

## STUDY PERFORMANCE REPORT

State: Michigan

Project No.: F-81-R-2

Study No.: 490

Title: Assessment of steelhead and brown trout populations in eastern Lake Michigan.

Period Covered: October 1, 2000 to September 30, 2001

**Study Objectives:** To evaluate the status and health of steelhead and brown trout stocks by assessing growth, abundance, diet composition, general health, and incidence of disease.

**Summary:** Small numbers of steelhead and brown trout were collected in assessment netting operations in 2000 (5 steelhead and 14 brown trout were collected from all nets set in Michigan's waters of Lake Michigan from April through September). Collections for 2001 are complete, and we are entering data into standard databases. A literature database is being compiled and continually updated with articles related to steelhead physiology, behavior, and habitat preferences. It was difficult to determine the relative abundance or characteristics related to distribution with the small number of brown trout and steelhead observed in our surveys. The largest steelhead and brown trout catch rates occurred in the southernmost districts. We captured more steelhead and brown trout in surface gill nets when compared to suspended or bottom gill nets. Brown trout captured in assessment gill nets have never tested positive for bacterial kidney disease (BKD), and incidence rates of infection in steelhead have remained relatively low when compared to those of lake trout or chinook salmon.

**Job 1. Title: Evaluate relevant literature on steelhead.**

**Findings:** Literature on steelhead physiology, behavior, and habitats is being collected and catalogued in an Endnote bibliographic software library. We conduct "Current Contents" searches twice a month on relevant fisheries journals to identify journal articles and publications that might be of interest.

**Job 2. Title: Establish the distribution pattern and origin of steelhead trout and brown trout during spring and summer in eastern Lake Michigan.**

**Findings:** We have much to learn regarding the movement patterns and distributions of steelhead and brown trout within Lake Michigan. It is difficult to determine distributional patterns and distinguish abundance levels with the small number of steelhead and brown trout observed in our surveys.

In 2001, we conducted standard netting efforts on Lake Michigan and we are in the process of entering this information into standardized databases. Throughout all years sampled (1994-2000), we have observed few steelhead or brown trout in the northernmost statistical districts MM-3 and MM-4 (Table 1). Brown trout were evenly distributed across statistical districts MM-5 through MM-8 based on catches, while the largest steelhead catch overall occurred in MM-8, the southernmost district (Table 1). Steelhead catch rates were highly variable ranging from 2-240 fish in any given year, making it difficult to attribute meaning to summary observations. In 2000 (as in 1999), catches of both species were low and appeared similar in statistical districts

MM-6 and MM-8. Steelhead and brown trout were mainly captured in surface gill nets compared to suspended or bottom gill nets for both 1999 and 2000 (Table 2).

**Job 3. Title: Determine relative abundance and survival rates of steelhead and brown trout in eastern Lake Michigan.**

**Findings:** Steelhead and brown trout sample sizes from gill net assessments were very limited and highly variable from year to year. It will be difficult to establish mortality estimates or attribute catch rates to abundance until multi-state, lake-wide assessments are implemented. Members of the Great Lakes Fishery Commission's Lake Michigan Technical Committee are still in the process of designing a lake-wide assessment plan for trout and salmon populations.

**Job 4. Title: Obtain data on diets of steelhead and brown trout in eastern Lake Michigan.**

**Findings:** We preserved stomachs from all steelhead and brown trout collected in 2001, but have not yet evaluated stomach contents. Laboratory analysis is complete for stomachs collected through 1995, but stomach samples collected from 1996 to the present have yet to be evaluated. The year 2001 was the last year of diet data collection.

**Job 5. Title: Monitor the general health and prevalence of BKD in populations of steelhead and brown trout in eastern Lake Michigan.**

**Findings:** We conducted Field Enzyme Linked Immunosorbent Assay (FELISA) testing for BKD on steelhead (N=5) and brown trout (N=14) collected in 2000 lake-wide assessments and all fish tested negative for the Renibacterium Salmoninarum (Rs) antigen. Since 1995, brown trout collected in annual surveys have never tested positive for BKD. During the same period, steelhead have tested positive at levels ranging from 0 to 25 percent (Table 3). In the last three years (1998 - 2000), no vessel-sampled steelhead have tested positive for BKD. Samples were collected but not yet analyzed for 2001.

**Job 6. Title: Coordinate with other studies, process and analyze data, write reports.**

**Findings:** Data collection for this project is closely coordinated with studies 486 and 485. We will also use information collected for this study (490) in study 487. This progress report was prepared as scheduled.

**Prepared by:** Jory Jonas  
**Date:** September 30, 2001

Table 1.—Total catch of brown trout (BNT) and steelhead (RBT) in statistical districts (MM-3 through MM-8) of Lake Michigan listed from north to south. An "-" indicates that we did not collect any data for the specified year, species, and location.

Year	Statistical district					
	MM-3	MM-4	MM-5	MM-6	MM-7	MM-8
Steelhead						
1994	1	0	0	13	9	19
1995	1	0	7	31	16	50
1996	1	0	41	41	85	240
1997	1	1	1	3	4	5
1998	4	—	—	5	—	8
1999	0	—	—	8	—	5
2000	0	—	—	3	—	2
Total	8	1	49	107	114	331
Pct. of tot.	1%	0%	8%	18%	19%	54%
Brown Trout						
1994	2	0	1	4	0	0
1995	1	0	1	2	1	0
1996	2	0	8	1	8	2
1997	0	0	18	5	6	10
1998	0	—	—	4	—	2
1999	0	—	—	14	—	12
2000	1	—	—	3	—	8
Total	6	0	24	28	13	29
Pct. of tot.	5%	0%	27%	29%	14%	25%

Table 2.—Number of steelhead and brown trout captured in surface, suspended, and bottom gill nets in Michigan waters of Lake Michigan. From 1994-1996, both net types were not set in each district and we did not separate catches into surface and suspended net categories in our records. Further, since we only collected one fish in a bottom gill net during this period, we have combined years. Numbers in parentheses represent the percent captured in each gear.

Year	Net Type		
	Bottom net	Suspended net	Surface net
Steelhead			
1994-96	0 (0%)	—	558 (100%)
1997	0 (0%)	4 (27%)	11 (73%)
1998	0 (0%)	6 (35%)	11 (65%)
1999	0 (0%)	6 (46%)	7 (54%)
2000	0 (0%)	0 (0%)	5 (100%)
Brown Trout			
1994-96	1 (3%)	—	32 (97%)
1997	6 (15%)	4 (10%)	29 (75%)
1998	0 (0%)	1 (12%)	7 (88%)
1999	1 (4%)	3 (11%)	22 (85%)
2000	5 (36%)	1 (7%)	8 (57%)

Table 3.—Incidence of bacterial kidney disease (positive or negative) in Lake Michigan steelhead and brown trout captured in assessment netting for 1995-2000, based on Field Enzyme Linked Immunosorbent Assay (FELISA). The percent frequency is given in parenthesis.

Year	FELISA Result	
	Positive	Negative
Steelhead		
1995	30 (23%)	103 (77%)
1996	41 (9%)	411 (91%)
1997	5 (25%)	15 (757%)
1998	0 (0%)	17 (100%)
1999	0 (0%)	13 (100%)
2000	0 (0%)	10 (100%)
Brown Trout		
1995	0 (0%)	5 (100%)
1996	0 (0%)	20 (100%)
1997	0 (0%)	35 (100%)
1998	0 (0%)	5 (100%)
1999	0 (0%)	24 (100%)
2000	0 (0%)	5 (100%)