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REPORT NO. 471

ANALYSIS OF FISHING
IN THE WATERLOO PROJECT,
WINTER OF 1936-37

The catch of fish from a lake may differ decidedly from one year to another according to a creel census maintained for two winters by the Waterloo Project on Clear Lake. One winter 90 per cent of the fish taken were black crappie and 8 per cent were perch; the next winter only 55 per cent were crappies and 41 per cent were perch.

Anglers removed about 4 fish per acre from the waters of the area during the winter of 1936-37. The catch very probably represented less than two pounds per acre.

A species which comprises most of the catch in a lake one season may be almost entirely absent in the catch at another season. Two-thirds of the fish caught in the lakes of the Waterloo area in summer (1936) were bluegills. The following winter only about one fish in 20 was a bluegill. During the winter of 1936-37 black crappies ranked first in the catch; the previous summer they comprised only 3 per cent of the catch.

For the second consecutive winter the Waterloo Project has taken on intensive creel census on lakes in the Project area. The fishing during the second season, covered by this report, was checked during the entire winter period and during April. It is believed that the information gathered

represents all or almost all of the fishing on the lakes where the census was taken. Fishing on the few lakes not covered by the census was probably relatively insignificant.

The two winters during which the census was taken differed decidedly-- the first was severe with deep snow and the second was exceptionally mild with relatively little snow. Data for the winter fishing for 1936-37 are given below. Information on fishing during the previous winter and summer is included in Report No. 411.

Summary of Fishing For the Area

Creel census was taken on all waters in the Project except on a few relatively unimportant ones. It is assumed that the data included in the tables represent information on almost all fishing in the area during the winter period (1936-37).

For the area as a whole data are available for 1,261 fisherman-days (Table 1), representing $4,919\frac{1}{2}$ hours of fishing. Fish were taken at the rate of almost exactly one fish per hour. An even third of the anglers took no fish. The fish caught averaged almost nine inches in length. On the average, each angler had about four fish at the end of his day's fishing.

Black crappies (calico bass) ranked first in the catch, representing over a third (37%) of the fish taken. Perch were second and rock bass third. These three species represented eighty-three per cent of all the fish caught.

The combined area of the lakes, exclusive of Cavanaugh, is approximately 1,260 acres. The catch per acre for the area was therefore about 4 fish, probably representing less than 2 pounds per acre. These fish had an average length of about 9 inches.

Fishing was almost entirely by persons living a relatively short distance from the lakes. Eighty-seven per cent of the fishing was by residents of Jackson County; 7 per cent was by anglers from Washtenaw County. Only two individuals were non-residents. Details are presented in Table 3.

Table 1

General Creel Census Data on Ten Lakes In
The Waterloo Area, Winter of 1936-37

Lake	Number of Fishermen	Fishermen Taking No Fish		Number of Legal Fish Caught	Number of Hours Fished	Catch Per Hour	Catch Per Angler	Average Size	Hours Per Fisherman-day
		No.	%						
Cassidy	4	0	0	43	10.75	4.0	10.8	8.0	2.7
Cavanaugh	14	14	100	0	43.5	0	0	0	3.1
Cedar	13	1	8	81	40.0	2.0	6.2	6.8	3.1
Clear	444	128	29	1,954	1,923.5	1.0	4.4	8.5	4.3
Crooked	19	2	11	91	75.0	1.2	4.8	9.4	3.9
Doyle	4	0	0	10	13.75	0.7	2.5	11.7	3.4
Mill	31	18	58	67	117.25	0.6	2.2	8.5	3.8
Mud	30	5	17	162	113.25	1.4	5.4	9.0	3.8
Portage	693	249	36	2,486	2,558.75	0.1	3.6	9.1	3.7
Sugarloaf	9	4	44	23	23.75	1.0	2.6	8.3	2.6
Total or Average	1,261	421	33	4,917	4,919.50	1.0	3.9	8.8	3.9

Table 2

Kind, Number and Size of Fish Caught in Ten Lakes
In the Waterloo Area, Winter of 1936-37

Species	Cassidy		Cavanaugh		Cedar		Clear		Crooked		Doyle		Mill		Mud		Portage		Sugarloaf		Total	
	No.	Ave. Size	No.	Ave. Size	No.	Ave. Size	No.	Ave. Size	No.	Ave. Size	No.	Ave. Size	No.	Ave. Size	No.	Ave. Size	No.	Ave. Size	No.	Ave. Size	No.	Ave. Size
Large-mouthed Bass	19	13.1	...	...	19	13.1
Small-mouthed Bass	1	14.0	1	14.0
Bluegills	28	3.0	...	...	33	6.0	18	7.2	38	6.8	...	...	2	7.5	...	...	117	7.0	14	7.0	250	7.0
Sunfish	15	8.0	...	...	23	6.2	...	...	11	6.6	...	...	5	7.0	...	...	188	6.9	...	...	242	6.9
Yellow Perch	20	7.4	801	8.1	28	9.5	7	9.0	51	8.2	157	8.7	193	7.8	7	9.0	1264	8.1
Calico Bass	1080	8.1	...	...	...	...	7	9.7	...	...	715	9.2	...	...	1802	8.5
Rock Bass	2	6.5	...	...	...	...	...	...	...	...	1023	7.4	...	...	1025	7.4
Walleye	3	23.0	...	...	3	23.0
Northern Pike	2	22.0	53	22.2	8	21.4	3	18.0	2	18.5	5	19.4	212	20.3	1	16.0	286	20.6
Gar Pike	13	22.8	...	...	13	22.8
Bullhead	1	9.0	...	...	...	...	...	...	...	...	...	...	1	8.0	...	...	2	8.5
Cisco	2	6.0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	6.0
Mud Pickerel	6	14.0	...	...	...	...	...	...	...	...	...	...	6	14.0
Dogfish	2	23.0	...	...	2	23.0
Total	43	3.0	...	...	81	6.8	1954	8.5	91	9.4	10	11.7	67	8.5	162	9.0	2486	9.1	23	8.3	4917	8.8

Table 3

Residence of Anglers On Ten Lakes In
The Waterloo Area, Winter 1936-37*

County	Cassidy	Cavanaugh	Cedar	Clear	Crooked	Doyle	Mill	Mud	Portage	Sugarloaf	Total
Genesee	...	...	...	...	...	...	...	...	1	...	1
Hillsdale	...	...	...	...	...	...	...	...	2	...	2
Ingham	...	...	...	3	...	...	...	...	33	...	36
Jackson	...	1	...	403	...	...	10	27	654	5	1100
Livingston	...	...	...	2	...	...	...	...	...	...	2
Washtenaw	2	13	1	32	14	4	19	3	...	1	89
Wayne	...	...	12	...	5	...	...	...	3	2	22
Unknown	4	2	1	7
Total	2	14	13	444	19	4	31	30	693	9	1259

*Also 2 non-residents--from Ohio

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1261

Comparison With Fishing the Previous Winter

An exact comparison of fishing for the two winters cannot be made because of the incomplete record for the 1935-36 season. On a catch per hour basis, however, fishing for the area as a whole was better during the severe winter of 1935-36 (1.2 fish per hour compared with 1.0 fish per hour during the second season). On most of the lakes for which records are available for the two winters, fishing was much better during the second season, but on Clear Lake, one of the most heavily fished lakes in the area, the catch declined from 1.7 fish per hour during the first winter to one fish per hour the second winter. Black crappies declined in the catch and perch and rock bass decidedly increased.

The catch in Clear Lake varied decidedly for the two seasons. In the winter of 1935-36 black crappies represented 90% of all fish caught; perch represented 8% of the fish. During the next winter a little over half the fish (55%) caught were black crappie and 41% were perch. Whether this change in the catch was due to a change in the abundance of the two species, to differences in weather for the two winters or to differences in fishing methods was not determined.

During both winters the catch of bluegills was relatively insignificant, although during the summer of 1936 two-thirds of all fish reported were of this species. In some southern counties bluegill fishing in winter has been developed quite extensively. It seems probable that the species would be much more prominent in the catch in the Waterloo area if the methods and bait used in other areas were also used here.

Data on Individual Lakes

Information on the fishing is summarized below by individual waters. It will be noted that most of the fishing in the area was on two lakes, Portage and Clear. These same two lakes supported almost all the fishing in the Project during the previous winter. For detailed data on the fishing

see tables in the appendix.

Cassidy Lake: Only four records were obtained on this lake, but the few who fished Cassidy were quite successful. They caught a total of 43 bluegills and sunfish at the rate of four fish per hour. These fish were all taken in April.

Cavanaugh Lake: Records for this lake are probably incomplete. According to the information obtained, 14 fishermen spent a total of $43\frac{1}{2}$ hours on this lake without catching a fish.

Cedar Lake: Only 13 fishing records were obtained on Cedar Lake. Eighty-one fish were taken in 40 hours, an average of two fish per hour. Two of these fish were listed as cisco, but were very probably adult golden shiners. Anglers sometimes mistake these two species which have a slight superficial resemblance, but which have very different habitat requirements.

Clear Lake: Clear Lake ranked next to Portage Lake in fishing intensity. A total of 444 records were obtained. These indicated a catch of 1,954 fish taken at the rate of one fish per hour. Nearly all the fish caught were black crappies and perch, the former predominating. Crappie fishing was apparently best during the last half of December and perch fishing was best late in February. The catch differed decidedly from the catch as recorded for the previous winter: In proportion, many more perch were taken during the second winter, also, fishing was much better in the winter of 1935-36 than in the following winter.

Crooked Lake: Records show that Crooked Lake yielded 91 fish in 19 fisherman-days at the average rate of 1.2 fish per hour. The fish had an average length of about $9\frac{1}{2}$ inches. Over a third of the fish were bluegills, but these were generally of small size. Perch, ranking second in abundance, had an average length of $9\frac{1}{2}$ inches. Eight of the fish were northern pike.

Doyle Lake: Doyle Lake was apparently fished very little. Seven

perch and three northern pike were caught in 14 hours of fishing.

Mill Lake: Only 31 fisherman-days are recorded for Mill Lake. In 117 hours, 67 fish, chiefly perch, were taken.

Mud Lake: Mud Lake suffered a heavy winter killing early in 1936. Fishing during the following winter was reasonably good however; 162 fish were taken at the rate of 1.4 fish per hour. The catch consisted primarily of perch. Whether perch and pike tended to survive the winter killing or whether they migrated into Mud Lake from Sugarloaf Lake cannot be stated, although the latter seems the more probable. Since both species have migratory tendencies, it is quite possible that they may have moved into the lake since the winter of 1935-36.

Portage Lake: A total of 693 fishing records were obtained for this lake. The anglers fished for a total of 2,559 hours and caught a total of 2,486 fish, an average of almost one fish per hour. About a third of the fishermen took no fish. Fishing on Portage differed decidedly from fishing on other lakes in the number of species caught, a total of eleven species being taken. Rock bass and calico bass predominated. The two combined represented seventy per cent of all fish caught. Far more northern pike were taken from Portage Lake than were caught in all the other lakes combined. Fishing was best in December. The records show that a few large-mouthed bass were caught through the ice.

Sugarloaf Lake: This relatively large lake yielded only 23 fish at the rate of one fish per hour.

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APPENDIX

In the following tables information on winter fishing (1936-37) on individual waters is presented by months except for the two heavily fished lakes (Clear and Portage), where the information is listed by half-month periods. Fishing during the month of April is included.

Table I

Data on Winter Fishing On
Cassidy Lake (1936-37)

Item	April
1. Number of fisherman-days	4
2. Number taking no fish	0
3. Number of fish caught	43
4. Number of hours fished	10.75
5. Catch per hour	4.0
6. Catch per fisherman-day	10.75
7. Average number of hours per fisherman-day	2.7
8. Per cent taking no fish	0
9. Average size of all fish caught	8.0
10. <u>Catch by species</u>	
Bluegills - Number taken	28
Average size	8.0
Sunfish - Number taken	15
Average size	8.0

Table II

Data on Winter Fishing In
Cavanaugh Lake (1936-37)

(Incomplete)

1. Number of fisherman-days	14
2. Number taking no fish	14
3. Number of fish caught	0
4. Number of hours fished	43.5

Table III

Data on Winter Fishing on
Cedar Lake (1936-37)

Item	January	February	March	April	Total or Average
1. Number of fisherman-days	1	3	2	7	13
2. Number taking no fish	0	0	0	1	1
3. Number of fish caught	2	13	33	33	81
4. Number of hours fished	3.0	14.75	5.0	17.25	40.00
5. Catch per hour	0.7	0.9	6.6	1.9	2.0
6. Catch per fisherman-day	2.0	4.3	16.5	4.7	6.2
7. Average number of hours per fisherman-day	3.0	4.9	2.5	2.5	3.1
8. Per cent taking no fish	0	0	0	14	8.0
9. Average size of all fish caught	22.0	7.7	6.0	6.4	6.8
10. Catch by species	...	...	...	...	...
Bluegills - Number taken	...	...	18	15	33
Average size	...	...	6.0	6.0	6.0
Sunfish - Number taken	...	...	15	8	23
Average size	...	...	6.0	6.6	6.2
Yellow Perch - Number taken	...	13	...	7	20
Average size	...	7.7	...	6.7	7.4
Northern Pike - Number taken	2	...	...	...	2
Average size	22.0	...	...	...	22.0
Golden shiners* - Number taken	...	...	...	2	2
Average size	...	...	...	6.0	6.0
Bullhead - Number taken	...	...	...	1	1
Average size	...	...	...	9.0	9.0

* Recorded as cisco, but more probably golden shiners.

Table IV

Data on Winter Fishing on
Clear Lake (1936-37)

	Dec. 16-31	Jan. 15-31	Feb. 1-15	Feb. 16-28	March 1-18	Total or Average
1. Number of fisherman-days	70	92	128	136	18	444
2. Number taking no fish	19	31	46	29	3	128
3. Number of fish caught	371	300	426	772	85	1,954 <i>÷ 136 days = 14.4/fish</i>
4. Number of hours fished	250.25	441.50	599.50	551.5	80.75	1,923.5
5. Catch per hour	1.5	0.7	0.7	1.4	1.05	1.0
6. Catch per fisherman-day	5.3	3.3	3.3	5.7	4.7	4.4
7. Average number of hours per fisherman-day	3.6	4.8	4.7	4.1	4.5	4.3
8. Percentage taking no fish	27	34	36	21	17	29
9. Average size of all fish caught	8.3	8.2	8.3	8.9	8.0	8.5
10. Catch by species*						
Bluegills - Number taken	1	3	4	9	1	18
Average size	7.0	7.5	6.1	7.7	6.0	7.2
Yellow Perch - Number taken	110	105	198	350	38	801
Average size	7.7	7.9	7.9	8.5	8.3	8.1
Black Crappie - Number taken	259	185	205	386	45	1,080
Average size	8.4	7.7	7.5	8.4	7.9	8.1
Northern Pike - Number taken	1	7	19	26	...	53
Average size	24.0	25.4	21.6	21.7	...	22.2
Rock Bass - Number taken	...	...	...	1	1	2
Average size	...	...	...	7.0	6.0	6.5

* Also 2 black suckers

Table IVa
Residence of Anglers, Clear Lake

County	Dec. 16-31	Jan. 15-31	Feb. 1-15	Feb. 16-28	March 1-18	Total
Ingham	...	3	...	...	...	3
Jackson	68	87	114	120	14	403
Livingston	...	...	2	...	...	2
Washtenaw	2	1	11	14	4	32
Unknown	...	1	1	2	...	4
Total	70	92	128	136	18	444

Table V

Data on Winter Fishing on
Crooked Lake (1936-37)

	December	January	February	March	April	Total or Average
1. Number of fisherman-days	2	5	8	1	3	19
2. Number taking no fish	0	0	2	0	0	2
3. Number of fish caught	18	7	13	11	42	91
4. Number of hours fished	7.0	29.5	27.50	2.0	9.0	75.0
5. Catch per hour	2.6	0.24	0.5	5.5	4.7	1.2
6. Catch per fisherman-day	9.0	1.4	1.6	11.0	14.0	4.8
7. Average number of hours per fisherman-day	3.5	5.9	3.4	2.0	3.0	3.9
8. Percentage taking no fish	0	0	25	0	0	11
9. Average size of all fish caught	10.4	15.5	15.0	6.0	7.0	9.4
10. Catch by species						
Bluegills - Number taken	...	...	...	7	31	38
Average size	...	...	...	6.0	7.0	6.8
Sunfish - Number taken	...	...	...	4	7	11
Average size	...	...	...	6.0	7.0	6.6
Yellow Perch - Number taken	18	4	2	...	4	28
Average size	10.4	8.1	8.0	...	7.5	9.5
Northern Pike - Number taken	...	3	5	...	...	8
Average size	...	25.3	19.0	...	...	21.4
Mud Pickerel - Number taken	...	...	6	...	...	6
Average size	...	...	14.0	...	...	14.0

Table VI

Data on Winter Fishing on
Doyle Lake (1936-37)

	Jan. 24	Feb. 7	Total or Average
1. Number of fisherman-days	3	1	4
2. Number taking no fish	0	0	0
3. Number of fish caught	6	4	10
4. Number of hours fished	7.75	6.0	13.75
5. Catch per hour	0.8	0.7	0.7
6. Catch per fisherman-day	2.0	4.0	2.5
7. Average number of hours per fisherman-day	2.6	6.0	3.4
8. Per cent taking no fish	0	0	0
9. Average size of all fish caught	12.0	11.3	11.7
10. Catch by species			
Yellow Perch - Number taken	4	3	7
Average size	9.0	9.0	9.0
Northern Pike - Number taken	2	1	3
Average size	18.0	18.0	18.0

Table VII

Data on Winter Fishing on
Mill Lake (1936-37)

	December	January	February	Total or Ave.
1. Number of fisherman-days	24	6	1	31
2. Number taking no fish	17	1	0	18
3. Number of fish caught	28	34	5	67
4. Number of hours fished	89.75	25.5	2.00	117.25
5. Catch per hour	0.3	1.3	2.5	0.6
6. Catch per fisherman-day	1.2	5.7	5.0	2.2
7. Average number of hours per fisherman-day	3.7	4.3	2.0	3.8
8. Percentage taking no fish	71	17	0	58
9. Average size of all fish caught	8.1	9.1	7.0	8.5
10. Catch by species				
Bluegills - Number taken	...	2	...	2
Average size	...	7.5	...	7.5
Sunfish - Number taken	...	...	5	5
Average size	...	...	7.0	7.0
Yellow Perch - Number Taken	26	25	...	51
Average size	7.3	9.0	...	8.2
Black Crappie - Number taken	...	7	...	7
Average size	...	9.7	...	9.7
Northern Pike - Number taken	2	...	...	2
Average size	18.5	...	...	18.5

Table VIII

Data on Winter Fishing on
Lud Lake (1936-37)

	February	March	Total or Average
1. Number of fisherman-days	29	1	30
2. Number taking no fish	5	0	5
3. Number of fish caught	154	8	162
4. Number of hours fished	111.25	2.0	113.25
5. Catch per hour	1.4	4.0	1.4
6. Catch per fisherman-day	5.3	8.0	5.4
7. Average number of hours per fisherman-day	3.8	2.0	3.8
8. Per cent taking no fish	17	0	17
9. Average size of all fish caught	9.1	7.0	9.0
10. Catch by species			
Yellow Perch - Number taken	149	8	157
Average size	8.8	7.0	8.7
Northern Pike - Number taken	5	...	5
Average size	19.4	...	19.4

Table IX

Data on Winter Fishing on
Big Portage Lake, (1936-37)

	Dec. 1-15	Dec. 16-31	Jan. 1-15	Jan. 16-31	Feb. 1-15	Feb. 16-28	March 1-15	April 10-30	Total or Average
1. Number of fisherman-days	53	136	7	116	240	116	12	13	693
2. Number taking no fish	9	36	6	50	74	58	10	6	249
3. Number of fish caught	364	638	4	320	949	174	22	15	2,486
4. Number of hours fished	173.25	410.5	17.0	441.50	939.5	415.0	39.0	62.0	2,553.75
5. Catch per hour	2.0	1.5	0.24	0.7	0.96	0.4	0.6	0.24	0.97
6. Catch per fisherman-day	6.9	4.7	0.6	2.8	4.0	1.5	1.8	1.2	3.6
7. Average number of hours per fisherman-day	3.4	3.1	2.4	3.8	4.1	3.6	3.3	4.8	3.7
8. Percentage taking no fish	17	26	86	43	31	50	83	46	36
9. Average size of all fish caught	8.8	8.4	22.0	9.5	9.0	11.1	7.3	20.9	9.1
10. Catch by species									
Large-mouthed bass - No. taken	6	4	...	2	5	1	...	1	19
Ave. size	11.3	12.3	...	11.5	14.4	16.0	...	20.0	13.1
Bluegills - Number taken	32	58	...	9	17	1	...	...	117
Average size	7.0	7.0	...	6.8	7.1	7.0	...	...	7.0
Sunfish - Number taken	31	114	...	11	28	4	...	...	188
Average size	7.0	6.9	...	6.6	6.6	6.8	...	...	6.9
Yellow Perch - Number taken	32	127	...	6	23	4	1	...	193
Average size	6.8	7.9	...	7.8	8.1	8.8	8.0	...	7.8
Black Crappie - Number taken	222	173	...	135	150	35	...	...	715
Average size	9.2	9.0	...	9.6	9.0	8.9	...	...	9.2
Rock Bass - Number taken	26	127	...	127	637	85	21	...	1023
Average size	7.1	7.1	...	7.6	7.4	7.2	7.2	...	7.4
Walleye - Number taken	...	...	...	...	...	1	...	2	3
Average size	...	...	...	...	...	20.0	...	24.5	23.0
Northern Pike - Number taken	15	34	4	30	80	37	...	12	212
Average size	17.0	19.5	22.0	19.6	21.2	20.6	...	20.3	20.3
Gar - Number taken	...	...	...	...	7	6	...	...	13
Average size	...	...	...	...	23.4	22.0	...	...	22.8
Bullheads - Number taken	...	1	...	...	...	...	...	...	1
Average size	...	8.0	...	...	...	...	...	...	8.0
Dogfish - Number taken	...	...	...	...	2	...	...	...	2
Average size	...	...	...	...	23.0	...	...	...	23.0

Table IXa
Residence of Anglers,
Big Portage Lake, (1936-37)

	Dec. 1-15	Dec. 16-31	Jan. 1-15	Jan. 16-31	Feb. 1-15	Feb. 16-28	March 1-15	April 16-30	Total
Genesee	...	...	...	...	...	...	1	...	1
Hillsdale	...	...	...	...	2	...	...	...	2
Ingham	...	...	1	13	12	7	...	...	33
Jackson	53	136	6	103	226	109	10	11	654
Wayne	...	...	...	...	...	...	1	2	3
Total	53	136	7	116	240	116	12	13	693

Table X
Data on Winter Fishing on
Sugarloaf Lake, (1936-37)

	January	February	April	Total or Average
1. Number of fisherman-days	6	1	2	9
2. Number taking no fish	3	1	0	4
3. Number of fish caught	6	0	17	23
4. Number of hours fished	14.25	5.0	4.50	23.75
5. Catch per hour	0.4	0	3.8	1.0
6. Catch per fisherman-day	1.0	0	8.5	2.6
7. Average number of hours per fisherman-day	2.4	5.0	2.25	2.6
8. Percentage taking no fish	50	100	0	44
9. Average size of all fish caught	11.0	0	7.4	8.3
10. Catch by species				
Small-mouthed Bass - Number taken	1	...	...	1
Average size	14.0	...	...	14.0
Bluegill - Number taken	...	...	14	14
Average size	...	...	7.0	7.0
Yellow Perch - Number taken	4	...	3	7
Average size	9.0	...	9.0	9.0
Northern Pike - Number taken	...	...	...	1
Average size	16.0	...	...	16.0