

STUDY PERFORMANCE REPORT

State: Michigan

Project No.: F-81-R-6

Study No.: 230494

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

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

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 for 1985-2005. Assessment netting and tagging have been done annually, 1988-2005. Fall sampling to assess natural reproduction by walleye has occurred from 2003-2005, with 2004 providing the first estimate of hatchery contribution to walleye year classes. Sampling during 2005 was completed according to schedule, and data from these surveys and assessments will be presented in future reports.

Creel surveys were conducted during 2004 at Little Bay de Noc (LBDN) and Big Bay de Noc (BBDN). Both sites were surveyed during the open-water season, but only LBDN was surveyed during the ice season. Combining estimates from all sites and seasons, sport anglers harvested 52,701 yellow perch and 35,767 walleyes during 2004.

Assessment netting for 2004 in Big and Little bays de Noc consisted of 39 10-minute trawl hauls and 32 overnight gill net sets. Data from these collections has been entered into computer files, and will be summarized in the final report for this study.

A total of 2,808 walleyes was tagged in spring of 2004. Incidence of lymphocystis on tagged fish ranged from 11% to 18% depending upon tagging location. Tag-return data were used to update estimates of exploitation and survival rates, and to further document fish movements. Mean annual exploitation rates of walleye populations, unadjusted for non-reporting, were 3.9% in LBDN, 3.0% in BBDN, 2.7% in Cedar River, and 4.4% in Menominee River. Walleye survival was 61% in LBDN, 65% in BBDN, 68% in Cedar River, and 48% in Menominee River.

Walleyes were sampled in fall 2004 in LBDN, BBDN, and Cedar River with gill nets and night boomshocking to assess recruitment and the relative contribution of hatchery-reared walleyes to year classes. Catches of juvenile walleye in LBDN and BBDN for 2004 were roughly three times lower than levels observed in the previous year. Examination of age-0 walleyes for oxytetracycline (OTC) marks revealed that naturally-reproduced walleyes made up 26% and 36% of the 2004 year class in LBDN and the Cedar River areas. Eighty-six percent of age-0 walleyes examined from BBDN were naturally reproduced. However, density of age-0 walleye appeared

much lower in BBDN compared to LBDN as evidenced by generally lower gill net and electrofishing catch rates, even in 2003 when BBDN received hatchery-reared walleyes.

Findings: Jobs 1, 2, 3, and 5 were scheduled for 2004-05, 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 1994-2003 have been calculated (G.P. Rakoczy and S. Thayer, personal communication, Charlevoix Fisheries Station, Charlevoix, Michigan), but are as yet unpublished. Coverage of Green Bay during the 2004 creel survey differed from those in previous years due to changes in the MDNR Fisheries Division's Great Lakes creel program. Creel data were obtained for the open water and ice seasons at LBDN, which typically accounts for the lion's share of Green Bay effort and harvest, and for the open water season at BBDN (Table 1). Creel data have been collected at these locations for 1998-2003, with walleye and yellow perch harvests averaging 30,265 and 105,690. Thus, the 2004 harvest of 35,767 walleyes was slightly above average, while that of yellow perch (52,701 fish) was well below average.

Marquette Fisheries Research Station personnel collected samples of adult and juvenile fish in June, July, August, and October in both Big and Little bays de Noc. Samples were obtained from 39 10-min bottom trawl hauls (20 in LBDN and 19 in BBDN) 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 has been entered into computer files, and will be summarized in the final report for this study.

In Michigan waters of Green Bay, individually-numbered monel bird leg bands have been used to jaw tag 55,928 walleyes between 1988 and 2004, 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 2004, 2,808 walleyes were tagged in Michigan waters of Green Bay (Tables 2 - 5). Walleyes were tagged at four locations: LBDN (N=506), BBDN (N=280), Cedar River (N=1021), and Menominee River (N=1000). Walleyes were tagged coincident with egg-take operations in LBDN 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 2003, incidence of lymphocystis in spawning populations during 2004 rose from 14 to 16% in LBDN, climbed from 11 to 13% in BBDN, inched up from 16 to 17% in Cedar River, and fell slightly from 19 to 18% 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 163 walleye tag returns was reported between May 2004 and April 2005 (Tables 2 - 5). Returns from fish tagged in LBDN included fish that had been tagged in 1989 and 1997-2004. BBDN returns came from fish tagged in 1995 and 2000-2004. Returns were reported for fish tagged in the Cedar River during 1993 and 1997-2003. Tag returns of Menominee River walleye came from fish that had been tagged in all years between 1995 and 2004, except for 1999.

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 2004, walleye exploitation rates were 3.9% in LBDN, 3.0% in BBDN, 2.7% in Cedar River, and 4.4% 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 10.5% in LBDN, 8.1% in BBDN, 7.3% in Cedar River, and 11.9% in Menominee River. Walleye survival was 61% in LBDN, 65% in BBDN, 68% in Cedar River, and 48% in Menominee River.

No tagged yellow perch were caught between May 2004 and April 2005. 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.

Job 2. Title: Intensify efforts to obtain an index of walleye recruitment.—All walleyes stocked into Michigan waters of Green Bay from 2004 to 2009 are being marked with OTC to allow assessment of the level of natural reproduction. Locations and numbers of OTC-marked walleye stocked into Green Bay in 2004 were as follows: LBDN (569,225), Cedar River (105,542), and Lake Michigan at Stony Point (22,391). We (Marquette Fisheries Research Station and Northern Lake Michigan Management Unit personnel) sampled walleye in fall 2004 using gill nets (each net consisting of three 200 ft x 6 ft panels of 1, 1.5, and 2.0 in. square mesh) and night boomshocking at randomly selected subset of pre-determined sampling zones in BBDN and LBDN. We also used night boomshocking to collect walleyes at the mouth of the Cedar River, and the Lake Michigan shoreline about 5 miles north and south of the Cedar River mouth. Alpena Fisheries Research Station personnel extracted otoliths from walleyes collected and examined them for OTC marks.

Walleye density appeared to vary considerably among water bodies as well as between years (Table 6). LBDN has consistently had higher electrofishing catch rates than BBDN in both 2003 (when BBDN was stocked) and 2004. This pattern is less apparent in the netting data, which seems to generally be more variable. Catch rates for both bays from both types of gear were roughly three times lower in 2004 than 2003, suggesting considerably lower abundance of juvenile walleyes in 2004. Gill net results for LBDN provide the only exception to this pattern, but little netting occurred here in fall 2003. Electrofishing catch rates for the Cedar River were on par with those observed in LBDN which was also stocked in 2004.

Results of OTC analysis showed considerable contribution of hatchery fish to the 2004 year class (Table 6). Hatchery-reared walleyes provided the bulk of the 2004 year class in LBDN and the Cedar River, with naturally reproduced fish contributing 26% and 36% respectively to the year class. Only seven age-0 walleyes were collected in BBDN and one of them had an OTC mark; no OTC-marked walleye were stocked into BBDN in 2004. Data on catch per hour of walleyes less than 8 in. for LBDN suggests that hatchery contribution may vary considerably among years, because the catch rate here was three times higher in 2003 even though walleye were not stocked into LBDN that year.

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 LBDN. This program was discontinued after the 2000 fishing season due to the limited quality and amount of diet data obtained (and the fact that such data had been collected previously).

Job 5. Title: Evaluate results and write report.—The 2004-05 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), 1985-2004. 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
2003 ^{a,b,d,g}	566,543	23,313	~26,234	75,049	~8,086
2004 ^{a,b}	486,893	35,767	~40,602	52,701	~5,550

^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, 1988-2004. (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	2003	2004	
1988	2,496	167	141	72	42	12	21	14	5	2	1	0	0	0	2	0	0	0	479
1989	2,486		150	58	25	20	7	7	8	1	3	1	1	0	0	0	3	1	285
1990	1,744			94	33	13	15	3	0	0	0	0	0	0	0	0	0	0	158
1991	1,886				79	30	10	5	2	1	1	0	0	0	0	0	0	0	128
1992	1,690					50	18	14	5	4	3	1	2	0	0	0	0	0	97
1993	1,563						69	22	10	5	1	3	3	0	1	3	0	0	117
1994	1,246							69	23	7	7	2	0	0	1	0	0	0	109
1995	711								33	18	6	3	1	0	0	0	0	0	61
1996	700									25	19	6	0	0	0	0	0	0	50
1997	700										17	9	6	4	0	2	1	6	45
1998	470											19	6	10	0	4	2	4	45
1999	530												16	12	9	3	1	1	42
2000	500													24	16	4	2	2	48
2001	500														20	6	12	2	40
2002	500															14	6	3	23
2003	894																46	24	70
2004	506																	17	17

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Table 3.—Number of walleyes tagged and tag returns by year from Big Bay de Noc, Lake Michigan, 1990-2004. (Recovery year = May-Apr).

Tag year	Number tagged	Recovery year															Total	
		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004		
1990	867	22	19	1	2	1	0	1	1	0	0	0	0	0	0	0	0	47
1991	354		6	3	3	1	2	1	0	0	0	0	0	0	1	0		17
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	2	3	0	3	1		134
1996	1,324							36	26	12	6	4	0	4	4	0		92
1997	868								21	17	3	3	1	6	1	0		52
1998	77									0	0	2	0	1	0	0		3
1999	609										3	7	2	4	5	0		21
2000	110											2	3	1	0	1		7
2001	55												1	0	1	1		3
2002	20													1	1	1		3
2003	617														27	12		39
2004	280																4	4

Table 4.—Number of walleyes tagged and tag returns by year from Cedar River, Lake Michigan, 1993-2004. (Recovery year = May-Apr).

Tag year	Number tagged	Recovery year												Total
		1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	
1993	1,312	50	27	9	1	1	1	0	0	0	0	0	1	90
1994	1,500		73	17	6	2	0	0	1	1	0	0	0	100
1995	1,677			36	23	9	3	3	4	1	3	0	0	82
1996	445				7	11	0	0	4	1	1	2	0	26
1997	925					26	9	3	8	4	6	2	5	63
1998	1,290						31	14	10	6	9	10	2	82
1999	1,203							31	19	7	11	3	2	73
2000	948								15	8	12	7	2	44
2001	840									22	16	18	3	59
2002	1,057										16	18	7	41
2003	714											21	10	31
2004	1,021												7	7

Table 5.—Number of walleyes tagged and tag returns by year from Menominee River, Lake Michigan, 1993-2004. (Recovery year = May-Apr).

Tag year	Number tagged	Recovery year												Total
		1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	
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	1	0	0	141
1995	1,879			98	28	14	1	4	1	0	1	2	5	154
1996	544				23	6	4	1	2	1	1	0	1	39
1997	1,758					81	25	6	5	3	1	1	1	123
1998	1,155						49	16	13	5	1	1	1	86
1999	1,503							47	21	13	14	5	0	100
2000	1,059								38	23	12	6	2	81
2001	976									42	13	18	3	76
2002	942										26	24	8	58
2003	959											31	7	38
2004	1,000												16	16

Table 6.—Effort, catch, and oxytetracycline (OTC) analysis results for walleye in Green Bay. Data shown include number of nights 600 ft gill nets were fished, gill net catch per unit effort (CPUE), hours of night boomshocking (EF hours), catch per hour (CPH) for all walleyes and walleyes < 8 in., age-0 walleyes stocked, and percent of young-of-year walleye originating from natural reproduction with number of walleyes examined for OTC marks in parentheses. No OTC marks were applied prior to 2004.

Year & location	Net nights	CPUE (#/net night)	EF hours	CPH Total	CPH < 8 in.	Walleyes stocked	% Wild (n)
<u>Little Bay de Noc</u>							
2003	2	1.0	13.6	37.5	22.7	0	--
2004	12	7.8	18.4	16.9	7.6	569,225	26% (62)
<u>Big Bay de Noc</u>							
2003	10	7.0	8.7	4.4	4.2	607,231	--
2004	24	2.0	7.1	1.1	0.0	0	86% (7)
<u>Cedar River 2004</u>							
River mouth			3.0	11.6	8.0		
Lake Michigan- south of mouth			1.2	22.6	21.0		
Lake Michigan- north of mouth			0.7	0	0		
Totals for Cedar River area			4.9	12.7	10.1	105,542	36% (44)