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Report No. 1122

July 28, 1947

The Cisco Harvest from Birch Lake, Cass County,  
Michigan, In 1945

by

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The following is a brief summary of the results of the 1945 cisco netting done in Birch Lake, Cass County, Michigan. The 1945 netting is the second in a series of controlled netting operations on Birch Lake made by local fishermen under the supervision of the Institute for Fisheries Research.

In 1943 G. N. Washburn of the Institute staff conducted an extensive preliminary survey of the cisco harvest problem of this particular lake.<sup>1</sup> His objectives were to determine the relative proportion of different species taken in an experimental harvest of ciscoes, and to thoroughly explore the field for the best practical method of harvesting ciscoes with a minimum of interference to the other species in the lake. Based on the results of the 1943 investigation a series of

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<sup>1</sup> Institute Report No. 948, "Experimental Cisco Netting in Birch Lake, Cass County, Michigan," by G. N. Washburn

controlled netting operations were initiated in 1944.<sup>2</sup> The second in this series of controlled netting was completed in 1945, the results of which are the subject of this paper. Where points of interest are evident, comparisons between the 1944 and 1945 data will be presented.

During the 1945 netting season the same regulations governing the taking of ciscoes were in effect as were in effect in 1944:

1. Not more than 20,000 ciscoes are to be removed from the lake annually.
2. The open season shall be from November 25 to December 10, inclusive.
3. Nets are to be in operation only between 5:00 p.m. and 11:00 p.m.
4. Nets are allowed to be set in water depths not less than eight feet nor more than twenty-five feet.
5. Each net, in operation, is to be marked at each end by a visible white float marker bearing the owner's name and address.
6. Each fisherman is required to secure a permit (good for one day only) to operate his net. Also, the entire catch from this daily operation must be brought to the checking station for clearance.

#### Fishing Pressure

A total of 126 fishermen participated in the 1945 netting operations, taking 11,812 fish in 3,593 fishing hours. Of the total catch, 11,327 (96.2%) were ciscoes. Of the cisco harvest, 34 were taken by Institute personnel for experimental purposes. The fishermen's catch per hour, of ciscoes only, amounted to 3.15 fish.

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<sup>2</sup> Institute Report No. 1020, "The Cisco Harvest From Birch Lake, Cass County, in 1944," by G. N. Washburn

Twelve species of game and other fish were taken including 127 perch, 108 rainbow trout, 96 largemouth bass, 49 pumpkinseeds, 24 bullheads, 19 rock bass, 10 bluegills, 8 suckers, 7 lake trout, 1 brown trout, 1 smallmouth bass, and 1 chub sucker. These 451 fish represented 3.8 percent of the total catch. (This figure is not accurate in representing the actual loss of game and other fish to the lake, however, since fully half of these fish were released unharmed by the fishermen as directed by the netting regulations).

As in 1944 the greatest variety of game and other fish was taken on the opening night (November 25). This tapered off quickly in almost every instance, and by the middle of the 16-day netting period they were represented by only a small fraction of the opening night catch.

The following table shows the general trend of catch of fish other than ciscoes during the netting. (This trend can be minutely interpreted on Table IV).

Table I. Table Showing Trend of Catch-Fish Other than Ciscoes

Species	Nov. 25	Dec. 2	Dec. 10
Perch	50	4	1
Rainbow trout	30	2	0
Rock bass	4	0	0
Largemouth bass	43	2	0
Pumpkinseed	7	2	0
Bullhead	8	1	0
Lake trout			
Bluegill			
Smallmouth bass			
Brown trout			
Green sunfish			
Garpike			

} Catch small and distributed unevenly throughout the first ten days

The largest single catch of ciscoes, a total of 1,167, was taken on the night of December 2--the same night that the largest catch was made during the 1944 netting season. After December 2 the cisco harvest dropped off almost constantly, and in considerable amounts. The number of fishermen tapered off after December 2 also, but to a lesser degree than the harvest. The first ten days of the season resulted in a harvest of 9,451 ciscoes, or 83 percent of the total 1945 harvest. This is comparable to 86 percent of the total catch in 1944 by the 10th day of the season. Catch per hour (computed by dividing the total daily catch of ciscoes by the total hours spent netting) ranged from a high of 5.14 on the night of November 29 to a low of 1.08 on December 9. The overall cisco catch per hour amounted to 3.15. The average catch per hour for the first ten days was 3.69, while the last six days recorded a drop to an average 1.78 fish per hour. This decrease in catch per hour during the last six days of the season may be compared to the corresponding data compiled during the 1944 season--6.28 fish per hour for the first ten days of the netting period to 3.52 fish per hour for the remaining six days. In both years a significant decline in fish production was noted for the latter third of the season, indicating that by December 4 of two consecutive years the peak of the cisco spawning had been reached and the fish from that date on were shifting away from the shoal spawning areas. As compared with the 1944 catch per hour the 1945 catch per hour is as follows:

Table II. Comparison of Catch Per Hour - 1944-1945

Year	Nov. 25	26	27	28	29	30	Dec. 1	2	3	4	5	6	7	8	9	10
1944	8.41	6.72	9.25	7.45	7.28	10.97	9.31	8.41	6.0	6.64	4.48	3.75	2.90	3.39	2.70	3.49
1945	2.68	2.46	4.75	4.54	3.68	5.14	3.34	4.03	3.93	2.41	2.62	1.75	1.56	2.44	1.08	1.26

Table III deals with fishing pressure in general:

Section a. Table showing fishing pressure of individual fishermen

Section b. Table showing number of fishermen each night

Section c. Table showing number of fishermen taking various species represented in the catch.

Table IV - Daily summary of fish taken in gill nets from Birch Lake during the 1944 season.

#### Age and Growth of Ciscoes

Samples of ciscoes taken at random from the netters' catches from day to day during the 16-day session (November 25 - December 10) were sexed, measured, weighed, and scale sampled for age and growth determinations. A total of 596 specimens were considered useful for accurate scale reading of a total of 681 specimens collected. Assuming that this sample is representative of the total harvest, and that the harvest is representative of the entire spawning population in terms of size of fish, it may be stated that few Birch Lake ciscoes mature in their third year of life (2-year-old fish), or at least do not enter the spawning grounds in any great numbers since only a small proportion of the total catch (5.2 percent) were in their third year of life.

A comparison of the age-growth data of 1944 and 1945 is presented in Tables V & VI. The age determination of these specimens was accomplished by G. N. Washburn.

Table III

a. Table showing fishing pressure of individual fishermen

Fishermen	fished	Number of nights
21	"	1
17	"	2
12	"	3
11	"	4
10	"	5
11	"	6
5	"	7
3	"	8
8	"	9
2	"	10
6	"	11
4	"	12
6	"	13
4	"	14
2	"	15
4	"	16

b. Table showing number of fishermen each night

Table showing number of Fishermen each night			
Nov. 25	65	Dec. 3	44
26	55	4	41
27	45	5	42
28	55	6	41
29	55	7	45
30	52	8	32
Dec. 1	62	9	23
2	59	10	23

c. Table showing number of fishermen taking various species represented in the catch

Species taken	Number of individual fishermen	Total number of fish taken
Ciscoes (only)	119	11,361
Perch	50	127
Rainbow trout	50	108
Largemouth bass	46	96
Pumpkinseed	30	49
Bullhead	18	24
Rock bass	15	19
Bluegills	6	10
Suckers	6	8
Lake trout	5	7
Chub sucker	1	1
Brown trout	1	1
Smallmouth bass	1	1
Grand total	...	11,812

Table IV.

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## Species taken and number of each

Date	No. of fishermen	No. of fishing hours	Ciscoes	Lake trout	Brown trout	Rainbow trout	Bullheads	Perch	Smallmouth bass	Largemouth bass	Green sun-fish	Pumpkinseeds	Bluegills	Rock bass	Suckers	Chub sucker	Total number of fish	Percent of other fish	Catch per hr. ciscoes only
Nov. 25	65	325	871	2	...	30	8	50	...	43	...	7	1	4	1	...	1017	14.0	2.68
26	55	276	677	1	...	13	3	18	...	28	...	7	3	1	1	...	752	10.0	2.46
27	45	226	1075 <sup>+3</sup>	2	...	5	3	13	...	6	...	3	...	3	...	...	1110	3.1	4.75
28	55	266	1209	...	1	18	2	8	...	3	...	3	2	5	1	1	1253	3.5	4.54
29	55	266	979	1	...	11	5	4	1	5	...	5	...	2	1	...	1014	3.4	3.68
30	52	207	1066	...	...	12	2	6	...	1	...	4	...	...	...	...	1091	2.3	5.14
Dec. 1	66	325	1087	...	...	6	...	3	...	2	...	6	1	...	2	...	1107	1.8	3.34
2	59	289	1167	...	...	2	1	4	...	2	...	2	...	...	...	...	1178	1.6	4.03
3	44	215	847	...	...	1	...	1	...	1	...	2	1	2	...	...	855	0.9	3.93
4	41	196	473 <sup>+31</sup>	1	...	3	...	2	...	...	...	...	2	...	...	...	481	1.7	2.41
5	42	205	538	...	...	3	...	4	...	2	...	5	...	...	1	...	553	2.7	2.62
6	41	197	346	...	...	2	...	...	...	2	...	2	...	...	...	...	352	1.7	1.75
7	45	213	334	...	...	1	...	9	...	...	...	1	...	...	1	...	346	3.0	1.56
8	32	160	391	...	...	...	...	4	...	...	...	1	...	...	...	...	396	1.2	2.44
9	23	112	122	...	...	1	...	...	...	1	...	1	...	2	...	...	127	3.8	1.08
10	23	115	145	...	...	...	...	1	...	...	...	...	...	...	...	...	146	0.7	1.26
Total	743	3593	11327 <sup>+34</sup> 11361	7	1	108	24	127	1	96	...	49	10	19	8	1	11778 <sup>+34</sup> 11812	3.47	3.15

Table V -- Age and Growth of Ciscoes taken from Birch Lake in the Fall of 1944

Age group	Number of specimens	Total length in inches			Percent of total collection
		Minimum	Maximum	Average	
II <sup>∇</sup>	24	11.22	12.67	11.94	8.60
III	194	10.82	13.14	12.15	69.53
IV	56	11.81	14.09	12.60	20.07
V	2	13.50	14.50	14.00	0.72
VI	1	...	...	14.43	0.36
VII	2	14.50	18.11	16.30	0.72

∇ Fish are one year older than indicated by the age groups. For example: The II-fish have lived through three growing seasons, etc.

Table VI -- Age and Growth of Ciscoes taken from Birch Lake in the Fall of 1945

Age group	Number of specimens	Total length in inches			Percent of total collection
		Minimum	Maximum	Average	
II	32	10.4	12.9	11.8	5.21
III	421	11.2	13.3	12.4	70.63
IV	131	12.0	13.79	12.8	21.97
V	10	12.6	13.7	13.2	1.67
VI	2	15.0	15.0	15.0	.33

In 1944 the average weight per cisco was computed to be 9 ounces. The average weight of certain aged ciscoes from Birch Lake was not determined due to difficulties encountered during the spawning season.



It was found that some fish were entirely spent, and others only partially so, and still others "green," consequently producing a significant change in individual weights which could not be compensated for in any manner. A total of 940 ciscoes were weighed during the 1945 netting operations, these fish were computed to weigh an average of 10.1 ounces each. Assuming that this weight is correct, a total harvest of 7,168 pounds of ciscoes were removed representing 23.3 pounds per acre. In 1944 10,540 pounds of ciscoes were removed, representing 32.9 pounds per acre.

Of the 940 ciscoes mentioned above, it was found that 85.6 percent were female and 14.4 percent were male. The 1944 netting resulted in a similar ratio. No reason for this male-female ratio is offered at the present time.

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