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June 11, 1941

REPORT NO. 668

REPORT ON THE

CREEL CENSUS IN THE CONNECTING WATERS BETWEEN LAKE SUPERIOR AND LAKE HURON
AND SOME ADJOINING WATERS IN LAKE HURON 1937-1940

by

Louis A. Krumholz

INTRODUCTION

A creel census by Conservation Officers was conducted in parts of the connecting waters between Lake Superior and Lake Huron and also in the Potagannissing Bay region during the summer of 1937. This census included waters open to as well as those closed to commercial fishing. Of the 240 records of the sport fishing obtained, 158 were from waters closed to commercial fishing and 82 were from waters open to commercial fishing. The data from these records have been summarized in Institute Report No. 443.

During the summer of 1938 a similar, though more intensive, census was conducted over the same areas and many additional waters. Waters open to and waters closed to commercial fishing were represented by 348 and 239 records respectively or a total of 587. These data have been summarized in Institute Report No. 509*.

*Some of the cards for 1938 were for men "not contacted" by the census takers and for this reason have been omitted in this report.

The creel census in these waters has been continued for the past two years. In 1939, Department of Conservation employees, R. W. Haken, L. E. Jankowski, F. W. Nelson, L. E. Perkins, Buster Bailey, C. A. Nelson and Eino Laakso, secured 312 records of which 236 were from waters closed to and 76 were from waters open to commercial fishing. In 1940 these men, assisted by George and Ralph Beaudoin, obtained 562 records. Of these, 483 were from waters closed to and 79 were from waters open to commercial fishing. The increase in the number of records in the year 1940 from waters closed to commercial fishing is probably due to the fact that all the connecting waters between Lake Superior and Lake Huron have been closed, the only remaining open water being found to the east and south sides of Drummond Island. These waters are not as readily accessible as the others are and are not frequented so much.

All the records were obtained by contacting the fishermen directly and were taken by Conservation Officers, incidental to their other duties. Every catch was examined and the number and sizes of the fish, the number of fishermen, the residence of the fishermen, the period of time spent in fishing, etc., were recorded.

The connecting waters between Lake Superior and Lake Huron are not definitely delimited. For instance, the Saint Marys River flows through Lake George, through Mud Lake, past Raber Bay and Maud Bay and through Potagannissing Bay. Also, Potagannissing Bay includes such small bays as Sturgeon Bay, Pigeon Cove, and Scott Bay. For this reason it is difficult in some cases to determine just where the fish reported in the catch were actually taken. However, it is definitely known whether or not the fish were taken from waters closed to or open to commercial fishing. It is recommended that in future censuses the catches should be spotted according to the districts outlined in the report by Westerman and Van Oosten (1939).

FISHING FAILURES

Table I shows the number of fishermen contacted for each of the years 1937 to 1940 inclusive. This table also shows the numbers and percentages of fishermen taking no legal fish and the catch per hour in the waters closed to as well as those open to commercial fishing and also for all waters combined.

Tables II, III, IV and V give the general creel census data for each of the connecting waters between Lake Superior and Lake Huron and for the Potagannissing Bay region for each of the four summers.

The waters used as a basis for this report have been divided into the following regions: a) Lake Superior waters; Bay Mills and Whaiska Bay; b) St. Marys River waters; St. Marys River, Below Power House, Hay Lake, Munuscong Bay and Raber Bay; c) Potagannissing Bay waters, Potagannissing Bay, Sturgeon Bay, Pigeon Cove, Maud Bay, Seymour Bay, Spring Bay Dock and Maxton Bay; d) Lake Huron waters open to commercial fishing; Scarmon Cove, Johnswood Bay, Huron Bay, Reynolds Bay and Pike Bay*; and e) Lake Huron waters closed to commercial fishing; Whitney Bay and Pike Bay. Table VI gives the percentages of fishermen taking no fish, the total catch per hour for each of the four years of the census, and also the catch per hour for each of the four species, small-mouth black bass, yellow perch, walleye pike and northern pike for the above-mentioned waters.

The figures for the numbers of fishermen in these tables do not indicate variations in the intensity of the fishing. They merely are the numbers of fishermen contacted by the census takers. The various data, however, probably do give a true cross-section of the fishing in the areas surveyed showing the percentages of failures,

*Pike Bay was closed to commercial fishing September 20, 1939.

the average number of hours spent in fishing by each fisherman and the catch per hour and per fisherman.

The percentage of fishermen taking no fish from the waters closed to commercial fishing varied from 12.8 percent in 1940 to 27.9 percent in 1938. (Table I). The average percentage of failures for the four years, 1937-1940, in the waters closed to commercial fishing was 19.8. In the waters open to commercial fishing there was a variation from 3.8 percent in 1940 to 44.2 percent in 1939 in the number of failures. The average for the four years was 27.7 percent in the waters open to commercial fishing, (Table I). No steady rise or decline occurred in the percentage of fishermen taking no fish, in either the closed or open waters but a sharp decrease in the percentage of fishing failures occurred in the waters closed to as well as those open to commercial fishing in 1940. In all waters combined the percentage of fishermen taking no fish varied from 11.6 in 1940 to 34.3 in 1939. The figures in Table I show that in all waters the percentage of fishing failures (11.6 percent) in 1940 was about half that of the average for all waters for the four year period (22.5 percent).

ANALYSIS OF CATCH

Catch Per Hour: In the waters closed to commercial fishing the maximum variation in the catch per hour was 0.3 fish. (Table I). There was a progressive increase in the catch per hour from 1.8 fish in 1937 to 2.1 fish in 1939. In 1940 there was a decrease in the catch per hour to 1.8, the same as that in 1937. This decrease in the catch per hour took place even though the waters of the entire Potaganmissing Bay region, which had a catch per hour of 1.94 in 1940, had been closed to commercial fishing in September 1939. In the waters open to commercial fishing the

maximum variation in the catch per hour was 1.6 fish. The 1940 catch per hour and per fisherman were more than double that of 1939. (Table I).

The waters of the Potagannissing Bay region that were closed to commercial fishing for the first time in 1939 showed an improvement in fishing from 1939 to 1940, (Table VI). This increase is probably the result of some general conditions since similar improvements in fishing occurred in all the waters mentioned in this report, with the exception of the Lake Superior waters, (Table VI). The creel census data for the inland non-trout waters of Chippewa county showed a marked improvement in the fishing in 1940 and have been included in this table for comparison.

The catch per hour for all legal fish taken from all of the waters under observation showed little variation from 1937 to 1940, (Table I). The greatest difference was 0.3 fish per hour between the catches of 1939 and 1940 (Figure I). If the catch per hour for 1937 and 1938 for all waters are combined and compared with the catch per hour for 1939 and 1940, there is a difference of only 0.08 fish per hour. This indicates that the fishing in the connecting waters between Lake Superior and Lake Huron and the adjoining waters in Lake Huron, has remained about the same as it was before the closure of the waters of the Potagannissing Bay region in September 1939. There was a definite increase in the catch per hour for the non-trout waters of Chippewa County exclusive of the Great Lakes waters in 1940 (Table VI). This increase (0.81 fish per hour) could not have been affected by the closure of the Potagannissing Bay region.

The average catch per hour for all waters for the four years of the census was 1.8 fish, (Table I). For all waters closed to commercial fishing the catch per hour was 1.9 fish, whereas in the waters open to commercial fishing the catch per hour was 1.7 fish.

In the catch per hour of the four most important game fishes of the area ~~there is~~ considerable variation (Table VI). In general there was an increase in the catch per hour of smallmouth bass and northern pike in 1940 for each of the waters mentioned in Table VI. The catch per hour for perch varied considerably, having an increase in St. Marys River waters, Potagannissing Bay waters, Lake Huron waters closed to commercial fishing and in the Chippewa County waters. In the other waters there was a drop in the catch per hour for perch. In all waters there was a drop in the catch per hour for walleye pike with the exception of the waters of the St. Marys River. There does not seem to be any correlation between the catch per hour between the open and closed waters. The natural cyclic rise and fall in abundance of fishes may at least partially explain these variations.

In analysing the catch per hour, there are several factors which are of importance. The time of day during which the fishing was done, the type of fishing, whether still fishing, casting, trolling, or all three of these, and the residence of the fishermen are probably the most important.

Time of Day When Fishing Was Done: In the creel census data collected, we find that less than one-third (32.2 percent) of the fishermen spent the time between five and nine o'clock in the evening fishing, and between five and nine o'clock in the morning, 64.4 percent fished during some period between 9 A.M. to 5 P.M. and the remaining 3.6 percent fished sometime between 9 P.M. and 5 A.M. (Table VII). Fishing is generally believed to be better in the early morning or late afternoon. If more of the anglers had fished during these periods of the day the catch per hour would probably have ^{been} increased for all waters. Since a higher percentage of anglers fished the closed waters than the open waters during the more favorable periods, this factor does not explain the better

returns from the waters open to commercial fishing.

Type of Fishing Done by Anglers: In the analysis of the catch per hour on the basis of the type of fishing done by the angler, we find that the average catch for the still fisherman was more than three times that of the angler who trolled or cast (Table VIII). The average still fisherman, for the three years 1938 to 1940*, caught 2.6 fish per hour whereas the average angler who spent his time trolling and casting caught an average of only 0.7 fish per hour. Also there were fishermen who cast and still fished at the same time. Their average catch per hour for the three-year period was 1.3 fish or nearly twice that of the caster, but only half that of the angler^{who} still-fished only.

We found that in 1938, when the average catch per hour for all waters was 1.8 fish, 60.3 per cent of the anglers were still fishing, 15.0 per cent were still fishing and casting, and 24.7 per cent spent their time either casting or trolling. In 1939 when the catch dropped to 1.6 fish per hour, there was a change in the type of fishing. Only 42.5 per cent were still fishermen, 39.4 per cent were still fishermen and casters, and 17.9 per cent were trollers and casters. In 1940 when there was an increase in the catch per hour to 1.9 fish, we found an increase in the percentage of still fishermen to 50.2 per cent together with an increase in the percentage of fishermen trolling and casting (26.3), but a decrease in the percentage of those fishermen doing both types of fishing (23.5 percent). It is difficult to ascertain just what percentage of the angler's time was employed in still fishing or in casting. Some may even have done both at the same time. For the three-year period, 1938-1940, the ratio between the still fishermen, anglers casting and still fishing, and anglers casting only is nearly 2:1:1.

*Individual creel census sheets for 1937 not available.

The fishing in the waters closed to commercial fishing was generally better than in the open waters for the years 1938 and 1939. In 1940 the fishing in the open waters was considerably better (1.0 fish per hour) than in the closed waters. When the catch per hour is analyzed for closed and open water by the type of fishing (Table IX), it will be seen that although a greater percentage of fishermen still fished in open waters than in closed waters during 1940, thereby raising the average catch per hour for all fishing in open waters, still fishing in the open water that year was much better than in closed water and results to the angler from casting and the combined method was practically the same. The superiority of fishing in open water was therefore due to a higher catch per hour in still-fishing as well as to the greater percentage of anglers employing the more effective method. The drop in the catch per hour in the closed waters in 1940 was not due to the inclusion of Potagannissing Bay waters because the catch per hour in these recently closed waters (1.94) was greater than the average for all other closed waters (1.8).

Residence of Fishermen: The data show that 50.0 per cent of the fishermen were from Chippewa County whereas 30.1 per cent were resident anglers from other counties of the state and 17.2 per cent were non-resident anglers (Table IX). Resident anglers usually do better in "home" waters which they know better than do anglers fishing in strange waters. Earlier creel census studies have shown that "home county" anglers usually catch more fish in their own county than do outsiders. It may be that some of the non-residents own cottages near these waters and may know the waters as well as the residents. Since a higher percentage of residents of Chippewa County fished in closed waters than in open waters, the better fishing in the open waters cannot be attributed to this factor.

Average Size of Legal Fish: The average size of the fish recorded in the census varies in the different species from year to year as shown in Table X. This variation in the lengths of the different species is probably normal due to the presence and growth of prominent broods in the cycles of reproduction. In general the size of the fishes taken in 1937 and 1938 compare favorably with those taken during the two following years. Although few, if any, of the fish in the catches were actually measured, a marked difference in the average size -- if any such difference had occurred -- would probably have been evident in the records.

Percentage of Total Catch by Species: In Figure 2 the numbers at the tops of the columns indicate the numbers of fish upon which the calculations of the percentages of total catch are based. Only five kinds of fish are treated separately because these are present in the census for each of the four years and make up a large majority of the catch. These fish in the order of abundance in the creel are: yellow perch, northern pike, rock bass, smallmouth black bass and walleye pike. The other kinds have been lumped together as "miscellaneous". The percentage of the total catch is given for each year as well as the total for the four-year period. The figures inside the columns indicate the percentage of total catch for the different species.

The yellow perch was by far the most abundant fish in the catch (Table XI). The average of the four-year period shows that this fish constituted 72.8 per cent of the total catch. The northern pike was a poor second comprising 9.2 per cent of the catch. The rock bass ranked third with 5.1 per cent, and the highly sought after smallmouth black bass ranked fourth and made up only 3.6 per cent of the total catch.

In 1938, the large percentage of miscellaneous fish was due to the catch of herring near Round Island in the upper St. Marys River during the latter part of February and the first part of March. This catch amounted to 289 fish or 8.4 per cent of the total catch of the

year. In each of the other years the above mentioned five kinds made up more than 90 per cent of the total catch.

CREEL CENSUS IN THE POTAGANISSING BAY REGION, 1937 - 1940

The fishing laws of the Department of Conservation of Michigan define the waters of Potagannissing Bay as those within the following boundaries: "Beginning at a point where the north line of town 41 north intersects the shore of the mainland south of the village of Detour, in Chippewa County; thence due east to Drummond Island; then northerly and easterly along the shore of Drummond Island to Chippewa Point; thence due north to the international boundary line; thence westerly along said international boundary line to a point where it intersects a line drawn due east through the most southerly point of Little Lime Island; then due west from said point to the mainland; thence following the shore of the mainland southeasterly to the point of beginning." This circumscribed area includes the following waters from which the Department of Conservation secured data during the four years of the census: Maud Bay, Spring Bay Dock, Potagannissing Bay, Pigeon Cove, Sturgeon Bay, Maxton Bay and Seymour Bay. These waters were closed to commercial fishing on September 20, 1939.

Table XII gives the creel census data for all the waters in the Potagannissing Bay region described above. The table shows that the percentage of fishermen taking no fish, i.e. fishing failures, varied considerably during the four-year period; a decided drop occurred in 1940. If the data for 1937, 1938 and 1939, when the region was open to commercial fishing, are compared with those of 1940 after it had been closed, we find that the percentage of fishermen taking no fish has decreased following the closure.

The catch per hour varied from year to year and was lowest in 1939 (0.7) and highest in 1940 (1.9). If the fishing in 1937, 1938 and 1939 (average 1.3 fish per hour), when the bay was open to commercial fishing, is compared with the fishing in 1940 (1.9 fish per hour) when the bay was closed, we see that there is a rise in the catch per hour. We also find that the average fishermen in 1939 and 1940 spent 3.6 hours per day to catch 6.9 fish, whereas before the bay was closed they spent an average of 3.5 hours to catch 4.5 fish. The increase in the catch per hour in Potagannissing Bay in 1940 over 1939 is probably not due to the closure of these waters to commercial fishing inasmuch as the records from the inland non-trout waters of Chippewa County showed a corresponding rise. All the connecting waters with the exception of the Lake Superior waters also showed an increased catch per hour in 1940.

In the census on the Potagannissing Bay region there are only four kinds of fish which are of sufficient abundance in the creel to warrant separate consideration. These in the order of their abundance are: yellow perch, northern pike, smallmouth black bass and rock bass. In these waters, similarly as in the other connecting waters, the yellow perch is by far the most abundant fish, in the catch Here it makes up 72.2 per cent of the total catch, which figure corresponds closely with the 72.8 per cent in all waters. Again, the northern pike ranked a poor second, comprising only 10.8 per cent of the total yield. The smallmouth black bass, however, ranked third with a percentage of 9.6. The reason for this high percentage of smallmouth black bass is that more than 65 per cent of all the bass in the census records were reported from the Potagannissing Bay region. The percentage of this species in each of the four years is nearly the same except in 1938 when it fell to 3.5 per cent. The northern pike is the only fish present in the records which showed a marked increase in abundance in the creel. The average per cent of the

total catch for the first three years for this species was 4.4, and in 1940 it was 17.4. The yellow perch made up at least 80 per cent of the catch in the first three years, but the percentage dropped to 61.0 per cent in 1940. This rise in the relative abundance of the northern pike and the decline in the yellow perch may have been due to the type of fishermen contacted by the Conservation Officers, or might be due to an actual change in abundance of the two species.

COMPARISON OF THE CREEL CENSUS DATA FROM THE DETOUR CHAMBER OF
COMMERCE AND THE DEPARTMENT OF CONSERVATION, 1940

During the summer of 1940, the Detour Chamber of Commerce conducted a creel census on the same waters as those covered by the employees of the Department of Conservation. In the following letter, Mr. Grover C. Reed, Secretary of the Detour Chamber of Commerce tells how the census was conducted. We quote:

Detour, Michigan
February 1st, 1941.

Mr. A. S. Hazzard.
Lansing, Michigan

Sir:

In reply to yours of January 27th, in regards to the method used in collecting our creel census I wish to inform you that the cards were given out to the fishermen in the following manner, by myself and other members of the Chamber of Commerce, by the information bureau, by the Drummond--Detour ferry, by our local boat liveries, and through some of the tourist camps of Drummond Island.

In other words we used every means at our command to get our cards into the hands of fishermen who would use them.

The improvement in the fishing in this locality, for the short time that Potagannissing Bay has been closed has far exceeded the hopes and expectations of most of the members of our local Sportsmens Club and we are now confident that within the next year or two

we will have the best fishing on the chain of Lakes.

Very truly yours,
(Signed)
 Grover C. Reed, Sec.
 Chamber of Commerce.

As previously stated, the Department of Conservation employees obtained their records by contacting the anglers and examining their catch in the field. The records secured by the Chamber of Commerce were voluntary and were made out by the anglers themselves. One of the conservation officers, Mr. Roosevelt Haken, was permitted to copy the records secured by the Chamber of Commerce of the creel census. Table XIII gives the general creel census data for the Detour Chamber of Commerce, the Department of Conservation and the two combined. There were more than twice as many records from both waters open to and closed to commercial fishing in the Department census as in that of the Chamber of Commerce.

NUMBER OF FISHERMEN

Of the records obtained by the Chamber of Commerce, 83 fishermen (33.3 per cent) were from Chippewa County, 120 (48.6 per cent) were resident anglers from outside Chippewa County and 44 (17.8 per cent) were non-resident anglers. In the records of the Department of Conservation for the same period of time, 287 fishermen (51.1 per cent) were from Chippewa County, 187 (33.3 per cent) were resident anglers from outside Chippewa County, and 88 (15.6 per cent) were non-resident anglers. These percentages indicate that only one-third of the anglers who reported to the Chamber of Commerce were "home county" anglers whereas more than half of those contacted by the Department of Conservation were from Chippewa County. This fact may partially explain the discrepancy in the results of the two censuses.

The percentage of anglers taking no fish reported by the Chamber of Commerce records may not be accurate. The Chamber of Commerce relied entirely upon the will of the fishermen to return the data, and therefore may not have obtained a good random sample. Further, experience has shown that many fishermen are reluctant to admit that they had spent several hours in angling without success. It is probable, therefore, that only those fishermen, with some exceptions, who had a fairly good catch volunteered to mail in a report. The Department employees, however, made records for all anglers contacted regardless of the number of fish caught. Only 3.7 per cent of the fishermen who reported to the Chamber of Commerce caught no fish. This percentage is much lower than that for any year of the Department census, or the grand average (22.5 per cent) of the four years (Table I). This fact suggests that only the more successful fishermen reported to the Chamber of Commerce.

We have stated before that it is generally accepted that fishing is better in the early morning or late afternoon than it is during midday. In the Chamber of Commerce records only 11.0 per cent of the fishing was done between 5 A.M. and 9 A.M. and between 5 P.M. to 9 P.M., whereas the records from the Department census show twice as much (22.1) fishing over the same periods of time. This too may account for the lower catch per hour shown by the Detour census.

ANALYSIS OF CATCH

Catch per Hour: The Chamber of Commerce data show that the catch per hour for all fish taken in all waters was 1.4. This value is 26.6 per cent less than the 1.9 fish per hour recorded by the census of the Department of Conservation. In the waters closed to commercial fishing the average of both censuses combined showed a catch of 1.6 fish per hour. This is 36.0 per cent lower than the catch of 2.6 fish per hour

in the waters open to commercial fishing at the present time. In all instances, that is, in the data collected by the Chamber of Commerce, the Department of Conservation and the two combined, the fishing in the open waters was considerably better than it was in the waters closed to commercial fishing (Table XIII). The 1940 average of 1.4 fish per hour of the Chamber of Commerce census was well below the four-year average of 1.8 fish per hour (Table I) of the Department of Conservation censuses, whereas the Department's 1940 average of 1.9 fish was slightly above the grand average.

In the waters of the Potagamissing Bay region, the Chamber of Commerce obtained records from only 27 anglers and of only 56 fish caught in 101.0 hours of angling (Table XIV). It is obvious that this number is too small upon which to base a reliable conclusion. The 56 fish were taken at the rate of 0.6 fish per hour, which rate is far below the average of the four yearly censuses (1.5 fish per hour) taken by the Department of Conservation. The 1940 data collected by the Department of Conservation were based on 1,240 fish. These records showed that the 1940 catch was 1.9 fish per hour in the Potagamissing Bay region, or more than three times that based on the records obtained by the Chamber of Commerce. The more reliable figure of the Department of Conservation indicates that the 1940 catch per hour was the highest of the four-year period, exceeding the grand average catch by 0.4 fish.

Each census shows that fishing is better in the open waters than it is in the waters closed to commercial fishing. The data from the two censuses combined showed that the catch per hour in the closed waters was only 1.6 fish whereas in the open waters the catch was 2.6 fish per hour. These values indicate that fishing is 42.0 per cent better in the waters open to commercial fishing.

Percentage of Total Catch: Table XV shows the percentage of total catch for all species represented in the censuses conducted by the Chamber of Commerce, the Department of Conservation and the two censuses combined. The yellow perch is the most abundant fish in each of the two censuses and is followed in order of abundance by the northern pike and the smallmouth black bass. The northern pike, smallmouth black bass and bullheads made up a large percentage of the total catch in the Chamber of Commerce census whereas the yellow perch and rock bass were more abundant in the data collected by the Conservation Officers. These results may indicate that anglers filling out Chamber of Commerce cards were fishing primarily for bass and pike (casting plugs, trolling with large spoons or using large minnows which would not readily take perch or other panfish.). The type of fishing done by the anglers reporting to the Chamber of Commerce might further explain the lower catch per hour in the Chamber of Commerce census.

In the data collected by the Department of Conservation there are four kinds of fish represented which do not occur in the other census, namely, walleye pike, herring, rainbow trout, and whitefish. The other seven kinds are represented in both censuses. This greater variety of fishes indicated that the conservation officers contacted anglers with more diversified interests than those who replied to the Detour census, and in obtaining more such records the officers have probably secured a truer estimate of the fishing as a whole in these waters.

The data collected by the Chamber of Commerce for the waters of the Potagamissing Bay region were based on only 56 fish representing three species. These data are too meagre to use as a reliable basis for the percentage of total catch. However, Table XVI shows the data for the percentage of total catch for each of the two censuses and the two combined.

The Department census includes five different kinds of fish with a total of 1,236. This gives a much better picture of the catch in the area although it does not include the walleye pike, bullheads, pumpkinseed, suckers, rainbow trout, and whitefish which have been taken from the same waters during previous years of the census.

SUMMARY AND CONCLUSIONS

From the data collected by the Department of Conservation employees during the past four years, and the records obtained by the Detour Chamber of Commerce in 1940, we may draw the following conclusions:

1. The numbers of fishermen contacted by the census takers were considerably smaller in 1937 and 1939 than in 1938 and 1940. An attempt should be made to secure a greater number of records in the following years.
2. The numbers of fishermen angling in waters open to commercial fishing have dropped off sharply since 1939 due primarily to the closure of the Potagannissing Bay region, from which a large percentage of fisherman's records for open waters were secured prior to its closing September 20, 1939.
3. The percentage of fishermen taking no fish was greater during the first three years of the census than during 1940, following the closing of the Potagannissing Bay region.
4. The average percentage of fishermen taking no fish was less in the open waters than in the waters closed to commercial fishing for the four year period of the census.
5. The catch per hour in the waters open to commercial fishing was higher in 1940 than it was in the closed waters, but was lower in other years. This increase in the catch per hour in 1940 in the open waters was not due to the closing of the Potagannissing Bay region, be-

cause the catch per hour was higher than that for any other closed water.

6. The fishing in the Potagannissing Bay region has improved since these waters were closed to commercial fishing. The fishing in the other connecting waters between Lake Superior and Lake Huron as well as the inland waters of Chippewa County has also improved. It is therefore unlikely that the improvement in Potagannissing Bay was due to closing the waters to commercial fishing.

7. The creel census conducted by the Detour Chamber of Commerce is not an accurate index of fishing in the waters under consideration for several reasons: a) the angler had to account for his own catch and was not contacted in the field; b) the report on the fish caught and other information had to be mailed in to the Chamber of Commerce; c) the percentage of fishermen taking no fish is much smaller than that of the Department census indicating that probably some of the fishermen who caught no fish did not report; and d) more than half of the records obtained in this census were from fishermen residing outside Chippewa County.

8. The Chamber of Commerce census for the entire Potagannissing Bay region, which is the area under controversy, included the reports of only 27 anglers who caught a total of 56 fish. These data are too meagre to be of statistical value.

INSTITUTE FOR FISHERIES RESEARCH

By Louis A. Krumholz

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TABLE I

GENERAL CREEL CENSUS DATA ON THE CONNECTING WATERS BETWEEN LAKE SUPERIOR AND LAKE HURON, AND SOME ADJOINING WATERS, 1937-1940

Year	No. of Fishermen	Fishermen Taking no Fish No.	%	Total Hours Fished	No. of Legal Fish	Catch per Fisherman	Catch per Hour	Hours per Fisherman
Waters Closed to Commercial Fishing								
1937	158	34	21.5	602.0	1092	6.9	1.8	3.8
1938	348	97	27.9	1109.5	2135	6.1	1.9	3.2
1939	140	31	22.1	424.75	874	6.2	2.1	3.0
1940	483	62	12.8	1580.0	2786	5.8	1.8	3.3
Total or Average	1129	224	19.8	3716.25	6887	6.1	1.9	3.3
Waters Open to Commercial Fishing								
1937	82	31	37.8	240.0	352	4.3	1.5	2.9
1938	239	48	20.1	749.75	1302	5.4	1.7	3.1
1939	172	76	44.2	585.25	718	4.2	1.2	3.4
1940	79	3	3.8	242.0	686	8.7	2.8	3.1
Total or Average	571	158	27.7	1817.0	3058	5.4	1.7	3.2
All Waters								
1937	240	65	27.1	842.0	1444	6.0	1.7	3.5
1938	587	145	24.7	1859.25	3437	5.9	1.8	3.2
1939	312	107	34.3	1010.0	1592	5.1	1.6	3.2
1940	562	65	11.6	1822.0	3472	6.2	1.9	3.2
Total or Average	1701	382	22.5	5533.25	9945	5.8	1.8	3.3

TABLE II

GENERAL CREEL CENSUS DATA ON THE CONNECTING WATERS BETWEEN LAKE SUPERIOR AND LAKE HURON, AND SOME ADJOINING WATERS, 1937

Name of Water	No. of Fishermen	Fishermen Taking no Fish	%	Total Hours Fished	No. of Legal Fish	Catch per Fisherman	Catch per Hour	Hours per Fisherman
Waters Closed to Commercial Fishing								
Whaiska Bay	76	0	-	332.0	864	11.4	2.6	4.4
Saint Marys River	26	17	65.4	96.0	17	0.7	0.2	3.7
Below Power House	16	10	62.5	68.0	12	0.8	0.2	4.3
Munuscong Bay	3	0	-	6.0	15	5.0	2.5	2.0
Whitney Bay	37	7	18.9	100.0	184	5.0	1.8	2.7
Total or Average	158	34	21.5	602.0	1092	6.9	1.8	3.8
Waters Open to Commercial Fishing								
Potagannissing Bay	56	17	30.4	170.5	237	4.2	1.4	3.0
Pike Bay	2	1	50.0	3.0	5	2.5	1.7	1.5
Scammon Cove	24	13	54.2	66.5	110	4.6	1.7	2.8
Total or Average	82	31	37.8	240.0	352	4.3	1.5	2.9
Grand Total or Average	240	65	27.1	842.0	1444	6.0	1.7	3.5

TABLE III

GENERAL CREEL CENSUS DATA ON THE CONNECTING WATERS BETWEEN LAKE SUPERIOR AND LAKE HURON, AND SOME ADJOINING WATERS, 1938

Name of Water	No. of Fishermen	Fishermen Taking no Fish	Fishermen Taking %	Total Hours Fished	No. of Legal Fish	Catch per Fisherman	Catch per Hour	Hours per Fisherman
Waters Closed to Commercial Fishing								
Bay Mills	2	2	100.0	8.0	0	-	-	4.0
Whaiska Bay	132	16	12.1	435.0	1329	10.1	3.1	3.3
Saint Marys River	96	47	49.0	294.25	365	3.8	1.2	3.1
Below Power House	59	25	42.4	196.75	72	1.2	0.4	3.3
Hay Lake	5	0	-	18.0	21	4.2	1.2	3.6
Whitney Bay	54	7	13.0	157.5	348	6.4	2.2	2.9
Total or Average	348	97	27.9	1109.5	2135	6.1	1.9	3.2
Waters Open to Commercial Fishing								
Potagannissing Bay	143	33	23.1	453.5	791	5.5	1.7	3.2
Sturgeon Bay	30	3	10.0	125.25	203	6.8	1.6	4.2
Maxton Bay	2	0	-	6.0	7	3.5	1.2	3.0
Raynolds Bay	18	2	11.1	45.5	66	3.7	1.5	2.5
Pike Bay	8	0	-	28.0	60	7.5	2.1	3.5
Huron Bay	2	1	50.0	3.0	1	0.5	0.3	1.5
Scammon Cove	27	9	33.3	60.5	78	2.9	1.3	2.2
Johnswood Bay	9	0	-	28.0	96	10.7	3.4	3.1
Total or Average	239	48	20.1	749.75	1302	5.4	1.7	3.1
Grand Total or Average	587	145	24.7	1859.25	3437	5.9	1.8	3.1

TABLE IV

GENERAL CREEL CENSUS DATA ON THE CONNECTING WATERS BETWEEN LAKE SUPERIOR AND LAKE HURON, AND SOME ADJOINING WATERS, 1939

Name of Water	No. of Fishermen	Fishermen Taking no Fish	%	Total Hours Fished	No. of Legal Fish	Catch per Fisherman	Catch per Hour	Hours per Fisherman
Waters Closed to Commercial Fishing								
Whaiska Bay	61	0	-	172.75	649	10.6	3.8	2.8
Saint Marys River	31	12	38.7	103.5	83	2.7	0.8	3.3
Whitney Bay	48	19	39.6	148.5	142	3.0	1.0	3.1
Total or Average	140	31	22.1	424.75	874	6.2	2.1	3.0
Waters Open to Commercial Fishing								
Scammon Cove	76	22	28.9	199.25	449	5.9	2.3	2.6
Potagamissing Bay	87	54	62.1	316.5	255	2.9	0.8	3.6
Pigeon Cove	9	0	-	69.5	14	1.6	0.2	7.7
Total or Average	172	76	44.2	585.25	718	4.2	1.2	3.4
Grand Total or Average	312	107	34.3	1010.0	1592	5.1	1.6	3.2

TABLE V

GENERAL CREEL CENSUS DATA ON THE CONNECTING WATERS BETWEEN LAKE SUPERIOR AND LAKE HURON, AND SOME ADJOINING WATERS, 1940

Name of Water	No. of Fishermen	Fishermen Taking no Fish	%	Total Hours Fished	No. of Legal Fish	Catch per Fisherman	Catch per Hour	Hours per Fisherman
Waters Closed to Commercial Fishing								
Whaiska Bay	79	8	10.1	241.0	605	7.7	2.5	3.1
Saint Marys River	179	27	15.1	549.5	751	4.2	1.4	3.1
Raber Bay	6	1	16.7	14.0	13	2.2	0.9	2.3
Maud Bay	8	3	37.5	21.0	22	2.8	1.0	2.6
Spring Bay Dock	9	4	44.4	11.0	7	0.8	0.6	1.2
Potagannissing Bay	153	9	5.9	592.5	1195	7.8	2.0	3.9
Pigeon Cove	4	2	50.0	8.0	2	0.5	0.3	2.0
Seymour Bay	1	0	-	1.0	1	1.0	1.0	1.0
Whitney Bay	38	8	21.1	130.0	125	3.3	1.0	3.4
Pike Bay	6	0	-	12.0	65	10.8	5.4	2.0
Total or Average	483	62	12.8	1580.0	2786	5.8	1.8	3.3
Waters Open to Commercial Fishing								
Raynolds Bay	2	0	-	7.0	12	6.0	1.7	3.5
Scammon Cove	72	3	4.2	226.0	632	8.8	2.8	3.1
Johnswood Bay	5	0	-	9.00	42	8.4	3.7	2.3
Total or Average	79	3	3.8	242.0	686	8.7	2.8	3.1
Grand Total or Average	562	65	11.6	1822.0	3472	6.2	1.9	3.2

TABLE VI

GENERAL CREEL CENSUS DATA ON THE CONNECTING WATERS BETWEEN LAKE SUPERIOR
AND LAKE HURON, AND SOME ADJOINING WATERS, 1937 to 1940

C A T C H P E R H O U R

Year	Per cent Failures	All Fish	Smallmouth Black Bass	Yellow Perch	Walleye Pike	Northern Pike
Lake Superior Waters (Closed)						
1937	0	2.60	-	1.89	0.01	0.44
1938	13.4	3.00	-	2.82	trace	0.07
1939	0	3.76	-	3.50	0.09	0.03
1940	3.8	2.51	-	2.40	-	0.03
Average	6.0	2.90	-	2.56	0.02	0.16
St. Marys River Waters (Closed)						
1937	60.0	0.26	-	0.09	0.09	0.06
1938	43.9	0.90	-	0.01	0.18	0.03
1939	33.3	0.80	0.10	0.31	0.02	0.23
1940	20.2	1.36	0.05	0.92	0.05	0.39
Average	33.3	1.00	0.03	0.40	0.09	0.19
Potagannissing Bay Waters (Open)						
1937	30.4	1.39	0.16	1.20	-	0.02
1938	20.7	1.71	0.04	1.50	0.02	0.08
1939	58.1	0.70	0.07	0.52	-	0.06
1940	10.1	1.94	(Closed) 0.24	1.17	-	0.27
Average	24.9	1.54	0.13	1.13	0.01	0.14
Lake Huron Waters (Open)						
1937	53.8	1.65	-	1.57	-	0.09
1938	18.8	1.82	0.34	1.21	-	0.19
1939	25.0	2.25	0.01	2.13	-	0.05
1940	3.8	2.83	0.05	1.98	-	0.04
Average	20.6	2.30	0.10	1.80	-	0.09

TABLE VI (Continued)

Lake Huron Waters (Closed)						
1937	18.9	1.84	-	0.69	-	0.19
1938	13.0	2.21	0.01	1.19	0.01	0.38
1939	39.6	0.96	-	0.41	-	0.14
1940	14.0	1.34	-	1.01	-	0.23
Average	22.4	1.58	trace	0.80	trace	0.23

Chippewa County Waters (Non trout waters exclusive of Great Lakes Waters)
(Closed)

1937	--*	1.01	0.04	0.50	0.12	0.01
1938	31.3	1.08	0.07	0.19	0.11	0.10
1939	35.1	1.03	trace	0.65	0.11	0.11
1940	20.7	1.84	0.07	1.23	0.05	0.17
Average	26.5**	1.39	0.05	0.80	0.09	0.11

* Figure not available

** Three Year Average

All Waters

1937	27.1***	1.48	0.03	0.99	0.05	0.15
1938	25.2	1.77	0.05	1.21	0.06	0.10
1939	34.5	1.47	0.03	1.18	0.04	0.09
1940	13.1	1.89	0.10	1.31	0.03	0.22
Average	22.6****	1.62	0.60	1.20	0.04	0.15

*** Does not include the anglers from Chippewa County non trout waters exclusive of Great Lakes.

****Does not include the anglers from Chippewa County non trout waters exclusive of Great Lakes for 1937.

TABLE VII

GENERAL CREEL CENSUS DATA ON THE CONNECTING WATERS BETWEEN LAKE SUPERIOR
AND LAKE HURON, AND SOME ADJOINING WATERS INDICATING THE
TIME OF DAY DURING WHICH FISHING WAS DONE 1938-1940

Figures in Percentage of Fishermen

Year	1-5 A.M.	5-9 A.M.	9 A.M.-1 P.M.	1-5 P.M.	5-9 P.M.	9-1 A.M.
Lake Superior Waters (Closed)						
1938	2.8	14.7	32.8	46.4	2.6	0.7
1939	-	3.3	18.2	73.4	5.1	-
1940	-	4.6	35.9	53.7	5.8	-
Average	1.4	9.5	30.6	54.2	4.0	0.3
St. Marys River Waters (Closed)						
1938	2.3	5.0	17.0	14.0	40.8	20.9
1939	2.9	6.8	20.8	35.7	29.0	4.8
1940	-	2.5	28.2	44.7	22.3	2.3
Average	1.2	7.0	22.0	29.9	29.8	10.1
Potagannissing Bay Waters (Open)						
1938	-	10.0	23.1	32.7	33.9	0.3
1939	-	5.2	21.8	42.1	30.9	-
1940	-	5.2	25.7	50.7	18.0	0.4
Average	-	7.0	23.9	42.3	26.5	0.3
Lake Huron Waters (Open)						
1938	-	9.3	27.3	43.5	16.5	3.4
1939	-	22.2	25.2	32.0	19.8	0.8
1940	-	10.6	28.4	43.7	17.3	-
Average	-	14.1	27.1	39.8	17.9	1.1
Lake Huron Waters (Closed)						
1938	-	17.2	20.9	36.7	24.1	1.1
1939	-	21.9	7.7	33.7	36.7	-
1940	-	14.1	21.8	24.3	39.8	-
Average	-	17.7	17.0	31.9	32.9	0.5
Grand Av.	0.5	9.3	24.4	40.0	22.9	2.9

TABLE VIII

GENERAL CREEL CENSUS DATA ON THE CONNECTING WATER BETWEEN LAKE SUPERIOR AND LAKE HURON, AND SOME ADJOINING WATERS,
SHOWING THE TYPE OF FISHING DONE BY THE ANGLERS, 1938 TO 1940

Year	Number of Fishermen	Fishermen Still-fishing		Catch per Hour	Hours per Man	Fishermen Still-fishing + Casting		Catch per Hour	Hours per Man	Fishermen Casting + Trolling		Catch per Hour	Hours per Man
		No.	%			No.	%			No.	%		
Waters Closed to Commercial Fishing													
1938	348	214	61.5	2.7	3.1	42	12.1	0.9	3.2	92	26.4	0.7	3.3
1939	140	60	42.9	3.3	2.6	49	35.0	1.6	3.7	31	22.1	0.7	2.8
1940	483	213	44.1	2.6	2.9	127	26.3	1.6	4.6	143	29.6	0.8	2.6
Tot. or Av.	971	487	50.2	2.7	3.0	218	22.5	1.5	4.1	266	27.3	0.7	2.9
Waters Open to Commercial Fishing													
1938	239	140	58.6	2.3	3.0	46	19.2	1.3	4.0	53	22.2	0.7	2.7
1939	172	73	42.5	2.1	3.1	74	43.0	0.9	3.7	25	14.5	0.2	3.3
1940	79	69	87.4	3.1	3.1	5	6.3	1.6	3.2	5	6.3	0.7	3.1
Tot. or Av.	490	282	57.6	2.4	3.0	125	25.5	1.1	3.8	83	16.9	0.5	2.9
All Waters													
1938	587	354	60.3	2.5	3.1	88	15.0	1.1	3.6	145	24.7	0.7	3.1
1939	312	133	42.5	2.6	2.9	123	39.4	1.2	3.7	56	17.9	0.4	3.0
1940	562	282	50.2	2.7	2.9	132	23.5	1.5	4.6	148	26.3	0.8	2.6
Tot. or Av.	1461	769	52.6	2.6	3.0	343	23.5	1.3	4.0	349	23.9	0.7	2.9

TABLE IX

GENERAL CREEL CENSUS DATA FOR THE CONNECTING WATERS BETWEEN LAKE SUPERIOR AND LAKE HURON AND SOME ADJOINING WATERS INDICATING THE RESIDENCE OF FISHERMEN, 1938 TO 1940

Figures in Percentages of Fishermen

Year	Resident, Chippewa County	Residents, outside Chippewa Co.	Non- resident	Unknown
Waters Closed to Commercial Fishing				
1938	60.2	26.2	24.6	9.8
1939	44.0	31.3	23.9	0.8
1940	52.2	28.9	18.1	0.8
Average	55.1	25.9	16.0	3.0
Waters Open to Commercial Fishing				
1938	39.4	26.2	24.6	9.8
1939	22.3	48.6	21.9	...
1940	44.7	52.9	2.4	...
Average	31.4	45.2	21.2	1.9
All Waters				
1938	58.2	22.4	13.7	5.7
1939	31.6	41.2	26.8	0.3
1940	51.1	32.6	15.7	0.6
Average	50.0	30.1	17.2	2.7

TABLE X

GENERAL CREEL CENSUS DATA FOR THE CONNECTING WATERS BETWEEN LAKE SUPERIOR AND LAKE HURON AND SOME ADJOINING WATERS INDICATING THE AVERAGE SIZES OF DIFFERENT SPECIES OF FISH TAKEN IN CREEL CENSUS, 1937 TO 1940

	1937		1938		1939		1940		ALL YEARS	
	No.	Av. Size	No.	Av. Size	No.	Av. Size	No.	Av. Size	No.	Av. Size
Smallmouth Black Bass	27	15.2	84	12.1	29	11.3	220	13.4	360	13.1
Walleye Pike	18	21.5	102	19.9	29	19.4	26	17.6	175	19.7
Northern Pike	185	21.7	184	18.6	85	22.9	459	22.9	913	21.8
Yellow Perch	1026	8.8	2465	8.1	1319	8.4	2419	8.7	7229	8.5
Bullheads	60	9.3	72	8.6	19	8.0	17	11.6	168	9.1
Rock Bass	58	6.6	166	7.2	85	7.2	202	7.5	511	7.3
Pumpkinseed Sunfish	68	7.2	12	7.0	3	7.0	18	7.6	101	7.2

TABLE XI

GENERAL CREEL CENSUS DATA FOR THE CONNECTING WATERS BETWEEN LAKE SUPERIOR AND LAKE HURON AND SOME ADJOINING WATERS INDICATING THE PERCENTAGE OF THE TOTAL CATCH OF THE VARIOUS FISHES, 1937 TO 1940

	1937		1938		1939		1940		TOT. OR AV.	
	No.	%	No.	%	No.	%	No.	%	No.	%
Smallmouth Black Bass	27	1.87	84	2.43	29	1.84	221	6.35	361	3.63
Northern Pike	185	12.81	184	5.33	85	5.38	462	13.24	916	9.21
Walleye Pike	18	1.25	102	2.96	29	1.84	26	0.75	175	1.76
Rock Bass	58	4.02	166	4.81	85	5.38	206	5.94	515	5.18
Yellow Perch	1026	71.05	2465	71.43	1319	83.48	2419	69.79	7229	72.72
Miscellaneous	130	9.01	450	13.05	33	2.08	132	3.93	745	7.49
Total Fish	1444		3451		1580		3466		9941	

TABLE XII

GENERAL CREEL CENSUS DATA ON THE WATERS OF THE POTAGANNISSING BAY REGION, 1937 TO 1940

Year	Number of Fishermen	Fishermen Taking No Fish		Total Hours Fished	No. of Legal Fish	Catch per Fisherman	Catch per Hour	Hours per Fisherman
		No.	%					
1937	56	17	30.4	170.5	237	4.2	1.4	3.0
1938	180	36	20.0	584.75	1001	5.6	1.7	3.2
1939	96	54	56.3	386.0	269	2.8	0.7	4.0
Total or Average	332	107	32.2	1151.25	1507	4.5	1.3	3.5
1940	181	19	10.5	647.0	1240	6.9	1.9	3.6
GRAND TOTAL OR AVERAGE	513	126	24.6	1788.25	2747	5.3	1.5	3.5

TABLE XIII

GENERAL CREEL CENSUS DATA ON THE CONNECTING WATERS BETWEEN LAKE SUPERIOR AND LAKE HURON SHOWING A COMPARISON OF THE DATA OF THE DEPARTMENT OF CONSERVATION AND THE DETOUR CHAMBER OF COMMERCE, 1940

	Number of Fishermen	Fishermen Taking no Fish No.	%	Total Hours Fished	No. of Legal Fish	Catch per Fisherman	Catch per Hour	Hours per Fisherman
Waters Closed to Commercial Fishing								
Dept. of Conservation	483	62	12.8	1580.0	2786	5.8	1.8	3.3
Chamber of Commerce	233	6	2.6	963.0	1347	5.8	1.4	4.1
Total	716	68	9.5	2543.0	4133	5.8	1.6	3.6
Waters Open to Commercial Fishing								
Dept. of Conservation	79	3	3.8	242.0	686	8.7	2.8	3.1
Chamber of Commerce	14	3	21.4	65.0	104	7.4	1.6	4.6
Total	93	6	6.5	307.0	790	8.5	2.6	3.3
All Waters								
Dept. of Conservation	562	65	11.6	1822.0	3472	6.2	1.9	3.2
Chamber of Commerce	247	9	3.7	1028.0	1451	5.7	1.4	4.2
Total	809	74	9.1	2850.0	4923	6.1	1.7	3.5

TABLE XIV

GENERAL CREEL CENSUS DATA ON THE WATERS OF THE POTAGANISSING BAY REGION TAKEN BY THE DEPARTMENT OF CONSERVATION
AND THE DETOUR CHAMBER OF COMMERCE, 1940

	Number of Fishermen	Fishermen Taking No Fish		Total Hours Fished	No. of Legal Fish	Catch per Fisherman	Catch per Hour	Hours per Fisherman	
		No.	%						
	1937	56	17	30.4	170.5	237	4.2	1.4	3.0
Department of Conservation	1938	180	36	20.0	584.75	1001	4.7	1.7	3.2
	1939	96	54	56.3	386.0	269	2.9	0.7	4.0
	1940	181	19	10.5	647.0	1240	7.8	1.9	3.2
	Total	513	126	24.6	1788.25	2747	5.3	1.5	3.5
Chamber of Commerce	1940	27	4	14.8	101.0	56	2.1	0.6	3.7
	Grand Total	540	130	24.1	1889.25	2803	5.2	1.5	3.5

TABLE XV

PERCENTAGE OF TOTAL CATCH OF ALL SPECIES OF THE CENSUSES TAKEN BY THE DEPARTMENT OF CONSERVATION AND THE DETOUR CHAMBER OF COMMERCE IN THE CONNECTING WATERS BETWEEN LAKE SUPERIOR LAKE HURON AND SOME ADJOINING WATERS IN LAKE HURON, 1940

	Dept. of Conservation	Chamber of Commerce	Combined Data
Smallmouth Black Bass	8.34	20.17	11.77
Yellow Perch	69.87	40.98	61.52
Walleye Pike	0.75		0.53
Northern Pike	13.26	33.24	19.03
Rock Bass	5.83	1.24	4.54
Bullheads	0.49	3.62	1.40
Pumpkinseed Sunfish	0.52	0.57	0.53
Sucker	0.03	0.07	0.04
Herring	0.84		0.59
Whitefish	0.03		0.02
Rainbow Trout	0.03		0.02

TABLE XVI

PERCENTAGE OF TOTAL CATCH OF ALL SPECIES OF THE CENSUSES TAKEN BY THE DEPARTMENT OF CONSERVATION AND THE DETOUR CHAMBER OF COMMERCE IN THE POTAGANNISSING BAY REGION, 1940

	Dept. of Conservation	Chamber of Commerce	Combined Data
Smallmouth Black Bass	17.3	42.9	18.4
Yellow Perch	60.8	35.7	59.8
Northern Pike	17.6	21.4	17.7
Rock Bass	2.0		1.9
Herring	2.3		2.2

FIGURE 1. CHART SHOWING THE CATCH PER HOUR PER FISHERMAN FOR WATERS OPEN TO COMMERCIAL FISHING, CLOSED TO COMMERCIAL FISHING AND ALL WATERS COMBINED, 1937 - 1940

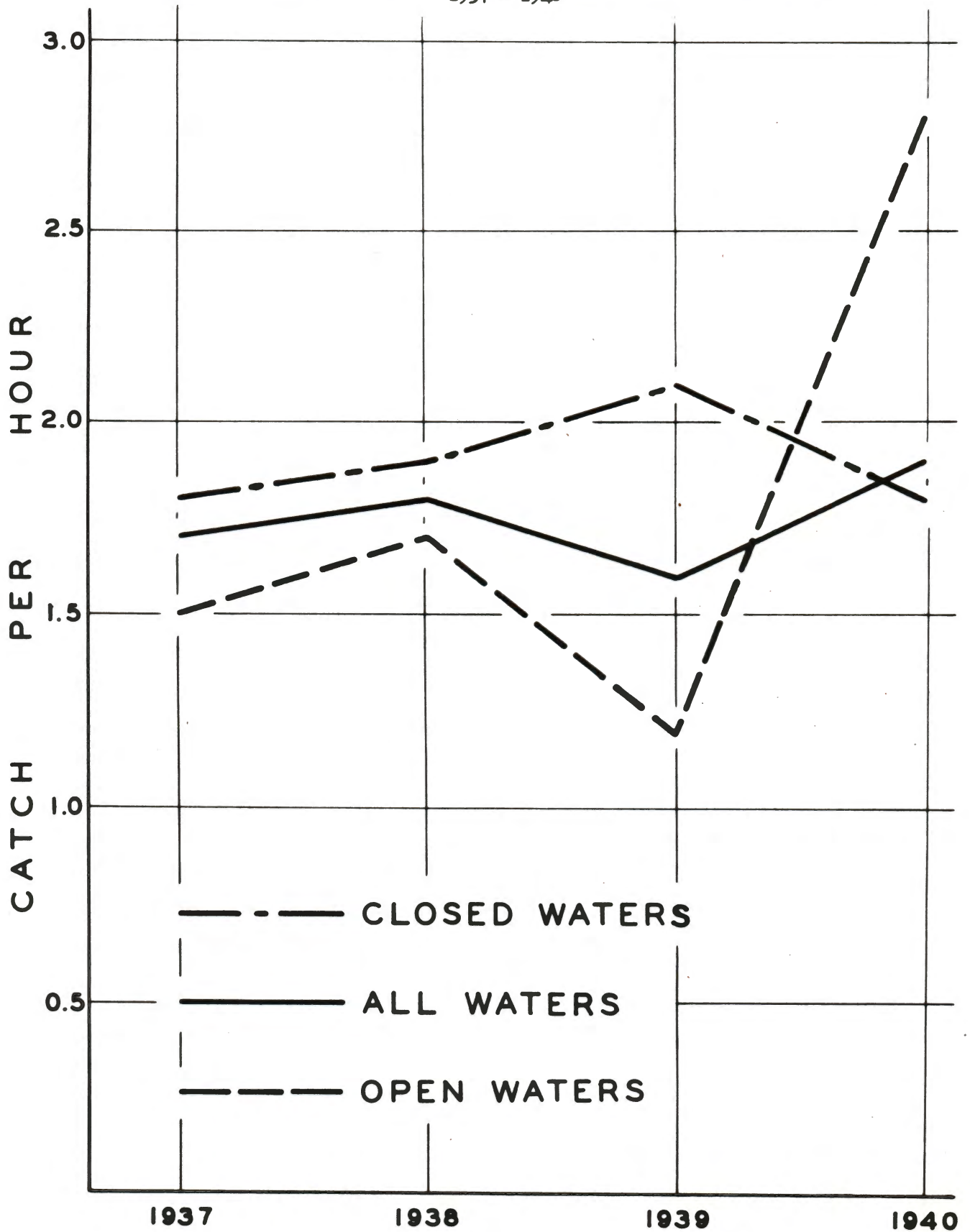


FIGURE 2. CHART SHOWING THE PERCENTAGE OF THE TOTAL CATCH FOR EACH OF THE FIVE MOST ABUNDANT SPECIES IN THE CATCH FOR EACH OF THE YEARS, 1937 - 1940

