

STUDY PERFORMANCE REPORT

State: Michigan

Project No.: F-81-R-4

Study No.: 494

Title: Continued monitoring of yellow perch and walleye populations in Michigan waters of Green Bay, Lake Michigan

Period Covered: October 1, 2002 to September 30, 2003

Study Objectives: (1) Continue monitoring population dynamics of yellow perch and walleye populations through creel surveys, netting, and tagging. (2) Intensify efforts to sample age-0 walleye using trawls and seines. (3) Obtain walleye diet information throughout the year from different areas in the Michigan waters of Green Bay. (4) Align yellow perch tagging and early-life history sampling efforts with lakewide programs.

Summary: Fish communities in Michigan waters of Green Bay (Big and Little bays de Noc, and open waters south to the Menominee River) were assessed through creel surveys, assessment netting, and a tagging program. Creel surveys have been conducted annually, 1985-2003. Assessment netting and tagging have been done annually, 1988-2003. Sampling during 2003 was completed according to schedule, and data from these surveys and assessments will be presented in future reports.

Creel surveys were conducted during 2002 at Little Bay de Noc, Big Bay de Noc, Cedar River, and Menominee River sites. All sites were surveyed during the open-water season, but only Little Bay de Noc and Menominee River were surveyed during the ice season. Combining estimates from all sites and seasons, sport anglers harvested 75,641 yellow perch and 46,204 walleyes during 2002.

Assessment netting for 2002 in Big and Little bays de Noc consisted of 41 10-minute trawl hauls and 32 overnight gill net sets. Data from these collections has not been entered yet.

A total of 2,519 walleyes were tagged in spring of 2002. Incidence of lymphocystis on tagged fish ranged from 10% to 17% depending upon tagging location. Tag-return data were used to update estimates of exploitation and survival rates, and to further document fish movements. Exploitation rates for walleye, unadjusted for non-reporting, were 4.0% for Little Bay de Noc, 2.6% for Big Bay de Noc, 2.6% for Cedar River, and 4.6% for Menominee River. Walleye survival was 56.8% in Little Bay de Noc, 65.2% in Big Bay de Noc, 59.4% in Cedar River, and 44.4% in Menominee River. Yellow perch have not been tagged since 1993, and anglers have not reported the catch of a tagged yellow perch since 1996.

Temperature recorders were deployed in nine Green Bay tributaries with known or suspected walleye spawning runs to gain a better understanding of when temperatures suitable for spawning migrations occurred in each river. First occurrences of a mean daily temperature of 42°F (a temperature associated with walleye spawning migrations) occurred in the Menominee River (the southernmost tributary) on April 11, in the Cedar River (the adjacent northern tributary) on April 15, and in the other tributaries on April 24 and 25.

Preliminary sampling of young-of-year (YOY) and juvenile walleye with night boomshocking and small mesh gill nets in Little and Big bays de Noc was initiated in fall 2003 to prepare for a future assessment of the contribution of hatchery fish to year class strength in the bays. The purpose of the fall 2003 sampling was to aid in determining how much gear and effort will be needed to obtain adequate samples of walleye for oxytetracycline analysis in upcoming years. In Big Bay de Noc, 38 walleye were collected in 9.8 hours of boomshocking, while 513 walleye were captured in 14.7 hours of electrofishing in Little Bay de Noc. Despite its not being stocked with walleye in 2003, catch per hour of walleye in Little Bay de Noc was nine times higher than in Big Bay de Noc, which was stocked.

Findings: Jobs 1, 2, 3, and 5 were scheduled for 2002-03, and progress is reported below.

Job 1. Title: Continue monitoring yellow perch and walleye populations.—Creel survey data have been collected for the Michigan waters of Green Bay (statistical district MM-1) by Michigan Department of Natural Resources (MDNR) personnel since 1985 (Table 1). Creel survey methods and results were summarized under F-81-R Study 427 by Rakoczy and Rogers (1987, 1988, 1990), Rakoczy and Lockwood (1988), Rakoczy (1992a, 1992b), and Rakoczy and Svoboda (1994). Creel estimates for 1994-2002 have been calculated (G.P. Rakoczy and S. Thayer, personal communication, Charlevoix Fisheries Research Station, Charlevoix, Michigan), but are as yet unpublished. Sites and seasons covered during the 2001 creel survey were consistent with those since 1999 and roughly comparable to those since 1993. Compared to 1993-2001 averages, the 2002 catch was 11% higher for walleye and 48% lower for yellow perch. Angling effort during 2002 decreased 11% over the 1993-2001 average.

Marquette Fisheries Research Station personnel collected monthly samples of adult and juvenile fish from June through September, 2002 in both Big and Little bays de Noc. Samples were obtained from 41 10-min bottom trawl hauls (20 in Little Bay de Noc and 21 in Big Bay de Noc) and 32 overnight gill net sets (16 in each bay). Gear dimensions and configurations were identical to those described by Schneeberger (2000). Data from these collections have not been entered yet.

In Michigan waters of Green Bay, individually-numbered monel bird leg bands have been used to jaw tag 49,936 walleyes between 1988 and 2002, and 19,572 yellow perch between 1989 and 1993. Virtually all tagged walleye were of legal size, and 99.8% of the tagged yellow perch were 7 inches or larger. During spring of 2002, 2,519 walleyes were tagged in Michigan waters of Green Bay (Tables 2 - 5). Walleyes were tagged at four locations: Little Bay de Noc (N=500), Big Bay de Noc (N=20), Cedar River (N=1,057), and Menominee River (N=942). Walleyes were tagged coincident with egg-take operations in Little Bay de Noc where fish were collected in fyke nets. Boomshocking boats were used to catch walleye for tagging at other locations.

Lymphocystis is an endemic viral skin disease common to walleye, especially during spawning (Scott and Crossman 1973). Presence or absence of lymphocystis was noted for fish at each tagging location. Compared to 2001, incidence of lymphocystis in spawning populations during 2002 rose from 6 to 11% in Little Bay de Noc, dropped from 15 to 10% in Big Bay de Noc, increased from 10 to 16% in Cedar River, and fell from 18 to 17% in Menominee River.

Solicitations for the return of tags have appeared in local newspapers, sport-club information bulletins, and notices at launch sites. In addition, the creel clerk surveying Cedar and Menominee river fisheries solicited tag-return data on his personal fishing information web site and some returns were reported on a form available through the Department of Natural Resources web site. Anglers catching tagged fish were asked to contact a creel clerk or an MDNR office to report species, tag number, fish length, date, time of catch, location of catch, fate of the fish (kept or

released), and their name, address, and phone number. These data were entered into database files, and a computer-generated letter was sent to cooperating anglers, informing them of the number of days between the tag and capture dates, the distance between the tag and capture sites, and the estimated age and growth of the fish they caught.

A total of 184 walleye tag returns was reported between May 2001 and April 2002 (Tables 2 - 5). Returns from fish tagged in Little Bay de Noc included fish that had been tagged in 1993 and 1997-2002. Big Bay de Noc returns came from fish tagged in 1997-2000, and 2002. Returns were reported for fish tagged in the Cedar River during 1995-2002. Tag returns of Menominee River walleye came from fish that had been tagged in 1994-2002.

Exploitation (unadjusted for non-reporting) and survival rates were estimated from tag-return data using formulae provided by Brownie et al. (1985). Based on cumulative tag returns through 2003, walleye exploitation rates were 4.0% in Little Bay de Noc, 2.6% in Big Bay de Noc, 2.6% in Cedar River, and 4.6% in Menominee River. Thomas and Haas (2000) examined reward versus non-reward walleye tag returns in Lake Erie to determine an adjustment factor of 2.7 for non-reporting. Using this factor to adjust for non-reporting in Michigan waters of Green Bay, estimated exploitation for walleye was 10.8% in Little Bay de Noc, 7.1% in Big Bay de Noc, 7.1% in Cedar River, and 12.5% in Menominee River. Walleye survival was 56.8% in Little Bay de Noc, 65.2% in Big Bay de Noc, 59.4% in Cedar River, and 44.4% in Menominee River.

No tagged yellow perch were caught in 2002. Yellow perch have not been tagged in Big and Little bays de Noc since 1993, and no tagged yellow perch have been reported since 1996.

Use of drop boxes, placed at 10 access sites throughout the study area, continued for the seventh year in 2002. Signs were posted asking walleye anglers to fill out brief catch summary forms that were available from a compartment in the drop boxes. Fifteen fishing parties submitted information for 2002. They collectively reported data for 54 walleye, 7 of which were tagged.

I deployed temperature recorders in nine Green Bay tributaries with known or suspected walleye spawning runs to gain a better understanding of when temperatures suitable for spawning migrations occurred in each river. Heavy walleye spawning migrations often happen at about 42°F, with spawning occurring shortly thereafter (Becker 1983; P. Schneeberger, personal communication). Warming of rivers generally occurred in a south to north direction. First occurrences of a mean daily temperature of 42°F occurred in the Menominee River (the southernmost tributary) on April 11, in the Cedar River (the adjacent northern tributary) on April 15, and the other tributaries on April 24 and 25 (Table 6). The latter streams are further north, and all but the Ford and Bark rivers drain into Little and Big bays de Noc. Recorders were also deployed at or near the mouths of the Menominee, Cedar, Escanaba, Rapid, and Sturgeon rivers to characterize river mouth conditions. Recorders at the mouths of the Menominee and Rapid rivers were not recovered. Temperature patterns at the other three locations were similar, with some exceptions that may relate to characteristics of each waterbody and specific locations where recorders were placed (i.e., relative influence of river vs. Lake Michigan conditions).

Job 2. Title: Intensify efforts to obtain an index of walleye recruitment.—All walleye stocked into Michigan waters of Green Bay from 2004 to 2009 will be marked with oxytetracycline to allow assessment of the level of natural reproduction. This evaluation will necessitate additional sampling to collect YOY and juvenile walleye for examination. Alpena Fisheries Research Station personnel will be examining otoliths from these fish for oxytetracycline marks. Marquette Fisheries Research Station and Northern Lake Michigan Management Unit personnel conducted preliminary sampling in fall 2003 with night boomshocking and small mesh gill nets in Little and Big bays de Noc to gain insight as to how much gear and effort will be needed to get an

adequate sample of walleye (in terms of numbers of fish and geographic coverage) for analysis. In Big Bay de Noc, 38 walleyes were collected in 9.8 hours of boomshocking, while 513 walleyes were captured in 14.7 hours of electrofishing on Little Bay de Noc (Table 7). No aging structures were collected, but fish length data suggest that 80% or more of the walleye collected were likely YOY. Despite its not being stocked with walleye in 2003, catch per hour of walleye in Little Bay de Noc was nine times higher than in Big Bay de Noc, which was stocked.

Job 3. Title: Obtain year-round walleye diet from different areas.—In previous years, an effort was made to obtain supplementary walleye diet data by providing containers and labels to cooperating proprietors of a resort located at the head of Little Bay de Noc. The quality and amount of diet data obtained (and the fact that such data had already been collected in previously) did not justify continuance of this program for 2002 and 2003 fishing seasons.

Job 5. Title: Evaluate results and write report.—This 2001-02 Study Performance Report was prepared during this study segment.

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Table 1.—Estimated sport catch (number and kilograms) and effort (angling hours) of walleye and yellow perch in Michigan waters of Green Bay, Lake Michigan (Statistical District MM-1), 1985-2001. Data from G. Rakoczy and S. Thayer, Michigan DNR, Charlevoix.

Year	Effort (hours)	Walleye		Yellow perch	
		Number	Kilograms	Number	Kilograms
1985 ^{a,b}	523,167	18,738	18,699	459,089	52,060
1986 ^{a,b}	486,339	21,682	20,653	432,646	41,212
1987 ^{a,b}	303,077	12,005	17,425	210,872	26,782
1988 ^{a,c}	551,750	25,535	35,906	323,294	33,729
1989 ^{a,c}	656,462	42,029	40,035	291,003	35,640
1990 ^{a,b}	736,599	43,144	43,054	372,402	38,851
1991 ^{a,b}	948,456	50,009	56,710	564,597	76,830
1992 ^{a,b}	692,284	23,374	28,627	399,671	36,258
1993 ^{a,b,d,e}	734,400	25,425	29,985	104,902	9,516
1994 ^{a,b,d,e}	609,360	32,508	39,813	139,409	12,647
1995 ^{a,b,d,e}	666,976	80,323	87,442	156,720	14,218
1996 ^{a,b,d,e}	627,900	62,752	74,007	323,789	29,374
1997 ^{b,d,e,f}	452,044	30,016	~34,492	43,908	~4,595
1998 ^{a,b,d,e}	532,829	27,863	~32,015	151,310	~15,844
1999 ^{a,b,d,g}	575,561	28,348	~32,572	158,297	~16,576
2000 ^{a,b,d,g}	672,377	33,884	~38,267	143,671	~15,044
2001 ^{a,b,d,g}	634,628	53,314	~60,210	105,467	~11,044
2002 ^{a,b,d,g}	546,875	46,204	~51,994	75,641	~8,150

^a Little Bay de Noc open water and ice seasons

^b Big Bay de Noc open water season

^c Big Bay de Noc open water and ice seasons

^d Cedar River open water season

^e Menominee River open water season

^f Little Bay de Noc open water season

^g Menominee River open water and ice seasons

Table 2.—Number of walleyes tagged and tag returns by year from Little Bay de Noc, Lake Michigan, 1988-2002. (Recovery year = May-Apr).

Tag year	Number tagged	Recovery year											Total				
		1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998		1999	2000	2001	2002
1988	2,496	167	141	72	42	12	21	14	5	2	1	0	0	0	2	0	479
1989	2,486	-	150	58	25	20	7	7	8	1	3	1	1	0	0	0	281
1990	1,744	-	-	94	33	13	15	3	0	0	0	0	0	0	0	0	159
1991	1,886	-	-	-	79	30	10	5	2	1	1	0	0	0	0	0	128
1992	1,690	-	-	-	-	50	18	14	5	4	3	1	2	0	0	0	97
1993	1,563	-	-	-	-	-	69	22	10	5	1	3	3	0	1	1	115
1994	1,246	-	-	-	-	-	-	69	23	7	7	2	0	0	1	0	109
1995	711	-	-	-	-	-	-	-	33	18	6	3	1	0	0	0	61
1996	700	-	-	-	-	-	-	-	-	25	19	6	0	0	0	0	50
1997	700	-	-	-	-	-	-	-	-	-	17	9	6	4	0	2	38
1998	470	-	-	-	-	-	-	-	-	-	-	19	6	10	0	4	39
1999	530	-	-	-	-	-	-	-	-	-	-	-	16	12	9	3	40
2000	500	-	-	-	-	-	-	-	-	-	-	-	-	24	16	4	44
2001	500	-	-	-	-	-	-	-	-	-	-	-	-	-	18	6	24
2002	500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	14

Table 3.—Number of walleyes tagged and tag returns by year from Big Bay de Noc, Lake Michigan, 1990-2002. (Recovery year = May-Apr).

Tag year	Number tagged	Recovery year											Total				
		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000		2001	2002		
1990	867	22	19	1	2	1	0	1	1	0	0	0	0	0	0	0	47
1991	354	-	6	3	3	1	2	1	0	0	0	0	0	0	0	0	16
1993	617	-	-	-	20	13	11	1	1	1	1	0	0	0	0	0	48
1994	1,458	-	-	-	-	37	15	5	3	0	0	0	0	0	0	0	60
1995	1,993	-	-	-	-	-	67	29	20	9	0	0	2	2	0	0	129
1996	1,324	-	-	-	-	-	-	36	26	12	6	4	0	0	0	0	88
1997	868	-	-	-	-	-	-	-	21	17	3	3	1	1	4	4	49
1998	77	-	-	-	-	-	-	-	-	0	0	2	0	0	1	1	3
1999	609	-	-	-	-	-	-	-	-	-	3	7	1	1	4	4	15
2000	110	-	-	-	-	-	-	-	-	-	-	2	2	2	1	1	5
2001	55	-	-	-	-	-	-	-	-	-	-	-	1	1	0	0	1
2002	20	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1

Table 4.-Number of walleyes tagged and tag returns by year from Cedar River, Lake Michigan, 1993-2002. (Recovery year = May-Apr).

Tag year	Number tagged	Recovery year										Total	
		1993	1994	1995	1996	1997	1998	1999	2000	2001	2002		
1993	1,312	50	27	9	1	1	1	0	0	0	0	0	89
1994	1,500	-	73	17	6	2	0	0	1	1	1	0	100
1995	1,677	-	-	36	23	9	3	3	4	1	1	3	82
1996	445	-	-	-	7	11	0	0	4	1	1	1	24
1997	925	-	-	-	-	26	9	3	8	4	5	5	55
1998	1,290	-	-	-	-	-	31	14	10	6	9	9	70
1999	1,203	-	-	-	-	-	-	31	19	7	11	11	68
2000	948	-	-	-	-	-	-	-	15	8	12	12	35
2001	840	-	-	-	-	-	-	-	-	22	15	15	37
2002	1,057	-	-	-	-	-	-	-	-	-	16	16	16

Table 5.-Number of walleyes tagged and tag returns by year from Menominee River, Lake Michigan, 1993-2002. (Recovery year = May-Apr).

Tag year	Number tagged	Recovery year										Total		
		1993	1994	1995	1996	1997	1998	1999	2000	2001	2002			
1993	1,280	94	19	7	2	0	0	0	0	0	0	0	0	122
1994	1,500	-	119	15	4	1	0	0	1	0	0	1	0	141
1995	1,879	-	-	98	28	14	1	4	1	0	0	1	1	147
1996	544	-	-	-	23	6	4	1	2	1	1	1	1	38
1997	1,758	-	-	-	-	81	25	6	5	3	1	1	1	121
1998	1,155	-	-	-	-	-	49	16	13	5	1	1	1	84
1999	1,503	-	-	-	-	-	-	47	21	13	11	11	11	92
2000	1,059	-	-	-	-	-	-	-	38	23	12	12	12	73
2001	976	-	-	-	-	-	-	-	-	42	13	13	13	55
2002	942	-	-	-	-	-	-	-	-	-	26	26	26	26

Table 6. Dates at which various tributaries to Green Bay reached 42°F.

River	Date
Menominee	11-Apr-03
Cedar	15-Apr-03
Escanaba	24-Apr-03
Bark	25-Apr-03
Days	25-Apr-03
Ford	25-Apr-03
Rapid	25-Apr-03
Sturgeon	25-Apr-03
Whitefish	25-Apr-03

Table 7.—Summary of night boomshocking surveys targeting walleye in Little and Big bays de Noc in fall 2003.

Date	Area sampled	Effort (hr)	Catch	CPUE (#/hr)	Effort (sec.)
Big Bay de Noc					
09/07/2003	Ogontz Bay to Martin Bay	2.00	18	9.00	7200
09/07/2003	Indian Pt. to Ogontz PAS	2.87	4	1.39	10338
09/08/2003	Garden Bay to Puffy Bay	2.70	10	3.70	9720
09/08/2003	Porcupine Pt. to Stony Pt.	2.22	6	2.70	7998
Total		9.79	38	3.88	35256
Little Bay de Noc					
09/09/2003	Head of LBDN to Days R. Pt.	2.25	144	64.00	8100
09/09/2003	Garth Pt. to Hunters Pt.	3.05	126	41.26	10994
09/10/2003	Escanaba Harbor to Portage Pt.	3.58	159	44.37	12900
09/10/2003	Terrace Bay Inn to Gladstone PAS, Squaw Pt.	2.37	36	15.22	8515
09/11/2003	Days R. to Gladstone PAS	3.40	48	14.12	12242
Total		14.65	513	35.01	52751