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THE CISCO HARVEST FROM BIRCH LAKE, CASS COUNTY, IN 1944

by

George N. Washburn

An experimental management project, consisting of the controlled harvest of ciscos was undertaken at Birch Lake, Cass County beginning in the fall of 1944. This project, based on the findings from a previous investigation conducted in 1943,[1] is planned to be in operation for at least three years, at the end of which time its complete value can be calculated. The basic plan consists of removing a set number of ciscos per year under certain regulations. To assist the reader, these regulations proposed and in use in 1944 are presented below.

1. Not more than 20,000 ciscos 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 the hours of 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 25 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.

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[1] Institute Report No. 948, "Experimental Cisco Netting In Birch Lake, Cass County, Michigan" by G. N. Washburn.

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.

The proposed annual harvest (see item 1 above) of ciscos is an arbitrary figure based somewhat on the findings presented in Institute Report No. 570.[2] This harvest would represent approximately 50 pounds of fish per acre, based on actual weights attained during the 1944 harvest, a significant figure in fish production for any Michigan lake. It is hoped by the end of the experiment to determine whether or not this figure is too high. Our ultimate objective, of course, is to be able to harvest as close as possible a maximum crop. We also plan to show that in using certain restrictions, ciscos can be removed from Birch Lake in large numbers with little interference to other species during the netting operations.

During the 1944 season a record of each fisherman's catch was collected, listing the number and kinds of fish taken and the hours spent in these operations. It was easy in this manner to compute the total data and keep abreast of daily events. In addition to the above collections, certain members of the Institute personnel[3] continued to work on cisco research, taking scale samples and weights of ciscos for growth studies and made further investigations pertaining to netting techniques.

A total of 19,044 fish were taken during the 16-day, 1944 season. Of these 18,738 were ciscos, consisting of 18,137 taken by the netters (see Table 1, page 3) and 601 taken by the Institute personnel for experimental or study purposes. The remaining lot of fish represented game species caught during the cisco harvest. It was computed that the average weight of each cisco was about 9 ounces. This would make a total production of 10,540 pounds of ciscos removed from Birch Lake

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[2] Institute Report No. 570, "Cisco Netting on Birch Lake, Cass County, During the Season of 1939" by Harold Bowditch.

[3] Rhyner Scholma, Wilma Scholma, and Ruth Kessler

Table 1

Daily summary of fish taken in gill nets from Birch Lake during the 1944 season

Date	No. of fishermen	No. of hours fishing	Species taken and number of each											Total number of fish	Per cent of other fish	Catch per hr. ciscos only
			Ciscos	Lake trout	Rainbow trout	Bullheads	Perch	Smallmouth bass	Largemouth bass	Green sunfish	Pumpkin-seeds	Bluegills	Rock bass			
Nov.																
25	34	168	1,413	1	6	2	99	2	1	...	3	2	10	1,539	8.19	8.41
26	38	186	1,250	...	9	...	34	...	...	...	2	...	1	1,296	3.55	6.72
27	32	158	1,461	1	2	...	9	...	...	...	2	...	6	1,481	1.35	9.25
28	42	209	1,558	...	1	1	13	3	4	...	1	2	5	1,588	1.89	7.45
29	45	225	1,639	...	3	...	3	...	...	...	2	2	1	1,650	0.67	7.28
30	27	135	1,481	...	1	...	3	...	1	...	5	1	2	1,494	0.87	10.97
Dec.																
1	25	125	1,164	...	3	1	1	...	1	...	2	...	1	1,173	0.76	9.31
2	40	199	1,673	...	1	...	1	1	2	...	...	2	...	1,680	0.42	8.41
3	49	243	1,458	...	1	...	6	1	...	...	2	1	...	1,469	0.75	6.00
4	44	214	1,421	...	...	...	5	...	...	...	...	...	...	1,426	0.35	6.64
5	48	240	1,076	...	2	2	2	...	...	...	...	2	...	1,084	0.43	4.48
6	45	221	828	...	1	...	2	...	...	...	1	...	...	832	0.81	3.75
7	31	155	450	...	...	...	2	...	1	1	1	...	...	455	1.10	2.90
8	31	155	525	...	...	...	1	...	...	...	...	...	...	426	0.23	3.39
9	38	190	513	...	1	...	1	...	...	...	...	...	...	515	0.39	2.70
10	13	65	227	...	...	...	1	...	...	...	...	...	...	228	0.44	3.49
Total	582	2,888	18,137	2	31	6	183	7	10	1	21	12	26	18,436		6.28

(208 acres in area), representing an average of 50.76 pounds per acre.

The percentage of other species taken during the cisco harvest was very low amounting to 1.62, or a ratio of 62.6 ciscos for every game fish. Perch were the most common game species taken accounting for 61 per cent of the total, rainbow trout were next, representing about 10 per cent. In all, 10 species other than ciscos were taken (see Table 1, page 3) and are listed below according to their abundance: perch, rainbow trout, rock bass, pumpkinseed, bluegills, largemouth bass, smallmouth bass, bullhead, lake trout, and green sunfish. The largest number of game species were taken on the first night (November 25) amounting to 126 fish. The next largest catch (46) was taken on the following night. From this date on the numbers gradually reduced.

The largest catch of ciscos was recorded on December 2, amounting to 1,673 and the lowest catch recorded on December 10, consisting of 227 ciscos. The average per day was 1,134. The first 10 days of the season produced 15,594 ciscos, representing 86 per cent of the total harvest.

The total number of fisherman days for the harvest was 582, represented by 105 individual fishermen. On the night of December 3, 49 fishermen participated in the harvest, representing the largest group for any night of the season. The least number present was on December 10, the last night.

Of the 105 fishermen participating in the 16-day harvest, two were recorded as having fished every night, three fished a total of 15 nights, 7 fished 12 nights, 4 fished 11 nights, 2 fished 10 nights, 4 fished 9 nights, 8 fished 8 nights, 6 fished 7 nights, 8 fished 6 nights, 10 fished 5 nights, 11 fished 4 nights, 7 fished 3 nights, 16 fished 2 nights, and 17 fished one night each.

The catch per hour (computed by dividing the total daily catch of ciscos by the total hours spent in netting these fish) ranged from a

high of 10.97 recorded on November 30 to a low of 2.70 on December 9. The average catch per hour of ciscos per net for the total season was 6.28. The catch per hour (with the exception of December 3) for the first 10 days of the season exceeded the season's average, and that of December 3 nearly equalled it (see Table 1, page 3). The average catch per hour for the last six days was 3.52, a significant reduction in comparison to the season's average.

Age and Growth of Ciscos

Samples of ciscos taken from day to day during the 16-day season were measured, weighed, and scale samples taken for age and growth studies. A total of 300 fish were used in these studies. Scale samples, taken from these fish were taken to the Institute laboratory, mounted on glass slides, and later the age of each specimen was computed. Out of the 300 scale samples collected, 279 were found to be of value in age determination. Presented below in Table 2 is the result of this study.

Table 2

Age and growth of ciscos taken from Birch Lake in the fall of 1944

Number of specimens	Total length in inches			Age group	Per cent of total collection
	Minimum	Maximum	Average		
24	11.22	12.67	11.94	2	8.60
194	10.82	13.14	12.15	3	69.53
56	11.81	14.09	12.60	4	20.07
2	13.50	14.50	14.00	5	0.72
1	...	...	14.43	6	0.36
2	14.50	18.11	16.30	7	0.72

Assuming that the sample of ciscos used in the growth studies was representative of the total cisco crop, it is evident that very few ciscos mature in their third year of life (2 year olds) or at least do not enter the spawning grounds in any great numbers, because if they did a much larger proportion of the catch would have been represented

by this group as there is very little difference in size (total length in inches) between the two-year olds and the three-year olds, which in the latter case were taken in large numbers. It is evident from these growth studies that the life span of the Birch Lake ciscos is relatively short, only a few fish living more than four years. There appears to be a heavy mortality among these fish between their third and fourth year of life, evidenced by the fact that Birch Lake had been closed to the taking of ciscos since 1939 and all four age groups would have a fair chance to be normally represented. If no mortality occurred between the third and fourth year, then it would be expected that a much higher proportion of old fish should show up in the fishermen's catch.

The growth in length of Birch Lake ciscos is rapid during the first three years. Two-year old ciscos (three growing seasons) had an average length of 11.94 inches (see Table 2, page 5) while three-year old fish (four growing seasons) had an average length of 12.15, indicating an increase of only 0.21 inches during the fourth season. Continued slow growth is evident for the next age group, four-year olds, having an increase of only 0.45 inches for the year.

The average weight of certain aged ciscos from Birch Lake was not determined due to difficulties encountered during the spawning season. It was found that some fish would be entirely spent and others only partially or "green," consequently producing a significant change in individual weights which could not be compensated for in any manner.

Individual Fishing Record

As mentioned previously, 105 fishermen took 18,137 ciscos during the 16-day season or roughly 172 ciscos per man. About 70 fishermen, representing 67 per cent of the total group took less than the average number of fish (see Table 3, page 7). Three fishermen failed to take a single specimen and 32 took less than 50. In contrast, three fishermen took over 1,000

each and one took nearly a thousand. Most of the former fishermen fished only one or at least just a few nights while the latter fished practically every night of the season.

Table 3

Individual fishermen's catches of ciscos

Number of ciscos caught	Corresponding number of fishermen	Number of ciscos caught	Corresponding number of fishermen
0	3	601 to 650	...
1 to 50	32	651 to 700	...
51 to 100	20	701 to 750	...
101 to 150	13	751 to 800	...
151 to 200	7	801 to 850	...
201 to 250	6	851 to 900	...
251 to 300	5	901 to 950	...
301 to 350	5	951 to 1,000	1
351 to 400	5	1,001 to 1,050	1
401 to 450	...	1,051 to 1,100	...
451 to 500	3	1,101 to 1,150	1
501 to 550	2	1,151 to 1,200	...
551 to 600	...	1,201 to 1,250	1

The individual catch per hour for the season ranged from 0.0 to 15.99, the average being 4.28 (see Table 1, page 3). Nine fishermen had a catch per hour of less than 1.0 and 70 netters had a seasons catch below the average catch per hour. The highest catch per hour (see Table 4, page 8) of 16.40 was recorded for one individual who fished every night of the season and took a total of 1,230 ciscos. The next highest catch per hour was represented by a single catch of 74 fish. In most instances the individual daily catch per hour was highest for the first 10 days of the season.

Individual records show that 40 fishermen took only ciscos during their entire netting operations, while the remaining group took, in addition to ciscos, one or more game species. Presented below is the frequency of game fish capture.

Species taken	No. of fishermen represented	Total number of fish
Ciscos (only)	40	2,654
Perch	38	199
Rainbow trout	22	31
Pumpkinseed	11	21
Rock bass	9	26
Bluegill	7	12
Largemouth bass	6	10
Smallmouth bass	4	7
Bullhead	4	6
Lake trout	2	2

Table 4

Total catch and catch per hour by individual fishermen during the 1944 season

Individual catch (catch per hour)															
0	25	20	30	183	50	215	35	129	372	100	335	380	535	74	1,230
0	1.25	2.00	3.00	4.06	5.00	6.14	7.00	8.60	9.30	10.00	11.16	12.66	13.27	14.80	16.40
0	28	114	125	104	51	464	70	304	374	154	505		1,104		
0	1.40	2.07	3.12	4.16	5.10	6.18	7.00	8.68	9.35	10.26	11.22		13.80		
0	15	11	63	99	307	346	358	87			957		1,038		
0	1.50	2.20	3.15	4.30	5.11	6.29	7.16	8.70			11.96		13.84		
7	87	22	81	131	26	337	396	482							
0.35	1.58	2.20	3.24	4.36	5.20	6.36	7.22	8.76							
2	59	44	82	57	26	194	223	44							
0.40	1.68	2.20	3.28	4.38	5.20	6.46	7.43	8.80							
3	17	41	33	110	204	165	186	264							
0.60	1.70	2.27	3.30	4.40	5.20	6.60	7.44	8.80							
4	36	12	152	89	279	199	459	223							
0.80	1.80	2.40	3.38	4.45	5.36	6.66	7.65	8.92							
32	39	54	116	47	136	136	77								
0.91	1.95	2.70	3.41	4.70	5.44	6.80	7.70								
14		81	137	260	55	69									
0.93		2.70	3.42	4.72	5.50	6.90									
		50	36	287	250	104									
		2.77	3.60	4.78	5.55	6.93									
		14	144	24	221										
		2.80	3.60	4.80	5.66										
		14	132	293											
		2.80	3.77	4.89											
		72	19												
		2.88	3.80												
			57												
			3.80												

Netting Research

Institute nets, of mesh sizes comparable to those used by local fishermen, were set 13 days out of the total of 16 at various locations on the lake in different depths of water during the evening and night. The fish taken in this manner were given away to the local people who assisted in the work. A total of 601 ciscos and 7 perch were collected in this manner (see Table 5, page 10).

As a repetition of the experimental project conducted in the fall of 1943, evening and all night sets were made on three different occasions, namely, November 27, 28, and 29. Again, as previously determined, the heaviest run was recorded for the evening sets. A total of 167 ciscos were taken during the three evenings, representing a catch per hour of 5.56 while sets made during the night took 91 ciscos, representing a catch per hour of 1.89.

Nets suspended 8 feet from the surface took only ciscos even though these sets were made over areas where a large number of perch have been gilled.

As the season progresses and the "run" tapers off, some fishermen believed that sets made in deeper water, than that allowed, would effectively take fish. To check this point, 9 sets were made in water depths ranging from 30 to 90 feet. These nets took 77 ciscos and 4 perch in 45 hours, representing a catch per hour of 1.80. This catch per hour is much lower than the average (by fishermen) for the last six days of the season, produced by shallow water sets.

A total of 433 ciscos were taken in 13 sets during a 65-hour period, set according to the prescribed official regulations governing the taking of ciscos from Birch Lake. This catch represents a catch per hour of 6.66 per net, quite comparable to the average catch per hour attained by the local fishermen during the total cisco harvest.

Table 5

Results of experimental sets in Birch Lake from November 27 to December 10

Date of set	Mesh size of net (inches)	Hours net was in operation	Species taken: Ciscos	Species taken: Perch	Water depth (feet)	Type of set
Nov. 27	2 1/2	5:00 P.M.-11:00 P.M.	26	...	18-30	Bottom rest
" "	2 1/2	11:00 P.M.-8:00 A.M.	9	...	18-30	Bottom rest
" "	3	5:00 P.M.-11:00 P.M.	4	...	18-30	Bottom rest
" "	3	11:00 P.M.-8:00 A.M.	8	...	18-30	Bottom rest
Nov. 28	2 1/2	5:00 P.M.-11:00 P.M.	21	...	16-30	Suspended 8 ft. below surface
" "	2 1/2	11:00 P.M.-8:00 A.M.	5	...	16-30	Suspended 8 ft. below surface
" "	3	5:00 P.M.-11:00 P.M.	11	...	16-30	Suspended 8 ft. below surface
" "	3	11:00 P.M.-8:00 A.M.	4	...	16-30	Suspended 8 ft. below surface
Nov. 29	2 1/2	5:00 P.M.-11:00 P.M.	59	...	18-37	Suspended 8 ft. below surface
" "	2 1/2	11:00 P.M.-8:00 A.M.	21	...	18-37	Suspended 8 ft. below surface
" "	2 1/2	5:00 P.M.-11:00 P.M.	46	...	16-32	Suspended 8 ft. below surface
" "	2 1/2	11:00 P.M.-8:00 A.M.	44	...	16-32	Suspended 8 ft. below surface
Dec. 1	1 net 2 1/2	5:00 P.M.-11:00 P.M.	62	...	20-25	Bottom rest
Dec. 2	2 nets 2 1/2	5:00 P.M.-11:00 P.M.	117	3	20-25	Bottom rest
Dec. 3	1 net 2 1/2	5:00 P.M.-11:00 P.M.	34	...	20-25	Bottom rest
Dec. 4	1 net 2 1/2	5:00 P.M.-11:00 P.M.	24	...	25-30	Bottom rest
Dec. 5	1 net 2 1/2	5:00 P.M.-11:00 P.M.	27	...	25-30	Bottom rest
Dec. 6	1 net 3	5:00 P.M.-11:00 P.M.	2	...	25-30	Bottom rest
Dec. 7	1 net 2 1/4	5:00 P.M.-11:00 P.M.	13	...	32-36	Bottom rest
" "	1 net 2 3/4	5:00 P.M.-11:00 P.M.	21	3	32-45	Bottom rest
" "	1 net 3	5:00 P.M.-11:00 P.M.	6	1	32-40	Bottom rest
Dec. 8	2 nets 2 1/4, 2 3/4	5:00 P.M.-11:00 P.M.	11	...	40-60	Bottom rest
Dec. 9	2 nets 2 1/4, 2 3/4	5:00 P.M.-11:00 P.M.	24	...	35-50	Bottom rest
Dec. 10	2 nets 2 1/4, 2 3/4	5:00 P.M.-11:00 P.M.	2	...	80-90	Bottom rest

Recommendations and Remarks

It is recommended that Birch Lake, Cass County be opened for the taking of ciscos during the 1945 season under the same regulations as were in force during 1944.

Some comments have been received in regard to the cisco regulations prescribed for Birch Lake. These have been studied and will be given due consideration in future operations after the experimental work is completed. It is felt by some individuals that the 20,000 cisco quota per season is too high and should be reduced to some figure around 10,000. It is not known at present if the 20,000 limit is too high. This figure was based on findings presented in Institute Report No. 570, which indicated that more than 20,000 ciscos were taken in 1939, the last year Birch Lake was open for the taking of ciscos. Birch Lake was an open cisco lake many years before 1939 and certainly was not showing any depletion according to figures for the last season's catch. The main object of this controlled cisco harvest is to obtain as close as possible the maximum annual yield and in order to do this it is felt that a 20,000 fish removal for a few years is necessary.

Further indications that a 20,000 limit is not in excess is brought about by the results of growth studies from these fish. The ciscos in Birch Lake are apparently a short lived species, the life span being about four years. It is believed that a heavy mortality occurs between the third and fourth year of life and if so then the fish should be harvested before this natural mortality occurs. A heavy cropping of the mature fish should not materially reduce the coming populations, providing that adequate protection is present to allow a small percentage to spawn successfully. The presence of two-year old fish in the catch was negligible, thus assuring a crop of spawners for the next year.

Another comment made was a desire to restrict the bag limit per fisherman. This idea certainly has merit and should possibly be considered for future use. It is felt at present though, that this regulation is not necessary and is undesirable for several reasons, namely: the 20,000 limit was not reached in a 16-day period even though the average catch per hour indicated that this could be accomplished by 100 fishermen per night in a weeks time. There are available in this area more than 100 licensed cisco fishermen which could have participated in this harvest any one night. It appears that the demand for ciscos in Birch Lake was not great enough to entice most of the cisco fishermen. Therefore, until the demand is critical no bag limit should be imposed. Hypothetically, if a larger number of cisco netters would have been present during the first of the season, the 20,000 fish would have been harvested in less than 16 days, thus automatically reducing the total catch for any one fisherman. As an example, if the 20,000 ciscos were taken in 5 days instead of 16, then no one person could net more than the alloted time and his total take would be in direct proportion to the catch per hour. It is suggested that any fisherman who feels that he is not getting his share of the total catch should start his netting operations at the beginning of the season.

Prohibiting the sale of ciscos along with a special bag limit has been suggested for all inland lake cisco netters. Very little is known about the sales transactions of ciscos and no comments are made at this time.

There are select locations on Birch Lake where netters are more successful and a certain amount of "taking over" these areas by individual fishermen has been noted. This type of netting is not encouraged and measures are being developed to correct this condition.

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