

Lake Michigan Committee  
Ann Arbor MI  
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Agenda Item 4e.

## REPORT OF THE LAKE MICHIGAN TECHNICAL COMMITTEE

### Status of Yellow Perch in Lake Michigan and Yellow Perch Task Group Progress Report

#### **Status of Yellow Perch in Lake Michigan**

This status report was prepared by Rich Hess and Dan Makauskas, IL DNR, from information provided by the following contributors:

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Phil Schneeberger, MDNR - Little and Big Bays de Noc  
Brian Belonger, WDNR - Green Bay (WI)  
Mike Keniry and Pradeep Hirethota, WDNR - Wisconsin waters, Southern Lake Michigan  
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David F. Clapp, MDNR - Southern Lake Michigan  
Steven M. Schroyer and Thomas S. McComish, BALL STATE UNIV. - Indiana waters  
Jim Francis, IN DNR - Indiana waters  
Dan Makauskas, IL DNR - Illinois waters

#### Northern Lake Michigan

Assessment data from this portion of the lake is sparse. Electrofishing was conducted in the fall (September) at night in Epoufette Bay from 1993 through 1996 by COTFMA. The resulting catches of yellow perch were predominantly young-of-the-year (YOY) fish less than 120mm in total length. Yearly capture rates were 53, 30, 38, and 55 YOY per hour of electrofishing, respectively. A total of only 8 perch age 1+ or older were captured in 1996. The assessments were conducted to evaluate the survival and relative abundance of walleye and the associated fish community in the bay.

The only other assessment information from the northern portion of the lake comes from the USGS-BRD (formerly NBS). Among the three forage fish index stations trawled (Manistique, Frankfort and Sturgeon Bay) in the fall (September-October) of 1996, no YOY yellow perch were captured.

#### Green Bay

The Wisconsin DNR has conducted trawl assessments in the bay since 1978 at standard index sites and at deep index sites which were added in 1988. The deeper sites were developed in response to a trend in increasing abundance at a single deep site established in 1985 off Marinette. The standard and deep site assessment data have been combined based upon the quantity of habitat they represent, and a weighted average value is now used which includes an adjustment for standard site data prior to 1988 to account for the increased area occupied by perch.

The number of YOY yellow perch caught per trawl hour in 1996 (104) ranked 16th in the past 19 years, since index sites were established in 1978. YOY abundance had increased slightly each year from the record low 1993 year class through 1995. 1996 was below the median of 299 and mean catch of 883 per trawl hour (Figure 1). Five consecutive relatively weak year classes appear to have occurred from 1992-96 in Wisconsin waters of the bay. A declining trend in the relative abundance of yearling and older perch captured in the trawls has also become apparent since 1988, with the exception of 1992 (Figure 2). In 1996 the average number of yearling and older perch caught per trawl hour was higher at the deep index sites (241/hr) than at the standard (shallower) sites (204/hr).

The Michigan DNR has employed both trawls and gill nets (1, 1.5, 2, 2.5, 3 and 4-inch stretched meshes) to assess perch stocks in Little Bay de Noc (LBDN) and Big Bay de Noc (BBDN). In LBDN **trawl** catch rates of perch less than 3.5" (90mm) were much lower in 1996 (90%) than in 1995 (Table 1). The 1996 catch rate of 3.4/haul was the lowest observed since 1988. The mean catch rate for perch <3.5" from 1988 through 1996 was 23.6/haul. Although relatively weak year classes appear to have been produced in LBDN in 1992, 1994, and 1996, no trend in the relative abundance of YOY perch is apparent (Figure 3). The mean catch rate of 8.6/lift for all perch in the 1996 LBDN **gill net** assessments (Table 1) was 32% lower than in 1995 (12.7/lift), and 32% lower than the mean of 12.7/lift for the 1988-96 period. Gill net CPEs have declined over 50% in the past two seasons and may be a result of the lower recruitment levels based on low trawl catches of perch less than 3.5" in 1992, 1994, and 1996. (Figure 4).

**Trawl** catch rates in BBDN for perch less than 3.5" peaked in 1994 (141.7), then declined by 69% to 44.1/haul in 1995, and further declined by 83% in 1996 to 7.6/haul (Table 1 and Figure 3). Overall **gill net** catches in BBDN, however, increased by 200% from 1994 to 1996 due mainly to a 300% increase in perch less than 7"- perhaps due to recruitment from the 1994 year class (Table 1 and Figure 4). The 1996 overall **gill net** catch rate of 17.2/lift was 192% greater than 1995 (5.9/lift), and 61% higher than the overall mean rate of 10.7/lift for the 1988-96 period.

In terms of growth rates for perch from both bays, length-at-age in 1996 was similar to 1995. Sex ratios, however, were skewed more toward females in 1996 (2.43F : 1M).

#### Central Lake Michigan

Assessment data is scant from the central region of the lake. The NBS did not collect any YOY perch at their Port Washington and Ludington trawling index stations. This has essentially been the case for the past 5 years.

Consumers Power at Ludington provided data for yellow perch caught in gill nets set near the barrier net for the pump storage facility in 1996. Catch rates were 155 fish per 1000' of net with most fish being greater than 7" and males (77%)

#### Southern Lake Michigan

Considerable assessment activity has been conducted annually in the southern portion of the lake for a number of years by Illinois, Indiana and Wisconsin (Milwaukee), and in 1995 the Michigan DNR reinstated perch assessment activities as well. After declining 86% from 1992 - 1995, CPEs in Illinois gill nets (1.0 to 3.0" stretched mesh) increased 373% to 562 fish per 1000' of net per night (Figure 5). This increase was the result of an incredible 1751% increase in the catch rate in the 2.5" mesh. The fish caught in the 2.5" mesh were 97% males and 91% were age 6 or older.

Michigan DNR gill net assessments (1.0 to 3.5" stretched mesh) at four southern ports had a combined CPE of 171 fish per 1000' per night in 1996 (Table 3). Gill net CPEs for Indiana waters were not yet available for their 1996 assessments.

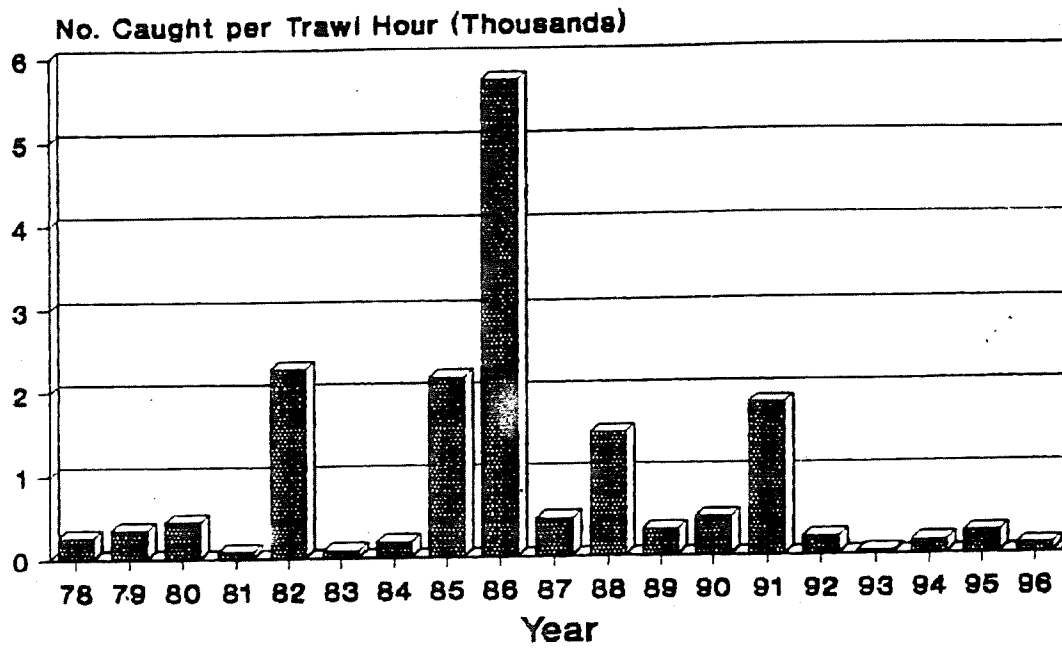


Figure 1. Index Trawl Rel. Abundance  
 YOY Yellow Perch Weighted Area Avg.

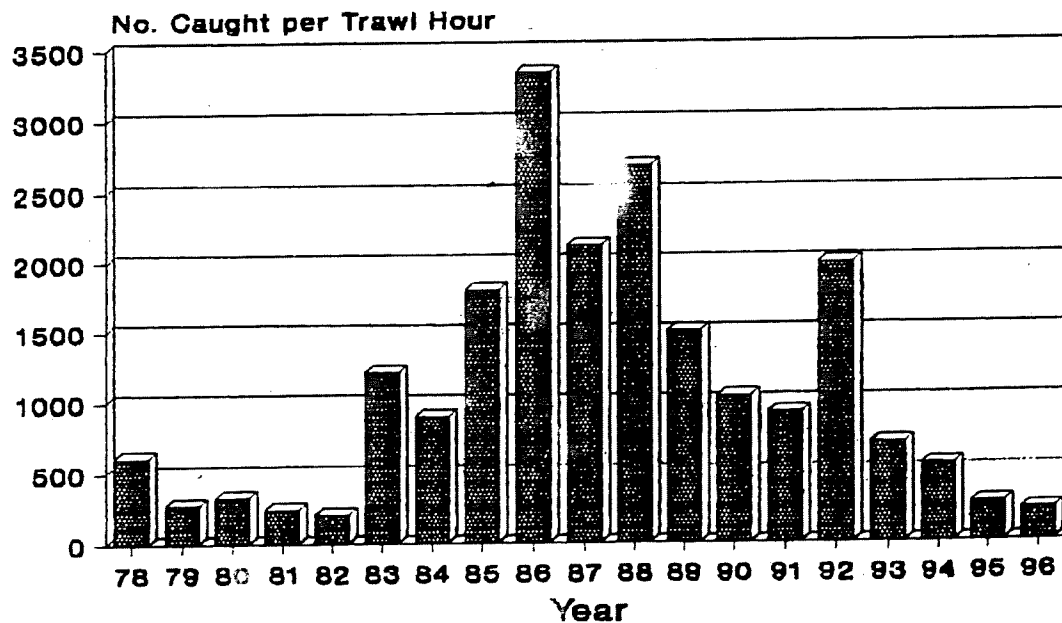


Figure 2. Index Trawl Rel. Abundance  
 Yg. & Older Y. Perch Weighted Area Avg

Table 1.—Catch-per-unit-effort for yellow perch in 10-min trawl hauls and 24-hr, 60-ft experimental gill net sets.

Bay	Year	Number of perch per trawl haul			Number of perch per gill-net lift		
		<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	3.4	0.9	4.2	7.9	0.7	8.6	
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	7.6	27.8	35.2	15.2	2.0	17.2	

Table 2. Catch per Effort by age (fish/1000ft./night), and the percent of each sex of yellow perch caught in standardized assessment graded mesh gill net sets conducted in January each year.

AGE	Year (January)										
	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0	0	0	0	0	0	0	0	0	0	0
2	343	269	464	626	724	159	49	60	0	0	0
3	2662	526	453	1854	1037	865	276	98	25	0	0
4	368	3580	386	1012	938	323	715	402	58	28	0
5	134	541	701	1563	394	327	281	757	218	65	0
6	236	71	324	1880	381	83	181	165	141	120	19
7	13	72	12	155	90	82	126	49	48	76	51
8	1	3	3	1	0	32	73	16	11	65	71
9	0	0	0	0	0	0	14	0	0	24	31
10	0	0	0	0	0	0	0	0	0	2	12
11	0	0	0	0	0	0	0	0	0	0	3
%male	54	56	56	69	61	72	82	86	89	90	95.2
%female	46	44	44	31	39	28	18	14	11	10	4.8

CPE for Yellow Perch <3.5" in 10-minute Trawl Hauls in Little and Big Bay De Noc, MI

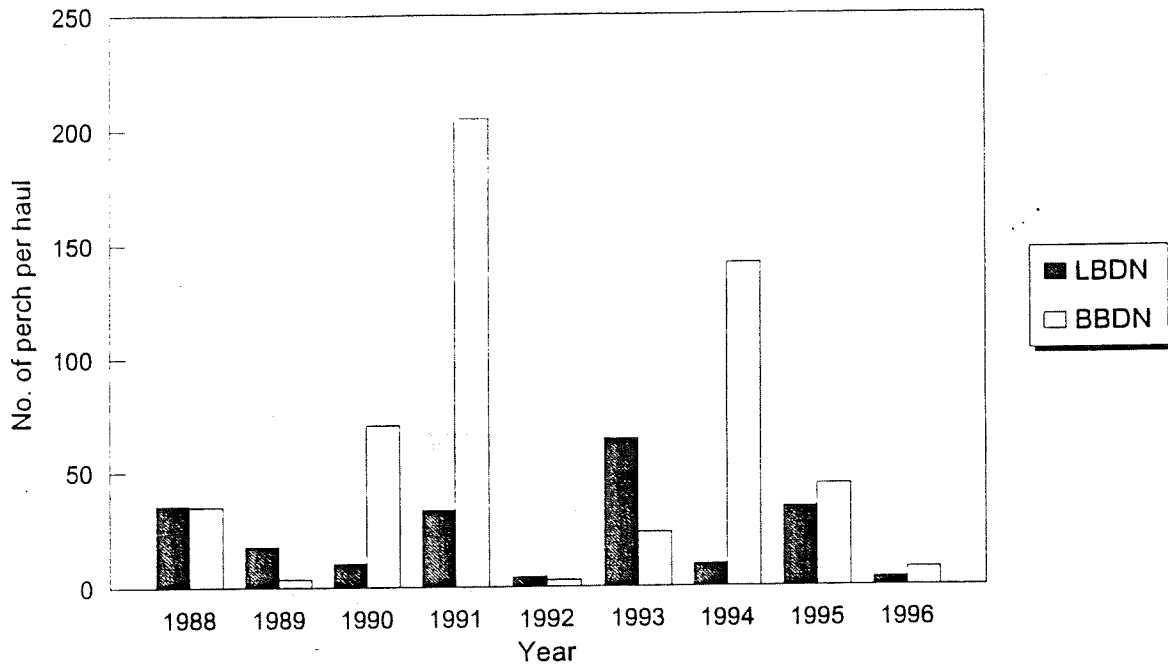


Figure 3

CPE for Yellow Perch in 24-Hour, 60' Gill Nets in Little and Big Bay De Noc, MI

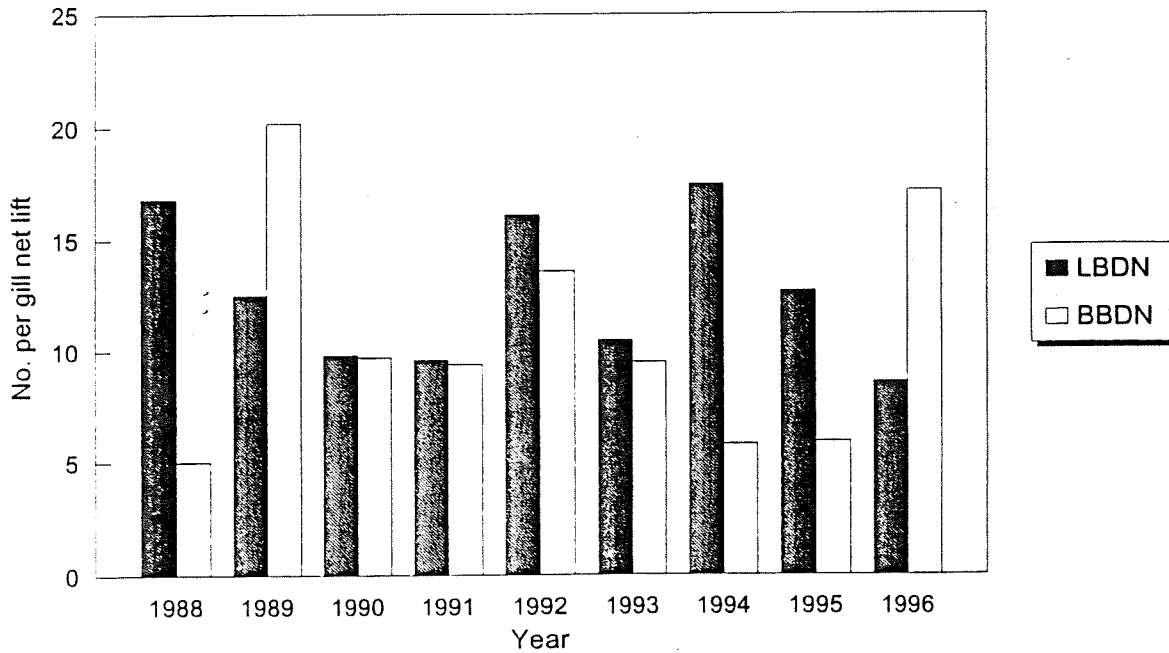


Figure 4

# Yellow Perch CPEs for Illinois Waters of Lake Michigan

1976 - 1996

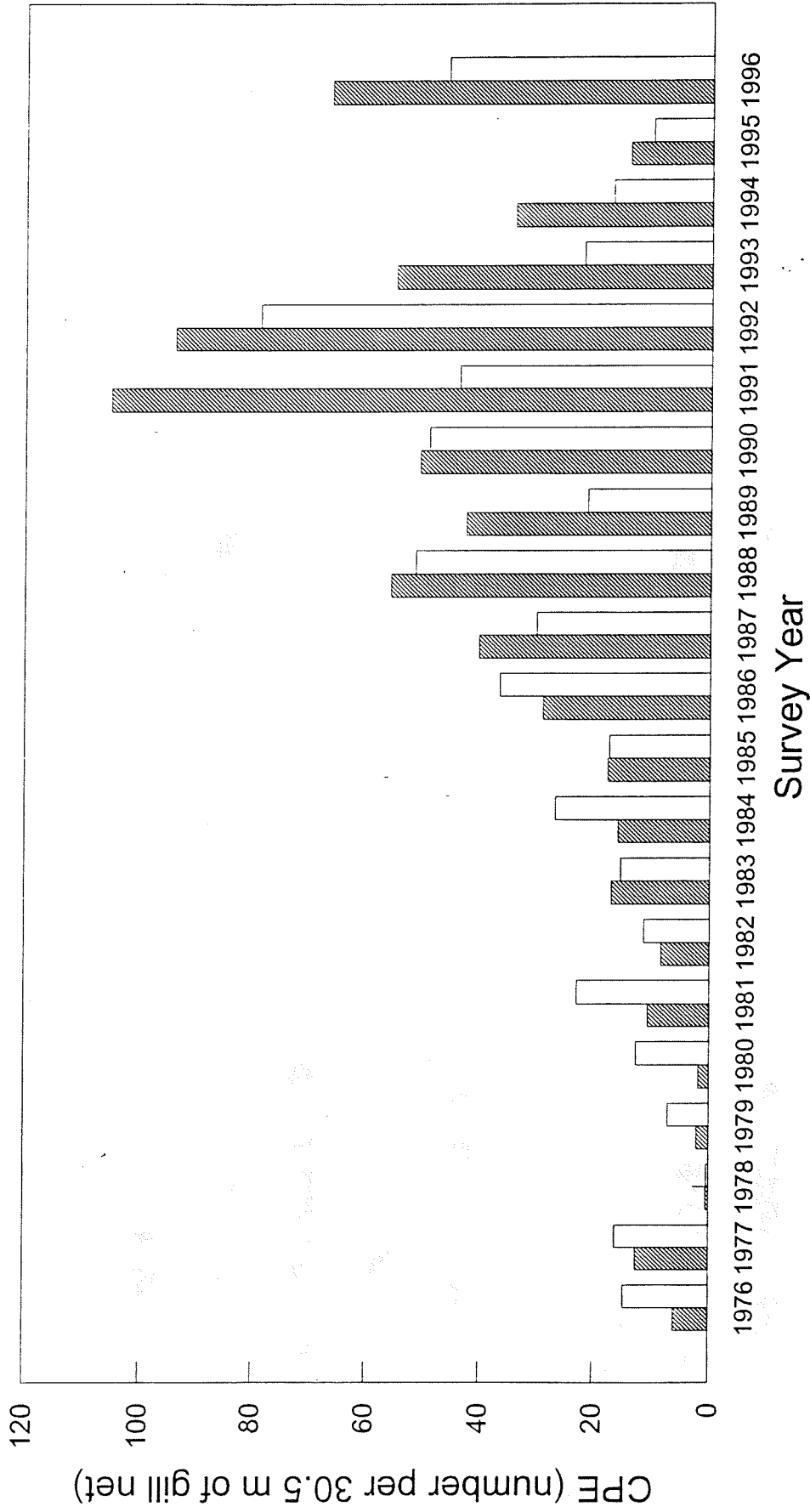


Figure 5

■ CPE Lake Bluff □ CPE Chicago

Table 3. Yellow perch catch-per-unit-effort (# per 1,000 feet of gill net per 24 h) at four southern Lake Michigan ports (Grand Haven, Saugatuck, South Haven, and St. Joseph), April-May 1996. Percent of sample at each port is shown in parentheses. Combined values are for these four ports, combined. Values for Ludington are actual number of perch of each size class sampled. Catch rates at the Ludington facility are not directly comparable to those from the southern Lake Michigan assessment because net types and effort varied significantly.

Port	Sex	Size class							Overall
		<6"	6"	7"	8"	9"	10"	>10"	
Grand Haven	Male	0 (--)	1 (<1)	22 (7)	56 (18)	19 (6)	2 (<1)	3 (1)	103 (33)
	Female	0 (--)	0 (--)	0 (--)	3 (1)	34 (11)	72 (23)	100 (32)	209 (67)
Saugatuck	Male	0 (--)	0 (--)	3 (17)	6 (30)	1 (6)	0 (--)	0 (--)	10 (53)
	Female	0 (--)	0 (--)	<1 (3)	<1 (3)	3 (14)	3 (17)	2 (10)	9 (47)
South Haven	Male	0 (--)	0 (--)	61 (19)	65 (20)	29 (9)	3 (1)	0 (--)	158 (49)
	Female	0 (--)	0 (--)	0 (--)	3 (1)	22 (7)	68 (21)	71 (22)	164 (51)
St. Joseph	Male	0 (--)	1 (3)	13 (41)	9 (28)	1 (4)	0 (--)	0 (--)	24 (76)
	Female	<1 (1)	1 (3)	1 (2)	<1 (1)	2 (7)	2 (8)	1 (2)	8 (24)
Combined	Male	0 (--)	2 (1)	27 (16)	36 (21)	10 (6)	2 (1)	2 (1)	79 (46)
	Female	1 (<1)	1 (<1)	2 (1)	2 (1)	15 (9)	32 (19)	39 (23)	92 (54)
Ludington	Male	0 (--)	1 (1)	28 (18)	28 (18)	31 (20)	23 (15)	9 (6)	120 (77)
	Female	0 (--)	1 (1)	0 (--)	0 (--)	1 (1)	11 (7)	22 (14)	35 (23)

The Wisconsin DNR graded mesh gill net assessment in 1996 (February 14 - March 13) had an overall CPE of 25 perch per 1000 feet of net per night (Table 2). Age 6 and older perch made up the catch and the number of females in the catch is decreasing at a rapid rate. The most recent relatively strong year class (1988) has predominated in both the Wisconsin and Illinois assessments from 1992 through 1996.

Shifts in sex ratios towards a lower proportion of females have also been observed during the decline in perch numbers. Females comprised only 4% of Illinois gill net catches (June) and 4.8% of Wisconsin's gill net catches (February and March) in 1996. The decline in females is attributed to their faster growth rate than males, which results in their harvest (sport and commercial) at a younger age. Indiana has observed that the sex ratio is near 1:1 up to the age when females enter the fisheries, and becomes skewed in favor of males at older ages due to selective harvest of females. Michigan found 54% females in their combined gill net assessments in 1996.

Captures of YOY perch in the annual beach seine assessments in Illinois and Wisconsin waters remained very low in 1996 (Figures 6 and 7), as did trawl catches in Indiana waters (Figure 8). Figure 9 also provides estimates of perch year class strength in Indiana waters based on trawl catch rates at age 2 and indicates that extremely weak year classes were produced in each year from 1989 through 1994.

The Michigan DNR also conducted some trawling in July and September of 1996 near St. Joseph, South Haven, Grand Haven, and Muskegon and had a trawl CPE of 0 for YOY yellow perch in July and 2 YOY per trawl in September (Table 4). WDNR also conducted 17 trawl tows in late August 1996 and collected no YOY yellow perch.

USGS-BRD bottom trawling in fall of 1996 was successful in capturing 9 YOY perch (40-110mm, all at Saugatuck) at depths of 5m (3 YOY), 9m (2 YOY), 13m (1 YOY), 22m (1 YOY), and 64m (2 YOY). The mean capture rate for YOY was 0.13 per 10-minute trawl (39-foot bottom trawl) down from 2.02 in 1995. A total of 274 adult perch (age 1 and older) were also captured and the mean capture rate was 4.03 per 10-minute trawl. The 1996 capture rate was 32% lower than the 1995 rate of 5.9 per 10-minute trawl.

The USGS-BRD also trawled at a depth of 9m off Waukegan, IL in the fall of 1996 in an attempt to capture YOY perch. No YOY perch were collected, but 28 adults between 150 and 280 mm were captured at depths ranging from 9 to 27 meters.

Preliminary data from a pilot tagging study conducted by the Illinois Natural History Survey in Illinois waters in 1996, in which 13,465 perch were tagged within a 9 mile area near Lake Bluff, indicated that total tag returns were almost two times higher than during a project in which 55,000 perch were tagged between 1988 and 1992 and returns occurred over a 5 year period. In addition, short-term returns (first five months at liberty) were more than ten times higher in 1996 (5.3%) than in 1990 (0.4%) when an equivalent number of perch were tagged. Both projects used the same capture and tagging equipment, and tagging sites were all within the same 20 mile area of shoreline. These data indicate that a tagging study conducted in the next three years (before any new recruits enter the population) will yield high recapture rates due to the decreased perch population size. Public awareness and concern about the perch decline is currently strong and will likely increase the tag return rate from anglers (anglers returned 10-30% of their tags in the 1988-1993 study).



**Yellow Perch: Young-of-the-Year**  
Indices of Relative Abundance in Illinois Waters

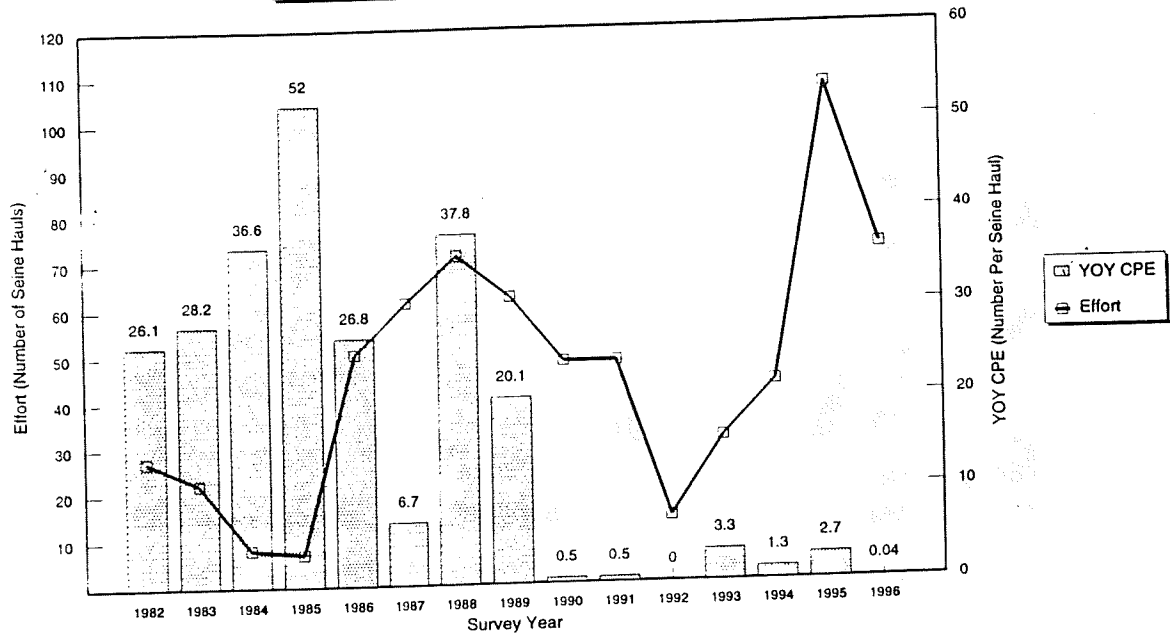


Figure 6

**Beach Seining for YOY Yellow Perch in the Wisconsin Waters of Southern Lake Michigan**

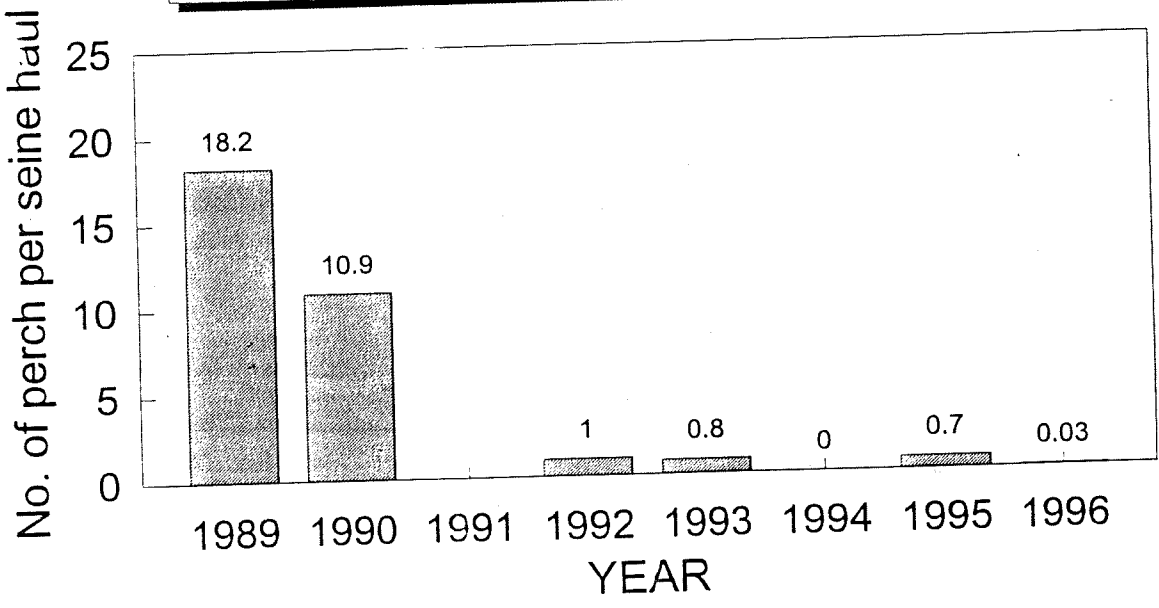


Figure 7

### Trawl CPUE for YOY Yellow Perch in Indiana Waters

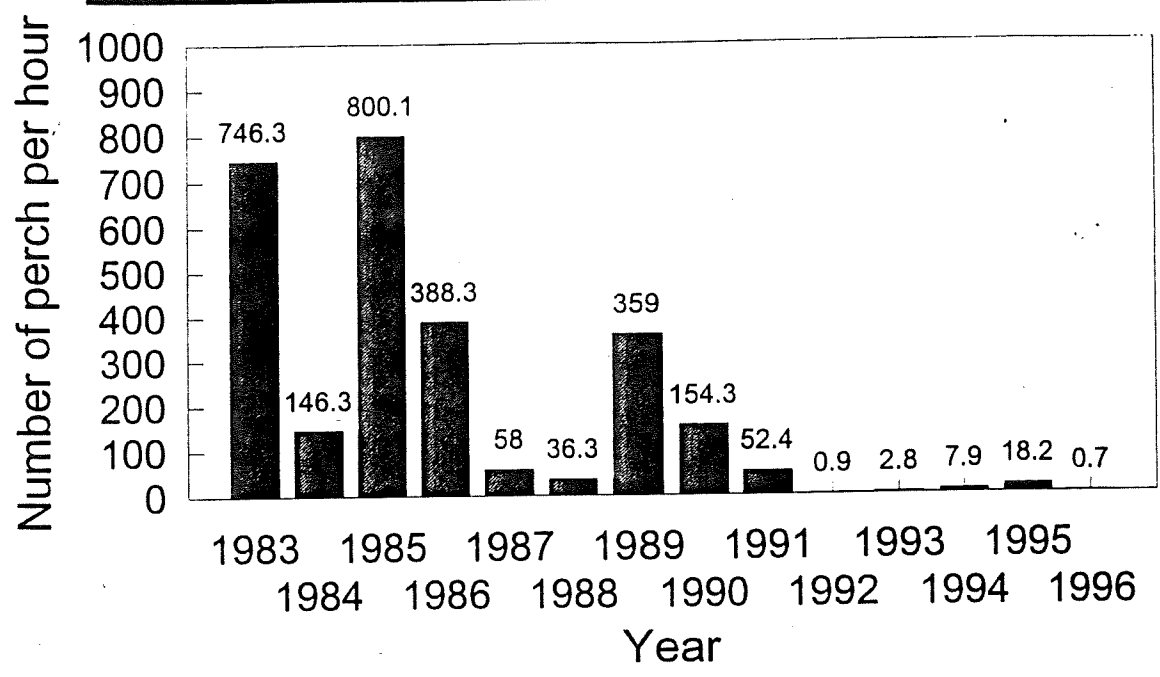


Figure 8

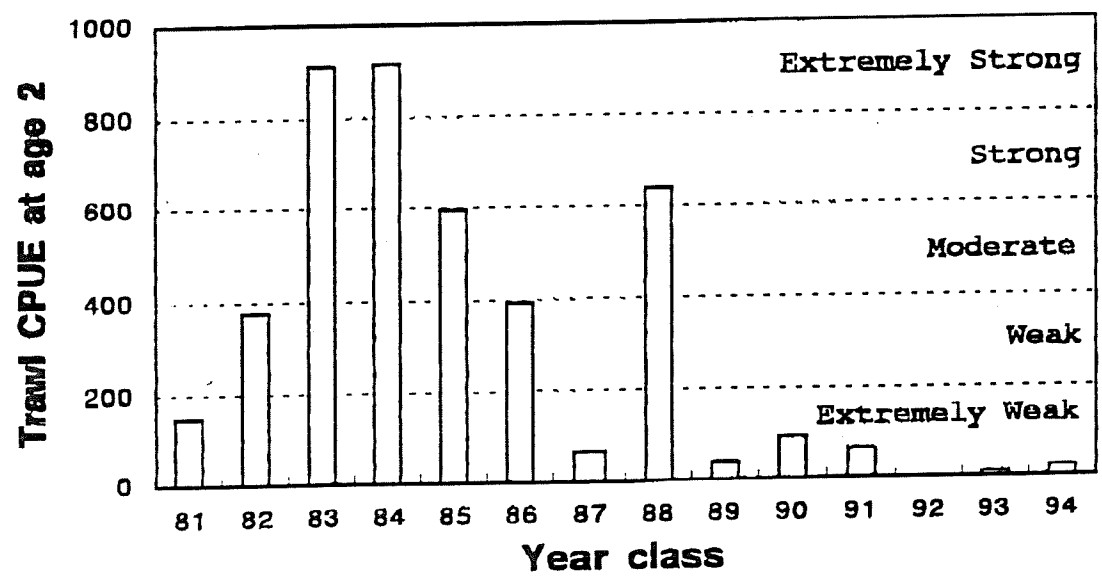


Figure 9. Relative strengths of the 1981-94 year classes of yellow perch in Indiana waters of Lake Michigan. Indices are based on trawl catches at pooled sites M and K.

Table 4. Yellow perch catch-per-unit-effort (# per trawl hour) at four Lake Michigan ports, July-September 1996. Percent of sample at each port is shown in parentheses. Samples were not collected at St. Joseph in September. Combined values are for the four ports, combined. Age class determinations are based on length frequency analysis.

Port	Month	Age class				Total
		0	1	2	>2	
Muskegon	July	0 (--)	131 (56)	49 (21)	54 (23)	234 (100)
	September	1 (100)	0 (--)	0 (--)	0 (--)	1 (100)
Grand Haven	July	0 (--)	106 (55)	19 (10)	68 (35)	193 (100)
	September	2 (4)	32 (70)	11 (23)	1 (3)	46 (100)
South Haven	July	0 (--)	17 (52)	9 (26)	7 (22)	33 (100)
	September	2 (75)	0 (--)	0 (--)	1 (25)	3 (100)
St. Joseph	July	0 (--)	3 (22)	2 (11)	9 (67)	14 (100)
Combined	July	0 (--)	77 (55)	22 (16)	41 (29)	140 (100)
	September	2 (9)	12 (66)	4 (21)	1 (4)	19 (100)

### 1996 Yellow Perch Harvest Restrictions

Following the initial harvest restrictions imposed by the four Lake Michigan states in 1995, additional changes were implemented for 1996:

#### Sportfishing regulations:

1. Illinois and Indiana continued the closed season for perch in June and the 25 perch daily sport bag limit.
2. Michigan reopened June for sportfishing but reduced the daily bag from 50 to 35 perch.
3. Wisconsin maintained the June closure and reduced the sport daily bag limit to 5 perch on Oct. 1.

#### Commercial regulations:

1. Illinois maintained the June closure and the 120,000 pound quota imposed in 1995.
2. Indiana maintained the June closure and further reduced their quota by 200,000 pounds to 160,000 pounds.
3. Michigan does not allow a commercial harvest.
4. Wisconsin closed their commercial fishery (112,000 pound quota) effective October 1.

### **Yellow Perch Task Group Progress Report**

Since the last progress report to the Lake Michigan Committee one year ago, the Task Group has been addressing their charge from the Lake Michigan Fish Chiefs to develop a multi-agency research initiative to identify the likely causes for the lack of perch recruitment. After evaluating an array of hypotheses the Task Group decided to focus research efforts on potential factors limiting survival in the first year of life. The hypotheses receiving the strongest support from Task Group members were:

*Alewife predation on larval perch is limiting their survival,*

*Pre-demersal mortalities are limiting survival,*

and, *Weather is limiting pre-demersal survival.*

The Task Group also recommended that a lakewide tagging study be conducted concurrently with the research initiative to investigate movements and spawning site fidelity.

The Task Group developed research proposals for each of the hypotheses and provided them to the Fish Chiefs on March 29, 1996. Subsequently, the Fish Chiefs met and directed the Task Group to combine the two proposals to investigate *alewife predation on larval perch* and *pre-demersal survival* into one comprehensive project, detailing each state's participation in the study, providing a breakdown of study costs, and identifying all potential sources of funding to conduct the research. The Fish Chiefs also requested that a collaborative, lakewide tagging study be undertaken in conjunction with the research initiative. Task Group members completed these charges and delivered a multi-agency yellow perch research initiative to the Fish Chiefs on December 16, 1996. The essence of the initiative is as follows:

**1. Multi-agency Research Proposal: Evaluation of Factors Affecting Yellow Perch Recruitment in Lake Michigan: Pre-demersal Survival and Alewife Predation on Larvae.**

Research objectives:

1. Evaluate reproductive output of yellow perch by monitoring relative egg densities and egg viability.
2. Evaluate relative annual abundance of yellow perch larvae, post-larvae, and young-of-the-year (survivorship curve).
3. Determine whether yellow perch year class strength can be correlated with either the temporal and spatial overlap of alewife and yellow perch larvae or the yearly relative abundance of alewife.
4. Determine the extent of alewife predation on yellow perch larvae in the presence of alternate food sources.
5. Determine the availability of alternate food sources (larger than 400µm) for adult alewife.

**2. Multi-agency Tagging Study: Lakewide Mark and Recapture Investigation of Inter-State Movements, Spawning Site Fidelity, and Spawning Population Abundance for Lake Michigan Yellow Perch.**

Objectives:

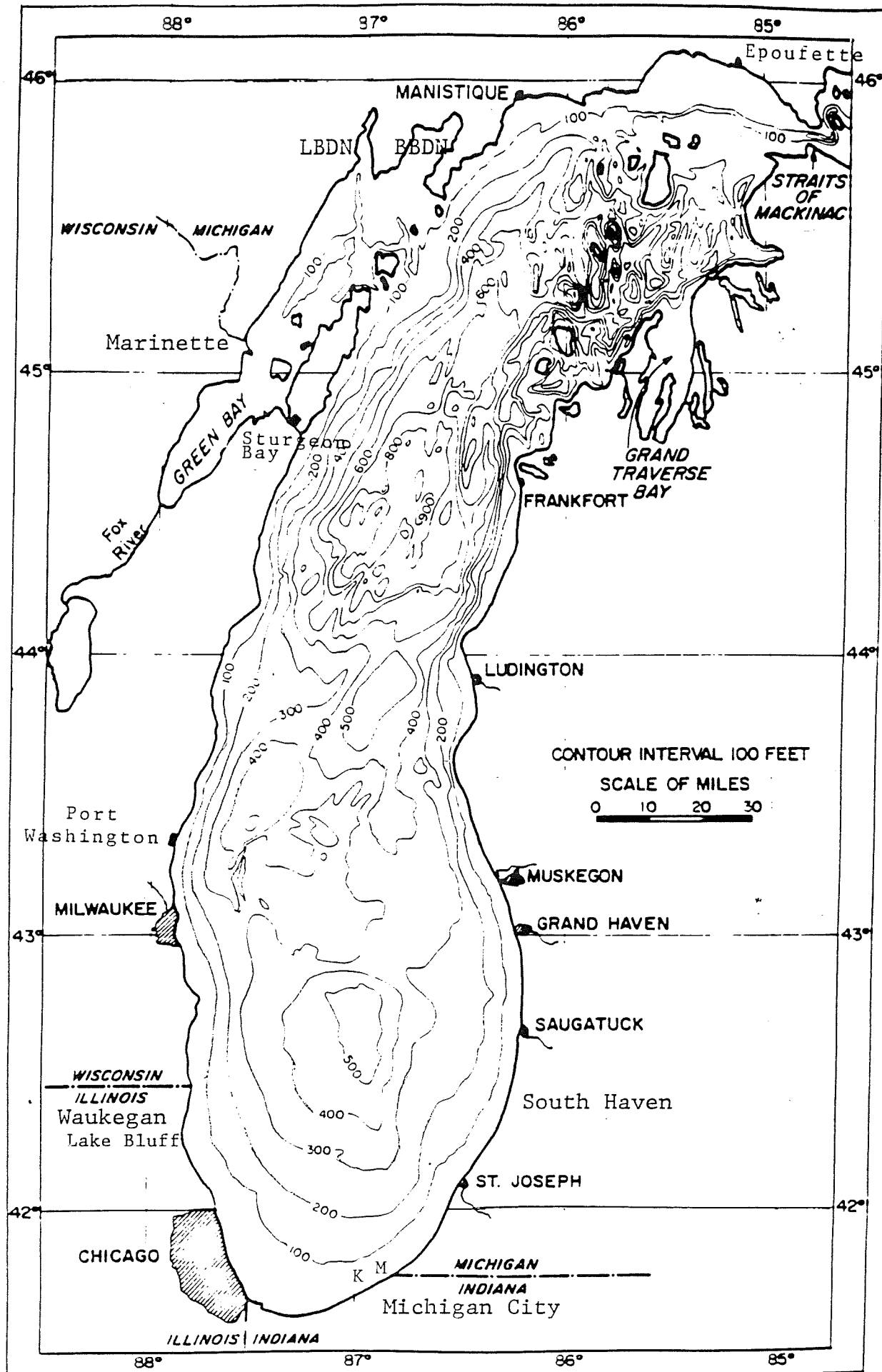
1. Describe the interstate movements of yellow perch in Lake Michigan.
2. Determine if spawning site fidelity exists in the lake.
3. Estimate local spawning population sizes and mortality rates.

Although full funding has not yet been achieved, a good portion of both projects will commence this spring. Both studies will be conducted for three years.

The following individuals have participated in the activities of the YPTG since the initial meeting in June of 1994:

Rich Hess, IL DNR (Chairman)	Jim Francis, IN DNR	Phil Schneeberger, MDNR
Ellen Marsden, INHS	Cliff Kraft, WI-SG	Steve Schroyer, Ball State Univ.
Tom McComish, Ball State	Fred Binkowski, U-WI	Brian Belonger, WDNR
Mike Keniry, WDNR	Dave Jude, U-MI	Mark Holey, USFWS
Steve Robillard, INHS	Wayne Brofka, INHS	Pradeep Hirethota, WDNR
John Forney, Cornell Univ.	Robert Herendeen, INHS	Ed Rutherford, MDNR
Dave Clapp, MDNR	Bill Horns, WDNR	Dan Makauskas, IL DNR

Special thanks goes to Steve Robillard, Brian Belonger, Jim Francis, and Dave Clapp for their key support and efforts in developing and coordinating the research needs and details of the multi-agency project.



Lake Michigan (modified from Hough 1958). Grand Traverse Bay, which is not contoured, has a steeply sloping bottom and a maximum depth of about 600 feet.