STUDY PERFORMANCE REPORT

State: Michigan **Project No.:** F-81-R-7

Study No.: 230484 **Title**: Population dynamics of yellow perch stocks in Michigan waters of Lake Michigan.

Period Covered: October 1, 2005 to September 30, 2006

Study Objectives: (1) To summarize pertinent existing data from state, federal, commercial, sport, university, and private sources; (2) to conduct assessment netting to establish baseline data and determine whether lack of recruitment and declining yellow perch numbers are problems in Michigan waters; (3) to determine whether factors of fish health might be affecting abundance or recruitment of yellow perch; (4) to reestablish a program of biological data collection for sport-caught yellow perch; (5) to investigate discreteness of yellow perch populations in Lake Michigan; and (6) to develop information and mathematical models from these data that will allow managers to predict, with some predetermined level of certainty, the outcome of various yellow perch management strategies.

Summary: Gill-net assessments were conducted at six eastern Lake Michigan ports (Charlevoix, Leland, Arcadia/Frankfort, Grand Haven, Saugatuck, and South Haven) in April and May, 2006. Catch-per-unit-effort at the six Lake Michigan assessment ports ranged from 1 to 46 yellow perch *Perca flavescens* per 1,000 feet of gill net per 24 h, and averaged 23 fish per net night for the southern ports, combined. Yellow perch abundance (based on gill net CPE) was highest at Grand Haven, and was higher in intermediate depth (50-foot contour) net sets, as compared with shallow (30 foot) and deep (100–150 foot) sets at the Lake Michigan ports we sampled.

Trawling was conducted in August–September, 2006 at Charlevoix, Pentwater, Grand Haven and South Haven, and yellow perch recreational catch information was collected in coordination with Studies 427 and 462. Data from summer trawl assessments indicate the 2006 year class was the second most abundant since standard index trawling began in 1996. Analysis of creel survey data is ongoing.

Results of yellow perch research were summarized for various MDNR and external committee reports and publications. Presentations were also made at various scientific and public meetings.

Findings: Jobs 1–2 and 4–7 were scheduled for 2005-06, and progress is reported below.

Job 1. Title: Review literature and summarize existing data.–A review of yellow perch literature is ongoing and is used in completing other jobs within this study.

Job 2. Title: Conduct standardized assessment sampling.–

*Spring Assessment Netting.***–**Gill-net assessments were conducted at six eastern Lake Michigan ports (Charlevoix, Leland, Arcadia/Frankfort, Grand Haven, Saugatuck, and South Haven) in April and May, 2006. Eight nets (each net 1,000 feet long, 1.5 to 3.5 in stretched nylon mesh, 0.5 in intervals) were fished overnight at each port. In addition, yellow perch were collected near Ludington, Michigan as part of a study of the barrier net at the Ludington Pumped Storage Hydroelectric Project. Sub-samples of fish from MDNR assessments and from the Ludington

study were returned to the Charlevoix Fisheries Research Station for analysis of age and growth, fecundity, body composition (percent water, gonadosomatic index), and diet.

Catch-per-unit-effort at the six Lake Michigan assessment ports ranged from 1 to 46 yellow perch per 1,000 feet of gill net per 24 h, and averaged 23 fish per net night for the southern Lake Michigan ports, combined (Table 1). Yellow perch catch rates were highest at Grand Haven, and were higher at intermediate depths (50-foot contour; 16 fish per net night) than in shallow samples (30-foot; 8 fish per net night) or deep samples (100-foot; 8 fish per net night). As in previous years, catch of yellow perch in gill nets set in the 150-foot depth strata was extremely low (0 fish per net night). Additional species collected in yellow perch assessment nets include alewife *Alosa pseudoharengus*, rainbow smelt *Osmerus mordax*, spottail shiner *Notropis hudsonius*, lake trout *Salvelinus namaycush*, brown trout *Salmo trutta*, chinook salmon *Oncorhynchus tshawytscha*, lake whitefish *Coregonus clupeaformis*, round whitefish *Prosopium cylindraceum*, white sucker *Catostomus commersoni*, Longnose sucker *C. catostomus*, and round goby *Neogobius melanostomus*.

Summer Trawl Assessments–Trawling was conducted in August–September, 2006 at Charlevoix, Pentwater, Grand Haven, and South Haven. Samples consisted of 12, 10-minute trawls at each port, on each of two successive nights. Six trawls were conducted before sunset and six were conducted after dark on each sampling date. Catch of age 0 yellow perch at Grand Haven and South Haven indicated the 2006 year class was the second most abundant (behind 2005) since standard index trawling began in 1996 (Table 2). Analysis of data from summer trawl assessments is ongoing, and additional data analyses will be presented in future reports.

Job 4. Title: Collect and analyze creel data.–Yellow perch length and age data were collected in 1985–92 as part of the Lake Michigan creel survey program (Study 230427). Beginning in 1996, data were again collected from the recreational creel at four sites for which fisheries-independent assessment data were available. In 1997, this data collection program was expanded to include all standard creel sites between New Buffalo and Grand Traverse Bay. At a given site, data are collected from up to 100 angler-caught yellow perch per month. Length and sex are recorded for each fish examined. Yellow perch recreational catch, effort, and biological (age, total length, growth) information for the period 1985–2006 are currently being summarized, in coordination with studies 230427 and 230462.

Job 5. Title: Investigate discreteness of yellow perch populations in Lake Michigan.–Tissue samples from assessment-caught fish were again provided to Dr. Carol Stepien of the Great Lakes Environmental Genetics Lab, University of Toledo for studies to address the issue of stock discreteness in Lake Michigan yellow perch populations. No additional work was conducted during 2005-06 to address discreteness of yellow perch populations in Lake Michigan.

Job 6. Title: Develop models.–Successful modeling of Lake Michigan yellow perch populations requires information on length, weight, age, sex, maturity, egg production, diet, movement, harvest rates, and predation. These data are currently being collected in jobs 1–5 (see above). Modeling efforts are being coordinated through an ongoing project (Bence and Jones 2004) of the Lake Michigan Yellow Perch Task Group, in cooperation with the Michigan State University unit of the Partnership for Ecosystem Research and Management (PERM).

Job 7. Title: Evaluate results, write reports.–Results of yellow perch research were summarized for this report, as well as in summaries to various MDNR and external committees. Assistance was provided to a decision analysis model development project, coordinated through the Lake Michigan Yellow Perch Task Group (Bence and Jones 2004).

References:

Bence, J. R., and M. Jones. 2004. Evaluating harvest policies for yellow perch in Lake Michigan. Michigan Sea Grant College Program, Integrated Assessment Project.

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Table 1.–Average assessment gill-net catch (fish/1,000 ft of gill net/24 hours) of yellow perch at eastern Lake Michigan ports, 1996–2006. Three to six nets were set at each port in each year. Two standard errors are shown in parentheses. Combined estimates are for the ports of Grand Haven, Saugatuck, South Haven, and St. Joseph only. Dash (–) = ports not sampled.

Sample year	Port															
	Charlevoix		Leland		Arcadia		Grand Haven		Saugatuck		South Haven		St. Joseph		Combined	
1996	–		–		–		317	(325)	20	(4)	345	(597)	33	(14)	179	(171)
1997	–		–		–		148	(97)	60	(59)	143	(184)	23	(9)	90	(57)
1998	–		–		–		159	(240)	35	(50)	87	(75)	18	(16)	75	(64)
1999	–		–		–		20	(15)	19	(19)	55	(34)	83	(52)	44	(20)
2000	15	(7)	–		14	(11)	26	(14)	39	(11)	390	(170)	278	(167)	177	(89)
2001	9	(7)	–		20	(23)	147	(157)	201	(164)	670	(538)	–		339	(226)
2002	1	(1)	8	(8)	13	(8)	48	(36)	6	(7)	24	(23)	46	(33)	31	(15)
2003	4	(2)	6	(4)	6	(3)	13	(11)	4	(6)	7	(5)	–		8	(4)
2004	1	(1)	0	(0)	3	(2)	121	(160)	27	(13)	16	(8)	–		55	(56)
2005	1	(1)	1	(1)	4	(7)	23	(14)	8	(6)	48	(47)	–		26	(23)
2006	5	(5)	1	(1)	1	(2)	46	(50)	12	(6)	10	(7)	–		23	(23)

Table 2.–Age-0 yellow perch catch-per-unit-effort (number per trawl hour) at two Lake Michigan ports (Grand Haven and South Haven), 1996–2006. Two standard errors are shown in parentheses. Age determinations are based on length frequency analysis. Dash (–) = ports not sampled.

Year	Grand Haven		South Haven	
1996	1	(2)	1	(1)
1997	2	(2)	6	(4)
1998	4	(3)	294	(195)
1999	3	(2)	6	(4)
2000	4	(4)	4	(4)
2001	<1	(1)	0	(0)
2002	54	(44)	27	(31)
2003	–		10	(11)
2004	0	(0)	1	(1)
2005	2,070	(1,413)	222	(359)
2006	273	(189)	162	(195)