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WINTER FISHING ON LAKES IN THE WATERLOO AREA,

WINTER OF 1935-36

During the winter of 1935-36 an intensive creel census was maintained on a number of the lakes in the Waterloo Project area. The census was under the supervision of Mr. O. H. Clark, in charge of fish and game work in the area. Those lakes on which there was no census were checked, at intervals, to ascertain that there was no fishing on them.

The census was interrupted for a period in mid-winter, but it is possible, nevertheless, to give an approximation of the catch from the entire project area. Several lakes in which there was extensive winter-kill were studied after the ice had disappeared to determine the abundance of fish ⁱⁿ these lakes. Since the lakes, in general, appear to be more or less similar with respect to their productive capacities, it is possible to give a rough approximation of the number of fish actually contained in the lakes in the area.

It will be noted that the Waterloo area contains a relatively large number of lakes and ponds, most of which are small. The names of these lakes were provided by Mr. Clark. Areas were determined by Mr. Coburn, engineer for the Waterloo Project. Mr. Coburn indicates that the areas were determined from the Geological Survey maps and that they must be regarded as approximate. Exact detailed maps of these lakes are being made under Mr. Coburn's direction and exact areas will therefore be available later.

Names and approximate areas of the lakes together with notes on the fishing (provided by Mr. Clark) are given below:

<u>Name of Lake</u>	<u>Approximate Area (Acres)</u>	<u>Extent of Fishing</u>
Big Portage	480	see below
Blind (Balmer prop.)	2	none
Cassidy	28	none
Cedar	56	none
Clear	130	see below
Crooked	70	see below
Doyle	10	none
Green (Stofer)	76	none
Leeke	20	none
Locker	25	none
Long	60	none
Markla	95	none
Mill	127	see below
Moran (tract #2)	6	none
Mt. Hope School	1	none
Mud	64	see below
Pendergast (tract #4)	6	none
Pond Lily	50	none
Spring	10	none
Sugarloaf	158	see below
Trist Mill Pond	60	none
Spruce (tract #5)	5	none
Walch	7	none
Winnewanna (tract #2)	10	none
Waterloo Mill Pond, upper	6	none
Waterloo Mill Pond, Lower	4	see below
North Cedar	6	none
Unnamed (tract 5)	1	none

There may have been a little fishing on some of those lakes, marked "none" in the column above. This fishing, if any, escaped the attention of those interested in the census and was probably negligible.

Winter fishing

Winter-fishing in the area was relatively light; many of the lakes were not fished during the winter period, others were fished very little. Data on the fishing are given below:

Big Portage Lake (see Table 1)

A total of 364 fisherman-days were recorded for this lake. The fishermen for whom records are available fished a total of $1726\frac{1}{2}$ hours and, in that period, caught a total of 1349 fish at the average rate of .8 fish per hour. Fishing was not uniform during the period. It varied from an average catch of one fish per ten hours early in January to 2.6 fish per hour in the latter part of March. During mid-winter a majority of the fishermen took no fish in their day's fishing; in March relatively few fishermen were entirely unsuccessful.

The species of fish caught, with number of each taken, are: Rock Bass, 552; Calico Bass, 330; Sunfish (probably all Common Sunfish), 250; Northern Pike, 71; Perch, 62; Bluegills, 46; Dogfish, 23; Gar, 5; Carp, 4; Suckers, 3; Large-mouthed Bass, 2; and Walleyes, 1. Other details regarding the catch are shown in Table 1. If an average number (for January and February) fished the lake during the period the census was not in progress, and if the catch for that period was average, Big Portage Lake was fished by approximately 694 fishermen (fisherman-days) and yielded a total of approximately 1613 fish for the winter, exclusive of what fishing may have taken place before January 8th (perhaps negligible). Since weather conditions were severe during this period when the census was not in operation, the figures given above are probably somewhat in excess of the actual season's fishing and season's catch.

Table 1

Summary of data for fishing in
Big Portage Lake, Jackson County,
Winter of 1935-36

	Jan.8-15	Jan.16-19	Feb.21-29	Mar.1-15	March 16-22	Total
1. No. of fishermen-days	128	36	51	128	21	364
2. No. of fish caught	118	16	35	867	313	1349
3. No. of hrs. fished	717 $\frac{1}{2}$	181	198 $\frac{3}{4}$	510 $\frac{3}{4}$	118 $\frac{1}{2}$	1726 $\frac{1}{2}$
4. Catch per fisherman-day	0.9	0.4	0.7	6.8	14.9	3.7
5. Catch per hour	0.2	0.1	0.2	1.7	2.6	0.8
6. Ave. no of hrs. per fisherman-day	5.6 $\frac{5}{2}$	5.03	3.9	3.99	5.6	4.7
7. No. taking no fish	91	27	40	33	1	192
8. Ave. size of all fish caught (inches)	13.2	10.0	9.5	10.4	7.9	10.2
9. <u>Perch</u>						
a. Number	18	1	1	27	15	62
b. Ave. size	7.6	9.0	9.0	7.7	8.0	7.8
10. <u>N. Pike</u>						
a. Number	30	13	2	22	4	71
b. Ave. size	17.6	16.9	16.5	16.3	17.0	17.0
11. <u>Large Mouth Bass</u>						
a. Number	1	...	...	1	...	2
b. Ave. size	17.0	...	...	14.0	...	15.5
12. <u>Bluegill</u>						
a. Number	1	...	...	1	44	46
b. Ave. size	6 $\frac{1}{2}$	...	...	7.0	7.0	7.0
13. <u>Sunfish</u>						
a. Number	5	...	...	185	60	250
b. Ave. size	6.3	...	...	6.7	7.0	6.7
14. <u>Rock Bass</u>						
a. Number	27	...	...	358	167	552
b. Ave. size	6.6	...	...	7.1	7.9	7.3
15. <u>Calico Bass</u>						
a. Number	4	...	30	273	23	330
b. Ave. size	10.1	...	8.3	9.4	10.0	9.3
16. <u>Walleye</u>						
a. Number	1	...	...	...	...	1
b. Ave. size	16.0	...	...	...	...	16.0
17. <u>Dogfish</u>						
a. Number	22	1	...	...	...	23
b. Ave. size	21.2	15.0	...	...	...	20.9
18. <u>Garpike</u>						
a. Number	3	...	2	...	...	5
b. Ave. size	25.0	...	25.0	...	...	25.0
19. <u>Carp</u>						
a. Number	3	1	...	...	...	4
b. Ave. size	10.0	10.0	...	...	...	10.0
20. <u>Sucker</u>						
a. Number	3	...	...	...	...	3
b. Ave. size	11.0	...	...	...	...	11.0

Clear Lake (see Table 2)

In comparison with other lakes in the area, fishing on Clear Lake was relatively extensive. When the catch is considered, the reason for heavier fishing on this lake becomes obvious. In comparison with winter fishing on other Michigan lakes for which census data are available, it must be concluded that fishing on Clear Lake was exceptionally good.

A total of 499 fisherman-days are recorded. ~~The~~ fishermen who were contacted took 3,881 fish in $2,290\frac{1}{2}$ hours, an average of 7.8 fish per fisherman, taken at the average rate of 1.7 fish per hour. Approximately 20% of the fishermen took no fish.

Fishing was apparently directed primarily toward the catching of Calico Bass. Almost all fishing was line fishing with minnows as bait. The catch included 3493 Calico Bass, 313 Perch, 48 Northern Pike, 25 Bluegills, 1 Large-mouthed Bass (returned) and 1 Dogfish. Fishing was uniformly good except during the period of February 21-29 when the catch per hour was less than half that for the entire season.

If fishing during the period when the census was interrupted was similar to that for the remainder of January and February, the lake was fished during the entire season (from January 6 to March 28) by 839 fishermen, who took a total of approximately 5920 fish. Fishing during the period in question was probably below average for January and February; the figures given above are therefore probably too high.

Mill Lake

Census on Mill Lake from January 6 to 16 indicated a presence of 18 fishermen during that period. They took, collectively, a total of 6 fish, all Northern Pike, in a total of $72\frac{3}{4}$ hours (one Large-mouthed Bass was also taken but was probably returned to the lake). The lake was under observation during the remainder of the season but no further fishing was noted.

Sugarloaf Lake

Between January 8th and January 17th, 11 fishermen fished this lake for a total of 39 hours and caught a total of 5 fish (1 Bluegill and 4 Calico Bass). According

Table 2

Summary of data for fishing in
Clear Lake, Jackson County
Winter of 1935-36

	Jan.6-15	Jan.16-17	Feb. 21-29	March 1-15	March 16-28	Totals
1. No. of fisherman-days	111	13	89	241	45	499
2. No. of fish caught	692	134	386	2155	514	3881
3. No. of hours fished	456 $\frac{1}{4}$	65 $\frac{1}{2}$	478	1058 $\frac{1}{2}$	232 $\frac{1}{4}$	2290 $\frac{1}{2}$
4. Catch per fisherman-day	8.0	10.3	4.3	8.9	11.4	7.8
5. Catch per hour	1.95	2.05	0.8	2.0	2.2	1.7
6. Ave. No. of hrs. per fisherman-day	4.11	5.04	5.4	4.39	5.2	4.6
7. No. taking no fish	19	1	33	45	4	102
8. Ave. size of all fish caught (inches)	8.3	8.3	8.5	7.9	8.0	8.2
9. <u>Perch</u>						
a. Number	42	8	17	183	63	313
b. Ave. size	8.2	7.8	7.7	7.8	8.8	9.8
10. <u>N. Pike</u>						
a. Number	10	1	27	10	...	48
b. Ave. size	20.4	26.0	20.4	18.2	...	20.1
11. <u>Bluegill</u>						
a. Number	14	...	7	4	...	25
b. Ave. size	7.9	...	6.7	7.8	...	7.6
12. <u>Calico Bass</u>						
a. Number	625	125	334	1958	451	3493
b. Ave. size	8.1	8.2	7.7	7.9	8.0	7.9
13. <u>Large mouth Bass</u>						
a. Number	1	...	...	...	...	1
b. Ave. size	16.0	...	...	...	...	16.0
14. <u>Dogfish</u>						
a. Number	...	...	1	...	...	1
b. Ave. size	...	...	18	...	...	18

to reports, there was no further fishing on this lake.

LEEKE Lake

A one-week census on this lake indicated a presence of 3 fishermen during that period. The fishermen took a total of 4 fish (3 Northern Pike and 1 Bullhead). According to reports there was no further fishing.

Mid Lake

Census from January 6th to 15th indicates that, during that period, the lake was fished by a total of 18 fishermen who, in 37 3/4 hours, took a total of 4 fish (all perch). According to reports there was no further fishing.

Waterloo Mill Pond (Lower)

According to reports, 2 men fished this lake 3 days each with spear, and 3 days each with lines. Their total fishing netted them 3 Northern Pike, 4 Gar, 6 Calico Bass, 6 Bluegills and 10 Perch. This represents a total production of 29 fish from this lake for the winter period.

Crooked Lake

According to reports Crooked Lake was fished by one man at more or less regular intervals. His first 6 days of fishing (total hours 24) produced 3 fish, all Northern Pike. It is probable that he also fished later in the season. The entire season's catch was not determined but it was relatively negligible.

Total Catch

The total catch for the area was approximately 7500 fish (according to reports there was no stream fishing). The total area of the lakes in the Waterloo Project is approximately 1573 acres. Winter fishing therefore yielded about 5 fish per acre. Since both the catch listed and the areas of the lakes as given are approximations, the actual catch per acre was probably somewhere between 4 and 6 fish.

Total Population

Any estimate of the total population must be regarded, at best, as a very rough approximation. The determination of a rough estimate is possible as a result of Mr. G. P. Cooper's study of the fish in several lakes in which there

was, apparently, an almost complete fish mortality last winter due to winter-killing. Cooper's estimates on the number killed in Mud Lake and Green Lakes are listed in his report (No. 351) and are repeated here. In addition to the data given in Report No. 351, Mr. Cooper has estimated the approximate average size of fish of each species. These estimates are shown below:

Mud Lake

Species, number and size of fish killed in
Mud Lake during the winter of 1935-36

Species	Per cent	Number	Range in length in inches	Average (estimated) length in inches
Bluegills	60	45,000	4 to 10	6
Warmouth bass	15	11,250	3 to 7	4
Pumpkinseed sunfish	10	7,500	4 to 8	5
Large-mouthed bass	5	3,750	10 to 20	16
Perch	2	1,500	4 to 8	5
Black crappie	2	1,500	6 to 12	8
Lake chub sucker	2	1,500	2 to 10	5
Mud pickerel	2	1,500	6 to 10	8
Gar pike	+	1	15	
Yellow bullhead	1	100	8 to 12	10
Brown Bullhead	1	100	10 to 15	12
Dogfish	+	50	6 to 18	15
Black-nosed shiner	?	thousands	1 $\frac{1}{2}$ to 2 $\frac{1}{2}$	2
Black-chinned shiner	?	"	1 $\frac{1}{2}$ to 2 $\frac{1}{2}$	2

Green Lake

Species, number and average size of fish killed in
Green Lake during the winter of 1935-36

Species	Number	Range:Length in inches	Average (estimated) length in inches
Bluegill	50,000	3 to 8	6
Pumpkinseed sunfish	10,000	3 to 7	5
Warmouth bass	10,000	2 to 6	4
Black crappie	5,000	4 to 9	7
Large-mouthed bass	15,000	6 to 22	15
Lake chub sucker	10,000	3 to 10	8
Dogfish	200	10 to 25	20

Both lakes were later revisited by Mr. Shetter of the Institute and were netted by him to determine the extent of the killing. Mr. Shetter placed approximately 800 feet of gill net in each lake for a period of about 24 hours. The nets were set in both shallow and deeper portions of the lake. The net in Green Lake produced one live Bullhead; that in Mud Lake produced one Northern Pike (the pike may possibly have entered from Sugarloaf Lake). The netting suggests that the loss from winter-killing was almost complete.

Mr. Cooper's estimates did not include the very small fish or those fish which may have sunk in deeper water. The estimates are therefore probably relatively conservative. Exclusive of the very small fish, the forage fish and the obnoxious predators, estimates indicate a killing of 72,200 fish of an average length of almost 6 inches in Mud Lake, a killing of 90,000 fish of an average size of about 7 inches in Green Lake, a killing of about 1125 food and game fish per acre in Mud Lake and of about 1200 food and game fish per acre in Green Lake.

If the lakes in the area in general contain in excess of 1000 food and game fish per acre of an average size of 6-7 inches, the area (exclusive of streams) contains in excess of 1,500,000 of these fish.

The winter-killing, disastrous as it was, made possible an optimistic viewpoint with regard to the abundance of fish in some of our lakes and indicated definitely that the often-heard contention that our lakes are "fished-out" seems to have its basis in the inability of those who make the contention to catch fish even when fish are present in abundance. The large number of bluegills, large-mouthed bass and other game and pan-fish (many of large size) which floated or washed to shore after the ice had left indicated plainly that these lakes had contained fish in abundance.

The fish taken during the entire winter probably represented considerably less than one per cent of the fish in the area.

The rough estimate of the total population should be of interest in connection with the rearing pond now being constructed in the area. If the fish were to be increased 10% by stocking a total of about 150,000 6-7-inch fish or a greater number of smaller fish (the number depending on the relative chances of survival) would need to be planted.

Further work

A continuation of creel census on a number of the lakes during the summer, together with completion of a physical, chemical and biological survey of these lakes would provide data on which to base improvement work, stocking and the other phases of fish management. Fishing will probably be a chief attraction in the area and it appears desirable that serious consideration ^{be given those projects designated to maintain} and improve fishing conditions.

Appreciation

This report on the winter fishing has been made possible through the joint efforts of Mr. Clark and others of the Waterloo Project (under U. S. Parks Service direction) and the Institute. The excellent cooperation which the representatives of the Waterloo Project and the Parks Service in general have given the Institute is duly appreciated and their further cooperation is solicited.

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