year-round fishing for all pan fish (and pike and walleye on May 15) with the further provision of no creel limit on pan fish less than six inches in length. (The two lakes selected for this category had overabundant populations of pan fish.)

For all of the lakes selected for this study, prior data were available on populations and rate of growth of fish and angling quality, which made possible the selection of test lakes of variable fishing quality. Also, the lakes had been mapped and general biological surveys had been made on them.

Preliminary statements of the methods and results of the present study on liberalized regulations have been published by Cooper (1946),

Figure 1. Geographical locations of twelve lakes on which experimental regulations were in effect from 1946 through 1950




## LEGEND

| NO. | LAKE | COUNTY | ACRES |
|---|---|---|---|
| 1 | BEAR | HILLSDALE | 117 |
| 2 | SADDLE | VAN BUREN | 271 |
| 3 | BIG PORTAGE | JACKSON | 360 |
| 4 | FIFE | GRAND TRAVERSE AND KALKASKA | 575 |
| 5 | MINNEWAUKON | ST. JOSEPH | 126 |
| 6 | SUGARLOAF | WASHTENAW | 180 |
| 7 | CRAIG | BRANCH | 122 |
| 8 | DUCK | CALHOUN | 630 |
| 9 | FINE | BARRY | 320 |
| 10 | LOBDELL | GENESEE | 545 |
| 11 | PONTIAC | OAKLAND | 585 |
| 12 | WHITMORE | LIVINGSTON AND WASHTENAW | 675 |

Predmore (1948 and 1949), Christensen (1950), Cooper and Christensen (1951) and Westerman (1952).

## METHODS OF CREEL CENSUS

The principal means of studying the effect of the regulation changes during 1946 to 1950 was an intensive creel census. It has been assumed from the beginning of the study that a census of angling started concurrently with the new fishing regulations would show up any effect of the change in regulations by a change in census figures during the course of the five years and in succeeding years. The census data for years prior to 1946 have been of limited use because the earlier census procedures were not entirely comparable with studies started in 1946.

The census in 1946 was by two methods. The six lakes open to year-round fishing for fish not protected by a closed season were censused by two men, each assigned to three lakes. The clerks contacted anglers and obtained information on residence of the anglers, type of bait, method of fishing, number of hours spent fishing, and the number of each species of fish caught. A random census was scheduled so as to give proportionate weight to days of heavy and light fishing intensity. The clerk adjusted his schedule week by week in order to get equal numbers of heavily fished days for each lake. Though some anglers were contacted before the completion of their fishing trips, most of the data were from completed trips. The clerk, when unable to contact all of the fishermen, either estimated the percentage he censused or recorded hourly counts of boats to estimate total angling. The census records, ranging from 25% to 100% of each day's fishing, were assumed to be representative of all anglers for the entire season. Estimates of total fishing were made by a simple proportion.

The census in 1946 on the remaining six lakes was of a different nature because the creel census clerk had to maintain an official checking station and issue permits to anglers to keep fish which were "out of season" or smaller than "legal-size," at the same time recording the census data mentioned above. One census clerk was assigned to each lake, and during times of heavy fishing, he had extra help. Creel census data were recorded for all anglers reporting at the checking station, and, in addition, the clerks made an independent census of anglers on the lake (many of the latter did not report to the checking station). The clerks also made observations on weather, air and water temperatures, and fish spawning activities, and collected samples of scales from fish for study of age and growth.

The census on all twelve lakes for the next four years (1947-1950), beginning with the winter of 1946-1947, had two phases: catch records were obtained from a portion of all anglers, contacted at random and at the end of fishing trips; and periodic counts were made of all boats (i.e., anglers) on the lake as a basis of computing total fishing pressure. Each clerk was assigned to two or three lakes and each adhered to a prearranged schedule as to dates assigned to each lake and hours on which boat counts were to be made. The earlier practice of censusing certain days more often because of heavier fishing intensity was discarded because it was found that the fishing quality was not correlated with fishing intensity.

The difficulty of censusing those anglers using "dark houses" on the ice in winter was recognized early in the study. These shanty fishermen were supplied with mimeographed sheets upon which they were to record, for every fishing trip, the number of hours spent fishing, the

number of each species of fish caught, and the method of fishing (spear, or hook and line). The return of these forms has varied from ninety-five percent on one lake to one percent or less on others. Where records of contacts by the census clerk and records of the same trips from shanty reports were sufficient to make a comparison (one lake, one winter), it was found that the shanty anglers' reports indicated a higher fishing quality than that shown by the census clerks' records, due probably to the anglers' failure to record fishing trips where they caught no fish. The low returns of shanty records on certain lakes, and the discrepancy in results between shanty records and those obtained by direct contact, did not introduce a large error in the annual totals, for several reasons: on some lakes there was practically no shanty fishing; on other lakes there was some shanty fishing but this was a relatively small amount as compared to open-ice fishing. Only on Fife Lake was there considerable shanty fishing, and for this lake the winter-fishing estimates are possibly in error. But even for Fife Lake, the winter fishing constitutes a small part of the season's total.

The clerks censused 31,548 angler trips during the 1946 season, or about 20% of the estimated total fishing trips. For the other four years they averaged 11,000 per year for the twelve lakes as a whole, or about 6% of the estimated total fishing trips. The higher number of contacts in 1946 was the result of a more intensive census that year.

For the analysis of records on a seasonal basis, the "spring" census period includes the entire month of May and the month of June up to and including the 24th; the "summer" period extends from June 25 through September 15, and the "fall" period from September 16 through the month of November. The "winter" period includes the days when ice cover was safe for fishing.

The index of fishing quality used to compare seasons and years is the average catch of fish per hour of angling for each angler-trip.

The method of estimating total fishing for 1946 is described above. Estimates for the remaining four years, computed separately for each season of each year, involved four variables: (1) the average number of boats counted at two-hour intervals each census day, (2) the average number of anglers per boat, as observed during angler contacts, (3) the average number of fishing hours per trip by anglers who were contacted, and (4) the average catch per hour per angler-trip. (For winter, anglers were counted instead of boats. The winter shanty data are treated separately and added to the rest of the winter angling.)

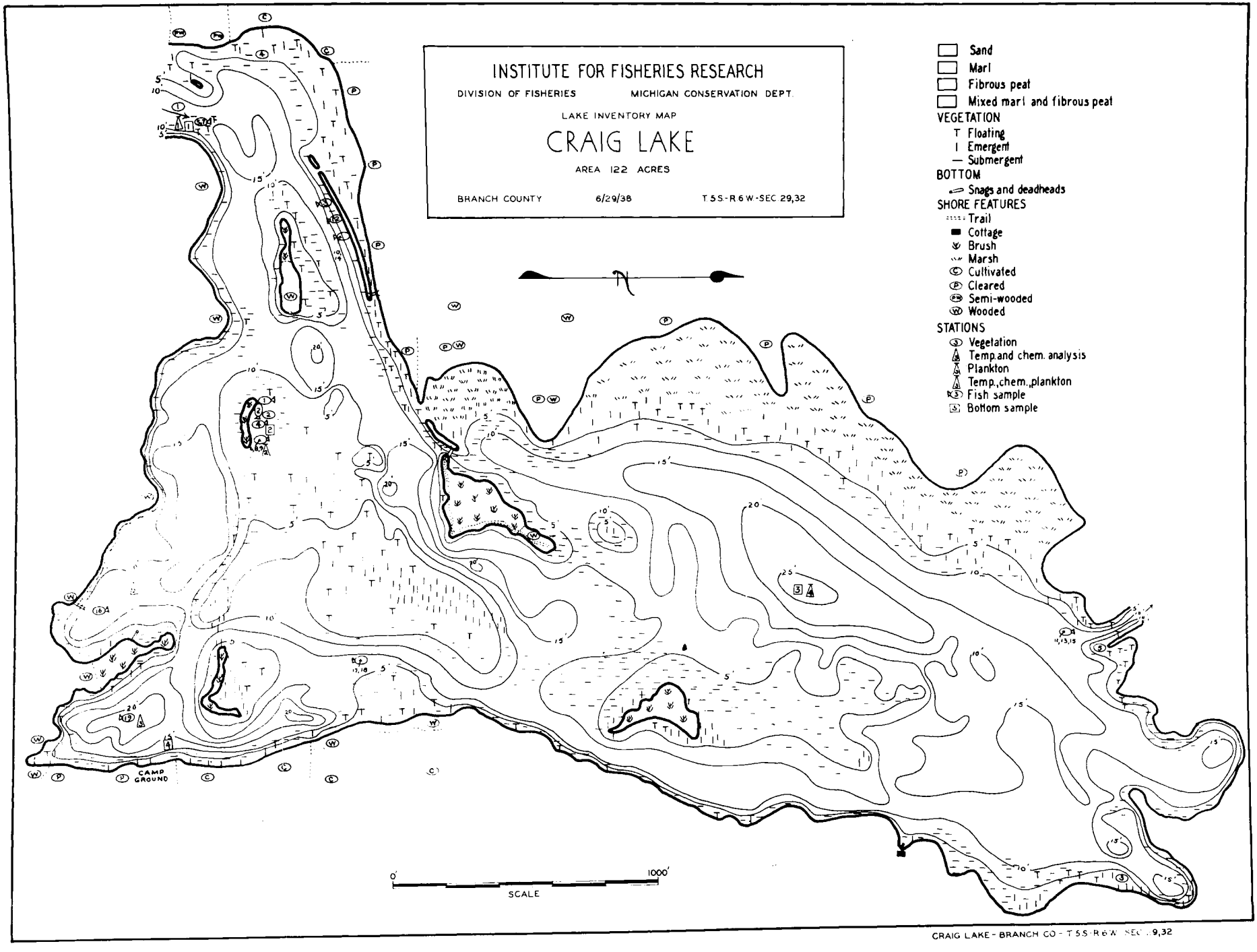
## SIX LAKES OPEN TO YEAR-ROUND FISHING FOR THOSE SPECIES NOT PROTECTED BY STATUTORY CLOSED SEASONS

The six lakes opened to year-round fishing for those species not otherwise protected by closed seasons were: Craig Lake, Branch County; Duck Lake, Calhoun County; Pine Lake, Barry County; Lobdell Lake, Genesee County; Pontiac Lake, Oakland County; and Whitmore Lake, Livingston and Washtenaw counties (Figure 1).

Craig Lake (Figure 2) is a part of the Coldwater River, a tributary to the St. Joseph River, and is the lower lake in a chain of five lakes. The lake is located four miles north of the city of Coldwater. It was the site of a marl dredging operation for several years; the dredging channels are evident in the bottom contours shown on the map.

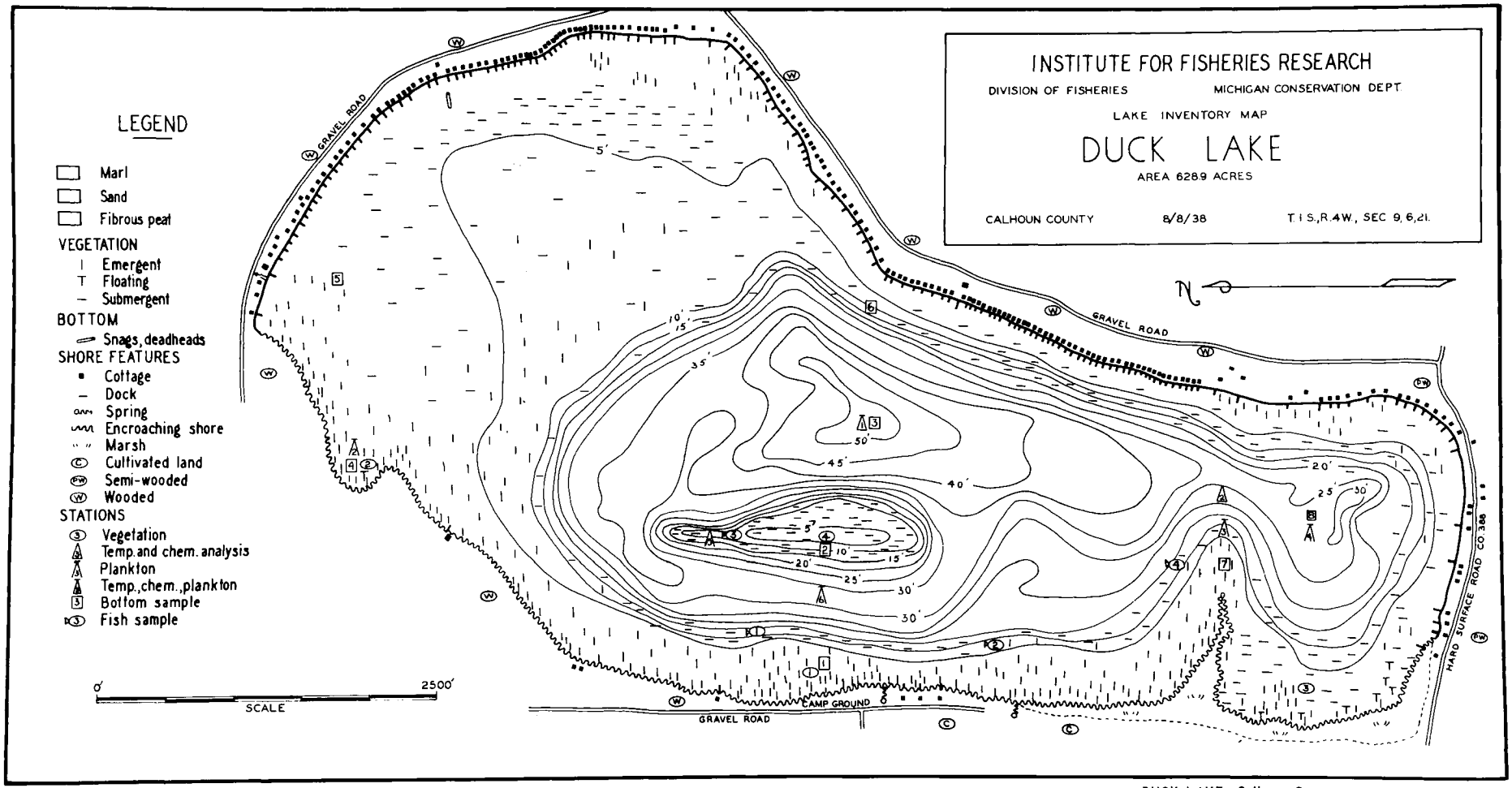
Duck Lake (Figure 3) is located about ten miles north of Albion. A public fishing site is located on the northwest shore. The outlet of the lake contributed to an intermittent branch of the Battle Creek River, a tributary of the Kalamazoo River.

Figure 2. Inventory map of Craig Lake, Branch County




CRAIG LAKE - BRANCH CO - T.5S.-R.6W. SEC. 29,32

Figure 3. Inventory map of Duck Lake, Calhoun County




DUCK LAKE Calhoun Co. T.1 S.,R.4 W., SEC. 9,16,21.

Pine Lake (Figure 4) is about ten miles northwest of Battle Creek. The outlet reaches High Bank Creek, a tributary of the Thornapple and Grand rivers. A public fishing site is located on the southwest shore.

Lobdell Lake (Figure 5) is situated three miles southwest of Linden. The outlet forms a branch of the Shiawassee River, a tributary of the Saginaw River. A public fishing site is located on the west shore. The level of the lake is maintained by a mill dam in the village of Argentine.

Pontiac Lake (Figure 6) is situated ten miles west of the city of Pontiac. The area to the north of the lake has been extensively developed by the Conservation Department as a recreation area. Two public fishing sites are maintained, one on the east end of the lake and the other on the island connected to the north shore. The lake level is maintained by a dam on the south shore. The Clinton River drainage includes Pontiac Lake.

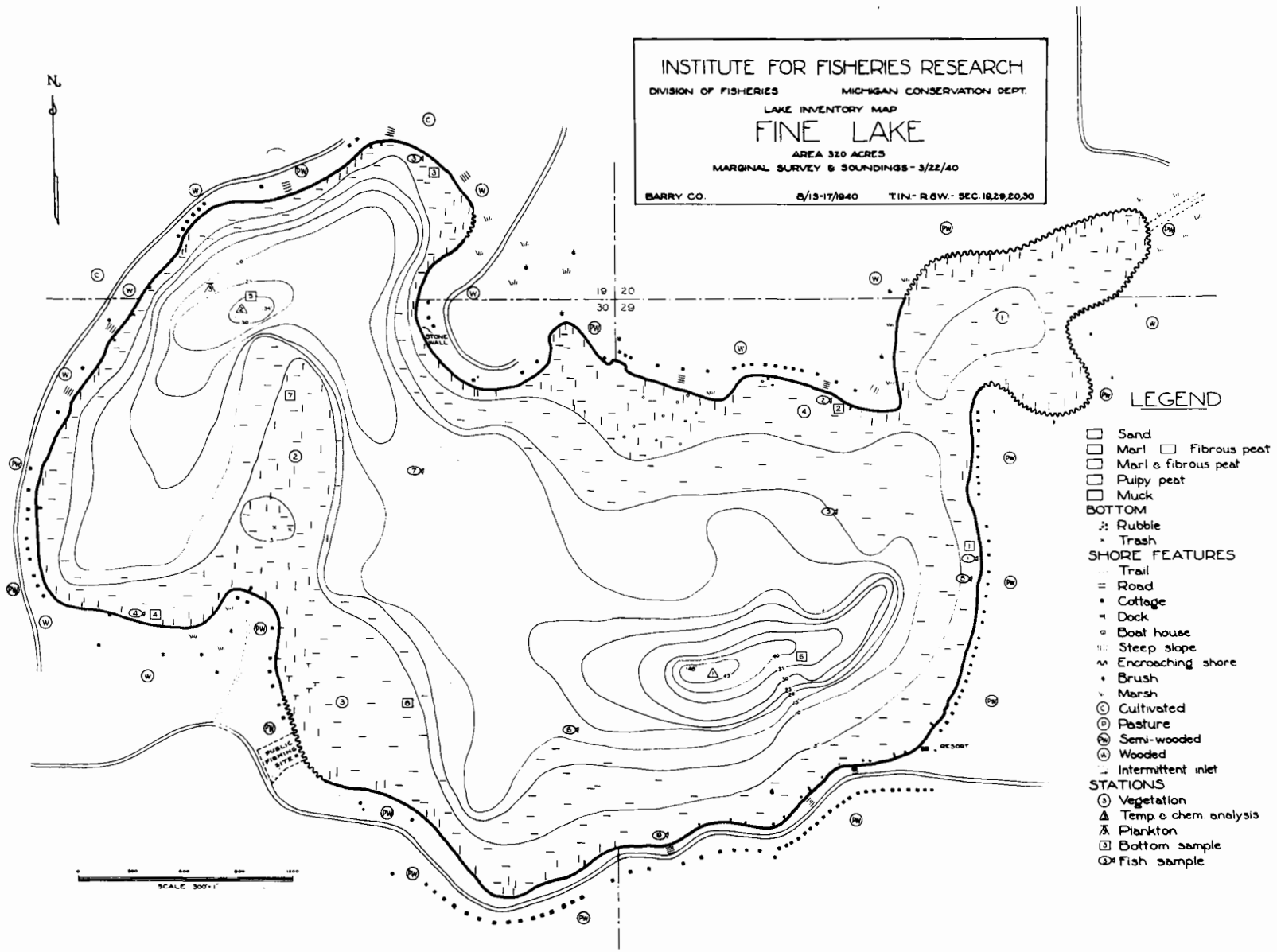
Whitmore Lake (Figure 7) is located ten miles north of Ann Arbor and lies within the drainage of the Huron River. A public fishing site is located on the northwest shore.

All six lakes are in areas where the land is used for agriculture. Also, all six lakes have boat liveries and five of them have state-owned frontage for public access. On Craig Lake, public access is limited to a boat livery on private property, or to boat travel from other connected lakes. On all of the lakes except Craig, there is extensive cottage and resort development.

Results of the census on these six lakes, for the years 1946-1950, have been summarized by season and by year (Tables 2-4 and Figure 8).

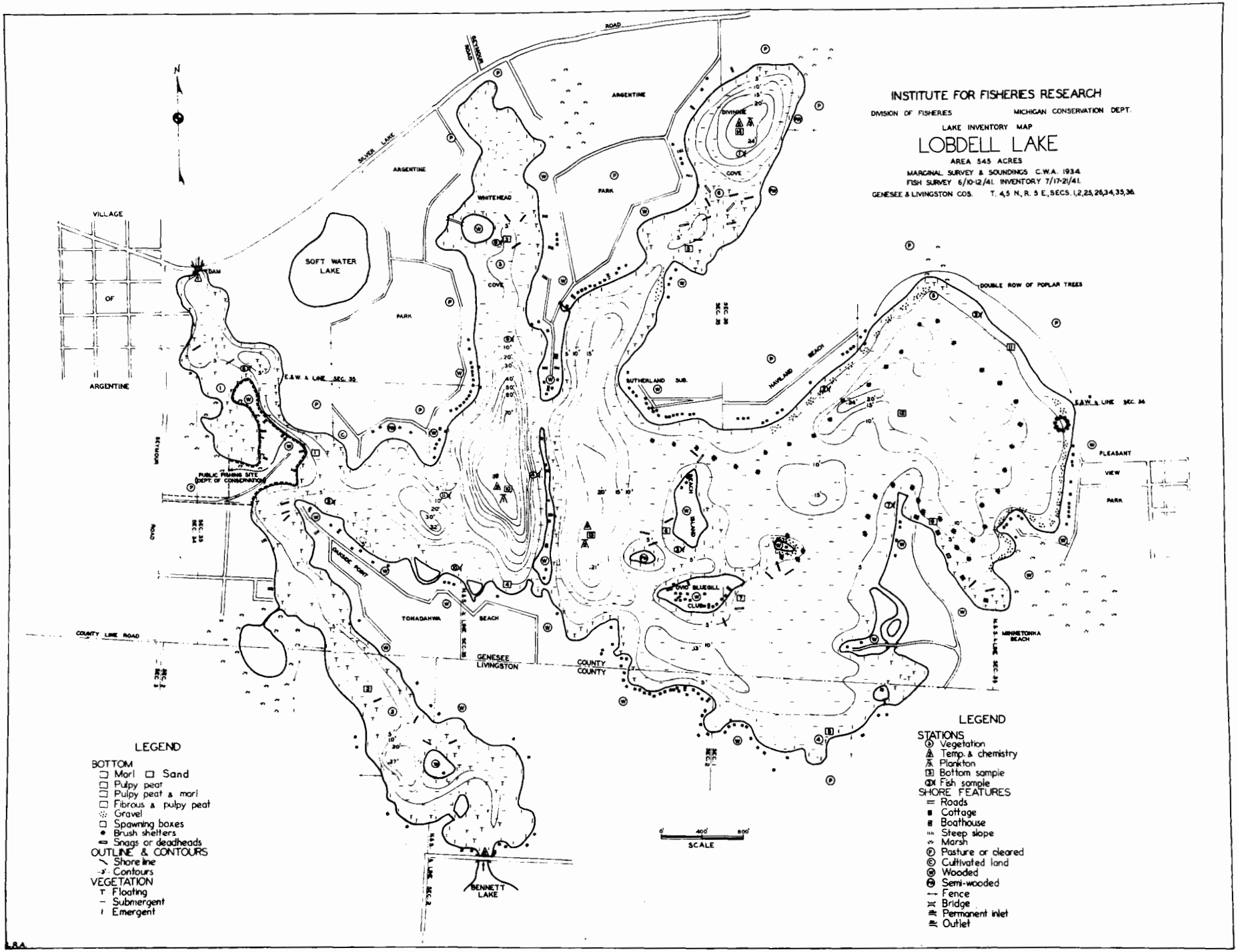
The amount of spring fishing was small as compared to other seasons (see Figure 17, graph at top), and most of the anglers who did fish in

Figure 4. Inventory map of Pine Lake, Barry County



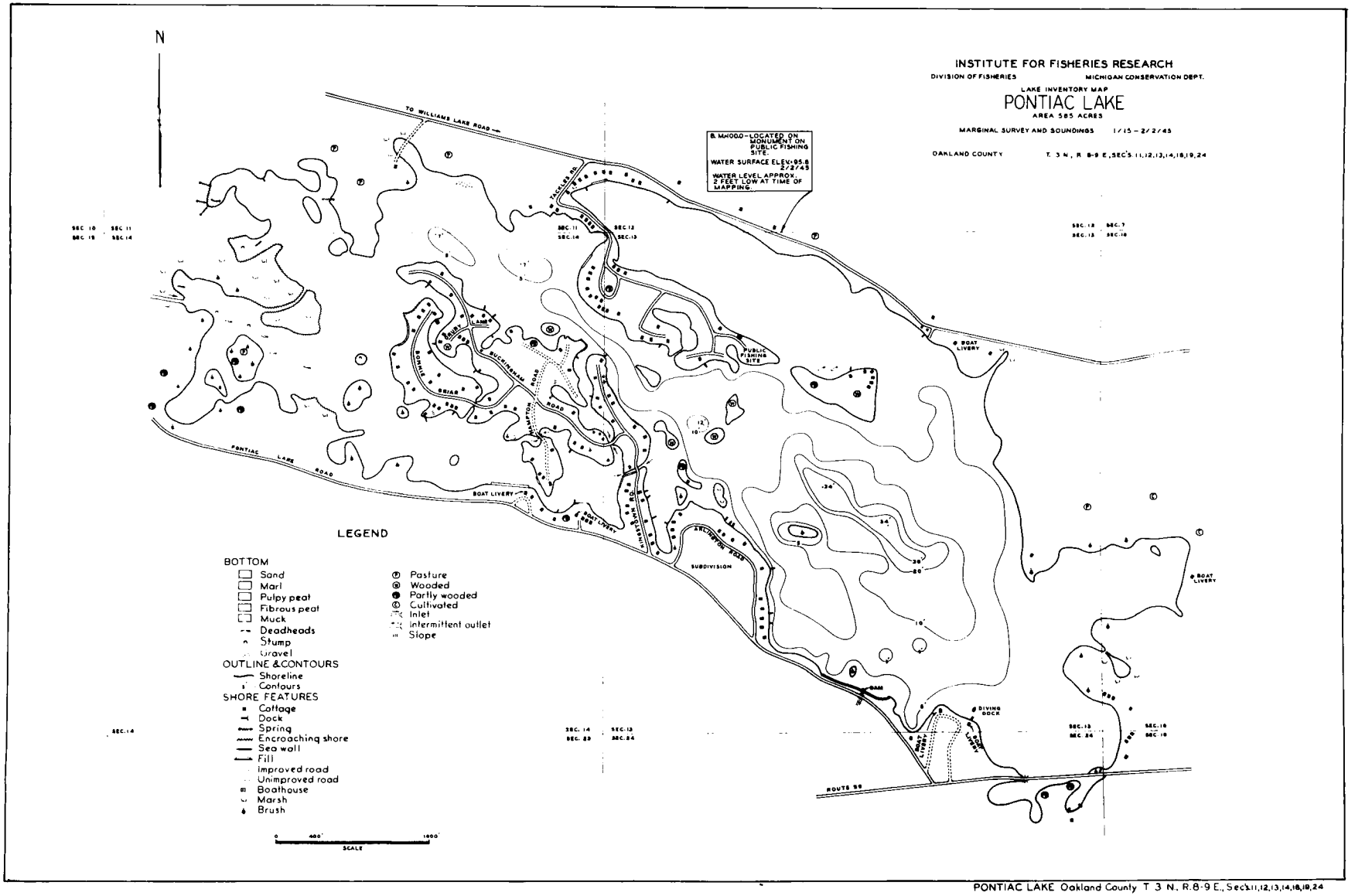

FINE LAKE, Barry Co. T.1N.-R.8W.- SEC.19,20,29,30

Figure 5. Inventory map of Lobdell Lake, Genesee County



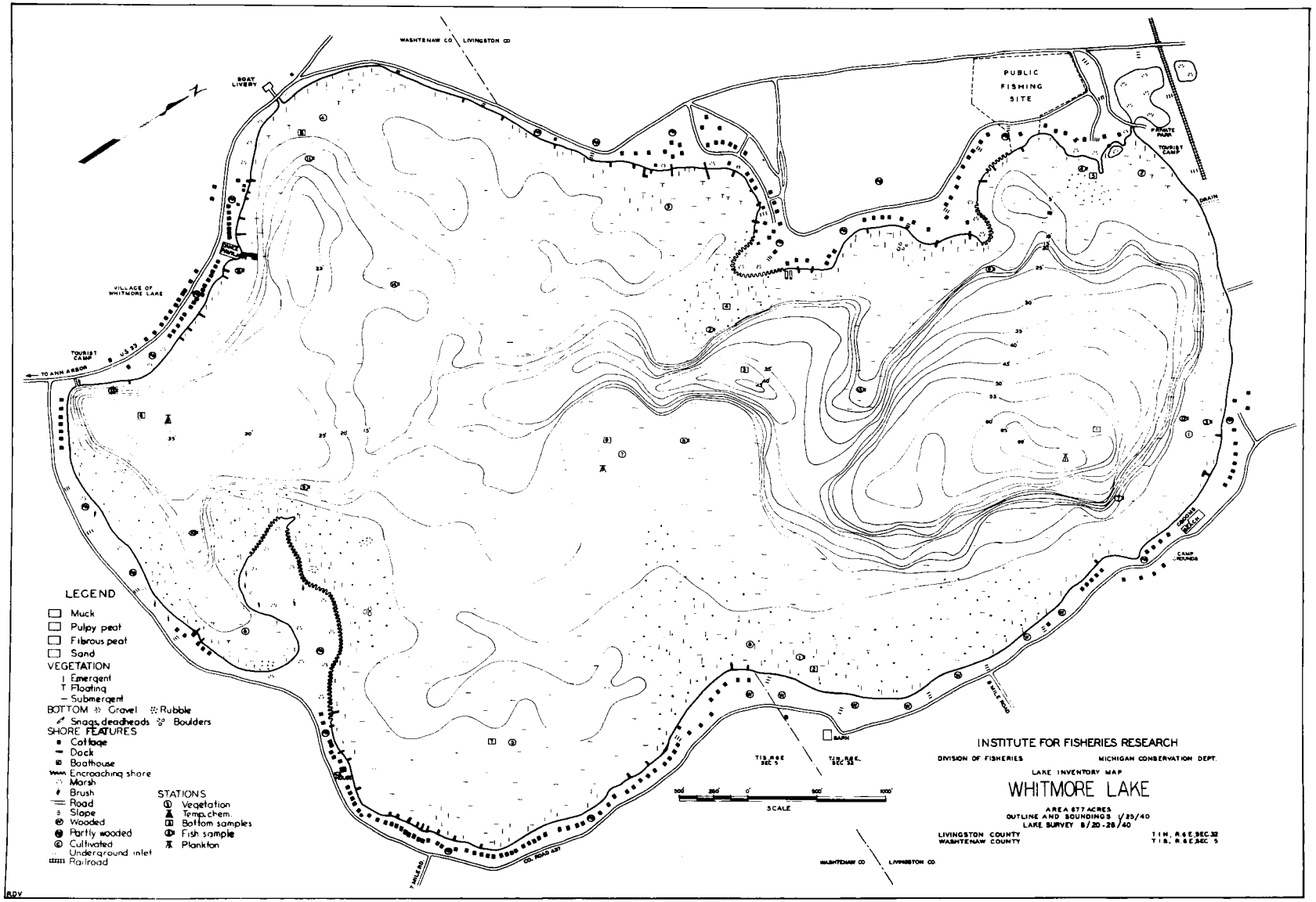

LOBDELL LAKE Genesee & Livingston Cos. T. 4,5 N., R. 5 E., SECS. 1,2,25,26,34,35,36.

Figure 6. Inventory map of Pontiac Lake, Oakland County




PONTIAC LAKE Oakland County T 3 N. R.8-9 E., Sec's.11,12,13,14,18,19,24

Figure 7. Inventory map of Whitmore Lake, Washtenaw and Livingston counties




WHITMORE LAKE Livingston Co. T1N, R6E, SEC. 32
Washtenaw Co. T1S, R6E, SEC. 5

Figure 8. Species composition of five-year catch (1946-1950) on six lakes closed to spring fishing for bluegills and sunfish

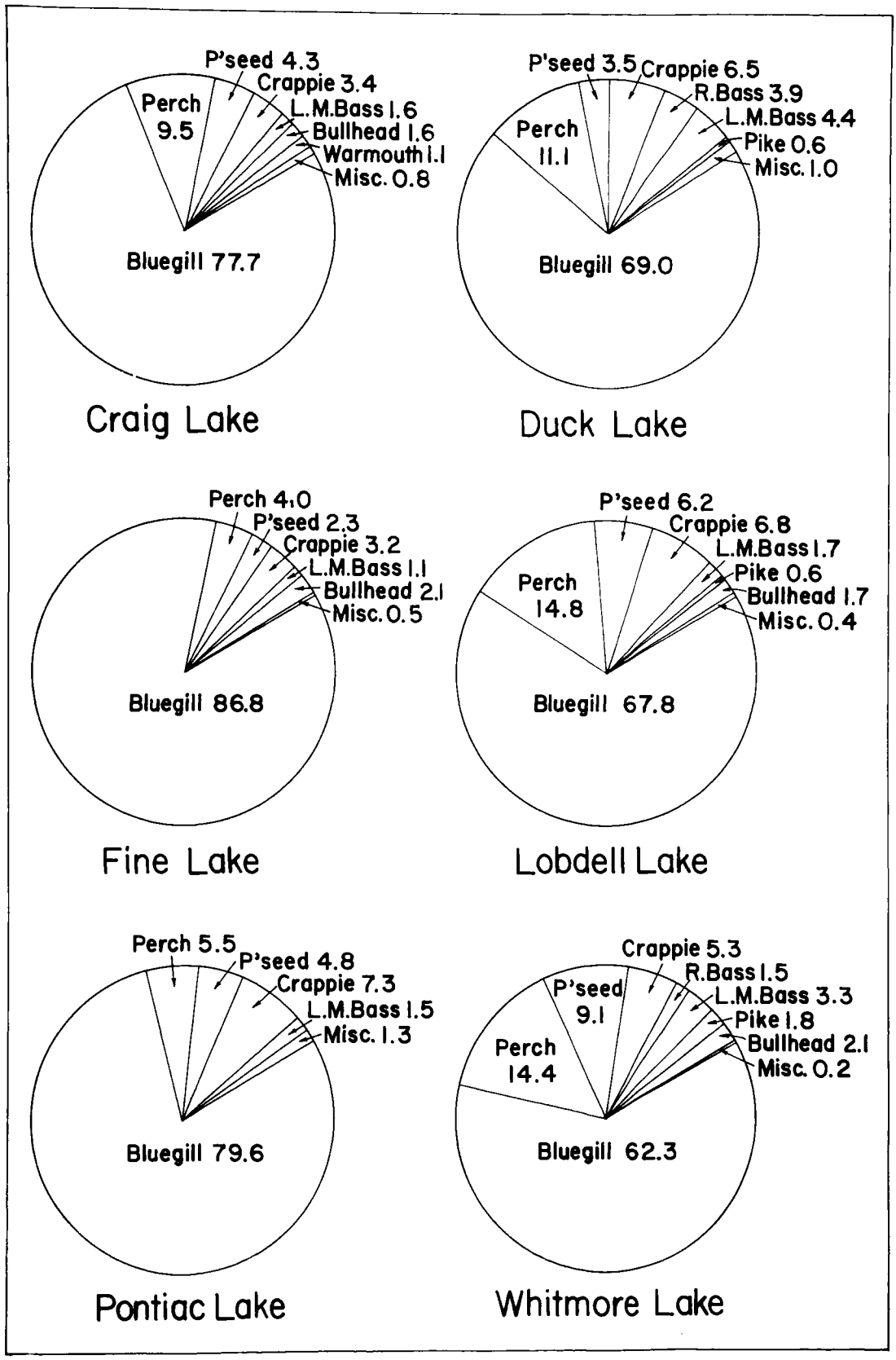

P'seed 4.3
Crappie 3.4
Perch 9.5
L.M.Bass 1.6
Bullhead 1.6
Warmouth 1.1
Misc. 0.8
Bluegill 77.7
Craig Lake
P'seed 3.5
Crappie 6.5
R.Bass 3.9
L.M.Bass 4.4
Perch 11.1
Pike 0.6
Misc. 1.0
Bluegill 69.0
Duck Lake
Perch 4.0
P'seed 2.3
Crappie 3.2
L.M.Bass 1.1
Bullhead 2.1
Misc. 0.5
Bluegill 86.8
Fine Lake
P'seed 6.2
Crappie 6.8
L.M.Bass 1.7
Pike 0.6
Perch 14.8
Bullhead 1.7
Misc. 0.4
Bluegill 67.8
Lobdell Lake
Perch 5.5
P'seed 4.8
Crappie 7.3
L.M.Bass 1.5
Misc. 1.3
Bluegill 79.6
Pontiac Lake
Crappie 5.3
R.Bass 1.5
P'seed 9.1
L.M.Bass 3.3
Pike 1.8
Perch 14.4
Bullhead 2.1
Misc. 0.2
Bluegill 62.3
Whitmore Lake

Table 2

Data on catch per hour per angler for six lakes under experimental regulations, 1946-1950

| Lake, and area | Season | Year 1946 | 1947 | 1948 | 1949 | 1950 |
|---|---|---|---|---|---|---|
| Craig | Spring | 0.12 | 0.01 | 0.07 | 0.26 | 0.04 |
| | Summer | 0.79 | 1.01 | 0.90 | 0.56 | 0.80 |
| 122 acres | Fall | 0.88 | 1.62 | 0.43 | 0.82 | 1.25 |
| | Winter | 3.08 | 2.70 | 2.83 | 2.28 | 1.81 |
| | Year | 1.52 | 1.69 | 1.74 | 0.99 | 0.92 |
| Duck | Spring | 0.61 | 1.20 | 0.54 | 0.51 | 0.21 |
| | Summer | 1.17 | 1.05 | 0.83 | 0.42 | 0.65 |
| 630 acres | Fall | 1.16 | 0.56 | 1.07 | 0.37 | 0.81 |
| | Winter | 0.60 | 0.82 | 0.65 | 0.44 | 0.40 |
| | Year | 1.01 | 0.95 | 0.82 | 0.42 | 0.64 |
| Pine | Spring | 0.59 | 0.38 | 0.35 | 0.56 | 0.30 |
| | Summer | 1.86 | 1.74 | 1.78 | 1.62 | 1.32 |
| 320 acres | Fall | 1.34 | 1.50 | 0.74 | 0.32 | 0.70 |
| | Winter | 0.12 | 0.54 | 0.49 | 2.28 | 0.68 |
| | Year | 1.62 | 1.58 | 1.49 | 1.44 | 1.15 |
| Lobdell | Spring | 0.50 | 0.71 | 0.73 | 0.25 | 0.53 |
| | Summer | 0.84 | 1.02 | 1.25 | 0.99 | 0.87 |
| 545 acres | Fall | 0.78 | 1.32 | 1.18 | 1.54 | 0.95 |
| | Winter | 0.87 | 1.36 | 2.29 | 1.33 | 1.50 |
| | Year | 0.81 | 1.06 | 1.32 | 0.99 | 0.87 |
| Pontiac | Spring | 0.40 | 0.25 | 0.17 | 0.16 | 0.19 |
| | Summer | 0.77 | 1.52 | 1.00 | 0.86 | 0.83 |
| 585 acres | Fall | 0.82 | 0.74 | 0.75 | 0.46 | 0.96 |
| | Winter | 2.85 | 1.96 | 2.89 | 1.34 | 1.90 |
| | Year | 1.03 | 1.42 | 1.15 | 0.76 | 0.87 |
| Whitmore | Spring | 0.20 | 0.18 | 1.46 | 0.25 | 0.81 |
| | Summer | 0.74 | 1.09 | 0.89 | 1.13 | 0.66 |
| 675 acres | Fall | 0.67 | 0.69 | 0.48 | 0.64 | 1.61 |
| | Winter | 0.46 | 0.25 | 0.57 | 1.60 | 0.77 |
| | Year | 0.67 | 0.90 | 0.82 | 1.01 | 0.85 |
| Six lakes combined | Spring | 0.46 | 0.39 | 0.59 | 0.27 | 0.29 |
| | Summer | 0.90 | 1.30 | 1.09 | 0.96 | 0.86 |
| | Fall | 0.86 | 0.90 | 0.82 | 0.66 | 0.95 |
| | Winter | 1.68 | 1.51 | 2.01 | 1.23 | 1.24 |
| | Year | 0.98 | 1.24 | 1.16 | 0.88 | 0.86 |

Table 3

Fishing data from six lakes under experimental regulations, 1946-1950

| Lake<br>County<br>Area | Year | Estimated total anglers | Number of anglers contacted | Percent of estimated total contacted | Estimated total hours | Estimated total catch | Catch per acre<br>Game fish | Catch per acre<br>Panfish* |
|---|---|---|---|---|---|---|---|---|
| Craig Lake | 1946 | 9,000 | 1,215 | 13.5 | 26,270 | 40,310 | 18.3 | 322 |
| Branch County | 1947 | 7,910 | 792 | 10.0 | 25,510 | 43,800 | 3.8 | 356 |
| 122 acres | 1948 | 12,300 | 1,093 | 8.9 | 35,100 | 61,310 | 8.0 | 494 |
| | 1949 | 10,070 | 547 | 5.4 | 33,230 | 32,700 | 11.8 | 256 |
| | 1950 | 9,420 | 616 | 6.5 | 28,230 | 25,860 | 7.0 | 205 |
| Duck Lake | 1946 | 21,200 | 2,391 | 11.3 | 60,670 | 54,400 | 3.0 | 83 |
| Calhoun County | 1947 | 30,200 | 1,886 | 6.2 | 89,380 | 87,290 | 6.1 | 132 |
| 630 acres | 1948 | 25,710 | 1,557 | 6.1 | 79,510 | 65,280 | 5.9 | 98 |
| | 1949 | 24,800 | 746 | 3.0 | 82,720 | 34,830 | 3.9 | 51 |
| | 1950 | 20,600 | 529 | 2.6 | 62,590 | 40,440 | 4.7 | 60 |
| Fine Lake | 1946 | 15,230 | 1,904 | 12.5 | 42,230 | 67,410 | 4.0 | 207 |
| Barry County | 1947 | 15,050 | 1,021 | 6.8 | 37,970 | 59,790 | 2.4 | 184 |
| 320 acres | 1948 | 21,930 | 1,145 | 5.2 | 60,160 | 89,750 | 3.6 | 277 |
| | 1949 | 21,800 | 432 | 2.0 | 65,370 | 94,270 | 5.0 | 290 |
| | 1950 | 15,330 | 636 | 4.1 | 41,470 | 47,860 | 1.6 | 148 |
| Lobdell Lake | 1946 | 16,090 | 2,372 | 14.7 | 64,560 | 53,360 | 3.4 | 94 |
| Genesee County | 1947 | 33,480 | 1,678 | 5.0 | 107,330 | 116,280 | 5.5 | 208 |
| 545 acres | 1948 | 34,360 | 1,905 | 5.5 | 115,990 | 155,840 | 4.3 | 282 |
| | 1949 | 18,070 | 499 | 2.8 | 63,950 | 62,420 | 1.6 | 113 |
| | 1950 | 7,190 | 359 | 5.0 | 30,650 | 26,540 | 0.8 | 48 |
| Pontiac Lake | 1946 | 21,810 | 2,423 | 11.1 | 96,780 | 92,650 | 3.0 | 155 |
| Oakland County | 1947 | 56,920 | 2,898 | 5.1 | 224,290 | 320,100 | 7.1 | 540 |
| 585 acres | 1948 | 44,740 | 1,809 | 4.0 | 181,660 | 209,930 | 5.4 | 353 |
| | 1949 | 34,390 | 874 | 2.5 | 154,020 | 117,290 | 5.8 | 195 |
| | 1950 | 26,190 | 623 | 2.4 | 116,830 | 100,750 | 7.6 | 165 |
| Whitmore Lake | 1946 | 19,280 | 2,487 | 12.9 | 68,300 | 43,630 | 5.8 | 59 |
| Washtenaw and | 1947 | 25,430 | 1,812 | 7.1 | 77,230 | 69,300 | 3.6 | 99 |
| Livingston | 1948 | 28,720 | 1,371 | 4.8 | 101,340 | 84,760 | 7.4 | 118 |
| counties | 1949 | 27,430 | 543 | 2.0 | 95,520 | 96,250 | 5.4 | 137 |
| 675 acres | 1950 | 6,240 | 329 | 5.3 | 21,800 | 18,540 | 0.8 | 27 |

*All fish except largemouth bass, smallmouth bass, walleye and pike.

Table 4

Species composition in percentage[1] of the total catch on six experimental regulation lakes, 1946-1950

| Lake / Year | Bluegill | Yellow perch | Pumpkinseed | Black crappie | Rock bass | Largemouth bass | Smallmouth bass | Walleye | Pike | Bullhead | Warmouth bass | Miscellaneous[2] | Estimated total fish |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Craig Lake** | | | | | | | | | | | | | |
| 1946 | 85.3 | 5.0 | 2.4 | 1.2 | 0.1 | 2.1 | .. | .. | 0.4 | 2.7 | 0.3 | 0.5 | 40,310 |
| 1947 | 78.9 | 9.7 | 3.6 | 5.0 | 0.1 | 0.9 | .. | .. | Tr. | 0.6 | 1.3 | .. | 43,800 |
| 1948 | 86.4 | 3.2 | 1.1 | 5.8 | | 1.3 | .. | .. | 0.3 | 0.9 | 0.9 | 0.1 | 61,310 |
| 1949 | 69.0 | 15.0 | 6.4 | 0.6 | 0.1 | 2.2 | .. | .. | 2.2 | 3.1 | 0.9 | 0.6 | 32,700 |
| 1950 | 51.0 | 25.0 | 12.8 | 2.8 | 0.2 | 2.0 | .. | .. | 1.3 | 1.6 | 2.9 | 0.5 | 25,860 |
| Five years | 77.7 | 9.5 | 4.3 | 3.4 | 0.1 | 1.6 | .. | .. | 0.5 | 1.6 | 1.1 | 0.2 | |
| **Duck Lake** | | | | | | | | | | | | | |
| 1946 | 64.6 | 10.4 | 1.4 | 14.3 | 4.5 | 2.4 | 0.1 | 0.1 | 0.9 | 0.6 | 0.4 | 0.4 | 54,400 |
| 1947 | 66.5 | 8.4 | 3.2 | 12.8 | 4.2 | 3.8 | 0.2 | .. | 0.4 | 0.2 | 0.3 | 0.1 | 87,290 |
| 1948 | 71.0 | 8.7 | 2.2 | 7.9 | 4.1 | 5.0 | 0.1 | Tr. | 0.6 | 0.2 | 0.3 | Tr. | 65,280 |
| 1949 | 63.0 | 9.3 | 4.2 | 10.2 | 3.9 | 6.0 | 0.2 | .. | 0.9 | 0.5 | 1.2 | 0.6 | 34,830 |
| 1950 | 47.7 | 26.0 | 7.7 | 4.3 | 6.1 | 5.2 | .. | 0.3 | 1.8 | 0.3 | 0.5 | 0.3 | 40,440 |
| Five years | 69.0 | 11.1 | 3.5 | 6.5 | 3.9 | 4.4 | 0.1 | Tr. | 0.6 | 0.3 | 0.4 | 0.1 | |
| **Fire Lake** | | | | | | | | | | | | | |
| 1946 | 82.1 | 3.6 | 1.5 | 7.2 | Tr. | 1.5 | .. | 0.2 | 0.2 | 3.7 | 0.1 | .. | 67,410 |
| 1947 | 82.5 | 6.7 | 2.0 | 3.4 | .. | 1.1 | Tr. | Tr. | 0.2 | 4.0 | .. | .. | 59,790 |
| 1948 | 89.5 | 1.9 | 1.0 | 4.4 | 0.1 | 0.6 | .. | Tr. | 0.7 | 1.8 | .. | Tr. | 89,750 |
| 1949 | 81.8 | 4.6 | 1.9 | 0.3 | 8.5 | 1.2 | .. | .. | 0.5 | 1.2 | .. | .. | 94,260 |
| 1950 | 79.5 | 8.1 | 1.7 | 7.0 | .. | 0.7 | .. | Tr. | 0.4 | 1.5 | 0.7 | 0.4 | 47,860 |
| Five years | 86.8 | 4.0 | 2.3 | 3.2 | Tr. | 1.1 | Tr. | Tr. | 0.4 | 2.1 | Tr. | Tr. | |
| **Lobdell Lake** | | | | | | | | | | | | | |
| 1946 | 54.8 | 10.2 | 6.8 | 20.6 | 0.2 | 2.2 | 0.1 | .. | 1.3 | 3.6 | .. | 0.2 | 53,360 |
| 1947 | 56.1 | 20.8 | 6.0 | 12.6 | 0.3 | 2.3 | .. | .. | 0.3 | 1.1 | 0.2 | 0.3 | 116,280 |
| 1948 | 65.2 | 16.2 | 4.3 | 11.0 | .. | 1.2 | .. | .. | 0.3 | 1.8 | .. | Tr. | 155,840 |
| 1949 | 71.9 | 9.1 | 11.9 | 4.4 | 0.3 | 0.7 | .. | .. | 0.7 | 0.8 | .. | 0.1 | 62,420 |
| 1950 | 64.9 | 7.1 | 9.6 | 14.4 | 0.9 | 1.0 | .. | .. | 0.6 | 1.4 | .. | .. | 26,540 |
| Five years | 67.8 | 14.8 | 6.2 | 6.8 | 0.1 | 1.7 | Tr. | .. | 0.6 | 1.7 | Tr. | 0.1 | |

[1] "Tr." means less than 0.1 percent.

[2] Dogfish, garpike, sucker, carp, golden shiner.

(continued)

Table 4 (continued)

| Lake<br>Year | Bluegill | Yellow perch | Pumpkin-seed | Black crappie | Rock bass | Largemouth bass | Smallmouth bass | Walleye | Pike | Bullhead | Warmouth bass | Miscel-laneous# | Estimated total fish |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pontiac Lake | | | | | | | | | | | | | |
| 1946 | 47.3 | 12.3 | 4.3 | 32.5 | 1.0 | 1.6 | .. | .. | 0.3 | 0.6 | .. | 0.1 | 92,650 |
| 1947 | 82.1 | 6.2 | 4.9 | 4.9 | 0.4 | 1.1 | .. | 0.1 | 0.1 | 0.3 | Tr. | 0.1 | 320,100 |
| 1948 | 87.6 | 3.3 | 5.1 | 1.9 | 0.4 | 1.1 | .. | .. | 0.4 | 0.2 | .. | 0.1 | 209,930 |
| 1949 | 80.8 | 4.7 | 4.0 | 6.1 | 0.8 | 2.4 | .. | .. | 0.5 | .. | .. | 0.6 | 117,290 |
| 1950 | 67.5 | 9.6 | 4.1 | 12.6 | 0.7 | 3.4 | .. | .. | 1.0 | 1.0 | .. | 0.2 | 100,750 |
| Five years | 79.6 | 5.5 | 4.8 | 7.3 | 0.4 | 1.5 | .. | Tr. | 0.3 | 0.3 | Tr. | 0.2 | |
| Whitmore Lake | | | | | | | | | | | | | |
| 1946 | 51.0 | 24.0 | 5.4 | 5.9 | 0.9 | 4.2 | 0.4 | .. | 4.5 | 3.5 | .. | 0.1 | 43,630 |
| 1947 | 70.9 | 9.8 | 7.9 | 2.6 | 1.6 | 2.8 | Tr. | .. | 1.7 | 2.5 | 0.1 | 0.1 | 69,300 |
| 1948 | 70.7 | 10.4 | 7.0 | 0.9 | 2.6 | 3.9 | 0.1 | .. | 1.9 | 2.5 | .. | 0.1 | 84,760 |
| 1949 | 56.3 | 18.0 | 13.6 | 6.3 | 1.0 | 2.7 | 0.2 | .. | 0.9 | 1.0 | .. | 0.1 | 96,250 |
| 1950 | 43.4 | 24.6 | 5.8 | 19.7 | 0.2 | 1.6 | .. | .. | 1.3 | 3.4 | .. | .. | 18,540 |
| Five years | 62.3 | 14.4 | 9.1 | 5.3 | 1.5 | 3.3 | 0.1 | .. | 1.8 | 2.1 | Tr. | 0.1 | |

"Tr." means less than 0.1 percent.

#Dogfish, garpike, sucker, carp, golden shiner.

the spring waited until the opening of pike season (May 15). Interest in pike fishing was greatest on Craig, Fine, Pontiac and (for certain years) Whitmore lakes, and this fact was reflected in the relatively low catch per hour (Table 2) for the spring seasons on these lakes--pike fishing is less productive than for other species. Duck and Lobdell lakes were fished more for crappies and perch in the spring (Table 4 and Figure 8), hence the higher catch per hour on these two lakes. Whitmore Lake also provided good perch and crappie fishing, but the low returns on pike fishing kept the average catch per hour low.

The summer season included the bulk of the fishing trips (Figure 17, top graph). The catch per hour for the summer on the six lakes combined (Table 2) increased from 0.9 fish per hour in 1946 to 1.3 fish per hour in 1947. For the next three years the catch per hour declined so that by 1950 it was again back to the 1946 figure of 0.9 fish per hour. The higher fishing quality that occurred in the summer of 1947--an increase of 0.4 fish per hour--was significant to the angler, putting four more fish in his creel for every ten hours that he fished.

The amount of fall fishing on these six lakes was small as compared to summer. Large variations in the catches per hour for consecutive falls occurred, without markedly influencing the yearly catch-per-hour figures (Table 2).

Winter fishing made up the bulk of the fishing on Craig Lake. The estimated average harvest for the winter was 25,400 fish (90% to 95% bluegills), as compared to 15,400 fish during the remainder of the year. Most of this fishing on Craig was "open-ice" fishing (i.e., not from shanties). The other lakes in this group were fished less heavily than Craig during the winter months, both by pike anglers using spears (in shanties) and tip-ups and by pan fish fishermen using ice lines.

The "spring" period is approximately fifty-six days in length and comprises 20% of the year's total fishing days. On the above six lakes an average of 9,070 fishing trips occurred in the spring over the five years, or 6.7% of the total fishing trips (See Figure 17 top); 2.6% of the estimated average yearly catch was taken during the same period. The "summer" period is eighty-three days long and is 28% of the year's fishing days. During the five summers, 1946-1950, 71.0% of the estimated yearly fishing trips took place, and 72.4% of the estimated yearly catch was taken (95,484 trips and 349,289 fish). The "fall" season is about seventy-six days in duration and comprises 26% of the fishing days in a year. Yet, only an average of 10.1% (13,614) of the year's fishing trips occurred in the fall, and only 7.2% (34,765) of the average estimated yearly catch was taken then. The "winter" season is approximately seventy-seven days long (26% of the year's fishing time) and during the five winters an average of 16,432 trips were made. This was 12.2% of the estimated yearly total. On these trips 17.8% (85,856 fish) of the year's estimated total catch was taken.

These six experimental lakes (plus another five of the test lakes) were the only lakes in the southern part of the state open to spring fishing, and it is assumed that they received somewhat greater pressure during this period than would have been the case had all lakes been open. The opening of the lakes to spring fishing meant an increase of 24% in the number of days available for fishing during the year, but the number of fish caught increased by only 2.7%.

For the six lakes combined the annual average figures on catch per hour showed some variation, with a rise from 1946 to 1947, with 1947 and 1948 having high values, and with a subsequent decrease through

1949 and 1950. The significant question is whether or not the downward trend in fishing quality from 1948 to 1950 was a result of an adverse effect of the experimental regulations initiated in 1946. If the new regulations were the primary factor, and operative because of over-fishing, the decline presumably would have started by 1947, and the same trend should have occurred in the six lakes individually. But only Pontiac Lake had a trend similar to the six lakes combined, while Duck and Pine had the highest fishing quality in 1946, Craig and Lobdell in 1948, and Whitmore in 1949 (Table 2). Another significant result of the study was that only 2.7% of the yearly catch on these six lakes was taken during the special spring season; removal of this additional catch could not be regarded as over-fishing. In view of the above it is concluded that the variation[1] in angling quality in these six lakes during the years 1946-1950 was not primarily an effect of the liberalized regulations.

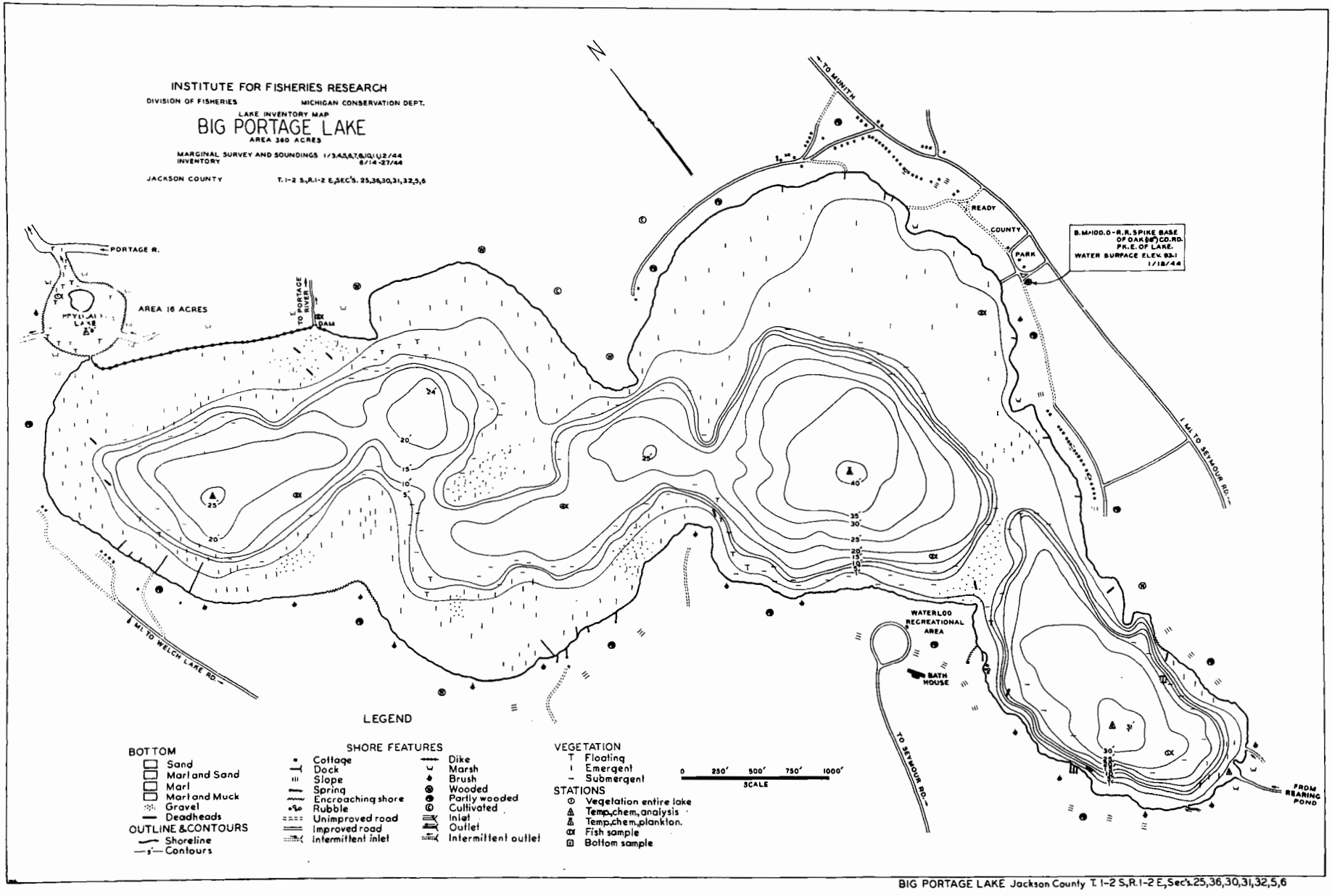
LAKES OPEN TO SPRING FISHING FOR BLUEGILLS AND SUNFISH

The four lakes opened to year-round fishing for bluegills and sunfish, in addition to those species not protected by statutory closed seasons, were: Big Portage Lake, Jackson County; Fife Lake, Grand Traverse and Kalkaska counties; Minnewaukon Lake, St. Joseph County; and Sugarloaf Lake, Washtenaw County (Figure 1).

Big Portage Lake (Figure 9) is about fourteen miles northeast of Jackson. The lake is within the Waterloo Recreation Area and much of the adjoining land is dedicated to recreational use. There is a public fishing site on the west shore and a county park with a boat landing on the east shore. Boat liveries are present also. The

[1] Studies by Trautman (1941) on Whitmore Lake showed annual variations in angling quality for bass and bluegills over the years 1934-1938 (a period prior to the experimental regulations).

Figure 9. Inventory map of Big Portage Lake, Jackson County




BIG PORTAGE LAKE Jackson County T. 1-2 S.,R.1-2 E.,Sec's.25,36,30,31,32,5,6

outlet had a dam at one time which maintained the water level about eighteen inches above present levels. The outlet is part of the Grand River drainage.

Fife Lake (Figure 10) is situated twenty-five miles north of Cadillac, in the northern half of the Lower Peninsula. It is the only one of the twelve experimental lakes not located in extreme southern Michigan. This lake is a part of the Manistee River drainage. It has a public fishing site, and access can also be gained through boat liveries and a village park. The lake is on the edge of the Fife Lake State Forest, and most of the shore property is occupied by summer cottages. The village of Fife Lake is at the northwest end of the lake.

Minnewaukon Lake (Figure 11), also known as Johnson Lake, is located two miles northwest of Sturgis. There is no public access except through a boat livery. A few cottages are located at each end of the lake, but much of the immediate land is pasture.

Sugarloaf Lake (Figure 12), like Big Portage, is located in the Waterloo Recreation Area. It is situated about seven miles northwest of Chelsea. There is a public fishing site on the west shore and a boat livery. Year-round residences are located along the east side of the lake. Sugarloaf is part of the headwaters of the Portage River, a tributary of the Grand River. Recreational development around the lake is not so extensive as around the larger Big Portage Lake.

Census data on these four lakes are summarized by season and by year in Tables 5-7 and Figures 13-14.

Figure 10. Inventory map of Fife Lake, Grand Traverse and Kalkaska counties

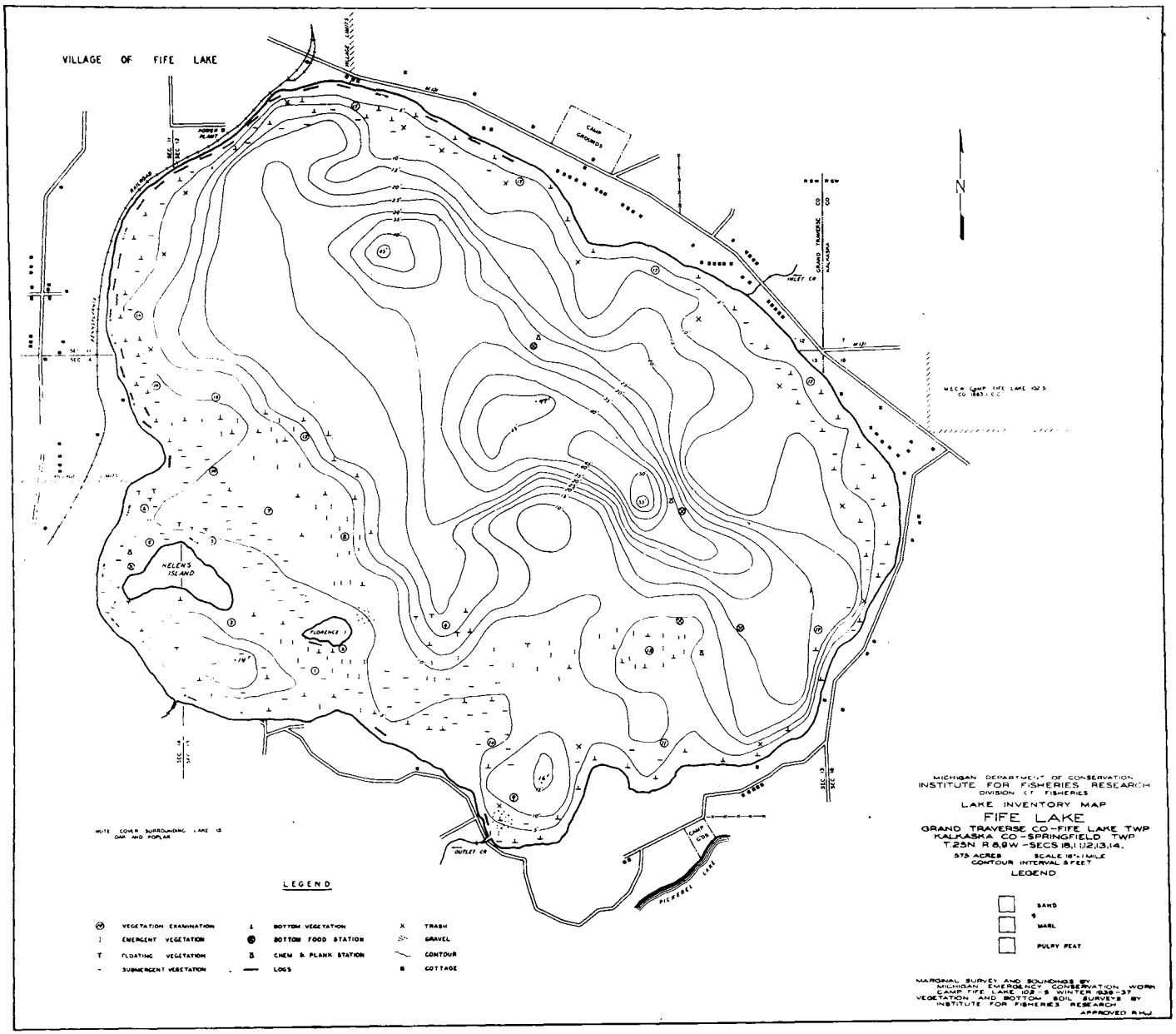
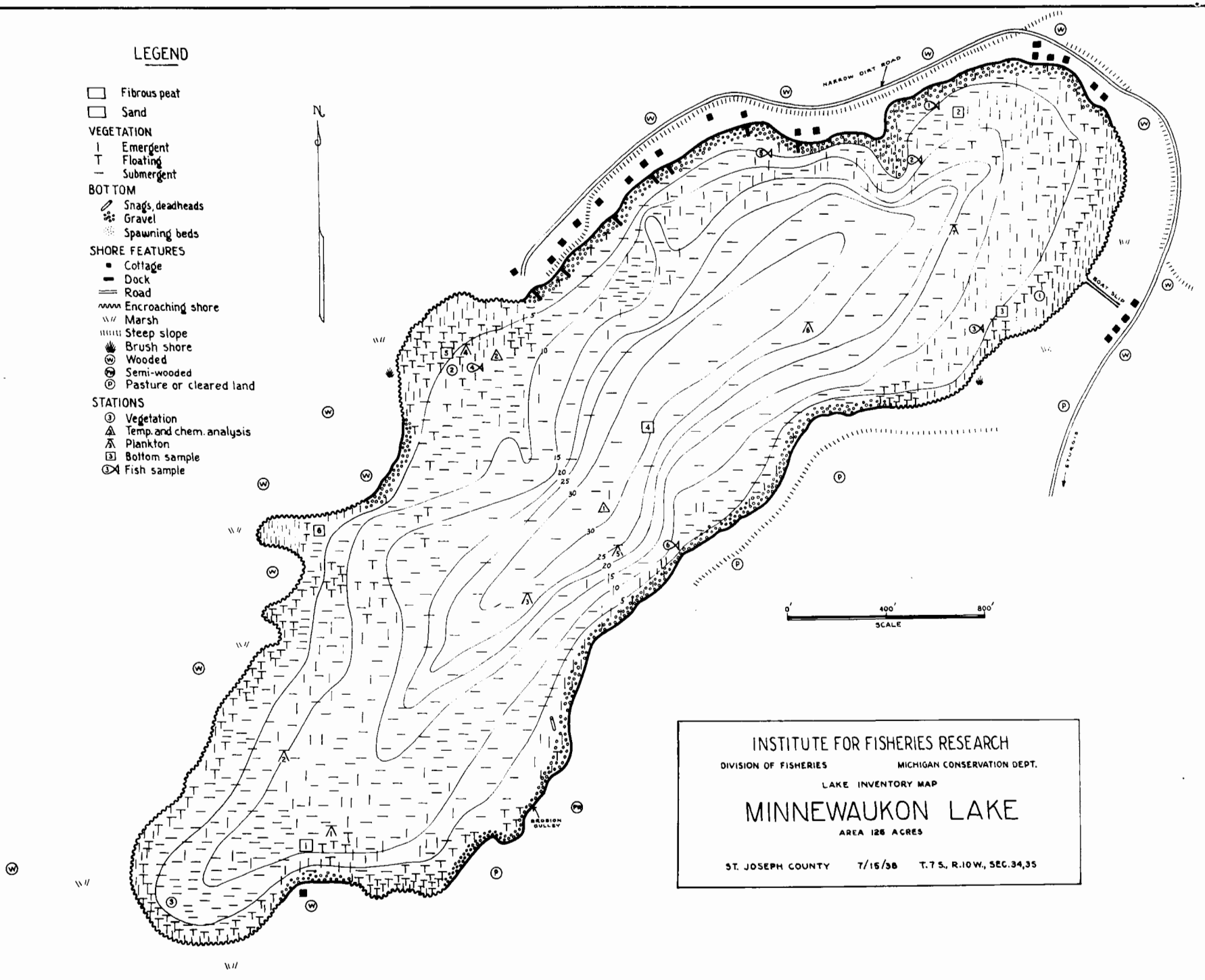
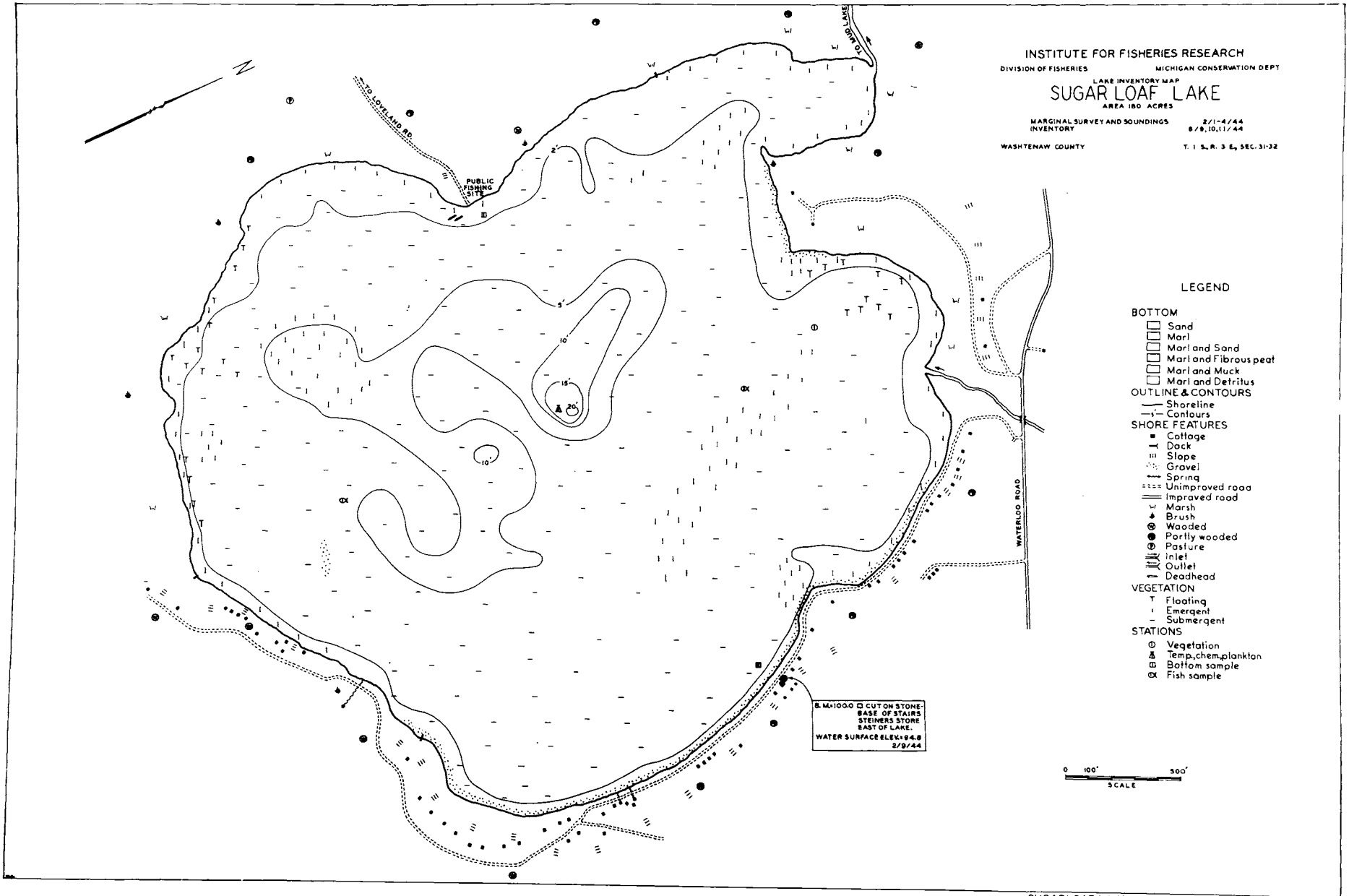

VILLAGE OF FIFE LAKE
HELEN'S ISLAND
FLORENCE I.
OUTLET CR.
INLET CR.
CAMP CUSTER
PICKEREL LAKE
LEGEND
VEGETATION EXAMINATION
EMERGENT VEGETATION
FLOATING VEGETATION
SUBMERGENT VEGETATION
BOTTOM VEGETATION
BOTTOM FOOD STATION
CHEM. & PLANK. STATION
LOGS
TRASH
GRAVEL
CONTOUR
COTTAGE
MICHIGAN DEPARTMENT OF CONSERVATION
INSTITUTE FOR FISHERIES RESEARCH
DIVISION OF FISHERIES
LAKE INVENTORY MAP
FIFE LAKE
GRAND TRAVERSE CO-FIFE LAKE TWP
KALKASKA CO-SPRINGFIELD TWP
T.25N R.8,9W -SECS.18,1,12,13,14,
573 ACRES
SCALE 16"=1 MILE
CONTOUR INTERVAL 5 FEET
LEGEND
SAND
MARL
PULPY PEAT
MARGINAL SURVEY AND SOUNDINGS BY
MICHIGAN EMERGENCY CONSERVATION WORK
CAMP FIFE LAKE 102-9 WINTER 1936-37
VEGETATION AND BOTTOM SOIL SURVEYS BY
INSTITUTE FOR FISHERIES RESEARCH
APPROVED R.H.J.

Figure 11. Inventory map of Minnemaukee Lake, St. Joseph County




MINNEWAUKON LAKE St. Joseph Co. T. 7 S., R. 10 W., SEC. 34, 35

Figure 12. Inventory map of Sugarloaf Lake, Washtenaw County




SUGARLOAF LAKE Washtenaw County T. 1 S., R. 3 E., Sec. 31 32

Table 5

Catch per hour per angler for four lakes under experimental regulations, as seasonal averages for the five years, 1946-1950

| Lake, and area | Season | Year | | | | |
|---|---|---|---|---|---|---|
| | | 1946 | 1947 | 1948 | 1949 | 1950 |
| Big Portage | Spring | .42 | .33 | .33 | * | .76 |
| | Summer | .55 | .67 | .70 | .71 | .66 |
| 360 acres | Fall | .59 | 1.06 | .95 | .93 | .50 |
| | Winter | .21 | .36 | .49 | .73 | .86 |
| | Year | .46 | .66 | .63 | .77 | .66 |
| Fife | Spring | .37 | .70 | .44 | .96 | .63 |
| | Summer | .54 | .81 | .72 | .77 | .80 |
| 575 acres | Fall | .66 | .89 | .78 | .43 | .75 |
| | Winter | .16 | .13 | .59 | .43 | .69 |
| | Year | .49 | .74 | .69 | .74 | .77 |
| Minnewaukon | Spring | 2.08 | 1.60 | 2.20 | 2.69 | 2.50 |
| | Summer | 1.76 | 1.42 | 2.09 | 2.22 | 1.42 |
| 126 acres | Fall | 1.38 | 1.09 | 3.06 | 1.36 | 1.16 |
| | Winter | .49 | .87 | * | * | 2.06 |
| | Year | 1.82 | 1.40 | 2.30 | 2.10 | 1.56 |
| Sugarloaf | Spring | .74 | .63 | .84 | .90 | .94 |
| | Summer | .80 | 1.17 | 1.12 | 1.02 | 1.03 |
| 180 acres | Fall | 1.53 | 2.51 | 1.46 | 3.53 | 2.40 |
| | Winter | 1.47 | 1.02 | .90 | 2.86 | 1.86 |
| | Year | .93 | 1.11 | 1.09 | 1.65 | 1.22 |

*No census taken.

Table 6

Fishing data from four lakes under experimental regulations, 1946-1950

| Lake<br>County<br>Area | Year | Estimated total anglers | Number of anglers contacted | Percent of estimated total contacted | Estimated total hours | Estimated total catch | Catch per acre | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | Game fish | Panfish[1] |
| Big Portage Lake | 1946 | 5,050 | 3,088 | 61.1 | 14,940 | 8,680 | 1.8 | 22 |
| Jackson County | 1947 | 6,710 | 718 | 10.7 | 21,100 | 14,020 | 2.4 | 37 |
| 360 acres | 1948 | 6,990 | 518 | 7.4 | 22,250 | 14,400 | 2.3 | 38 |
| | 1949[2] | 2,800 | 241 | 8.6 | 9,880 | 7,570 | 2.5 | 19 |
| | 1950 | 3,890 | 411 | 10.6 | 20,150 | 13,410 | 2.7 | 35 |
| Fife Lake | 1946 | 11,940 | 3,274 | 27.4 | 40,890 | 19,260 | 5.9 | 28 |
| Grand Traverse and Kalkaska | 1947 | 13,070 | 1,099 | 8.4 | 43,810 | 32,630 | 3.8 | 53 |
| Counties | 1948 | 17,400 | 1,724 | 9.9 | 58,510 | 41,260 | 6.2 | 66 |
| 575 acres | 1949 | 19,370 | 1,887 | 9.7 | 63,720 | 48,170 | 6.5 | 77 |
| | 1950 | 15,820 | 976 | 6.2 | 51,440 | 39,450 | 4.7 | 64 |
| Minnewaukon Lake | 1946 | 4,170 | 3,498 | 83.9 | 11,950 | 20,550 | 2.9 | 160 |
| St. Joseph County | 1947 | 5,810 | 1,140 | 19.6 | 14,960 | 20,890 | 4.3 | 162 |
| 126 acres | 1948[3] | 3,640 | 473 | 10.3 | 10,210 | 23,520 | 3.7 | 183 |
| | 1949[3] | 5,290 | 486 | 9.2 | 11,400 | 23,930 | 7.6 | 182 |
| | 1950 | 5,600 | 506 | 8.2 | 13,640 | 21,290 | 4.1 | 165 |
| Sugarloaf Lake | 1946 | 6,110 | 4,081 | 66.8 | 20,150 | 17,090 | 3.3 | 92 |
| Washtenaw County | 1947 | 4,450 | 729 | 16.4 | 14,330 | 16,050 | 2.7 | 86 |
| 180 acres | 1948 | 5,160 | 500 | 9.7 | 13,880 | 15,220 | 3.3 | 81 |
| | 1949 | 6,830 | 764 | 11.2 | 23,160 | 38,270 | 7.0 | 206 |
| | 1950 | 6,880 | 1,112 | 16.2 | 25,470 | 31,150 | 10.3 | 163 |

[1] All fish except largemouth bass, smallmouth bass, walleye and pike.

[2] No census in spring.

[3] No winter census.

Table 7

Species composition in percentages[1] of the total catch on four experimental regulation lakes, 1946-1950

| Lake / Year | Bluegill | Yellow Perch | Pumpkinseed | Black crappie | Rock bass | Largemouth bass | Smallmouth bass | Walleye | Pike | Bullhead | Warmouth bass | Miscellaneous[2] | Estimated total fish |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Big Portage Lake** | | | | | | | | | | | | | |
| 1946 | 77.7 | 7.8 | 2.6 | 2.3 | 1.6 | 4.7 | 0.2 | 0.6 | 2.1 | 0.1 | | 0.2 | 8,680 |
| 1947 | 67.9 | 12.6 | 3.9 | 6.8 | 2.2 | 4.6 | | 0.4 | 1.5 | | 0.3 | 0.2 | 14,020 |
| 1948 | 61.3 | 13.3 | 3.4 | 14.2 | 1.6 | 3.9 | | 0.1 | 1.8 | | 0.4 | | 14,400 |
| 1949 | 62.0 | 8.9 | 8.7 | 3.1 | 3.6 | 9.8 | | 0.1 | 2.0 | 0.5 | 0.5 | 0.6 | 7,570[3] |
| 1950 | 74.4 | 5.1 | 4.7 | 1.4 | 2.3 | 6.2 | | 0.3 | 0.8 | 1.0 | 0.8 | 3.5 | 13,410 |
| Five years | 69.8 | 9.6 | 4.2 | 5.0 | 2.1 | 6.0 | Tr. | 0.2 | 1.7 | 0.4 | 0.3 | 0.7 | |
| **Fife Lake** | | | | | | | | | | | | | |
| 1946 | 32.2 | 8.4 | 9.1 | 14.3 | 18.4 | 2.3 | 1.4 | 1.6 | 12.3 | | | | 19,260 |
| 1947 | 37.6 | 14.7 | 18.5 | 9.5 | 13.0 | 1.2 | 1.6 | 0.6 | 3.4 | Tr[1] | | Tr. | 32,630 |
| 1948 | 57.3 | 4.9 | 9.2 | 10.2 | 9.9 | 1.6 | 1.8 | 0.4 | 4.8 | | | Tr. | 41,270 |
| 1949 | 49.4 | 13.7 | 8.3 | 10.3 | 10.5 | 0.6 | 2.0 | 0.2 | 5.0 | | | Tr. | 48,170 |
| 1950 | 46.6 | 11.4 | 12.8 | 17.3 | 5.0 | 1.0 | 0.9 | 0.2 | 4.8 | 0.1 | | | 39,450 |
| Five Years | 49.6 | 10.3 | 11.1 | 12.0 | 8.6 | 1.3 | 1.8 | 0.8 | 4.4 | Tr. | | Tr. | |
| **Minnewaukon Lake** | | | | | | | | | | | | | |
| 1946 | 50.1 | 4.1 | 4.1 | 0.6 | Tr. | 1.7 | | | 0.1 | 32.4 | | 6.9 | 20,550 |
| 1947 | 59.8 | 10.1 | 9.1 | 1.3 | | 2.5 | Tr. | | 0.1 | 18.7 | | | 20,890 |
| 1948 | 57.2 | 9.0 | 11.0 | 9.0 | | 2.0 | | | | 19.9 | | Tr. | 23,520 [4] |
| 1949 | 54.5 | 10.9 | 5.2 | 4.9 | | 3.7 | | | 0.3 | 20.5 | 0.1 | | 23,930 * |
| 1950 | 48.0 | 10.6 | 7.9 | 8.8 | | 2.3 | 0.1 | | 0.1 | 22.1 | | 0.3 | 21,290 |
| Five years | 53.2 | 9.4 | 6.5 | 3.4 | Tr. | 3.2 | Tr. | | 0.2 | 22.8 | Tr. | 1.3 | |
| **Sugarloaf Lake** | | | | | | | | | | | | | |
| 1946 | 46.6 | 37.1 | 3.3 | 3.5 | 3.9 | 1.8 | | | 1.7 | 0.9 | 0.3 | 1.0 | 17,090 |
| 1947 | 52.1 | 25.6 | 9.5 | 2.4 | 5.1 | 2.1 | | | 0.9 | 0.9 | 1.0 | 0.4 | 16,050 |
| 1948 | 52.1 | 28.3 | 5.3 | 6.5 | 1.9 | 2.8 | | | 1.1 | 0.8 | 0.6 | 0.6 | 15,220 |
| 1949 | 47.6 | 37.1 | 7.4 | 0.9 | 2.0 | 2.8 | | | 0.5 | 0.6 | 0.4 | 0.6 | 38,270 |
| 1950 | 47.1 | 32.1 | 6.4 | 0.6 | 3.5 | 5.7 | | | 0.3 | 1.0 | 1.9 | 1.4 | 31,150 |
| Five years | 42.3 | 39.6 | 5.4 | 2.5 | 2.9 | 4.0 | | | 0.7 | 0.8 | 0.9 | 0.9 | |

[1] "Tr." means less than 0.1 percent.

[2] Dogfish, garpike, sucker, carp, golden shiner, channel catfish (Minnewaukon Lake).

[3] No spring census on Big Portage Lake in 1949.

[4] No winter census on Minnewaukon Lake in 1948 and 1949.

Figure 13. Species composition of five-year catch (1946-1950) on six lakes open to spring fishing for bluegills and sunfish

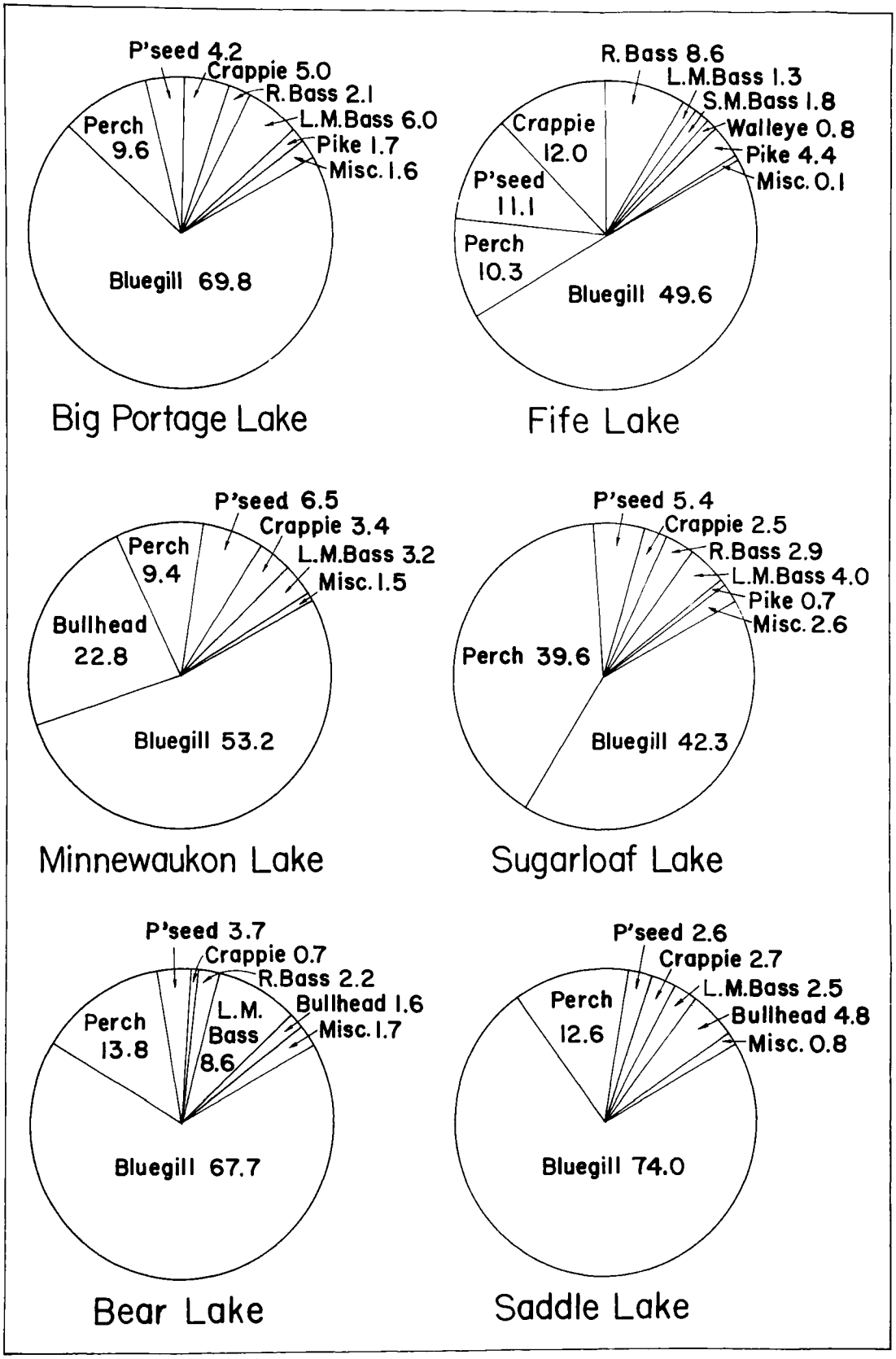
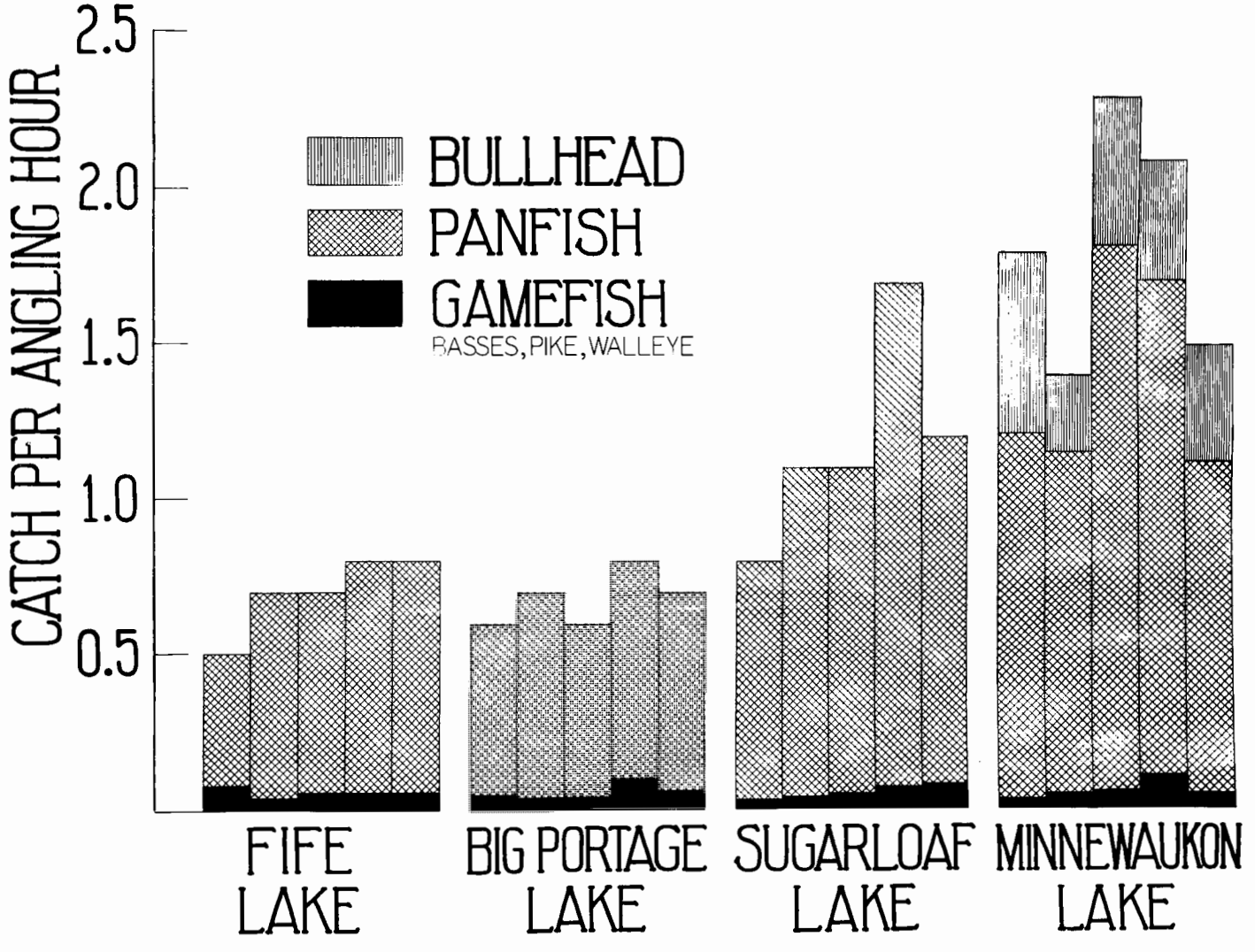

P'seed 4.2
Crappie 5.0
R.Bass 2.1
L.M.Bass 6.0
Pike 1.7
Misc. 1.6
Perch 9.6
Bluegill 69.8
Big Portage Lake
R.Bass 8.6
L.M.Bass 1.3
S.M.Bass 1.8
Walleye 0.8
Pike 4.4
Misc. 0.1
Crappie 12.0
P'seed 11.1
Perch 10.3
Bluegill 49.6
Fife Lake
P'seed 6.5
Crappie 3.4
L.M.Bass 3.2
Misc. 1.5
Perch 9.4
Bullhead 22.8
Bluegill 53.2
Minnewaukon Lake
P'seed 5.4
Crappie 2.5
R.Bass 2.9
L.M.Bass 4.0
Pike 0.7
Misc. 2.6
Perch 39.6
Bluegill 42.3
Sugarloaf Lake
P'seed 3.7
Crappie 0.7
R.Bass 2.2
Bullhead 1.6
Misc. 1.7
L.M. Bass 8.6
Perch 13.8
Bluegill 67.7
Bear Lake
P'seed 2.6
Crappie 2.7
L.M.Bass 2.5
Bullhead 4.8
Misc. 0.8
Perch 12.6
Bluegill 74.0
Saddle Lake

Figure 14. Catch per hour for five years on four lakes open to spring fishing for bluegills and sunfish. Catch is separated into three classes in case of Minnewaukon Lake because of the large percentage of bullheads. Bullhead catch on the other lakes is included with the panfish. The set of graphs for each lake represents, from left to right, 1946 through 1950


CATCH PER ANGLING HOUR
2.5
2.0
1.5
1.0
0.5
BULLHEAD
PANFISH
GAMEFISH
BASSES, PIKE, WALLEYE
FIFE LAKE
BIG PORTAGE LAKE
SUGARLOAF LAKE
MINNEWAUKON LAKE

It has been suggested that the bluegill is quite easily caught while guarding its nest in the spring, but this was not substantiated by the catch-per-hour figures on these four lakes (Table 5). The catch per hour of all fish during the spring was below that for the summer for at least four of the five years on three of the four lakes. Minnewaukon Lake was the exception, but in this case the large catch of bullheads, rather than bluegills (Table 7 and Figure 13),contributed to the high catch per hour in the spring. Minnewaukon Lake, on a fish-per-acre basis, was the most productive in this group of four study lakes (Table 6) Big Portage Lake was the least productive.

This group of lakes maintained a very constant yearly catch per hour (Table 5). Annual variations occurred in the spring, fall and winter, while the steady summer index exerted the most influence on the yearly averages. None of the lakes showed a decline in catch per hour of game fish over the five-year period (Figure 14). Judging from the species composition of the catch (Table 7 and Figure 13), the game fish, particularly the basses, have not decreased, which means that these fish reproduced successfully even though disturbed to some extent by anglers during the spring bluegill fishing. The tests on these four lakes show that there was no decline in fishing quality which might have been caused by the additional harvest of pan fishes in the spring season.

A further summary of conclusions is found following the section on Bear and Saddle lakes, below.

## TWO LAKES WITH NO CREEL LIMIT ON PAN FISH LESS THAN SIX INCHES LONG

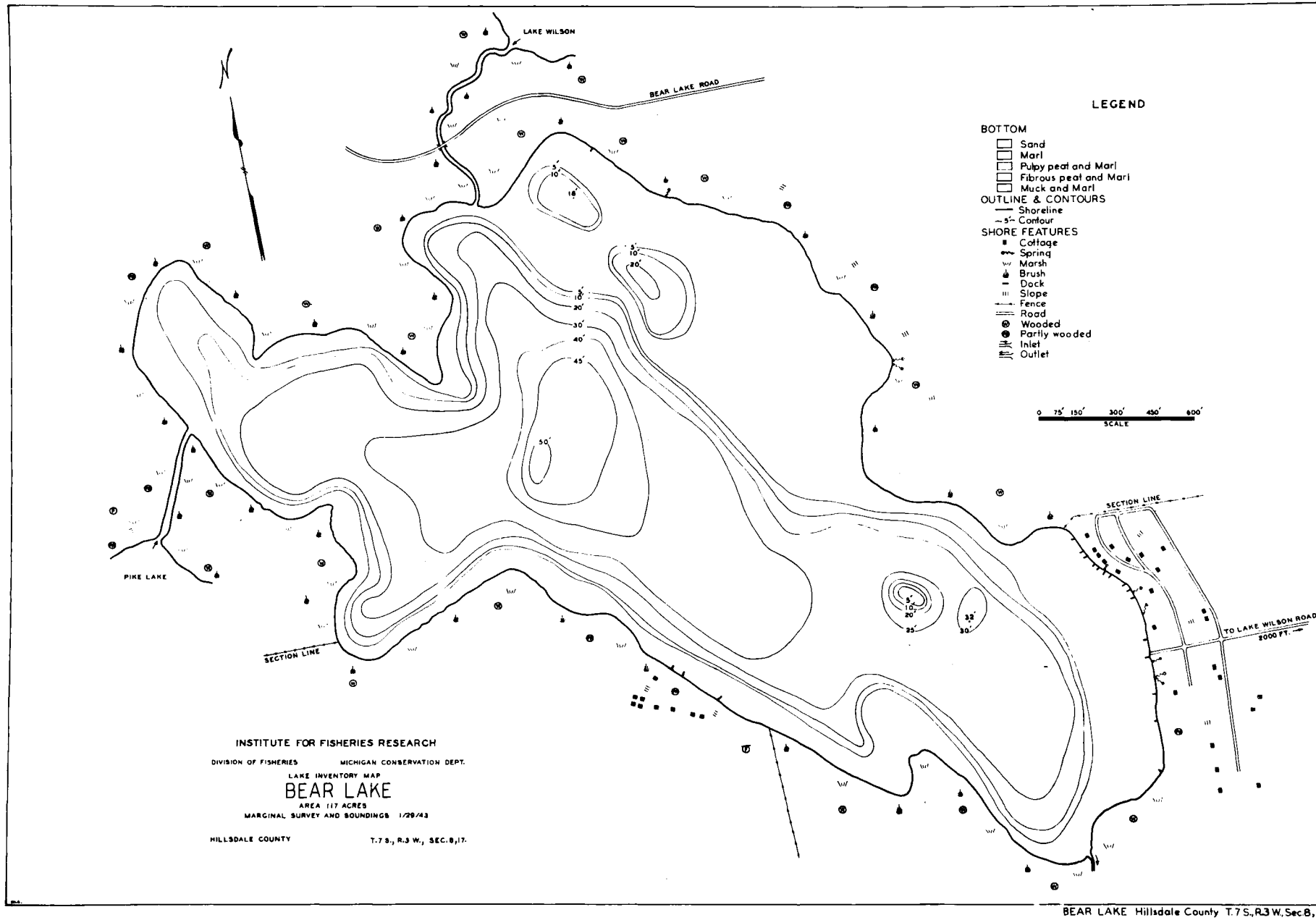
Bear Lake in Hillsdale County, and Saddle Lake in Van Buren County, were opened to year-round fishing for bluegills and sunfish and all species not protected by a closed season. Also the creel limit was removed for pan fish less than six inches long. These two provisions were intended to allow an almost unlimited removal of pan fish in a stunted population.

Bear Lake (Figure 15) is about six miles from Hillsdale and is surrounded by agricultural land. There is a public fishing site on the east shore, and the property on the southeast and east shores is occupied by cottages and year-round dwellings.

Saddle Lake (Figure 16) is twelve miles east of South Haven. It is located in an area devoted primarily to orchards. There is a public fishing site on the south shore. The outlet drains into the Black River which empties into Lake Michigan at South Haven. Most of the shore property suitable for real estate developement has been built up to cottages and a few year-round residences.

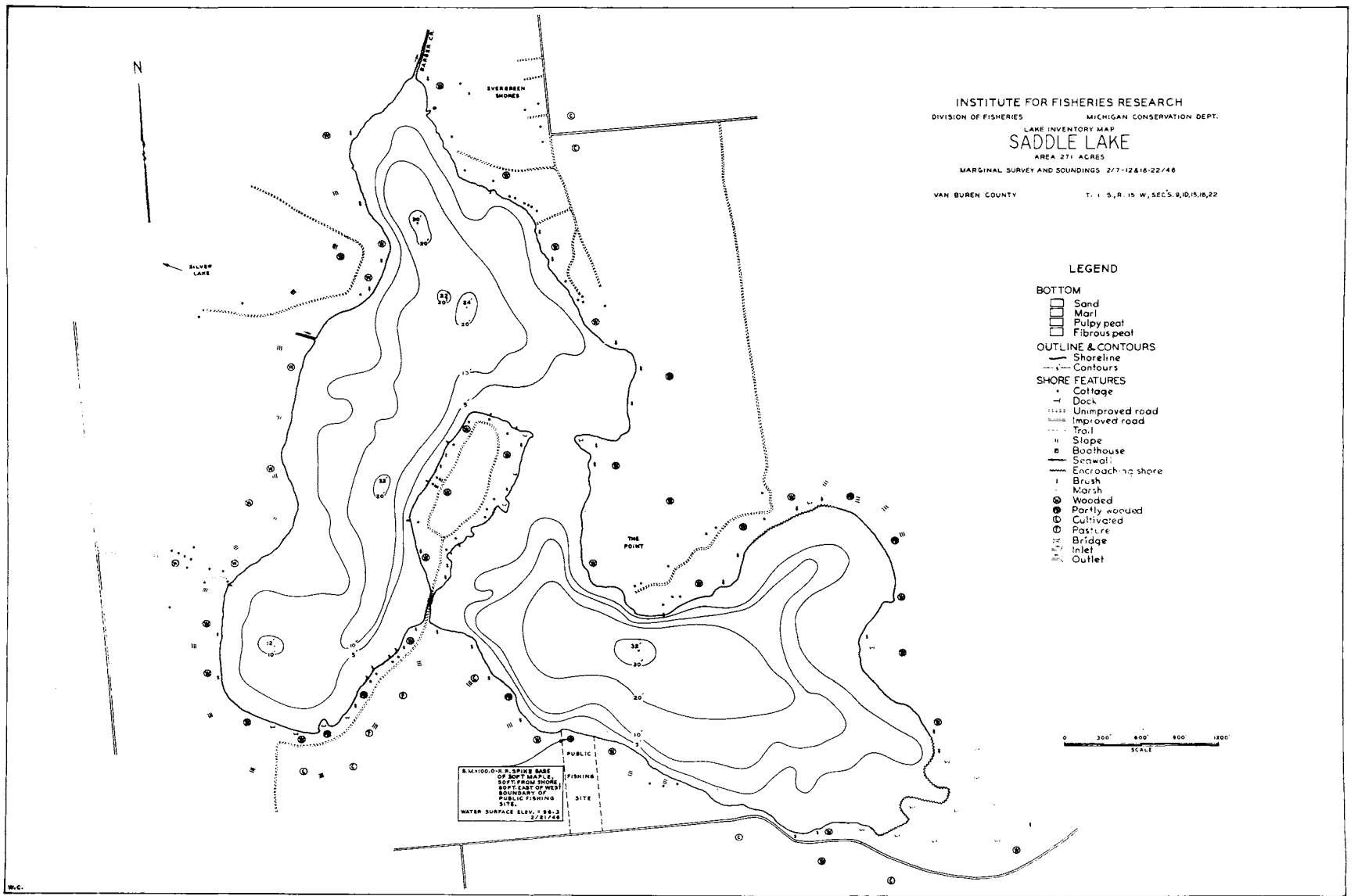
Bear Lake had a very constant yearly catch per hour of "legal-size" fish for the first four years (1946-1949), followed by a decline in 1950 (Table 8). The five index values were respectively, 0.62, 0.70, 0.74, 0.79 and 0.42. The low figure for 1950 (0.42), coupled with a significant decline in fishing intensity (Table 9), resulted in a greatly reduced catch of legal-size fish (mostly pan fish) in 1950. The average annual catch of fish in 1946-1949 was 16,050 of which 75% were legal, and in 1950 the catch was 8,940 of which 55% were legal. The

Figure 15. Inventory map of Bear Lake, Hillsdale County




BEAR LAKE Hillsdale County T.7S.,R.3W.Sec.8,17

Figure 16. Inventory map of Saddle Lake, Van Buren County




SADDLE LAKE Van Buren County T.1 S, R.15 W, Sec's 9,10,15,16,22

Table 8

Catch per hour per angler for two lakes under experimental regulations, 1946-1950

| Season | Size of fish | Year | | | | |
|---|---|---|---|---|---|---|
| | | 1946 | 1947 | 1948 | 1949 | 1950 |
| **Bear Lake, 117 acres** | | | | | | |
| Spring | Legal | .45 | .14 | .38 | .58 | .72 |
| | Legal + sublegal | .84 | .27 | .63 | .78 | .92 |
| Summer | Legal | .69 | .84 | .88 | .75 | .32 |
| | Legal + sublegal | .87 | 1.21 | 1.08 | 1.00 | .76 |
| Fall | Legal | .57 | .72 | .43 | 1.11 | .22 |
| | Legal + sublegal | .75 | .84 | .43[1] | 1.70 | .47 |
| Winter | Legal | .59 | .75 | .89 | 1.39 | .33 |
| | Legal + sublegal | .59[1] | .93 | .91 | 1.39 | .40 |
| All seasons | Legal | .62 | .70 | .74 | .79 | .42 |
| | Legal + sublegal | .82 | .95 | .92 | 1.09 | .77 |
| **Saddle Lake, 271 acres** | | | | | | |
| Spring | Legal | 1.13 | 1.15 | .60 | 1.06 | 1.30 |
| | Legal + sublegal | 2.84 | 2.85 | 2.33 | 2.35 | 2.99 |
| Summer | Legal | 1.19 | .79 | 1.19 | .93 | 1.09 |
| | Legal + sublegal | 2.04 | 1.57 | 2.91 | 1.71 | 2.00 |
| Fall | Legal | 1.22 | .27 | .64 | 1.56 | .64 |
| | Legal + sublegal | 2.05 | .90 | 1.90 | 2.16 | 1.85 |
| Winter[2] | .. | .. | .. | .. | .. | .. |
| | .. | .. | .. | .. | .. | .. |
| All seasons | Legal | 1.16 | .90 | .86 | 1.02 | 1.14 |
| | Legal + sublegal | 2.45 | 2.08 | 2.57 | 1.94 | 2.33 |

[1] No "sublegal" fish recorded.
[2] No winter census on Saddle Lake.

Table 9

Fishing data from two lakes under experimental regulations, 1946-1950

| | Year | Estimated total anglers | Number of anglers contacted | Percent of estimated total contacted | Estimated total hours | Estimated total catch | | Catch per acre (legal-size fish) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Legal-size fish* | All fish# | Game fish | Panfish |
| Bear Lake | 1946 | 3,890 | 2,978 | 76.6 | 14,420 | 9,110 | 12,110 | 3.0 | 100 |
| Hillsdale County | | | | | | | | | |
| 117 acres | 1947 | 6,490 | 702 | 10.8 | 18,760 | 13,070 | 17,870 | 10.3 | 142 |
| | 1948 | 5,140 | 527 | 10.3 | 17,150 | 12,780 | 15,770 | 5.7 | 129 |
| | 1949 | 5,430 | 434 | 8.0 | 16,730 | 13,280 | 18,450 | 4.6 | 153 |
| | 1950 | 4,800 | 285 | 5.9 | 11,690 | 4,880 | 8,940 | 1.5 | 75 |
| Saddle Lake** | 1946 | 6,920 | 2,538 | 36.7 | 25,180 | 28,300 | 55,900 | 1.5 | 205 |
| Van Buren County | | | | | | | | | |
| 271 acres | 1947 | 10,630 | 659 | 6.2 | 37,030 | 33,440 | 77,090 | 2.0 | 282 |
| | 1948 | 10,480 | 660 | 6.3 | 33,890 | 29,380 | 86,860 | 2.9 | 318 |
| | 1949 | 9,520 | 727 | 7.6 | 26,070 | 26,510 | 50,500 | 2.2 | 184 |
| | 1950 | 9,350 | 841 | 9.0 | 27,670 | 31,470 | 64,540 | 2.9 | 235 |

* All fish except largemouth bass, smallmouth bass, walleye and pike.
** No winter census, 1946-1950.
+ All fish except panfish under six inches.
# All fish, including panfish under six inches.

significant question is whether or not this drop in catch and angling quality in 1950 can be attributed to an effect of the spring fishing for pan fish which was begun in 1946. If fishing for bluegills over their spawning beds during 1946, 1947 and 1948 had seriously interferred with natural reproduction, there would have been an increasing scarcity of sublegal bluegills during the years 1948-1950. Such a decline is not revealed by the annual catch-per-hour figures for sublegal pan fish, for 1946-1950, which were: 0.20, 0.25, 0.18, 0.30, and 0.35, respectively. Furthermore, if there had been a serious depletion of the pan fish population, because of interferrence with natural reproduction, the effect should have lasted for more than one year, that is, beyond 1950. The census on Bear Lake was continued through 1951 and 1952 and the results have been summarized for a comparison here with data for 1946-1950. In 1951 the total catch was 12,660 fish of which 68% were legal, and in 1952 the catch was 18,050 fish of which 77% were legal. Thus the annual catch of legal fish (mostly pan fish) increased substantially in 1951 and 1952 to a point where the 1952 catch was equal to the best of the experimental years. The catch-per-hour figures for 1946 through 1952 show the same recovery in catch of legal fish, with a low in 1950 (Table 8) followed by a rise in 1951 (0.61) and a further rise in 1952 to a value (0.77) about equal to the best of the experimental years. To summarize for Bear Lake, the yearly analysis of total catch and of catch per hour, for both legal-size fish and sublegal pan fish, favors the conclusion that the considerable slump in fishing quality in 1950 was not due primarily to five years of experimental regulations (from 1946 to 1950) for such an effect should have lasted for more than just the one year.

Saddle Lake produced a constant ratio of six legal fish to seven sublegal fish for the five years, indicating that angling was not a practical method of decreasing a population of stunted pan fish on this lake. The catch per hour of legal fish on Saddle Lake for each of the five years (Table 8) was about 1.0, without significant annual differences--another indication that the harvesting of the sublegal pan fish was not sufficient to alter the fishermen's take of legal fish.

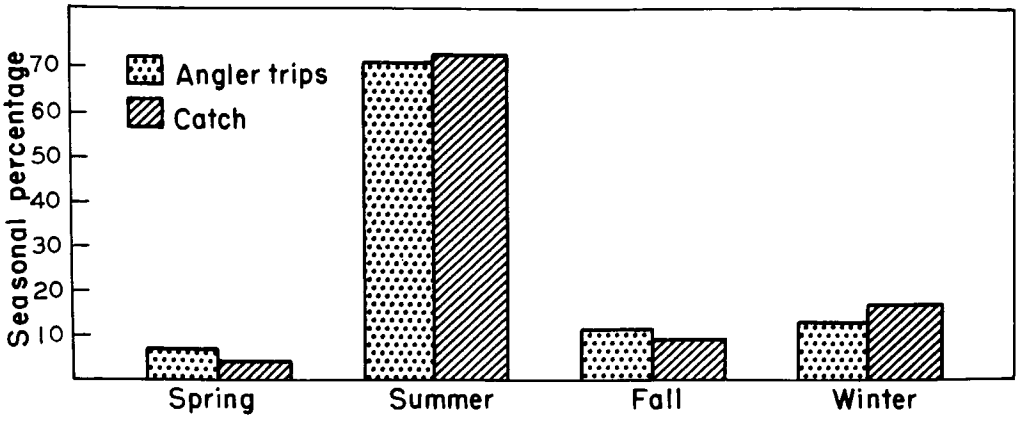
## SUMMARY FOR SIX LAKES OPEN TO SPRING SEASON FOR BLUEGILLS AND SUNFISH

On the six lakes with open season on bluegills in the spring, the additional fishing undoubtedly attracted more anglers to the six lakes where this regulation existed than would have been present had all the lakes in the state been open. This means that any detrimental effect of extending the fishing season to include the spring should have been more extreme on these test lakes than would occur on all lakes of the State if they were open in the spring.

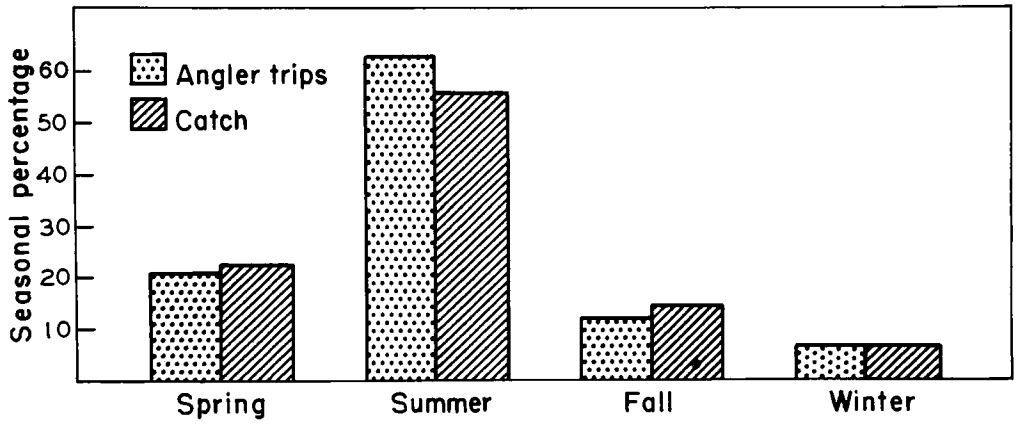
The spring trips (Figure 17, middle) made up 21.6% of the estimated yearly fishing, an average for the five years of 9,970 trips as against 36,118 trips for the remainder of the year. The catch per hour for the spring was generally less than that for the summer and fall except in the case of Minnewaukon Lake (Tables 5 and 8). The catch per hour for the year on these six lakes varied little from 1946 through 1950, being respectively 0.81, 0.87, 0.88, 1.04 and 0.94 fish per hour of angling (bottom graph of Figure 17, and Table 11). An average of 32,024 fish were taken during each spring from 1946 through 1950, while 101,792 fish were taken during the remainder of each year.

Figure 17. Top. Seasonal distribution of angler trips and catch on six lakes closed to spring fishing for bluegills and sunfish. Middle. Seasonal distribution of angler trips and catch on six lakes open to spring fishing for bluegills and sunfish. Bottom. Yearly variation in catch and fishing quality (catch per hour) on six lakes open to spring fishing for bluegills and sunfish. (Reprinted from Westerman, 1952)

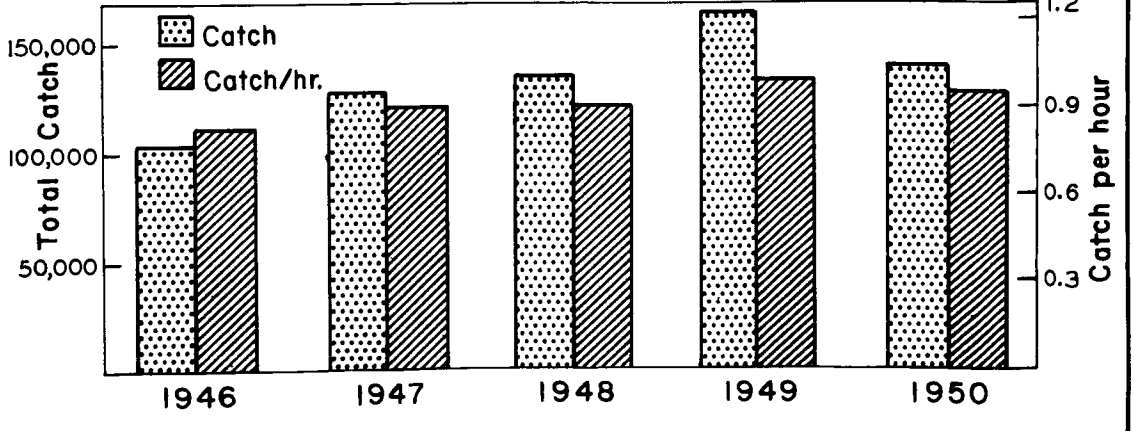
Six Lakes without spring fishing for Bluegills, 5-yr. average, by seasons.




Six Lakes with spring fishing for Bluegills, 5-yr. average, by seasons.




Six Lakes with spring fishing for Bluegills.



The 32,024 fish caught in the spring made up 23.9% of the total catch for the year, and represented an increase of 31.5% over what was caught during summer, fall and winter. That this spring catch actually represents a real increase in annual yield is suggested by the census figures for 1951 when there was no spring season. In 1951 the annual catch for summer, fall and winter (see below) was an estimated 107,425 fish, as compared to an average annual catch for the same seasons in 1946-1950 of 101,792 fish; during the two periods of comparison the annual angling pressure was virtually the same, as was the catch per hour (0.94 in 1951, and 0.91 in 1946-1950). In other words, anglers took no more fish during summer, fall and winter (of 1951) when there was no spring fishing, than they took during the summer, fall and winter seasons (of 1946-1950) when spring fishing was allowed.

## COMPARISON OF ANGLING IN 1946-1950 WITH 1951

The experimental regulations expired in the spring of 1951 and the twelve lakes were once again under state-wide regulations. All, with the exception of Fife Lake (North of Highway M-46), were closed to spring fishing until June 25. A creel census was continued on the twelve lakes during the summer, fall and winter of 1951, (Table 11). The census clerks made boat counts and contacted 2,890 anglers as a basis for census estimates.

The summer fishermen in 1951 spent 380,620 hours fishing during 113,440 trips to the twelve lakes and caught 356,250 fish at the rate of 0.94 fish per hour. The summer anglers during each of the preceding five years had caught 424,910 fish in 417,700 hours (catch per hour 1.02). Comparing fall fishing in 1951 the anglers took an estimated 23,550 fish in 37,110 hours (0.63 fish per hour); whereas during the period

Table 10

Species composition of the catch by percentage of the total catch on two experimental regulation lakes, 1946-1950

| Lake and year | Size of fish | Bluegill | Yellow perch | Pumpkinseed | Black crappie | Rock bass | Largemouth bass | Smallmouth bass | Walleye | Pike | Bullhead | Yarmouth bass | Miscellaneous* | Estimated total fish |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bear Lake | | | | | | | | | | | | | | |
| 1946 | Legal | 52.0 | 33.8 | 2.1 | 1.0 | 2.6 | 3.9 | .. | .. | .. | 3.0 | 0.7 | 0.9 | 9,110 |
| | Legal + sublegal | 54.4 | 28.8 | 7.2 | 0.7 | 2.3 | 2.9 | .. | .. | .. | 2.3 | 0.5 | 0.9 | 12,110 |
| 1947 | Legal | 67.4 | 10.6 | 5.6 | 1.2 | 2.5 | 9.7 | .. | .. | .. | 1.0 | 1.1 | 0.9 | 13,070 |
| | Legal + sublegal | 70.2 | 8.6 | 8.8 | 0.9 | 2.2 | 7.1 | .. | .. | .. | 0.7 | 0.8 | 6.7 | 17,870 |
| 1948 | Legal | 82.2 | 6.7 | 2.0 | 0.2 | 0.7 | 5.8 | .. | .. | .. | 1.0 | 0.9 | 0.6 | 12,780 |
| | Legal + sublegal | 83.3 | 6.1 | 3.1 | 0.3 | 0.6 | 4.7 | .. | .. | .. | 0.8 | 0.7 | 0.5 | 15,770 |
| 1949 | Legal | 69.2 | 12.4 | 7.0 | 2.4 | 3.1 | 4.5 | .. | .. | .. | 0.6 | 0.7 | 0.2 | 13,280 |
| | Legal + sublegal | 66.5 | 11.0 | 13.9 | 1.7 | 2.7 | 3.2 | .. | .. | .. | 0.4 | 0.5 | 0.1 | 18,450 |
| 1950 | Legal | 64.0 | 18.1 | 2.0 | .. | 5.3 | 3.6 | .. | .. | .. | .. | 6.7 | 0.4 | 4,880 |
| | Legal + sublegal | 74.5 | 13.4 | 2.5 | .. | 3.8 | 2.0 | ... | ... | .. | .. | 3.6 | 0.2 | 8,940 |
| Five years | Legal | 67.7 | 13.8 | 3.7 | 0.7 | 2.2 | 8.6 | .. | .. | .. | 1.6 | 1.1 | 0.6 | |
| Saddle Lake | | | | | | | | | | | | | | |
| 1946 | Legal | 70.5 | 10.4 | 7.3 | 2.5 | Tr. | 1.5 | .. | .. | 0.1 | 5.2 | 2.3 | 0.1 | 28,300 |
| | Legal + sublegal | 75.6 | 6.9 | 11.7 | 1.3 | Tr. | 0.7 | .. | .. | Tr. | 2.6 | 1.1 | tr. | 55,900 |
| 1947 | Legal | 63.1 | 24.3 | 2.5 | 2.4 | 0.1 | 1.7 | .. | .. | Tr. | 4.5 | 1.3 | .. | 33,440 |
| | Legal + sublegal | 75.4 | 11.6 | 8.6 | 1.0 | 0.1 | 0.7 | .. | .. | Tr. | 1.9 | 0.5 | .. | 77,090 |
| 1948 | Legal | 77.6 | 11.2 | 0.7 | 2.7 | Tr. | 2.7 | .. | .. | .. | 5.0 | .. | 0.2 | 29,380 |
| | Legal + sublegal | 83.2 | 4.6 | 8.5 | 0.9 | 0.2 | 0.9 | .. | .. | .. | 1.6 | .. | Tr. | 86,860 |
| 1949 | Legal | 82.8 | 5.8 | 1.3 | 2.2 | .. | 2.6 | .. | ... | Tr. | 5.2 | Tr. | .. | 26,510 |
| | Legal + sublegal | 84.7 | 3.4 | 7.2 | 1.0 | .. | 1.2 | .. | .. | Tr. | 2.4 | Tr. | .. | 50,500 |
| 1950 | Legal | 79.8 | 8.5 | 2.7 | 3.0 | .. | 2.6 | Tr. | .. | Tr. | 3.0 | .. | .. | 31,470 |
| | Legal + sublegal | 81.8 | 5.0 | 10.0 | 1.4 | 0.2 | 1.2 | Tr. | .. | Tr. | 1.4 | .. | .. | 64,540 |
| Five years | Legal | 74.0 | 12.6 | 2.6 | 2.7 | Tr. | 2.5 | Tr. | .. | Tr. | 4.8 | 0.6 | Tr. | |

*Dogfish, garpike, sucker, carp, golden shiner.

"Tr." means less than 0.1 percent.

Table 11

Creel census data for 1951 from twelve experimental regulation lakes, compared with data for 1946-1950

| Year | 1946 | 1947 | 1948 | 1949 | 1950 | 1951 |
|---|---|---|---|---|---|---|
| **Six lakes open to year-round fishing for those species not protected by a closed season** | | | | | | |
| **Estimated total angling hours:** | | | | | | |
| Spring | 32,120 | 26,600 | 35,840 | 46,710 | 17,500 | |
| Summer | 248,800 | 411,490 | 409,910 | 358,110 | 229,990 | 285,620 |
| Fall | 21,990 | 54,730 | 49,670 | 51,650 | 32,690 | 26,680 |
| Winter | 55,910 | 68,900 | 78,340 | 38,350 | 21,420 | (40,660)# |
| Summer-Fall-Winter Total | 326,700 | 535,120 | 537,920 | 448,110 | 284,100 | 352,960 |
| Year | 358,820 | 561,720 | 573,760 | 494,820 | 301,600 | 352,960+ |
| **Catch per hour of angling:** | | | | | | |
| Spring | 0.46 | 0.39 | 0.59 | 0.27 | 0.29 | |
| Summer | 0.90 | 1.30 | 1.09 | 0.96 | 0.86 | 0.94 |
| Fall | 0.86 | 0.90 | 00.82 | 0.66 | 0.95 | 0.64 |
| Winter | 1.68 | 1.51 | 2.01 | 1.23 | 1.24 | (1.33)# |
| Summer-Fall-Winter Total | 1.03 | 1.29 | 1.20 | 0.95 | 0.90 | 0.96 |
| Year | 0.98 | 1.14 | 1.16 | 0.88 | 0.86 | 0.96 + |
| **Six lakes open to year-round fishing for bluegills and sunfish** | | | | | | |
| **Estimated total angling hours:** | | | | | | |
| Spring | 40,400 | 31,790 | 38,500 | 33,690 | 32,740 | |
| Summer | 69,500 | 87,150 | 90,800 | 88,430 | 94,330 | 95,000 |
| Fall | 6,710 | 18,980 | 16,240 | 19,770 | 14,590 | 10,440 |
| Winter | 10,920 | 12,070 | 10,320 | 9,070 | 8,410 | 12,170 |
| Summer-Fall-Winter Total | 87,130 | 118,200 | 117,360 | 117,270 | 117,330 | 117,610 |
| Year | 127,530 | 149,990 | 155,860 | 150,960 | 150,070 | 117,610 |
| **Catch per hour of angling:** | | | | | | |
| Spring | 0.86 | 0.96 | 0.66 | 1.04 | 1.06 | |
| Summer | 0.79 | 0.88 | 0.92 | 0.91 | 0.88 | 0.93 |
| Fall | 0.93 | 0.89 | 1.17 | 1.78 | 1.08 | 0.62 |
| Winter | 0.63 | 0.54 | 0.85 | 0.74 | 1.05 | 1.04 |
| Summer-Fall-Winter Total | 0.78 | 0.85 | 0.95 | 1.04 | 0.92 | 0.91 |
| Year | 0.81 | 0.87 | 0.88 | 1.04 | 0.94 | 0.91 |

#Includes average for five years (1946-1950) for Craig Lake since no census was taken in winter of 1951.

+Includes average for five years (1946-1950) for Craig Lake since no census was taken in winter of 1951.

1946 through 1950 they caught an average of 53,400 fish in 57,400 hours (0.93 fish per hour). Winter fishermen had a catch per hour of 0.95 fish in 1951 as compared to 1.49 fish per hour for 1946 through 1950; the number of fish taken declined from an average of 93,400 fish to 41,360 fish in 1951. It is to be noted in the above figures that about 75% to 80% of the summer, fall and winter catch was taken during the summer season. Thus the summer figures are most significant. Both angling intensity and fishing quality were somewhat lower in 1951 than the average for 1946-1950, but the differences lose some of their significance when the annual variations from 1946 to 1950, and the variations between lake categories, are considered (Table 11). For the 12 lakes collectively, 1947 and 1948 were "high" years, followed by a decline and a "low" year in 1950, with some recovery in 1951.

## COMPARISON OF CENSUS ON EXPERIMENTAL WATERS WITH GENERAL CREEL CENSUS

Conservation officers throughout the state contact several thousand anglers each year and record creel census data as to species of fish caught and number of hours spent fishing. These data are totalled by districts and regions each year and an index of fishing quality is computed. The general creel census data for 1950 have been summarized by Mr. K. G. Fukano in an unpublished report (1951) from which certain summary data have been extracted for comparison with similar information from experimental lakes. The average catch per hour shown by special creel census on the twelve experimental lakes (Table 12) was lower than the average catch per hour from the general creel census data gathered from non-trout lakes over the southern half of the Lower

Table 12

Catch-per-hour data for three Conservation Districts[a] from general creel census, as compared to comparable data for the 12 experimental lakes

| District | Year | | | | |
|---|---|---|---|---|---|
| | 1946 | 1947 | 1948 | 1949 | 1950 |
| 10 | 1.2 | 1.6 | 1.7 | 1.8 | 2.1 |
| 11 | 1.2 | 1.0 | 1.1 | 1.4 | 1.7 |
| 12 | 1.1 | 1.3 | 1.4 | 1.2 | 1.1 |
| 10, 11 and 12 combined | 1.2 | 1.4 | 1.4 | 1.5 | 1.7 |
| 12 experimental lakes | 0.9 | 1.2 | 1.1 | 0.9 | 0.9 |

[a] The three districts cited comprise Conservation Region III, the southern half of the Lower Peninsula where all but one of the experimental lakes are located.

Peninsula (Conservation Department Region III). The general creel census figures for 1950 for Region III are based on contacts with nearby 16,000 anglers, and the data from the twelve lakes for the same year are based on over 7,000 angler contacts. The experimental lakes are believed to be generally representative, in productivity, of the waters in Region III, although there is no basis for a precise comparison. The difference in catch per hour of angling from the two census methods might be due to a bias in the general creel census where, in recording catches, there is a possibility of preference in selecting the more successful anglers.

## ANGLING PRESSURE

The angling pressure on Pontiac, Lobdell and Whitmore lakes declined from 1948 to 1950, especially the last year (Table 3). One possible explanation for this decline is found in the increased business activity in the metropolitan area in which these lakes are located--the decrease in number of industrial strikes and lay-offs from 1948 to 1950 decreased the amount of fishing time that the anglers could spend on the lakes. A second factor which might account in part for the higher pressure in 1947 was the release of thousands of men from the armed forces. Finally, angling pressure over the five years was closely correlated with angling quality (which also varied considerably), indicating that quality might have been primarily responsible for annual differences in intensity.

## CHECK ON REPRODUCTION BY SEINING

Five of the twelve experimental lakes--Bear, Big Portage, Minnewaukon, Saddle and Sugarloaf--were seined during the period of regulation changes to determine whether spawning had been affected adversely by the fishing allowed during the spawning season. The first seining was done in 1946 and comparable seining was carried out in September 1950.

The seining gear used on Bear Lake and Minnewaukon Lake in 1950 was not similar to that used in 1946; therefore the data from these two lakes could not be compared. The other lakes were seined with nets sufficiently alike so that direct comparisons of catches can be made.

Shoal areas in Big Portage Lake were seined in 1946 with a 35-foot bag seine and a 30-foot common sense seine. The gear employed in 1950 was a 30-foot bag seine and a 20-foot common sense seine. Approximately 700 linear feet of shoal area were seined in 1946, yielding 3.5 bass and 11.2 pan fish per 100 feet. Seining 800 linear feet of shoal in 1950 produced 3.1 bass and 6.1 pan fish per 100 feet.

Saddle Lake was seined with a 35-foot bag seine in 1946 and a 30-foot bag seine in 1950. Seining produced 2.9 bass and 21.6 pan fish per 100 feet from 1,000 linear feet of shoal in 1946, whereas 3.4 bass and 29.9 pan fish were seined from 475 linear feet of shoal in 1950.

A 35-foot bag seine was used at Sugarloaf Lake in 1946, whereas the collecting was done with a 30-foot bag seine and a 20-foot common sense seine in 1950. Approximately 2,200 linear feet of shoal were seined in 1946, 1,250 linear feet in 1950. The catch in 1946 was 3.3 bass and 18.5 pan fish per 100 feet and, in 1950, 2.2 bass and 21.5 pan fish per 100 feet.

The conclusions drawn from these data is that the reproduction of bass and pan fish was not adversely affected by the spring fishing.

## GENERAL CONCLUSIONS AND SUMMARY

In the preceding discussion certain conclusions have already been drawn, concerning quality and intensity of fishing under the separate categories of lakes having different regulations, and in comparing the experimental years 1946-1950 with 1951. Reaching valid conclusions

from these studies is complicated because of several factors, namely: (1) the variation in fishing intensity on an annual basis and from lake to lake, (2) a considerable variation in productivity among the several lakes, reflected by the catch per hour, which is a complicating factor when data for several lakes are combined, and (3) the large number of variables which must be assumed to be constant, (i.e., weather, fishing habits, available fish food, etc.) since there is no practical means for evaluating their influence on catch per hour.

A basic premise of this study, stated earlier, has been that any major change in fishing quality which might result from liberalized (experimental) regulations would show up during the course of the five years of experimental regulations and census. If fishing during the first year or two had the effect of overfishing the lakes with resultant poorer fishing in later years, then fishing quality should have been best the first year followed by some decline thereafter. For an evaluation of "fishing quality" both the catch-per-hour index and the total catch should be considered, although catch per hour would seem to be the more significant index of the two. Total catch depends much upon fishing pressure which, in turn, is affected considerably by "outside" factors such as employment and special interest in fishing in the test waters.

For the twelve test lakes combined, average catch-per-hour figures for the five years, 1946-1950, were 0.9, 1.2, 1.1, 0.9 and 0.9 respectively. The higher values for 1947 and 1948, each based on many thousand records, are statistically significant. The trend in quality was thus a rise from 1946 to 1947, a decline from 1947 through 1949 and no change from 1949 to 1950. Significantly, fishing in 1949 and 1950 was of quality equal to 1946. The figures show a small downward trend in fishing quality

starting with the second year, but since the trend does not commence with 1946 it is concluded that the trend was not caused primarily by overfishing as a result of the special regulations. Evidence supporting the conclusion that the extra, spring fishing did not overfish these lakes is obtained from the catch figures: the number of fish caught in the spring season added only 7.8% (five-year average for the twelve lakes) to the total catch for the balance of the year; the annual averages varied from 5.2% to 12.2%. Catches which made up less than 10% of annual totals would not have been the entire cause of changes in catch per hour amounting to as much as 25%.

The most drastic of the present experimental regulations was the omission of the spring closed season on bluegills and sunfish in six lakes; this was also accompanied by a May-15 opening on pike and walleye and year-round fishing on certain other species. The annual catch-per-hour averages for "legal-size" fish from these six lakes for 1946 to 1950 were: 0.81, 0.87, 0.88, 1.04, and 0.94, respectively. The figures show some improvement in fishing quality over the five years. It is obvious that the special regulations did not cause a decline in fishing quality. Furthermore, fishing intensity did not decline over the five years--angling hours (in thousands) for the five years totalled 128, 150, 156, 151 and 150, respectively--and therefore there was no decline in total catch; rather, there was some increase in total catch. Spring fishing on these six lakes added 31.5% to the total catch for the balance of the year. The census results on these six lakes were the basis for greatly shortening the closed season on bluegills and sunfish which was done by the State Legislature effective in 1952.

The disparity in annual trends in fishing quality, between all twelve lakes collectively and the six lakes with no closed season on

bluegills, is explained by a downward trend in quality among the six lakes open to year-round fishing for crappie, rock bass and other species not protected by closed seasons. The catch-per-hour figures for the group of six lakes open to fishing in the spring for species not protected by closed seasons were: 0.98, 1.14, 1.16, 0.88 and 0.86 for 1946-1950, respectively. The decline in fishing quality from 1948 to 1949 and 1950, as evident in these average figues, actually occurred on only four of the six lakes. The subsequent rise in fishing quality (to 0.96) which occurred in 1951 on the six lakes shows that the decline during 1949 and 1950 was of temporary duration. These average figures for the six years do not represent a marked downward trend which might be ascribed to the liberalized regulations.

Results of the five-year study on the twelve test lakes have shown that, in general, less restrictive fishing could safely be allowed on warm-water lakes, especially for pan fishes. Largely on the basis of these results, the Michigan Legislature has recently enacted important liberalizations on warm-water fishing, as follows:

(1) removal of size limits on pan fish (Sept., 1949),

(2) addition of lakes in the southern half of the Lower Peninsula to those lakes open to year-round fishing for species not protected by closed seasons, and

(3) the shortening of the closed season on bluegills and sunfish to the period from April 1 to the last Saturday in April.

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