STUDY PERFORMANCE REPORT

State: Michigan **Project No.:** F-53-R-13

Study No.: 486 **Title:** Assessment of lake trout in Lake Michigan.

Period Covered: April 1, 1996 to March 31, 1997

Study Objectives: To evaluate age, growth, mortality, and natural reproduction of lake trout in Lake Michigan, particularly lake trout within and around the northern refuge.

Summary: During the 1996 field season lake trout sampling efforts focused on the northern refuge in Lake Michigan, though some information was also collected from lake trout captured in other assessment netting efforts throughout the lake. In future years nearshore and offshore lake trout populations will be evaluated from May to August in all of Michigan's waters of Lake Michigan. Fall spawning assessments will continue in the northern refuge, but we will broaden the search to include historic spawning reefs that may not be located within the refuge boundaries.

A total of 1427 lake trout were captured throughout Lake Michigan during the 1996 field season, 714 of which were collected in the northern refuge. As expected, a greater size and age range of fish were collected in summer netting efforts than in fall spawning reef assessments. Fish collected on fall spawning reefs tended to be older and larger. The majority of the fish collected on Fisherman's Island spawning reef were between the ages of 4 and 6, there were few fish over the age of 8. The majority of the fish collected in northern Lake Michigan originated from plantings in the northern refuge area. Lake trout populations in Lake Michigan were relatively healthy during 1996. Lamprey wounding rates were extremely low at 0.65% during July/August and 1.1% during October. The incidence of BKD was also low, only 1 of 108 fish tested positive for BKD in northern Lake Michigan. Stomach samples from over 1400 lake trout were collected in 1996. The diets of 156 lake trout collected during 1995 have been analyzed. The main prey items found in the diets of lake trout collected from northern Lake Michigan in 1995 include alewives, bloater chubs, sculpin, smelt, and sticklebacks.

Job 1. Title: Determine age, size, and maturity structure of the lake trout population in the refuge.

Findings: Lake trout were collected during July and August in suspended gill nets (N=6) and bottom gill nets (N=617) set throughout the northern refuge. During the month of October, lake trout were collected in bottom gill nets set on Fisherman's Island reef (N=91) to determine how lake trout were utilizing historically important spawning sites. Table 1 summarizes the catch and effort information for nets set. A greater size range of lake trout were collected in the July and August (200-899 mm) when compared to October spawning reef assessments (500-899 mm; Table 2).

Lamprey Wounding Rates.–The highest incidence of A1 to A3 lamprey wounds was observed in larger lake trout collected in October spawning reef assessments. Overall, wounding rates were

extremely low in northern Lake Michigan during 1996. Of all lake trout collected in bottom gill nets, 1.1% showed A1-A3 wounds in October and 0.65% in July and August (Table 3).

Lake Trout Distributions.–Lake trout collected in July/August ranged from 2 to 7 years of age and for the most part originated from plants in the northern refuge (Table 4). Lake trout collected in October spawning reef assessments also tended to originate from plants in the northern refuge, but ranged from 4 to 11 years of age (Table 4).

Lake Trout Diets.–Stomach contents were collected from over 1400 lake trout in 1996, processing of these samples is not yet complete. In 1995, stomach contents were evaluated from 156 lake trout collected in northern Lake Michigan. Alewives (81.56%) comprised the bulk of lake trout diets in 1995 followed by bloater chubs (8.77%), sculpins (4.39%), smelt (3.56%) and sticklebacks (1.32%; Table 5).

BKD Incidence.–The incidence of BKD in lake trout populations evaluated during 1996 were extremely low. Only 1 of 108 lake trout collected from northern Lake Michigan in July/August and tested using FELISA procedures measured positive for BKD. Throughout the rest of Lake Michigan, only 2 of 107 lake trout evaluated tested positive for BKD.

Job 2. Title: <u>Search for feral lake trout.</u>

Findings: The number of unmarked fish collected from each statistical district is within the range expected for clipping or tagging error. In 1996 5% from Statistical District MM-8, 5% from District MM-7, 15% from District MM-6, 1.4% from District MM-5 and 1.9% from District MM-3 were unmarked fish. Due to the high ratio of marked to unmarked fish in Statistical District 6, scales were evaluated to determine if anything other than typical hatchery growth was observed inside the first annuli. All unmarked fish exhibited similar growth patterns to known hatchery-raised fish. There is no reason to believe that there has been a significant increase in the number of feral lake trout in Lake Michigan.

Job 3. Title: <u>Process and analyze data and write performance and final reports.</u>

Findings: The 1996-97 Federal Aid Study Performance Report was prepared.

Table 1.–Summary of 1996 gill net effort, and catch of lake trout from northern Lake Michigan. Comparing suspended gill nets (SGN) set in July and August, bottom gill nets (BGN) set in August, and spawning reef assessments conducted in October. N is the number of fish captured in each statistical district. Catch per unit effort (CPUE) is the number of fish captured per 1,000 feet of graded mesh (2.5-6" for July and August assessments and 4.5-6" for spawning reef assessments) experimental gill net in 24 h.

		Lake Trout		
Gear type	Number of nets set	N	CPUE	# Adipose clipped
SGN (July/Aug.)	4	6	2.74	6
BGN (July/Aug.)	9	617	10.71	528
BGN (Oct.)	4	91	5.83	38
Total	17	714	19.28	572

Table 2.–Length frequency distribution of lake trout collected in northern Lake Michigan during 1996 assessment netting. Frequencies are defined for July and August suspended (3-7" mesh) and bottom (2.5-6" mesh) gill nets and for October spawning assessments with bottom gill nets (4.5-6" mesh).

	Gear type		
Length(mm)	SGN (July/Aug.)	BGN (July/Aug.)	BGN (Oct.)
0-99	0	0	0
100-199	0	0	0
200-299	0	2	0
300-399	0	170	0
400-499	0	157	0
500-599	0	104	4
600-699	4	154	40
700-799	2	48	39
800-899	0	3	8
900-999	0	0	0
>999	0	0	0
Total	6	617	91

Table 3.–Lamprey wounding rates for lake trout collected during 1996 from assessment netting in northern Lake Michigan. Values are percent of fish collected from surface (SGN) and bottom (BGN) gill nets set during July and August, and from bottom gill nets set in October exhibiting each category of wound. Numbers captured in each category are reported in Table 1.

	Lamprey wound classification		
Gear type	A1-A3	A4	B1-B4
SGN (July/Aug.)	0.00	50.00	17.00
BGN (July/Aug.)	0.65	1.30	8.70
BGN (Oct.)	1.10	0.00	34.00

Table 4.–Distributional information on lake trout collected in statistical district MM-3 based on coded-wire tagged fish captured in assessment netting efforts in the district. Numbers represent the percent of coded-wire-tagged fish captured within a sample period from each stocking site and age category.

Age	Stocking location	July/August	October
Age 2	Boulder Island	3.38	0.00
Age 2	Gull Island	2.63	0.00
Age 2	Richards Reef	1.13	0.00
Age 3	Boulder Island	9.40	0.00
Age 3	Gull Island	5.26	0.00
Age 3	Richards Reef	14.29	0.00
Age 4	Gull Island	0.00	2.22
Age 4	Boulder-Gull Is	1.88	0.00
Age 4	Boulder-Richards Reef	2.63	0.00
Age 4	Gull Is-Richards Reef	4.51	0.00
Age 4	Northern Refuge	4.51	0.00
Age 5	Boulder Island	1.50	4.44
Age 5	East Reef	0.75	0.00
Age 5	East Reef-Richards Reef	2.63	0.00
Age 5	Richards Reef	0.00	20.00
Age 5	Gull Is-Northern Refuge	1.13	0.00
Age 5	Gull Island	2.26	0.00
Age 5	Richards Reef	4.89	0.00
Age 6	Boulder Island	1.88	13.33
Age 6	Gull Island	2.26	11.11
Age 6	Richards Reef	4.89	17.78
Age 6	NE Reef-Sheboygan	0.00	2.22
Age 7	Gull Island	2.63	6.67
Age 7	Northern Refuge	0.00	2.22
Age 7	Richards Reef	3.01	0.00
Age 11	Boulder Island	0.00	2.22
Age 11	Richards Reef	0.00	2.22
No Tag	??	17.29	15.56

Table 5.–Summary of 1995 lake trout diets from northern refuge. Numbers represent the overall percent of a given prey type eaten.

Prey type	Percent
Alewives	81.65
Bloater Chubs	8.77
Sculpin	4.39
Smelt	3.56
Sticklebacks	1.32
Miscellaneous	0.31

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Date: March 31, 1997