

STUDY PERFORMANCE REPORT

State: Michigan

Project No.: F-81-R-1

Study No.: 494

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

Period Covered: October 1, 1999 to September 30, 2000

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 1985-2000, assessment netting and tagging has been done annually, 1988-2000. Sampling during 2000 has been completed according to schedule, and data from these surveys and assessments will be presented in future reports.

Creel surveys were conducted during 1999 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 158,297 yellow perch and 28,348 walleye during 1999.

Assessment netting in 1999 captured 1,579 fish representing 27 species. Fish were identified and counted, and 37% were measured and examined to determine sex, maturity, and stomach contents. Yellow perch was the most common species collected (30% of the total number), and walleye ranked eleventh (3% of the total). Diet information was summarized from 299 yellow perch, 46 walleye, and 233 fish of other species.

The 1999 yellow perch year class was weak in both bays based on trawl catches of young-of-the-year fish. Catches of age-1 and older yellow perch were also relatively low in 1999. Overall, gill net catch of yellow perch was lowest of survey years in Little Bay de Noc, but second highest of survey years in Big Bay de Noc. Three young-of-the-year walleye were gillnetted during August/September in Big Bay de Noc, but because this bay received 544,384 fingerlings stocked in July, it could not be determined whether the captured walleye had been planted or resulted from natural reproduction.

A total of 3,845 walleye was tagged in spring of 1999. Since 1988, 42,420 walleye 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, 2.6% for Big Bay de Noc, 3.1% for Cedar River, and 5.7% for

Menominee River. Walleye survival was 58.2% in Little Bay de Noc, 59.1% in Big Bay de Noc, 41.0% in Cedar River, and 35.9% in Menominee River. 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 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-53-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 1994-99 have been calculated (G.P. Rakoczy, personal communication, Charlevoix Fisheries Station, Charlevoix, Michigan), but are as yet unpublished. Sites and seasons covered during the 1999 creel survey were roughly comparable to those surveyed since 1993. Compared to 1993-98 averages, the 1999 catch was 34% lower for walleye, but 3% higher for yellow perch. Angling effort during 1999 represented 95% of the 1993-98 average.

Marquette Fisheries Research Station personnel collected monthly samples of adult and juvenile fish from June through September, 1999 in both Big and Little bays de Noc. Samples were obtained from 52 bottom trawl hauls (31 in Little Bay de Noc and 21 in Big Bay de Noc), each of 10-min duration, 32 overnight gill net sets (16 in each bay), and 12 seine hauls (all in Little Bay de Noc). Gear dimensions and configurations were identical to those described by Schneeberger (2000) except 1999 seining was accomplished using a net that was 15.2-m long by 1.2-m high, with 12.7-mm mesh netting and a 6.4-mm mesh bag.

Total length, sex, maturity, and diet data were recorded for 299 yellow perch and 46 walleye during 1999 (Table 2). An additional 89 yellow perch were measured but not examined internally, and 89 were counted only. Scales and/or spines were collected from 43 walleye and 132 yellow perch. Ages of these fish will be determined and tabulated in future reports.

Besides walleye and yellow perch, 1,056 fish, representing 25 other species, were caught in 1999 assessment nets. Of these, 233 fish were measured and examined to determine sex, maturity, and stomach contents. The remainder were measured or counted only.

Yellow perch was the most abundant species present in 1999 assessment netting (Table 2), but represented a lower percentage of the total catch compared to other years. White perch were first detected in Little Bay de Noc in 1990 and in Big Bay de Noc in 1996. Numbers of white perch collected through 1998 were relatively low, but in 1999 they ranked second in overall abundance, due mostly to a large catch (N=164, length range=96-297 mm, mean length=119 mm) in a June seine haul in Little Bay de Noc. Mimic shiners had never previously been caught during this study, but were ranked third in 1999 sample abundance. Aside from one mimic shiner caught in Little Bay de Noc during August, all the rest were caught during two September trawl hauls in Big Bay de Noc. Walleye ranked eleventh in total abundance, and more than five times as many were collected from Little Bay de Noc than from Big Bay de Noc. The exotic threespine stickleback was nominally present in Big Bay de Noc during 1999. The round goby, another recently detected exotic, was not collected during 1999 sampling.

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 yellow perch 178-mm and larger

(generally ≥ 3 -years old) were used as an index of abundance for sizes large enough to interest sport anglers. The 1999 yellow perch year class was very weak in both bays based on trawling. However, 1999 trawl catches of yellow perch from previous strong year classes (i.e., 1997 and 1998) were also low, so it may be that overall trawling efficiency for yellow perch was down during 1999. Compared to average values for 1988-98, gill net CPUEs for large, catchable yellow perch in 1999 was above average in Little Bay de Noc and below average in Big Bay de Noc.

In Michigan waters of Green Bay, individually-numbered monel bird leg bands have been used to jaw tag 42,420 walleye between 1988 and 1999, 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 1999, a total of 3,845 walleye were tagged in Michigan waters of Green Bay (Table 4). Walleye were tagged at four locations: Little Bay de Noc (N=530), Big Bay de Noc (N=609), Cedar River (N=1,203), and Menominee River (N=1,503). Walleye 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, but 914 walleye were obtained from commercial pound nets set near the mouth of the Cedar 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 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 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 181 walleye tag returns was reported between May 1999 and April 2000 (Table 4). Returns from fish tagged in Little Bay de Noc included fish that had been tagged in 1989, 1992, 1993, 1995, and 1997-99. Big Bay de Noc returns came from fish tagged in 1993, 1996, 1997, and 1999. Returns were reported for fish tagged at Cedar River during 1995, and 1997-99. Menominee River returns came from fish tagged from each year from 1996 through 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 1999, walleye exploitation rates were 4.2% in Little Bay de Noc, 2.6% in Big Bay de Noc, 3.1% in Cedar River, and 5.7% in Menominee River. Walleye survival was 58.2% in Little Bay de Noc, 59.1% in Big Bay de Noc, 41.0% in Cedar River, and 35.9% 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 11.3% in Little Bay de Noc, 7.0% in Big Bay de Noc, 8.4% in Cedar River, and 15.4% in Menominee River.

No tagged yellow perch were caught in 1999. 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 1999 in conjunction with a lakewide tagging effort

coordinated among various agencies around Lake Michigan, but efforts were not successful (see Job 4).

Use of drop boxes, placed at 10 access sites throughout the study area, continued for the fourth year in 1999. Signs were posted asking walleye anglers to fill out brief catch summary forms that were available from a compartment in the drop boxes. During 1999, 31 forms were received but only 2 were deposited in the separate slotted portion of the drop boxes; the rest were reported on a simulation of the form available on the web site administered by the creel clerk, mentioned above. These forms provided extra information on the fisheries both for tagged and non-tagged walleye.

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 1998, incidence of lymphocystis in 1999 spawning populations decreased in three of four areas: from 10% to 7% in Little Bay de Noc, from 13% to 12% in Big Bay de Noc, and from 13% to 7% in Cedar River. Incidence increased for Menominee River fish from 16% in 1998 to 17% in 1999. Lymphocystis was not seen on any of the 46 walleye caught in 1999 assessment nets.

Fish stomach contents were examined in the field during assessment netting, and food items were identified and counted. Fish prey were measured, weighed, and identified to species when possible, insects were identified to order or family, and zooplankton was considered a broad, inclusive category excepting *Bythotrephes cederstroemi* which was differentiated from other zooplankton. Predation on *Bythotrephes cederstroemi* during 1999 was very minimal (one yellow perch ate six in Big Bay de Noc) compared to previous years (Schneeberger 1989, 1991, 2000). Despite the high abundance of zebra mussels (*Dreissena polymorpha*) in both bays, they were found only in one white sucker stomach (50 zebra mussels), one northern pike stomach (4 zebra mussels), and one yellow perch stomach (1 zebra mussel).

In Little Bay de Noc, diet data were obtained from 112 yellow perch and 39 walleye. Amphipods, fish (mostly alewives), aquatic insects, and zooplankton were prominent in yellow perch stomachs (Table 6). Fourteen walleye stomachs were empty, but 15 contained fish (alewife, yellow perch, and unidentified) and 3 contained aquatic insects (Table 7).

Stomachs were examined from 187 yellow perch and 7 walleye in Big Bay de Noc. Yellow perch ate amphipods, zooplankton, fish, aquatic insects, crayfish, and plant material (Table 8). Walleye had fish (alewife and unidentified) in their stomachs (Table 9).

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

Findings: Twelve extra trawl hauls were made during the course of the field season in an effort to catch YOY walleye. Although trawling effort was targeted in areas and during times where and when YOY walleye were expected to be present, none were caught. Twelve seine hauls also failed to capture any YOY walleye. Three YOY walleye were caught in Big Bay de Noc gill nets during August (1) and September (2). Big Bay de Noc was stocked with 544,384 walleye fingerlings in July, so the origin (stocked or naturally produced) of these gillnetted fish could not be determined.

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

Findings: Supplemental walleye diet data were obtained through cooperation with the proprietors of a resort located at the head of Little Bay de Noc and from individual members of a Menominee-area sports club. Anglers saved, labeled, and froze walleye stomachs in containers provided by the Marquette Fisheries Research Station. Stomachs collected in this way during 1999 have not yet been collected, processed, or tabulated.

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

Findings: This was the final year for attempts to coordinate yellow perch tagging efforts with lakewide assessments. Similar to 1998, yellow perch were not caught during spring 1999 in numbers or sizes suitable for tagging. Evaluations of the 1999 year class of 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. In addition, yellow perch scale samples collected from bays de Noc were shared with a member of the lakewide task group who is looking for genetic differentiation among Lake Michigan yellow perch populations.

Job 5. Title: Evaluate results and write report.

Findings: The 1999-2000 Study Performance Report (F-81-R-15) was prepared during this study segment.

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Prepared by: P.J. Schneeberger

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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), 1985-99. Data from G. Rakoczy, 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

^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.—Numbers of each fish species captured in assessment nets in Little Bay de Noc (LBDN) and Big Bay de Noc (BBDN), Lake Michigan, June-September, 1999.

Common name	Measured and examined ^a		Measured or counted only		Totals			
	LBDN	BBDN	LBDN	BBDN	LBDN	BBDN	All	%
Yellow perch	112	187	57	121	169	308	477	30.21
White perch	9	6	159	0	168	6	174	11.02
Mimic shiner	0	0	1	170	1	170	171	10.83
White sucker	9	7	112	3	121	10	131	8.31
Rock bass	16	1	82	0	98	1	99	6.27
Trout-perch	21	0	67	0	88	0	88	5.57
Spottail shiner	0	11	36	39	36	50	86	5.45
Johnny darter	1	26	10	46	11	72	83	5.26
Smallmouth bass	24	28	2	1	26	29	55	3.48
Brook stickleback	0	19	7	25	7	44	51	3.23
Walleye	39	7	0	0	39	7	46	2.91
Alewife	12	3	5	9	17	12	29	1.84
Bluntnose minnow	0	0	27	0	27	0	27	1.71
Northern pike	18	8	1	0	19	8	27	1.71
Common shiner	3	0	4	0	7	0	7	0.44
Threespine stickleback	0	0	0	6	0	6	6	0.38
Common carp	1	2	0	1	1	3	4	0.25
White bass	4	0	0	0	4	0	4	0.25
Brown bullhead	1	1	1	0	2	1	3	0.19
Largemouth bass	0	0	2	0	2	0	2	0.13
Ninespine stickleback	0	0	0	2	0	2	2	0.13
Pumpkinseed	0	0	2	0	2	0	2	0.13
Black bullhead	0	1	0	0	0	1	1	0.06
Freshwater drum	0	1	0	0	0	1	1	0.06
Gizzard shad	0	0	1	0	1	0	1	0.06
Rainbow smelt	0	0	1	0	1	0	1	0.06
Unidentified sculpin	0	0	0	1	0	1	1	0.06
Total	270	308	577	424	847	732	1,579	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, 18-m experimental gill net sets in Little Bay de Noc and Big Bay de Noc, Lake Michigan, 1988-99.

Bay	Year	Number of yellow perch per gill-net lift			Number of yellow perch per trawl haul		
		<90 mm	≥90 mm	All	<178 mm	≥178 mm	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
1999	12.0	1.7	3.4	4.6	4.7	6.3	
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
1999	3.0	10.0	9.8	16.9	2.0	17.9	

Table 4.—Number of walleye tagged and tag returns by year from Michigan waters of Green Bay, Lake Michigan, 1988-99. (Recovery year = May-April).

Tag Number year tagged	Year													Total
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999		
Little Bay de Noc														
1988	2,496	167	141	72	42	12	21	14	5	2	1	0	0	477
1989	2,486	-	150	58	25	20	7	7	8	1	3	1	1	281
1990	1,744	-	-	94	33	13	15	3	0	0	0	0	0	158
1991	1,886	-	-	-	79	30	10	5	2	1	1	0	0	128
1992	1,690	-	-	-	-	50	18	14	5	4	3	1	2	97
1993	1,563	-	-	-	-	-	69	22	10	5	1	3	3	113
1994	1,246	-	-	-	-	-	-	69	23	7	7	2	0	108
1995	711	-	-	-	-	-	-	-	33	18	6	3	1	61
1996	700	-	-	-	-	-	-	-	-	25	19	6	0	50
1997	700	-	-	-	-	-	-	-	-	-	17	9	6	32
1998	470	-	-	-	-	-	-	-	-	-	-	19	6	25
1999	530	-	-	-	-	-	-	-	-	-	-	-	16	16
Big Bay de Noc														
1990	867	-	-	22	19	1	2	1	0	1	1	0	0	47
1991	354	-	-	-	6	3	3	1	2	1	0	0	0	16
1993	617	-	-	-	-	-	20	13	11	1	1	0	1	47
1994	1,458	-	-	-	-	-	-	37	15	5	3	0	0	60
1995	1,993	-	-	-	-	-	-	-	67	28	20	6	0	121
1996	1,324	-	-	-	-	-	-	-	-	32	25	11	6	74
1997	868	-	-	-	-	-	-	-	-	-	18	17	3	38
1998	77	-	-	-	-	-	-	-	-	-	-	0	0	0
1999	609	-	-	-	-	-	-	-	-	-	-	-	3	3
Cedar River														
1993	1,312	-	-	-	-	-	50	27	9	1	1	1	0	89
1994	1,500	-	-	-	-	-	-	73	17	6	2	0	0	98
1995	1,677	-	-	-	-	-	-	-	36	23	9	3	3	74
1996	445	-	-	-	-	-	-	-	-	7	11	0	0	18
1997	925	-	-	-	-	-	-	-	-	-	26	8	3	37
1998	1,290	-	-	-	-	-	-	-	-	-	-	31	14	45
1999	1,203	-	-	-	-	-	-	-	-	-	-	-	31	31
Menominee River														
1993	1,280	-	-	-	-	-	100	24	6	4	0	0	0	134
1994	1,500	-	-	-	-	-	-	127	16	4	2	0	0	149
1995	1,879	-	-	-	-	-	-	-	103	25	15	6	0	149
1996	544	-	-	-	-	-	-	-	-	20	8	5	1	34
1997	1,758	-	-	-	-	-	-	-	-	-	77	28	14	119
1998	1,155	-	-	-	-	-	-	-	-	-	-	52	19	71
1999	1,503	-	-	-	-	-	-	-	-	-	-	-	46	46

Table 5.—Number of yellow perch tagged and tag returns by year from Michigan waters of Green Bay, Lake Michigan, 1988-99. (Recovery year = April-March).

Tag Number year tagged	Year													Total
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999		
Little Bay de Noc														
1989 2,523	-	102	51	17	2	5	0	0	0	0	0	0	0	177
1990 2,127	-	-	73	30	12	1	1	0	0	0	0	0	0	117
1991 2,418	-	-	-	71	32	13	0	1	0	0	0	0	0	117
1992 3,683	-	-	-	-	137	49	3	2		0	0	0	0	191
1993 5,278	-	-	-	-	-	153	28	13	2	0	0	0	0	196
Big Bay de Noc														
1990 1,059	-	-	19	3	0	0	0	0	0	0	0	0	0	22
1991 2,484	-	-	-	14	2	2	0	0	0	0	0	0	0	18

Table 6.—Diet composition from 112 yellow perch collected in assessment nets in Little Bay de Noc, June-September, 1999.

Food category	Observed occurrence in yellow perch stomachs			Total length (mm) of yellow perch	
	Frequency	Mean number		Min.	Max.
		per fish	Months		
Amphipods	24	4.0	5, 6, 8	69	147
Fish ^a	20	1.0	6, 7, 8	137	239
Miscellaneous	20	1.0	5, 6, 7, 8, 9	79	216
Hexagenia	13	3.3	5, 6, 7, 9	79	239
Zooplankton	12	27.9	5, 7, 9	48	84
Diptera	9	1.9	5, 6, 9	71	130
Crayfish	5	1.4	6, 7, 8	107	236
Ephemeroptera	3	12.3	7, 8	94	145
Eggs	2	10.0	5	79	79
Isopoda	1	1.0	5	79	79
Trichoptera	1	3.0	8	145	145
Vascular plants	1	1.0	7	112	112
Worms	1	1.0	5	69	69
Zebra mussel	1	1.0	8	216	216
Empty	19	-	6, 7, 8	140	234

^a Alewife (5), unidentified (15)

Table 7.—Diet composition from 39 walleye collected in assessment nets in Little Bay de Noc, June-September, 1999.

Food category	Observed occurrence in walleye stomachs			Total length (mm) of walleye	
	Frequency	Mean number	Months	Min.	Max.
		per fish			
Fish ^a	15	1.3	6, 7, 8, 9	183	490
Miscellaneous	11	1.0	6, 7, 8, 9	206	490
Diptera	1	1.0	6	246	246
Ephemeroptera	1	1.0	8	399	399
Hexagenia	1	1.0	6	254	254
Empty	14	-	6, 7, 8	183	536

^a Alewife (4), yellow perch (1), unidentified (14)

Table 8.—Diet composition from 187 yellow perch collected in assessment nets in Big Bay de Noc, June-September, 1999.

Food category	Observed occurrence in yellow perch stomachs			Total length (mm) of yellow perch	
	Frequency	Mean number	Months	Min.	Max.
		per fish			
Amphipods	43	11.3	6, 7, 8, 9	64	155
Zooplankton	40	105.5	7, 8, 9	56	224
Fish ^a	30	1.1	6, 7, 8, 9	74	244
Hexagenia	25	1.5	6, 7, 9	89	157
Crayfish	24	1.3	6, 7, 8, 9	107	284
Miscellaneous	20	1.0	6, 7, 8, 9	86	183
Diptera	15	4.5	6, 7, 8, 9	66	155
Vascular plants	7	1.0	7, 8, 9	66	231
<i>Bythotrephes</i>	1	6.0	6	183	183
Diptera	1	22.0	8	124	124
Eggs	1	115.0	6	155	155
Ephemeroptera	1	2.0	7	112	112
Empty	29	-	6, 7, 8, 9	56	297

^a Brook stickleback (5), johnny darter (4), alewife (3), stickleback sp. (2), spottail shiner (1), unidentified (19)

Table 9.—Diet composition from 7 walleye collected in assessment nets in Big Bay de Noc, June-September, 1999.

Food category	Observed occurrence in walleye stomachs			Total length (mm) of walleye	
	Frequency	Mean number		Min.	Max.
		per fish	Months		
Fish ^a	6	2.7	6, 8, 9	152	538
Empty	1	-	6	472	472

^a Alewife (1), unidentified (15)