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1975 FISHERIES SURVEY OF TORCH LAKE, ANTRIM COUNTY

Warren Alward, Fisheries Habitat Biologist

SUMMARY

This survey was initiated to evaluate an increased lake trout stocking program begun in 1969. Although lake trout are native to Torch Lake, limited fry, fingerling, yearling or legal-size fish stocking has continued since 1895.

In October, 1975, the fish population of Torch Lake, Antrim County was surveyed with standard Great Lakes gill net gangs. Index stations were established and sampling gear was standardized so year-to-year comparisons of species abundance could be made.

Lake trout (66 percent of the catch by weight) followed by cisco and whitefish were the most abundant species collected in the survey. The catch of lake trout per 1,000 feet of gill net compared favorably with similar netting efforts in Lake Michigan during 1975. Lake trout catch per 1,000 feet of net for Torch Lake and Lake Michigan were 20.3 and 17.6 respectively.

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INTRODUCTION

A gill net survey was conducted on Torch Lake, Antrim County from October 21, through October 30, 1975. The survey was designed to evaluate survival and growth of recent lake trout plants. The numbers of lake trout stocked were greatly increased beginning in 1969. An attempt was made to standardize gear and set up index stations so year-to-year comparisons of abundance of major species can be made.

SURVEY PROCEDURES

Ten overnight sets were made from the steel "sucker barge" with standard Great Lakes gill net gangs. This is a 1,000-foot nylon net with 100-foot sections, each having mesh sized 1½-inch through 6-inch stretch measure. The net is six feet deep.

All fish were measured to the nearest tenth of an inch. Lake trout were sexed and their stomach contents were analyzed. Some of the whitefish were sexed. All fish were weighed to the nearest ounce. Ten fish per inch group for each species were scale sampled for age and growth analysis. Not all fish were aged; therefore, an estimated age structure was generated by taking the percent per inch group for each age and expanding this to the total catch. The catch data from each 1,000-foot gang is filed in the Atlanta Field Office. Length distributions of fish taken are listed in Table 1.

SURVEY RESULTS AND DISCUSSION

The majority of fish collected were lake trout, cisco and whitefish. A discussion of fish by species follows.

Lake Trout

Two hundred and three lake trout, weighing 840 pounds, were taken during the survey. This was 66 percent of the catch by weight. The length range of these fish was 9.2 to 32.6 inches. Lake trout are the dominant game species in this lake. The catch per unit effort (C.P.E.) of lake trout per 1,000 feet of gill net was 20.3 (Table 2). This compares well with catches from Lake Michigan where the mean C.P.E. in 1975 using the same gear was 17.6 (Rybicki and Keller, 1976). A similar survey in Elk Lake, Antrim County, showed a C.P.E. of only 2.23.

The extent of natural reproduction must be known before an accurate assessment of fish stocking can be made. We did not attempt to determine which fish were produced in the lake because none of the stocked fish had been marked prior to release into the lake. Lake trout were native to Torch Lake. A state party surveyed the lake in 1888 and reported taking lake trout (I.F.R. Report 1931). Stocking of fry started in 1895 and plants of fry, fingerlings, yearlings or legal-size fish continue to the present. Rodeheffer and Day reported that natural reproduction was taking place in 1958. Miller concluded that approximately 33 percent of the lake trout were stocked (Miller, 1966). This study was done in 1965, before stocking was increased. Patulski found that 55 percent of the lake trout ovaries analyzed from Torch Lake had a concentration of 2.95 p.p.m. or more of D.D.T. He felt this would cause a significant mortality of sac fry (Patulski, 1971).

Table 3 shows the sex ratio and maturity of lake trout and whitefish collected. Most lake trout were mature at 21 inches or Age V. This is a full year earlier than lake trout from Lake Michigan where only 13 percent of the Age V females were mature (Rybicki and Keller, 1976). Reproduction would be largely dependent on only three year-classes in Torch Lake.

Although the survey was close to the spawning time of lake trout in Torch Lake, we did not encounter large concentrations of spawning fish which might bias our findings. There was a predominance of mature males in the catch, but the females did not appear to be fully ripe and their eggs were not running freely. Fisheries Division attempted to take lake trout eggs from Torch Lake in 1958 and 1959. At that time it was also noted that the majority of spawning occurred between October 15th and November 15th, with no concentrations of spawning fish located.

An attempt was made to relate year-class strength to stocking. Estimated age structure is shown in Figure 1. Table 5 relates stocking to year-classes. Age VI (1970 year-class) fish made up the largest percentage (44) and corresponds to a stocking of 70,000 yearlings in 1970. Age V (1971 year-class) fish, the next strongest year-class, represented 30 percent of the catch and corresponds to a stocking of 15,000 yearlings in 1971. The largest plant of yearlings, 115,000 in 1972, should have produced a large year-class but only 24 Age IV fish were taken.

It is difficult to draw any conclusions as to relative survival of the plants. Year-classes may not be equally vulnerable to the gear and natural reproduction may vary. Annual sampling would allow us to assess more accurately year-class strength.

Little information was gained from stomach analysis. Digestion during the time the fish were in the gill nets made identification of stomach contents difficult. One hundred ninety seven (197) lake trout stomachs were examined. Fifty (50) percent were empty and the other contained fish remains. Most were unidentifiable, but a few cisco, smelt and perch were recognized.

Table 6 compares the growth of lake trout collected in 1975 with previous surveys. The 1975 growth data is similar to that collected in past years.

Whitefish

A C.P.E. for whitefish of 16.4 indicates a large population is present. One hundred sixty four (164) whitefish weighing 306 pounds were taken during the survey. This was 24 percent of the catch by weight. The length range of these fish was 12.4 to 23.5 inches.

An age distribution curve for whitefish is shown in Figure 1. It shows a relatively even age distribution from Age III to XI, similar to the whitefish population in Grand Traverse Bay which is closed to commercial fishing. Commercially fished whitefish stocks in northern Lake Michigan were composed mainly of Age III and younger fish (Rybicki and Keller, 1976). Torch Lake whitefish had no year-class voids indicating annual recruitment and reproduction.

Growth of whitefish was similar to that found in past studies on Torch Lake (see Table 7). There is considerable overlapping of length in age groups (Table 8). Forty (40) percent of the whitefish caught were sexed. Sixty (60) percent were immature. Most fish were mature when they reached 18 inches in length. The whitefish had not spawned before the survey and C.P.E. was not influenced by spawning concentrations.

Cisco

One hundred eighty seven (187) cisco weighing 75 pounds were taken. These fish ranged from 4.8 to 15.2 inches. Figure 1 depicts the age distribution curve for cisco. Young-of-the-year to Age VIII fish were represented. No year-classes were void. Recruitment of cisco is apparently steady.

Age and growth of cisco is shown in Table 9. Growth was similar to that determined in past surveys of Torch Lake. There was considerable overlap of length between age groups (Table 10).

Other Species

No other species were abundant in the survey (see Table 1). Even perch were represented by only 32 individuals. In the past, burbot were considered to be an undesirable predator. Only seven (7) were taken. They are apparently relatively scarce now.

MANAGEMENT CONSIDERATIONS

Great Lakes data sheets might be used in future surveys to record netting information. This would allow summarization of the data.

It appears there is an excellent population of lake trout in Torch Lake. We should continue stocking at the present rate until more information is gathered. A distinctive finclip should be used on lake trout stocked into Torch Lake to aid in evaluation of natural reproduction and migration to Elk Lake and Lake Bellaire.

Mail creel census surveys in 1970 and 1973 reported only 0.5 and 0.7 angler-days per acre respectively for Torch Lake. This level of fishing effort is not too surprising considering the size of Torch Lake. Based on the number of lake trout and whitefish found in this survey, however, the lake could and should support much more fishing.

REFERENCES

1. Institute of Fisheries Research Report No. 112, 1931, Torch Lake.

2. Miller, Barry Robert, 1966 - Age and Growth of Lake Trout and Whitefish in Torch Lake, Antrim County, Michigan. M. S. Thesis, Central Michigan University.

3. Patulski, Daniel E., 1971 - D.D.T. Levels in Lake Trout, Whitefish and Cisco from Torch Lake, Antrim County, Michigan. M. S. Thesis, Central Michigan University.

4. Rybicki, R. W. and Keller, Myrl, 1976 - Progress Report on Major Fish Species in Lake Michigan. Presented at Great Lakes Fishery Commission, Milwaukee, Wisconsin.

AGE DISTRIBUTION OF LAKE TROUT, WHITEFISH & CISCO FROM TORCH LAKE

FIGURE 1

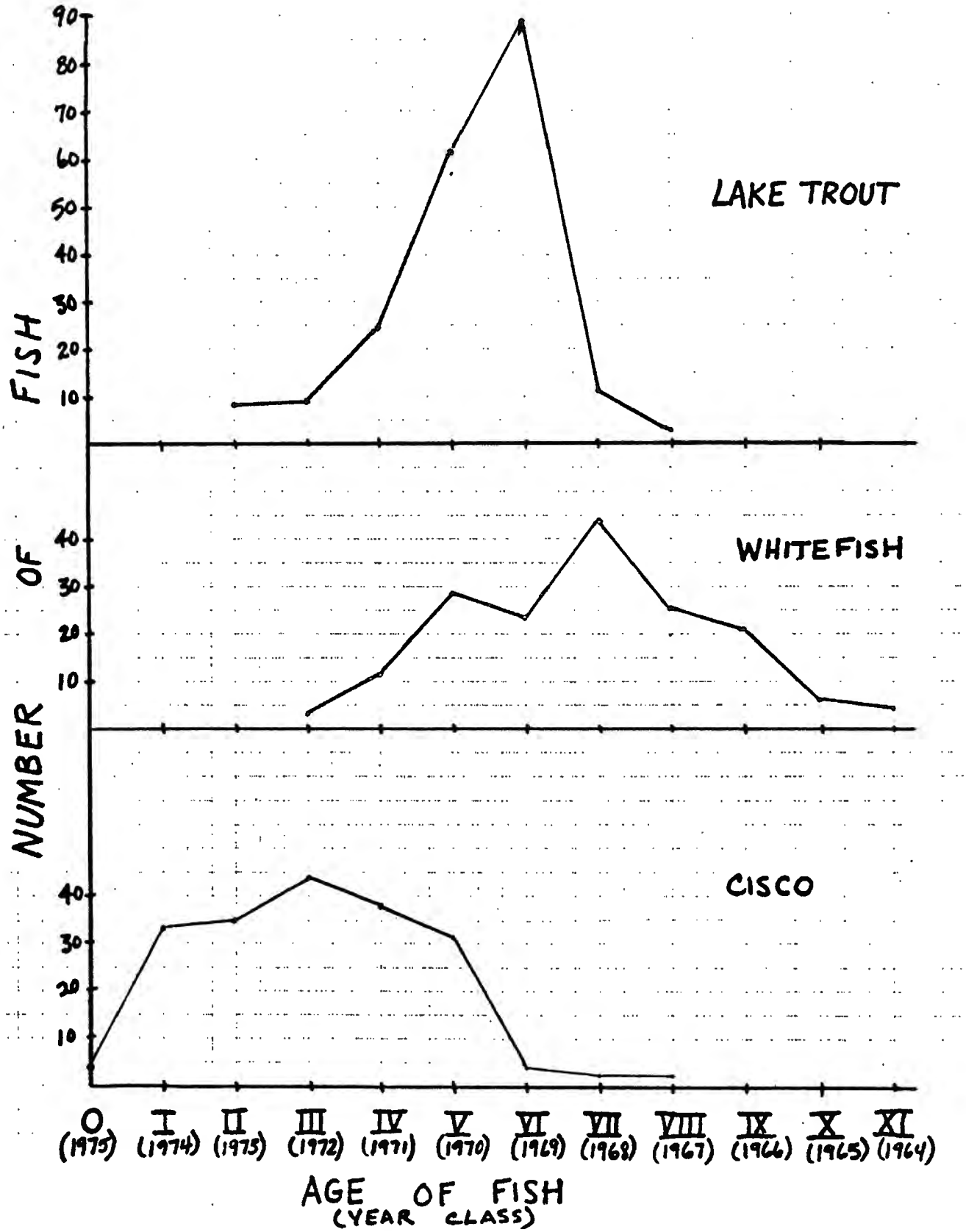

TABLE 1. Length Distribution & Weight by Species
Collected in 1975 Torch Lake Survey

*Estimate

Inch Group	Lake Trout	Brown Trout	Yellow Perch	Rock Bass	Cisco	White-fish	Burbot	White Sucker	Smallmouth Bass	TOTAL
3	-	-	-	1	-	-	-	-	-	
4	-	-	-	2	3	-	-	-	-	
5	-	-	1	-	4	-	-	-	-	
6	-	-	21	-	7	-	-	-	-	
7	-	-	8	1	19	-	-	1	-	
8	-	-	-	6	25	-	-	-	-	
9	3	-	-	-	33	-	-	-	-	
10	2	-	2	-	16	-	-	-	-	
11	1	1	-	-	10	-	-	-	-	
12	2	-	-	-	31	1	-	-	-	
13	1	-	-	-	25	1	-	-	1	
14	-	-	-	-	10	7	-	-	-	
15	6	-	-	-	3	25	-	-	-	
16	7	-	-	-	-	29	-	-	-	
17	6	-	-	-	-	31	-	2	-	
18	7	-	-	-	-	27	-	3	-	
19	6	-	-	-	-	20	-	1	-	
20	7	-	-	-	-	11	-	-	-	
21	16	-	-	-	-	8	-	-	-	
22	25	-	-	-	-	1	-	-	-	
23	29	-	-	-	-	3	-	-	-	
24	26	-	-	-	-	-	1	-	-	
25	21	-	-	-	-	-	1	-	-	
26	20	-	-	-	-	-	1	-	-	
27	6	-	-	-	-	-	1	-	-	
28	7	-	-	-	-	-	3	-	-	
29	1	-	-	-	-	-	-	-	-	
30	2	-	-	-	-	-	-	-	-	
31	1	-	-	-	-	-	-	-	-	
32	1	-	-	-	-	-	-	-	-	
Total	203	1	32	10	187	164	7	7	1	612
Total Weight	839.6	0.5	4.2	2.1	74.6	305.8	36.6	10.0*	0.6*	1,274
% by Weight	66%	-	-	-	6%	24%	3%	1%	-	

TABLE 2. Catch per Unit of Effort, from 1975 Surveys
(C.P.E. = Number/1,000 ft. gillnet)

Species	No. Caught Torch Lake	C.P.E. 10 Nets	No. Caught Elk Lake	C.P.E. 13 Nets
Lake Trout	203	20.30	29	2.23
Brown Trout	1	0.10	-	-
Yellow Perch	32	3.20	71	5.46
Rock Bass	10	1.00	243	19.08
Cisco	187	18.70	54	4.15
Whitefish	164	16.40	93	7.15
Burbot	7	0.70	10	0.77
White Sucker	7	0.70	35	2.69
Smallmouth Bass	1	0.10	3	0.23

TABLE 3. Sex & Maturity of Lake Trout & Whitefish from Torch Lake, 1975

Inch Group	Lake Trout Males	Lake Trout Females	Lake Trout Immature	Whitefish Males	Whitefish Females	Whitefish Immature
9	-	-	3	-	-	-
10	-	-	2	-	-	-
11	-	-	1	-	-	-
12	-	-	2	-	-	1
13	-	-	1	-	-	1
14	-	-	-	-	-	6
15	-	-	6	2	-	12
16	1	1	5	1	4	11
17	-	2	4	1	4	7
18	1	-	5	2	1	1
19	1	1	3	2	5	-
20	2	-	4	1	1	-
21	7	5	4	1	1	-
22	18	5	1	-	-	-
23	21	7	1	-	-	-
24	19	7	-	-	-	-
25	9	10	-	-	-	-
26	12	8	-	-	-	-
27	3	2	-	-	-	-
28	5	2	-	-	-	-
29	-	1	-	-	-	-
30	2	-	-	-	-	-
31	1	-	-	-	-	-
32	-	1	-	-	-	-
Total	102	52	42	10	16	39
Percent	52%	27%	21%	15%	25%	60%

TABLE 4. Length & Age Distribution of Torch Lake Lake Trout in 1975

INCH GROUP	II	III	IV	V	VI	VII	VIII
9	3	-	-	-	-	-	-
10	2	-	-	-	-	-	-
11	1	-	-	-	-	-	-
12	2	-	-	-	-	-	-
13	-	1	-	-	-	-	-
14	-	-	-	-	-	-	-
15	-	6	-	-	-	-	-
16	-	2	5	-	-	-	-
17	-	-	6	-	-	-	-
18	-	-	7	-	-	-	-
19	-	-	5	1	-	-	-
20	-	-	1	6	-	-	-
21	-	-	-	16	-	-	-
22	-	-	-	10	15	-	-
23	-	-	-	8	21	-	-
24	-	-	-	5	21	-	-
25	-	-	-	9	12	-	-
26	-	-	-	4	16	-	-
27	-	-	-	2	2	2	-
28	-	-	-	-	2	5	-
29	-	-	-	-	-	1	-
30	-	-	-	-	-	2	-
31	-	-	-	-	-	1	-
32	-	-	-	-	-	-	1
TOTAL	8	9	24	61	89	11	1

TABLE 5. Comparison of Year-Class Strength & Stocking History for Torch Lake

Age (Year-Class)	II (1973)	III (1972)	IV (1971)	V (1970)	VI (1969)	VII (1968)	VIII (1967)	Total
Number in Sample	8	9	24	61	89	11	1	203
Percent of Sample	3.9	4.5	11.8	30.0	43.9	5.4	.5	100%
Lake Trout Plants Number	54,891	29,500	115,000	15,000	70,000	50,000	13,199	
Age (months)	15	15	17	21	18	17	Spring Fingerling	
Size (inches)	5.37	5.47	4.0	5.25	3.5	3.5	-	
Month	April	May	June	Sept.	May	May	-	
Year	1974	1973	1972	1971	1970	1969	1967	
Hatchery	Oden	Oden	Marquette	Charl.	Marquette	Marquette	-	

TABLE 6. Date of Collection & Mean Length of Lake Trout from Torch Lake

AGE GROUP	July/Aug. 1958 (No.)	Oct. 1958 (No.)	Fall 1964 Spring 1965 (No.)	Oct. 1972 (No.)	Oct. 1975 (No.)
II	9.9 (2)	10.2 (2)	12.5 (1)	12.1 (16)	10.7 (8)
III	13.2 (4)	13.5 (3)	-	15.9 (13)	15.3 (9)
IV	-	-	11.0 (3)	19.9 (4)	18.1 (24)
V	19.5 (3)	20.5 (1)	18.8 (10)	25.5 (12)	22.8 (34)
VI	22.4 (3)	23.9 (7)	24.0 (6)	27.0 (2)	25.0 (39)
VII	26.4 (1)	25.9 (4)	25.2 (19)	31.7 (3)	29.2 (11)
VIII	-	29.4 (3)	27.8 (22)	-	32.6 (1)
IX	-	31.9 (1)	29.0 (6)	-	-
X	-	-	30.5 (5)	-	-
XI	-	-	30.2 (5)	-	-

TABLE 7. Date of Collection & Mean Length of Whitefish from Torch Lake

AGE GROUP	Fall 1964 Spring 1964 (No.)	Oct. 1972 (No.)	Oct. 1975 (No.)
I	7.0 (1)	-	-
II	-	11.4 (4)	-
III	-	12.5 (11)	12.9 (2)
IV	11.0 (6)	14.4 (15)	14.8 (8)
V	11.9 (13)	15.8 (18)	15.5 (11)
VI	17.0 (1)	17.5 (14)	16.6 (8)
VII	-	-	18.2 (21)
VIII	22.5 (1)	-	18.5 (13)
IX	19.5 (1)	-	20.4 (17)
X	21.5 (1)	-	21.6 (5)
XI	21.5 (1)	-	23.3 (3)
XII	22.9 (5)	-	-

TABLE 8. Length and Age Distribution for Whitefish from Torch Lake

INCH GROUP	AGE GROUP III	IV	V	VI	VII	VIII	IX	X	XI
12	1	-	-	-	-	-	-	-	-
13	1	-	-	-	-	-	-	-	-
14	-	5	2	-	-	-	-	-	-
15	-	8	17	-	-	-	-	-	-
16	-	-	9	20	-	-	-	-	-
17	-	-	-	2	19	9	-	-	-
18	-	-	-	-	17	10	-	-	-
19	-	-	-	-	7	7	7	-	-
20	-	-	-	-	-	-	11	-	-
21	-	-	-	-	-	-	4	4	-
22	-	-	-	-	-	-	-	1	-
23	-	-	-	-	-	-	-	-	3
TOTAL	2	13	28	22	43	26	22	5	3

TABLE 9. Age & Growth of Cisco from Torch Lake

AGE GROUP	Mean Length in Inches				
	July/Aug. 1958 (No.)	April 1966 (No.)	November 1970 (No.)	Oct. 1972 (No.)	Oct. 1975 (No.)
0	-	-	-	-	4.6 (3)
I	7.3 (4)	-	7.5 (1)	-	7.1 (19)
II	10.5 (1)	-	8.2 (4)	-	9.1 (16)
III	10.6 (5)	-	-	10.6 (2)	10.3 (21)
IV	11.8 (9)	10.2 (1)	-	11.7 (21)	12.2 (22)
V	12.2 (35)	11.0 (7)	11.8 (1)	12.7 (19)	13.5 (18)
VI	12.8 (20)	13.4 (3)	12.9 (1)	13.8 (6)	14.0 (4)
VII	13.8 (1)	-	-	14.2 (2)	15.1 (1)
VIII	-	-	-	-	15.2 (1)

TABLE 10. Length and Age Distribution for Cisco from Torch Lake

INCH GROUP	0	I	II	III	IV	V	VI	VII	VIII
4	3	-	-	-	-	-	-	-	-
5	-	4	-	-	-	-	-	-	-
6	-	6	1	-	-	-	-	-	-
7	-	15	4	-	-	-	-	-	-
8	-	8	11	6	-	-	-	-	-
9	-	-	15	18	-	-	-	-	-
10	-	-	2	10	5	-	-	-	-
11	-	-	2	4	4	-	-	-	-
12	-	-	-	2	20	9	2	-	-
13	-	-	-	3	8	15	-	-	-
14	-	-	-	-	1	6	3	-	-
15	-	-	-	-	-	1	-	1	1
TOTAL	3	33	35	43	38	31	5	1	1