

STUDY PERFORMANCE REPORT

State: Michigan

Project No.: F-53-R-15

Study No.: 494

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

Period Covered: April 1, 1998 to September 30, 1999

Study Objective: (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 populations 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 since 1985, assessment netting and tagging has been done since 1988.

Creel surveys were conducted during 1998 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 was surveyed during the ice season. Combining estimates from all sites and seasons, sport anglers caught 151,310 yellow perch and 27,863 walleye during 1998.

Assessment netting in 1998 captured 2,626 fish representing 23 species. Fish were identified, counted, and 19% were measured and examined to determine sex, maturity, and stomach contents. Yellow perch was the most common species collected (70% of the total number), and walleye ranked tenth (1% of the total). Diet information was summarized from 310 yellow perch, 27 walleye, and 194 fish of other species.

The 1998 year class of yellow perch was strong based on trawl sampling in both bays. Overall 1998 trawl catches were higher than for most of the 1990s, but overall gill net catches of perch were relatively low. Trawling caught six young-of-the year walleye in Little Bay de Noc, but it could not be determined whether they had been planted or resulted from natural reproduction. Trawling also caught five round gobies.

Nearly 3,000 walleyes were tagged in spring 1998. Since 1988, 38,575 walleyes and 19,572 yellow perch have been tagged. Tag-return data were used to estimate exploitation and survival rates, and to document movements. Exploitation rates for walleye (unadjusted for non-reporting) were 4.2% for Little Bay de Noc, 2.9% for Big Bay de Noc, 3.3% for Cedar River, and 5.9% for Menominee River. Walleye survival was 59.1% in Little Bay de Noc, 57.9% in Big Bay de Noc, 40.3% in the Cedar River, and 32.9% in the Menominee River. Yellow perch exploitation and survival were not calculated since no yellow perch have been tagged since 1993 and no tagged yellow perch have been reported caught by anglers since 1996.

Job 1. Title: Continue monitoring yellow perch and walleye populations.

Findings: Creel survey data have been collected for 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 developed under F-53-R Study 427 and summarized by Rakoczy and Rogers (1987, 1988, 1990), Rakoczy and Lockwood (1988), Rakoczy (1992a, 1992b), and Rakoczy and Svoboda (1994). Creel estimates for 1994-98 have been calculated (G.P. Rakoczy, personal communication, Charlevoix Fisheries Station, Charlevoix, Michigan) but are as yet unpublished. Sites and seasons covered during the 1998 creel survey were comparable to those surveyed during 1993-96. The 1998 catches of walleye and yellow perch were 44% and 16% lower than 1993-96 averages for the two species. Angling effort during 1998 was down by 19% compared to the average during 1993-96.

Marquette Fisheries Station personnel collected monthly samples of adult and juvenile fish from June through September in both Big and Little bays de Noc. Samples were obtained from 49 bottom trawl hauls (27 in Little Bay de Noc and 22 in Big Bay de Noc), each was of 10-min duration; and 32 overnight gill net sets (16 in each bay). The trawl was a shrimp trawl with a 10-ft headrope, 0.75-in square mesh body, and 0.25-in square mesh codend liner. Gill nets were 6-ft deep and 60-ft long, comprised of 6 10-ft panels of experimental monofilament stretch mesh measuring 1.0-, 1.5-, 2.0-, 2.5-, 3.0-, and 4.0-in (respectively). Two 60-ft gangs were tied together to provide replication of each mesh size for any given set.

Total length, sex, maturity, and diet data were recorded for 310 yellow perch and 27 walleyes (Table 2). An additional 212 yellow perch were measured but not examined internally, and 1,303 were counted only. Scales and/or spines were collected from 23 walleyes and 114 yellow perch. Ages of these fish will be determined and reported in future reports.

Besides walleye and yellow perch, 773 fish (representing 21 other species) were caught. Of these, 167 fish were measured and examined to determine sex, maturity, and stomach contents.

Yellow perch was the most abundant species present in 1998 assessment netting, and walleye ranked tenth (Table 2). Yellow perch has been the most abundant species in assessment samples during all years of this study but walleye ranking has varied from year to year. More yellow perch were caught in Little Bay de Noc than in Big Bay de Noc during 1998. Walleye were only caught in Little Bay de Noc during 1998.

Catch per unit effort (CPUE) was calculated for yellow perch caught in standard monthly trawl hauls and gill net sets (Table 3). Trawl catches of young-of-the-year (YOY) yellow perch were used as an index of year-class strength, and gill-net catches of perch 7-inches and larger (generally \geq 3-years old) were used as an index of abundance for sizes large enough to interest sport anglers. The 1998 year class appeared to be strong in both bays, especially Little Bay de Noc where the index trawl CPUE for YOY perch was higher than for any other year of the study. Compared to 1988-97, gill net CPUEs for large, catchable yellow perch was relatively high in Little Bay de Noc and relatively low in Big Bay de Noc.

Threespine stickleback and white perch are two species that were recently (< 10 yr) documented in bays de Noc for the first time. During 1998, another new exotic species, round goby, was documented in Little Bay de Noc (Table 2). Sampling also produced two sauger, a species that has been rare in previous study years.

In Michigan waters of Green Bay, individually numbered monel bird leg bands have been used to jaw tag 38,575 walleye between 1988 and 1998, 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 1998, a total of 2,992 walleye were tagged in Michigan waters of Green Bay (Table 4). Walleye were tagged at four locations: Little Bay de Noc (N=470), Big Bay de Noc (N=77), Cedar River (N=1,290), and Menominee River (N=1,155). Tagging operations were conducted by personnel from the Marquette Fisheries Station and from MDNR offices in Newberry, Escanaba, Crystal Falls, and Baraga. Additional help on the Menominee River was provided by personnel from the Wisconsin DNR. 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 walleyes for tagging at other locations, but 1,290 were obtained from commercial pound nets set near the mouth of the Cedar River. Target numbers for tagging were 350 in Little Bay de Noc and 1,500 at each of the other three tagging locations. The Little Bay de Noc target was exceeded and targets for Cedar River and Menominee River approximated, but the number tagged in Big Bay de Noc was way below the target. Boomshocking efforts were undertaken soon after ice-out in Big Bay de Noc, but fish were not found to be concentrated or in spawning condition. It appeared that walleye may have congregated, spawned, and dispersed prior to ice-out.

Advertisements for the return of tags were placed in local newspapers, sport-club information bulletins, and notices at launch sites. In addition, the creel clerk surveying the Cedar and Menominee river fisheries solicited tag-return data on his personal fishing information web page. Anglers catching tagged fish were asked to contact a creel clerk or an MDNR office to report the species, tag number, fish length, date, time, and location of capture, whether they kept or released the fish, and their name, address, and phone number. These data were entered into computer files, and a computer-generated a 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 their fish.

A total of 197 walleye tag returns was reported between May 1998 and April 1999 (Table 4). Returns from fish tagged in Little Bay de Noc included fish that had been tagged in 1989, and during the period 1992-98. Big Bay de Noc returns came from fish tagged during 1995-97. Returns were reported for fish tagged at Cedar River during 1993, 1995, 1997, and 1998. Menominee River returns came from fish tagged during 1995-98.

Exploitation rates (unadjusted for non-reporting) and survival were estimated from tag-return data using formulae provided by Brownie et al. (1985). Based on cumulative tag returns through 1998, walleye exploitation rates were 4.2% in Little Bay de Noc, 2.9% in Big Bay de Noc, 3.3% in Cedar River, and 5.9% in Menominee River. Walleye survival was 59.1% in Little Bay de Noc, 57.9% in Big Bay de Noc, 40.3% in Cedar River, and 32.9% in Menominee River. Exploitation and survival of yellow perch in Little Bay de Noc was not calculated due to discontinued tagging since 1993 and lack of tag returns since 1996.

Thomas and Haas (1994) examined reward versus non-reward walleye tag returns in Lake Erie to determine an adjustment factor of 2.84 for non-reporting. Using this factor to adjust for non-reporting in Michigan waters of Green Bay, estimated exploitations for walleye were 11.9% in Little Bay de Noc, 8.2% in Big Bay de Noc, 9.4% in Cedar River, and 16.8% in Menominee River.

No tagged yellow perch were caught in 1998. Yellow perch have not been tagged in bays de Noc since 1993, and no tagged yellow perch have been reported since 1996 (Table 5). There was a

plan to tag additional yellow perch during 1998 in conjunction with a lakewide tagging effort coordinated among various agencies around Lake Michigan, but efforts were not successful.

Use of drop boxes, placed at 10 access sites throughout the study area, continued for the third year in 1998. Signs were posted asking walleye anglers to fill out brief catch summary forms that were available from a compartment in the drop boxes. During 1998, 59 forms were voluntarily completed and deposited in a separate slotted portion of the drop boxes. Drop boxes provide an additional way for anglers to report tagged fish (13 were reported in this way during 1998) and it is hoped that useful information will be obtained relating to the ratio of tagged to untagged fish in catches.

Lymphocystis, an endemic viral skin disease common to walleye, especially during spawning (Scott and Crossman 1973), was noted on fish at each tagging location. Compared to 1997, incidence of lymphocystis in 1998 spawning populations increased slightly in three of four areas: from 8% to 10% in Little Bay de Noc, from 11% to 13% in Big Bay de Noc, and from 15% to 16% in Menominee River. Incidence decreased for Cedar River fish from 17% in 1997 to 13% in 1998. Lymphocystis was not seen on any of the 28 walleye caught in assessment nets.

Fish stomach contents were examined in the field during assessment netting, and food items were identified and counted. Fish prey were measured and identified to species when possible, insects were identified to order or family, and zooplankton was considered a broad, inclusive category except that *Bythotrephes cederstroemi* was differentiated from other zooplankton. *Bythotrephes* has been observed in fish stomachs collected from both bays de Noc since 1988 (Schneeberger 1989, 1991). During 1998 sampling, *Bythotrephes* was found in stomachs of 28 yellow perch and 6 alewife. Despite the abundance in both bays of zebra mussels (*Dreissena polymorpha*), only one white sucker stomach was found containing zebra mussels as a food item.

In Little Bay de Noc, diet data were obtained from 191 yellow perch and 27 walleye. Aquatic insects (especially Ephemeroptera), amphipods, zooplankton, *Bythotrephes* and fish (trout-perch, walleye, yellow perch, and unidentified) were prominent in yellow perch stomachs (Table 6). Eight walleye stomachs were empty, but 16 contained fish (rainbow smelt, white sucker, alewife, trout-perch, and unidentified) and 3 contained Ephemeroptera nymphs (Table 7).

Stomachs were examined from 119 yellow perch in Big Bay de Noc. Yellow perch ate amphipods, Ephemeroptera, fish (mostly johnny darters), insects, zooplankton, crayfish, and various other food items (Table 8). No walleye were collected in Big Bay de Noc during 1998 assessment netting.

Job 2. Title: Intensify efforts to obtain an index of walleye recruitment.

Findings: During the course of the field season, nine extra trawl hauls were made with hopes of catching YOY walleye. Trawling effort was targeted in areas and during times where/when YOY walleye were expected to be present. Only six YOY walleye were captured, two each in June (mean length = 1.9 inches), July (mean length = 3.6 inches), and August (mean length = 5.4 inches). All were caught in Little Bay de Noc in the vicinity of Kipling/Saunders Point. Walleye fingerlings were stocked in Little Bay de Noc in 1998 so it was not possible to know if the captured YOY were products of natural reproduction.

Job 3. Title: Obtain year-round walleye diet from different areas.

Findings: For the second year in a row, an attempt was made to obtain additional walleye diet data through cooperation with the proprietors of a resort located at the head of Little Bay de Noc. Anglers that used the resort's cleaning station had the opportunity to label and save walleye stomachs in containers provided by the Marquette Fisheries Station. The resort owners kept the collected stomachs frozen until the containers were picked up by MDNR personnel. Also during 1998, individual members of a Menominee-area sports club saved, labeled, and froze stomachs from walleye they caught through the year. Subsequently, two students from Northern Michigan University identified, counted, and weighed stomach contents for each of the 59 walleye (21 from Little Bay de Noc, 15 from the Menominee River, 15 from the Rapid River estuary, 1 from Little Sturgeon Bay, and 7 from unknown locations) in the collection. They reported 32 empty stomachs, 12 walleye with fish in their stomachs (8 rainbow smelt, 3 logperch, 2 alewife, 2 white suckers, 1 sunfish, 1 sculpin, and 9 unidentified), and 14 walleye stomachs containing items various including aquatic insects and plant material. Stomachs had been preserved from the months of January (3), March (1), April (13), May (22), July (6), October (1), November (10), and unrecorded (3). Both students summarized their work for course credits. By collecting data from additional stomachs, from different areas in the bay, and from different times of year, this approach has increased walleye diet information that previously had been restricted to data taken from assessment nets.

Job 4. Title: Align with lakewide yellow perch programs.

Findings: Efforts were made to capture and tag yellow perch in Little Bay de Noc during April. Fyke nets that had been used to capture walleye for tagging and egg take were left in the water to fish for spawning congregations of yellow perch. Hoop nets were also deployed to capture perch. All nets filled with walleye, northern pike, smallmouth bass, and white suckers. The few yellow perch that were found in the nets were all too small to tag. Attempts to capture yellow perch using the boomshocker were also unsuccessful. Efforts ceased out of consideration for numerous sport anglers crowding the area, and because of time and manpower limitations. Evaluations of YOY yellow perch (Table 3) were submitted to the lakewide yellow perch task group to be compared with similar assessments in other areas of Lake Michigan.

Job 5. Title: Evaluate results and write report.

Findings: This 1998-99 Study Performance Report (F-53-R-15) was prepared.

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Table 1.—Estimated sport catch (number and pounds) and effort (angling hours) of walleye and yellow perch in Michigan waters of Green Bay, Lake Michigan (Statistical District MM-1), 1985-98. Data from G. Rakoczy, Michigan DNR, Charlevoix.

Year	Effort (hours)	Walleye		Yellow perch	
		Number	Pounds	Number	Pounds
1985 ^{a,b}	523,167	18,738	41,224	459,089	114,772
1986 ^{a,b}	486,339	21,682	45,532	432,646	90,856
1987 ^{a,b}	303,077	12,005	38,416	210,872	59,044
1988 ^{a,c}	551,750	25,535	79,159	323,294	74,358
1989 ^{a,c}	656,462	42,029	88,261	291,003	78,571
1990 ^{a,b}	736,599	43,144	94,917	372,402	85,652
1991 ^{a,b}	948,456	50,009	125,023	564,597	169,379
1992 ^{a,b}	692,284	23,374	63,110	399,671	79,934
1993 ^{a,b,d,e}	734,400	25,425	66,105	104,902	20,980
1994 ^{a,b,d,e}	609,360	32,508	87,772	139,409	27,882
1995 ^{a,b,d,e}	666,976	80,323	192,775	156,720	31,344
1996 ^{a,b,d,e}	627,900	62,752	163,155	323,789	64,758
1997 ^{b,d,e,f}	452,044	30,016	~76,040	43,908	~10,130
1998 ^{a,b,d,e}	532,829	27,863	~70,580	151,310	~34,930

^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

Table 2.—Species of fish captured in assessment nets in Little Bay de Noc (LBDN) and Big Bay de Noc (BBDN), Lake Michigan, June-September, 1998.

Common name	Measured and examined ^a		Measured or counted only		Totals			
	LBDN	BBDN	LBDN	BBDN	LBDN	BBDN	All	%
Yellow perch	191	119	907	608	1,098	727	1,825	69.50
Trout-perch	31	0	203	0	234	0	234	8.91
White sucker	12	18	81	1	93	19	112	4.27
Smallmouth bass	5	5	2	74	7	79	86	3.27
Johnny darter	3	3	12	67	15	70	85	3.24
Spottail shiner	7	17	44	3	51	20	71	2.70
Rainbow smelt	2	1	3	37	5	38	43	1.64
Brook stickleback	0	0	0	38	0	38	38	1.45
Alewife	8	24	0	1	8	25	33	1.26
Walleye	27	0	1	0	28	0	28	1.07
Rock bass	10	3	6	6	16	9	25	0.95
Threespine stickleback	1	1	0	8	1	9	10	0.38
Northern pike	7	2	0	0	7	2	9	0.34
Brook trout	0	0	0	7	0	7	7	0.27
Bluegill	1	0	3	1	4	1	5	0.19
Round goby	0	0	5	0	5	0	5	0.19
Gizzard shad	2	0	0	0	2	0	2	0.08
Logperch	0	0	2	0	2	0	2	0.08
Sauger	2	0	0	0	2	0	2	0.08
Burbot	1	0	0	0	1	0	1	0.04
Carp	0	0	1	0	1	0	1	0.04
Pumpkinseed	0	1	0	0	0	1	1	0.04
Splake	0	0	1	0	1	0	1	0.04
Total	310	194	1,271	851	1,581	1,045	2,626	100.00

^a Stomach contents, sex, and maturity.

Table 3.—Catch-per-unit-effort for yellow perch in 10-min trawl hauls and 24-hr, 60-ft experimental gill net sets in Little Bay de Noc and Big Bay de Noc, Lake Michigan, 1988-98.

Bay	Year	Number of perch per gill-net lift			Number of perch per trawl haul		
		<3.5"	≥3.5"	All	<7"	≥7"	All
Little Bay de Noc	1988	35.3	43.1	71.8	15.1	4.8	16.8
	1989	17.7	10.7	21.3	11.0	2.7	12.5
	1990	10.3	18.0	24.0	9.4	1.8	9.8
	1991	33.1	11.3	36.7	6.4	4.3	9.6
	1992	4.3	11.0	13.2	12.6	5.9	16.1
	1993	64.1	17.6	67.1	9.9	1.8	10.5
	1994	9.7	3.2	12.9	14.4	3.2	17.5
	1995	34.3	3.8	28.6	10.8	4.0	12.7
	1996	5.4	0.9	4.2	7.9	0.7	8.6
	1997	20.0	1.8	15.9	9.3	2.3	10.7
	1998	81.0	7.1	58.3	6.8	5.2	8.5
Big Bay de Noc	1988	34.7	34.0	51.5	3.0	3.0	5.0
	1989	3.5	3.7	3.6	14.9	7.1	20.2
	1990	70.3	12.0	70.4	6.6	4.2	9.7
	1991	205.0	1.5	205.2	8.4	3.8	9.4
	1992	2.9	2.8	3.8	11.6	3.6	13.6
	1993	23.4	1.7	24.0	9.4	2.0	9.5
	1994	141.7	8.5	150.2	3.9	1.9	5.8
	1995	44.1	60.0	52.6	5.2	1.4	5.9
	1996	22.8	27.8	35.2	15.2	2.0	17.2
	1997	20.8	1.0	7.0	12.5	2.1	13.8
	1998	69.2	6.0	72.6	4.9	1.4	5.1

Table 4.—Number of walleye tagged and tag returns by year from Michigan waters of Green Bay, Lake Michigan, 1988-98. (Recovery year = May-April).

Tag Year	Number tagged	Year											Total
		1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	
Little Bay de Noc													
1988	2,496	167	141	72	42	12	21	14	5	2	1	0	477
1989	2,486	-	150	58	25	20	7	7	8	1	3	1	280
1990	1,744	-	-	94	33	13	15	3	0	0	0	0	158
1991	1,886	-	-	-	79	30	10	5	2	1	1	0	128
1992	1,690	-	-	-	-	50	18	14	5	4	3	1	95
1993	1,563	-	-	-	-	-	69	22	10	5	1	3	110
1994	1,246	-	-	-	-	-	-	69	23	7	7	2	108
1995	711	-	-	-	-	-	-	-	33	18	6	3	60
1996	700	-	-	-	-	-	-	-	-	25	19	5	49
1997	700	-	-	-	-	-	-	-	-	-	17	9	26
1998	470	-	-	-	-	-	-	-	-	-	-	17	17
Big Bay de Noc													
1990	867	-	-	22	19	1	2	1	0	1	1	0	47
1991	354	-	-	-	6	3	3	1	2	1	0	0	16
1993	617	-	-	-	-	-	20	13	11	1	1	0	46
1994	1,458	-	-	-	-	-	-	37	15	5	3	0	60
1995	1,993	-	-	-	-	-	-	-	67	28	20	6	121
1996	1,324	-	-	-	-	-	-	-	-	32	25	10	67
1997	868	-	-	-	-	-	-	-	-	-	18	17	35
1998	77	-	-	-	-	-	-	-	-	-	-	0	0
Cedar River													
1993	1,312	-	-	-	-	-	50	27	9	1	1	1	89
1994	1,500	-	-	-	-	-	-	73	17	6	2	0	98
1995	1,677	-	-	-	-	-	-	-	36	23	9	2	70
1996	445	-	-	-	-	-	-	-	-	7	11	0	18
1997	925	-	-	-	-	-	-	-	-	-	26	7	34
1998	1,290	-	-	-	-	-	-	-	-	-	-	27	27
Menominee River													
1993	1,280	-	-	-	-	-	100	24	6	4	0	0	134
1994	1,500	-	-	-	-	-	-	127	16	4	2	0	149
1995	1,879	-	-	-	-	-	-	-	103	25	15	6	149
1996	544	-	-	-	-	-	-	-	-	20	8	4	32
1997	1,758	-	-	-	-	-	-	-	-	-	77	27	104
1998	1,155	-	-	-	-	-	-	-	-	-	-	49	49

Table 5.—Number of yellow perch tagged and tag returns by year from Michigan waters of Green Bay, Lake Michigan, 1988-98. (Recovery year = April-March).

Tag year	Number tagged	Year											Total
		1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	
Little Bay de Noc													
1989	2,523	-	102	51	17	2	5	0	0	0	0	0	177
1990	2,127	-	-	73	30	12	1	1	0	0	0	0	117
1991	2,418	-	-	-	71	32	13	0	1	0	0	0	117
1992	3,683	-	-	-	-	137	49	3	2		0	0	191
1993	5,278	-	-	-	-	-	153	28	13	2	0	0	196
Big Bay de Noc													
1990	1,059	-	-	19	3	0	0	0	0	0	0	0	22
1991	2,484	-	-	-	14	2	2	0	0	0	0	0	18

Table 6.—Diet data from 191 yellow perch collected in assessment nets in Little Bay de Noc, June-September, 1998.

Food category	Observed occurrence in yellow perch stomachs			Length of yellow perch	
	Frequency	Mean number per fish	Months	Min.	Max.
Ephemeroptera	41	1.6	6, 7, 8, 9	2.7	7.4
Diptera	35	5.6	6, 7, 8, 9	1.8	6.9
Amphipods	34	6.7	6, 7, 8, 9	2.2	6.6
Zooplankton	30	18.4	6, 7, 8, 9	1.8	4.3
<i>Bythotrephes</i>	25	49.6	7, 8, 9	3.1	7.9
Fish ^a	16	1.3	6, 7, 8	3.7	11.5
Miscellaneous	10	1.0	6, 7, 8, 9	2.5	6.8
Tricoptera	3	2.7	6, 8	5.9	6.5
Worms	2	1.0	6, 7	3.8	6.6
Corixids	1	1.0	7	4.6	4.6
Isopoda	1	1.0	6	6.0	6.0
Molluscs	1	1.0	8	2.7	2.7
Mussel	1	1.0	8	4.5	4.5
Vascular plants	1	1.0	8	11.0	11.0
Empty	31	-	6, 7, 8, 9	2.2	7.7

^a Trout-perch (4), walleye (1), yellow perch (1), unidentified (13)

Table 7.—Diet data from 27 walleye collected in assessment nets in Little Bay de Noc, Jun-Sep, 1998.

Food category	Observed occurrence in walleye stomachs			Length of walleye	
	Frequency	Mean number per fish	Months	Min.	Max.
Fish ^a	16	2.1	6, 7, 8, 9	1.8	19.6
Ephemeroptera	3	12.7	7	13.1	20.7
Empty	8	-	6, 8, 9	15.2	21.4

^a Rainbow smelt (4), white sucker (2), alewife (1), trout-perch (1), unidentified (13)

Table 8.—Diet data from 119 yellow perch collected in assessment nets in Big Bay de Noc, Jun-Sep, 1998.

Food category	Observed occurrence in yellow perch stomachs			Length of yellow perch	
	Frequency	Mean number per fish	Months	Min.	Max.
Amphipods	37	5.0	6, 7, 8, 9	2.6	6.1
Ephemeroptera	23	1.3	6, 7, 8, 9	3.3	9.4
Fish ^a	22	1.9	6, 7, 8, 9	4.2	9.5
Diptera	19	7.1	6, 7, 8, 9	2.6	4.8
Zooplankton	11	35.5	8, 9	2.5	3.4
Crayfish	9	1.0	6, 7, 8	4.2	9.4
<i>Bythotrephes</i>	3	16.3	9	3.8	5.9
Isopoda	3	1.0	6, 9	2.9	3.9
Miscellaneous	3	1.0	8, 9	3.4	5.2
Tricoptera	3	9.0	7	4.3	4.7
Eggs	1	24.0	7	4.3	4.3
Vascular plants	1	1.0	7	4.3	4.3
Empty	19	-	6, 7, 8, 9	3.7	12.4

^a Johnny darter (7), alewife (2), brook stickleback (2), threespine stickleback (2), mottled sculpin (1), unidentified (10)