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Recoveries of Marked Lake Trout Planted in Lake Michigan  
and Lake Huron in 1944-1948

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The primary objective of the Great Lakes Lake Trout Committee, formulated in December 1943, was to determine the effect of artificial propagation of lake trout on the commercial fisheries. Unfortunately the Committee's well-planned program was largely nullified by the predation of the sea lamprey which is held responsible for the decline of lake trout production in State of Michigan waters of Lake Michigan from 2,814,200 pounds in 1943 to less than 50 pounds in 1954, and in Michigan waters of Lake Huron, from 459,000 pounds in 1943 to nil in 1953 and 1954 (Table 1).

This report covers only a portion of Michigan's contribution to the work of the Committee and deals with the recoveries of fin-clipped lake trout in Michigan waters of Lake Michigan and Lake Huron during the period 1947-1955. Other aspects of the study were reported by Hazzard (1947), Van Oosten (1950), and Cable (1956).

In September of 1944, 1945 and 1946 a total of 411,394 fin-clipped fingerling lake trout were planted in northern Lake Michigan in the vicinity of the Fox Islands. The dorsal and adipose fins were removed from 100,280 fingerlings stocked in 1944; the right pectoral fin was clipped from 159,712 planted in 1945; and the left pectoral fin was removed from 151,402 stocked in 1946. The fish were reared at the U. S. Fish and Wildlife Service hatchery at Charlevoix and marked by personnel from Michigan and Wisconsin. During

Table 1.—Catch of lake trout (pounds)  
by commercial fishermen in State of Michigan waters  
of Lake Michigan and Lake Huron, 1943-1954. ✓

Year	Lake Michigan	Lake Huron
1943	2,814,200	459,000
1944	2,609,400	363,400
1945	2,228,200	172,900
1946	1,908,000	38,100
1947	913,800	12,300
1948	589,200	4,000
1949	223,200	900
1950	24,900	< 50
1951	2,200	< 50
1952	400	< 50
1953	300	...
1954	< 50	...

✓ Taken from Lake Fisheries an annual summary published by the U. S. Department of the Interior, Fish and Wildlife Service.

this 3-year period a total of 3,277,402 lake trout fingerlings were planted in Lake Michigan (Table 2).

A total of 510,647 lake trout fingerlings, reared at the Charlevoix Hatchery, were planted in Lake Huron off Alpena, Michigan in September of 1947 and 1948. Of these 73,890 or 14.5 percent were marked by State of Michigan personnel. The right pelvic fin was clipped from 51,284 fingerlings planted in 1947 and the left pelvic fin was removed from 22,606 stocked in 1948 (Table 3).

The fin-clipping experiment was publicized to all commercial fishermen in Michigan by posting reward placards in fish houses and fishing boats and on docks along the shore of Lake Michigan and Lake Huron. Articles dealing with this experiment have appeared in the newspapers, Michigan Conservation (Hazzard, 1947), and The Fisherman (Van Oosten, 1950).

At the beginning of the experiment a \$2.00 reward was paid for the recovery of each marked fish. When a lake trout with a missing or badly deformed fin was caught, the commercial fisherman called the local Conservation Officer who inspected the trout and arranged for payment of the reward. For legal-size fish the officer cut off the fin scar or scars and preserved them in 10-percent formalin, took scale samples, and recorded the name and residence of the fisherman, date, locality and depth of capture, and type of gear. Fish of illegal size (less than 1 1/2 pounds, round weight, or 1 1/4 pounds, dressed) were shipped on ice to Ann Arbor where appearance of the marked fin was recorded, and scale samples, length and weight of the fish taken. The Conservation Officer forwarded the remainder of the information. Effective May 1, 1951, the Michigan Conservation Commission increased the reward for the recovery of marked lake trout of legal size to \$4.00 per fish and continued the payment of \$2.00 for smaller marked lake trout.

Table 2.--Numbers of fingerling lake trout stocked  
and numbers marked, Lake Michigan, 1944-1946.

Year	Total number planted	Marked fish			
		Number	Percentage of total	Average total length (inches)	Fins clipped
1944	1,093,237	100,280	9.2	2.9	Dorsal and adipose
1945	1,299,488	159,712	12.3	3.2	Right pectoral
1946	884,677	151,402	17.1	3.2	Left pectoral
Total	3,277,402	411,394	12.6	3.1	...

Table 3.—Numbers of fingerling lake trout stocked  
and numbers marked, Lake Huron, 1948 and 1949.

Year	Total number planted	Marked fish			
		Number	Percentage of total	Average total length (inches)	Fins clipped
1947	338,880	51,284	15.1	2.9	Right pelvic
1948	171,767	22,606	13.2	2.8	Left pelvic
Total	510,647	73,890	14.5	2.9	...

This motion further specified that the entire fish was to be shipped to the Institute for Fisheries Research in accordance with previous shipping instructions. The Commission order on payment of a reward for marked lake trout expired December 31, 1955.

Each report of the recapture of a marked fish was acknowledged by letter to the reporting officer, with copies to A. B. Cook, Jr., Lansing office of the Fish Division, to either Dr. John Van Oosten or Dr. James W. Moffett, Chairman of the Great Lakes Lake Trout Committee, and to the officer's District Supervisor. The letter to the officer gave an opinion as to the validity of the recovery. In many cases it was possible to state that the specimen was a valid recovery of a marked hatchery fish, but there were also many questionable specimens due to a high degree of regeneration of the clipped fin. The reward was paid on many specimens which were in the doubtful category to encourage further cooperation by the fishermen. The officer was asked to impress on the fishermen the reasons for evaluating recoveries as "doubtful."

Scale samples of lake trout with deformed or clipped fins were turned over to Miss Louella E. Cable, Fishery Research Biologist with Great Lakes Fishery Investigations. Her 1956 paper entitled "Validity of age determination from scales, and growth of marked Lake Michigan lake trout" is based on an intensive study of these scale samples.

The appearance of abnormal fins in terms of numbers of fin rays and length of fin was used as the criterion for evaluating recoveries. In a few fish the appearance of the fin and the extreme size of the fish was used to place it in the doubtful category. Throughout the experiment all lake trout taken in the vicinity of South Haven and southward were considered in the doubtful category since no recoveries of marked lake trout were reported from the 60-mile stretch between Montague and South Haven.

Some information was obtained on 1,608 fish from Lake Michigan with clipped or deformed fins. The annual recoveries of marked lake trout are given in Table 4. A total of 1,363 fish or 84.7 percent were classified as recoveries of marked fish and the remaining 246, as doubtful. Recoveries from the 1945 planting exceeded those from the 1946 planting by more than 4:1 and exceeded recoveries from the 1944 planting by more than 30:1. The rate of recovery of marked fish from all plantings was small (0.03, 0.67, and 0.17 percent of those marked in 1944, 1945 and 1946, respectively). No explanation is offered for the higher percentage of returns from the 1945 planting than from the others.

Most marked lake trout were caught in the vicinity of Charlevoix and Manistique. These two ports accounted for 1,129 marked fish or 82.8 percent of the recoveries. Recoveries of marked fish tabulated according to residence of the commercial fishermen who caught the fish (Table 5) indicate a gradual scattering of small lake trout from the area of release. Smith and Van Oosten (1940) reported a similar pattern of movement for small native lake trout tagged in Lake Michigan.

Only 138 (10.1 percent) of the recoveries of marked lake trout were of legal size (Table 6). This low rate of recovery is no doubt due mainly to the predation of sea lampreys on the larger lake trout.

Age determinations from scales of captured lake trout were made by Miss. Louella E. Cable. Of the 1,363 "valid" recoveries, scales were not available for 23 fish (1.7 percent); in 52 fish (3.8 percent) the scale reading disagreed with age, based on fin mark; and in 1,288 lake trout (94.5 percent) the age of the fish as determined from scales agreed with their supposed age (Table 7). Disregarding the recoveries for which no scales were available, age determinations from scales and from fin marks agreed in 97.1 percent of

Table 4.—Numbers of marked lake trout recovered from State of Michigan waters of Lake Michigan and Lake Huron, 1947-1955.

(Average total length in inches shown in parentheses)

Year of recovery	Year of fin-clipping and planting			Doubtful recoveries	Total recoveries	Approximate rewards paid
	1944	1945	1946			
1947	8 (11.6)	32 (10.1)	... ...	43	83	\$166
1948	10 (14.6)	207 (12.8)	9 (10.0)	62	288	576
1949	17 (15.3)	570 (14.2)	59 (12.3)	✓49	✓695	1,390
1950	... ...	248 (16.4)	171 (14.5)	52	471	936
1951	... ...	10 (16.6)	22 (16.8)	23	55	138
1952	...	...	...	15	15	30
1954	...	...	...	1	1	2
1955	...	...	...	1	1	2
Total	35	1,067	261	✓246	✓1,609	\$3,240

✓ One legal-size lake trout with a deformed dorsal fin was caught in Lake Huron.



Table 5.—Number of recoveries of marked lake trout from Lake Michigan and Lake Huron, arranged according to residence of the fishermen reporting recaptures.  
(Number of doubtful recoveries in parentheses)

Residence of fisherman	Year of capture						Total
	1947	1948	1949	1950	1951	1952	
Wisconsin	(1)	(1)	1	...	...	...	1 (2)
Escanaba	...	...	1	...	...	...	1
Fayette	...	...	34 (5)	...	...	...	34 (5)
Fairport	...	...	6	...	...	...	6
Manistique	2 (8)	15	187	252 (11)	19 (5)	(1)	475 (25)
Naubinway	(4)	7	11	5	...	...	23 (4)
St. James	9	27	46 (1)	...	...	...	82 (1)
Charlevoix	28 (1)	153 (4)	315 (3)	146 (1)	12	...	654 (10) ✓
Northport	(1)	(2)	...	...	...	...	(3)
Leland	1	23 (1)	18 (2)	16 (1)	1	...	59 (4)
Frankfort	(3)	...	22 (4)	...	...	...	22 (7)
Manistee	(11)	1 (3)	1 (1)	...	...	...	2 (15)
Pentwater	...	...	4	(8)	(1)	...	4 (9)
South Haven	(9)	(32)	(20)	(31)	(17)	(14)	(124) ✓
Benton Harbor	(4)	(19)	(12)	...	...	...	(35)
Indiana	(1)	...	...	...	...	...	(1)
Port Huron	...	...	(1)	...	...	...	(1)
Total	40 (43)	226 (62)	646 (49)	419 (52)	32 (23)	(15)	1,363 (246)

✓ One doubtful recovery submitted in 1955.

✓ One doubtful recovery submitted in 1954.

Table 6.--Legal and undersize marked lake trout recovered  
from Lake Michigan and Lake Huron.

(Legal size is 1 1/2 pounds in the round or 1 1/4 pounds when dressed)

Year of recovery	Legal size				Illegal size			
	Year of planting			Doubtful recoveries	Year of planting			Doubtful recoveries
	1944	1945	1946		1944	1945	1946	
1947	...	...	...	32	8	32	...	11
1948	...	...	...	38	10	207	9	24
1949	4	22	1	19	13	548	58	30
1950	...	85	9	4	...	163	162	48
1951	...	5	12	...	...	5	10	23
1952	...	...	...	...	...	...	...	15
1953	...	...	...	...	...	...	...	...
1954	...	...	...	...	...	...	...	1
1955	...	...	...	...	...	...	...	1
Total	4	112	22	93	31	955	239	153

Table 7.—Number of lake trout recoveries whose age according to scale reading agreed or disagreed with age based on fin mark.

Year of capture	Dorsal and adipose		Right pectoral		Left pectoral		No scale reading	Total
	Mark agreed with age	Mark disagreed with age	Mark agreed with age	Mark disagreed with age	Mark agreed with age	Mark disagreed with age		
1947	8	...	31	1	...	...	...	40
1948	9	...	188	11	8	...	10	226
1949	16	1	554	10	49	10	6	646
1950	...	...	232	11	163	6	7	419
1951	...	...	9	1	21	1	...	32
Total	33	1	1,014	34	241	17	23	1,363

the 1944 recoveries, 96.8 percent of the 1945 recoveries, and 93.4 percent of the 1946 recoveries.

Of the 246 doubtful recoveries, no age determinations were made on 48 fish or 19.5 percent. The age determination from scales of 35 of 77 (45.5 percent) doubtful recoveries captured in northern Lake Michigan agreed with the age based on fin marks. Only 40 or 33.1 percent of the 121 doubtful recoveries captured in southern Lake Michigan agreed (Table 8).

Not a single valid recovery of the 73,890 marked lake trout planted in Lake Huron was recorded. Three lake trout with deformed pelvic fins were caught in northern Lake Michigan in 1948-1955 but all were classified as doubtful recoveries. For all three fish, age determinations based on scale examination disagreed with age based on fin marks.

Table 8.—Number of doubtful recoveries whose age according to scale reading agreed or disagreed with age based on fin mark.

Year of capture	Northern Lake Michigan			Southern Lake Michigan			Total
	Mark agreed with age	Mark disagreed with age	No scale reading	Mark agreed with age	Mark disagreed with age	No scale reading	
1947	8	17	4	...	7	7	43
1948	5	5	1	2	33	16	62
1949	4	12	...	9	11	13	49
1950	12	6	3	22	6	3	52
1951	5	1	...	7	9	1	23
1952	1	...	...	...	14	...	15
1954	...	...	...	...	1	...	1
1955	...	1	...	...	...	...	1
Total	35	42	8	40	81	40	246

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