STUDY PERFORMANCE REPORT

State: Michigan

Project No.: F-81-R-6

Study No.: 230484

Title: Population dynamics of yellow perch stocks in Michigan waters of Lake Michigan.

Period Covered: October 1, 2004 to September 30, 2005

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 2005. Catch-per-unit-effort at the six Lake Michigan assessment ports ranged from 1 to 48 yellow perch per 1,000 feet of gill net per 24 h, and averaged 26 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 shallow and intermediate depth (30- and 50-foot contour) net sets, as compared with deep (100–150 foot) sets at the Lake Michigan ports we sampled.

Trawling was conducted in August–September, 2005 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 2005 year class was the 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 in peer-reviewed publications. Presentations were also made at various scientific and public meetings.

Findings: Jobs 1–2 and 4–7 were scheduled for 2004-05, 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: <u>Conduct standardized assessment sampling.</u>–

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 2005. Eight nets (each net 1,000 feet long, 1.5 to 3.5" stretched nylon mesh, 0.5" 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 Great Lakes 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 48 yellow perch per 1,000 feet of gill net per 24 h, and averaged 26 fish per net night for the southern Lake Michigan ports, combined (Table 1). Yellow perch catch rates were highest at South Haven, and were higher at intermediate depths (50-foot contour; 36 fish per net night) than in shallow samples (30-foot; 16 fish per net night). As in previous years, catch of yellow perch in deep gill nets was extremely low (100-foot and 150-foot depth strata; 0.3 and 0.0 fish per net night, respectively). Additional species collected in yellow perch assessment nets include alewife, rainbow smelt, spottail shiner, lake trout, brown trout, chinook salmon, lake whitefish and round whitefish, white sucker and longnose sucker, and round goby.

Summer Trawl Assessments.–Trawling was conducted in August–September, 2005 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 prior to 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 2005 year class was the most abundant 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: <u>Collect and analyze biological data from sport-caught yellow perch.</u>–Yellow perch recreational catch and effort information for the period 1985–2005 are currently being summarized, in coordination with Studies 427 and 462.

Yellow perch length and age data were collected in 1985–92 as part of the Lake Michigan creel survey program (Study 427). Beginning in 1996, data were again collected from the recreational creel at four sites for which fisheries-independent assessment data are 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. Age composition of the recreational catch will be determined in the future, using a length-age key based on otolith-aged yellow perch collected in fishery independent gillnet assessment samples. Analyses of biological data from sport-caught yellow perch are ongoing.

Data from 1985–2002 were compiled with data from other Lake Michigan management agencies for use in development of yellow perch population models for southern Lake Michigan. Results of this work were published in the North American Journal of Fisheries Management (Wilberg et al. 2005). Ongoing model development and improvement, using MDNR yellow perch creel data, is being coordinated through the Lake Michigan Yellow Perch Task Group (Bence and Jones 2004).

Job 5. Title: <u>**Investigate discreteness of yellow perch populations in Lake Michigan.**</u>–*Tagging study*–Tagging of yellow perch was conducted during spring 1997–99, in coordination with other Lake Michigan management agencies through the Lake Michigan Yellow Perch Task Group. Additional funding and graduate student assistance for data analysis began in 2002, in coordination with personnel from the Illinois Natural History Survey's Lake Michigan Biological Station. A final report for this project was completed in 2005 (Glover et al. 2005).

Tissue samples from assessment-caught fish were again provided to Dr. Carol Stepien of the Great Lakes Environmental Genetics Lab, University of Toledo and to Grand Valley State University (Aaron Parker) for studies to address the issue of stock discreteness in Lake Michigan yellow perch populations.

Job 6. Title: <u>**Develop information and mathematical models related to yellow perch management strategies.**</u>–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: <u>**Evaluate results, write reports, and develop future study plans for Michigan waters of Lake Michigan south of the 45th parallel.**</u>–Results of yellow perch research were summarized for this report, as well as for summaries to various MDNR and external committees. A seminar describing MDNR Lake Michigan yellow perch research activities was presented at Grand Valley State University. Assistance was provided to the Lake Michigan Basin Team (review of and comment on regulation and stocking proposals). Work was completed on a Great Lakes Fish and Wildlife Restoration Act-funded yellow perch modeling project (Wilberg et al. 2005 – see Jobs 4 and 6), and on a GLFC-CAP project to complete the yellow perch tagging work described in Job 5 (Glover et al. 2005). Assistance was provided to a recently-funded 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.

Glover, D.C., J.M. Dettmers, and D.F. Clapp. 2005. Evaluation of yellow perch (*Perca flavescens*) movements in Lake Michigan: an analysis using lake-wide mark and recapture. Final report to the Great Lakes Fishery Commission, Coordination Activities Program, Ann Arbor, Michigan.

Wilberg, M.J., J.R. Bence, B.T. Eggold, D. Makauskas, and D. F. Clapp. 2005. Yellow perch dynamics in southwestern Lake Michigan during 1986–2002. North American Journal of Fisheries Management 25:1130–1152.

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Table 1.–Average assessment gillnet catch (fish / 1,000' of gillnet / 24 hours) of yellow perch at eastern Lake Michigan ports, 1996–2005. 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. "–" = Ports not sampled in years indicated.

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)

Table 2.–Age-0 yellow perch catch-per-unit-effort (number per trawl hour) at two Lake Michigan ports (Grand Haven and South Haven), 1996–2005. Two standard errors are shown in parentheses. Age determinations are based on length frequency analysis. "–" = Ports not sampled in years indicated.

Year	Port	
	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)