

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



Wisconsin Department of Natural Resources divers preparing to board the R/V *Gaylord Nelson*, after completing yellow perch egg deposition assessments near Green Can Reef, Lake Michigan.

REPORT TO THE LAKE MICHIGAN COMMITTEE  
Ypsilanti, Michigan  
March 26, 2009

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## Yellow Perch Task Group Contact List: 2008-2009

This report was prepared from information provided by the following Lake Michigan Yellow Perch Task Group members and contributors. Questions regarding data from a specific area of Lake Michigan, or concerning a specific aspect of Lake Michigan yellow perch research, should be directed to the contributor of that information (see Appendix 1 for a map of lake areas).

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

Yellow perch assessment activity is occurring throughout the lake, with numerous agency and university personnel sampling perch utilizing various gear types in different seasons. Selected parts of this information are presented here, in three sections. The first section covers the relative abundance of adult (age 1 and older) yellow perch. The second section examines the most recent age structure data available for different parts of the lake. The final section consists of estimates (or indices) of juvenile yellow perch recruitment: most of these data come from collections of age-0 yellow perch. Coordinated regulation of yellow perch harvest has been an important part of perch management in recent years. Current commercial and recreational regulations for all Lake Michigan jurisdictions are included as a final section of this status report.

### **Adult Relative Abundance**

The data assembled were collected with either gill nets or bottom trawls (Figures 1 to 9). Generally, this information shows a long-term decline in adult yellow perch abundance. The longer data series show a peak abundance in the mid- 1980s to early 1990s, followed by significant declines through the early 2000s (Figures 1-2, 5-8). Increases in catch-per-unit-effort resulting from recruitment of the 1998 and 2002 year classes are particularly apparent in some data series (Figures 2-4, 6-8). Data from common gear types (graded-mesh gill net) fished in all jurisdictions are presented in Figure 9; these index data show that current abundance remains well below the historically observed abundance of the late 1980s and early 1990s.

Since the mid 1990s, there has been a general upward trend in the frequency of females within the adult assessments in most areas of the lake. Percent females in Illinois, Indiana, and Michigan waters of Lake Michigan has ranged from 50 to 85% over the past five years (Figures 1, 2, 4, 5). The percentage of females in Wisconsin waters has been more variable, increasing from approximately 5% in 1996 to 65% in 2000, then ranging from >60% to <40% since that time (Figure 6).

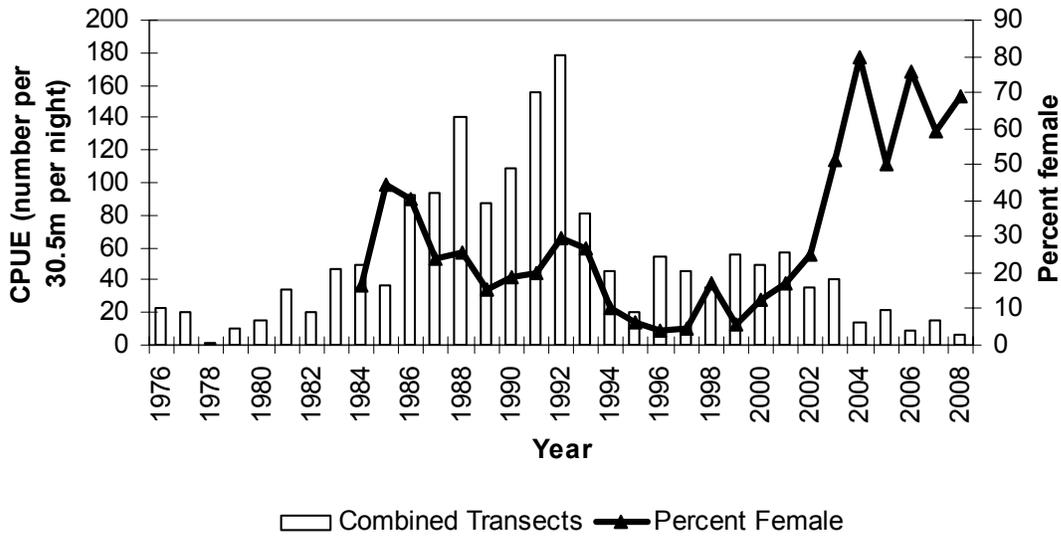


Figure 1. Adult yellow perch relative abundance and percent female in the Illinois waters of Lake Michigan. (ILDNR; data from spring gill net assessment, Chicago and Lake Bluff, IL, 1976 – 2008.)

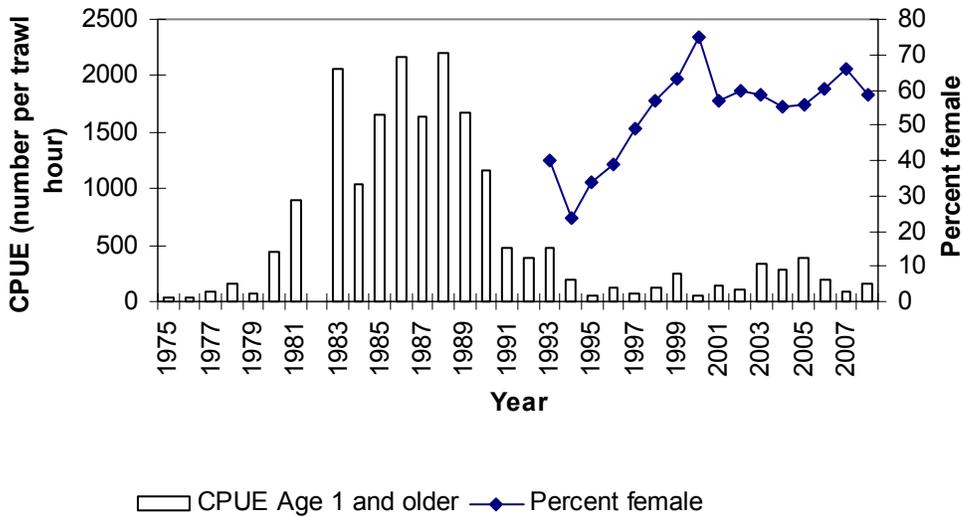


Figure 2. Adult yellow perch trawl CPUE and percent female in Indiana waters of Lake Michigan. (Ball State University; data from summer trawl survey at sites M and K in 1975 – 2008.)

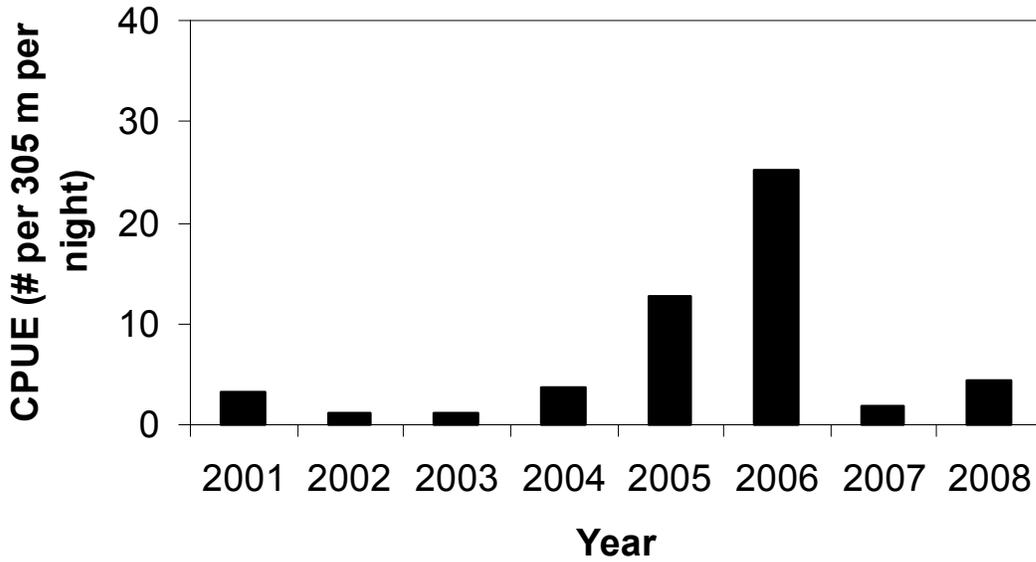


Figure 3. Adult yellow perch gill net catch-per-unit-effort in Little Traverse Bay. (LTBB; data from spring LWAP survey at Petoskey, 50-100' strata, 2001 – 2008. CPUE adjusted for gear selectivity.)

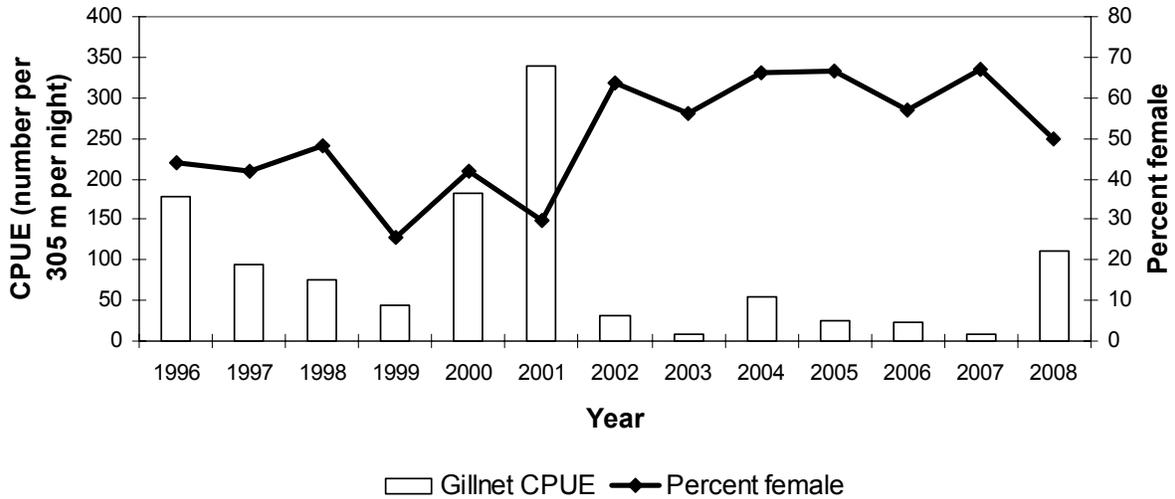


Figure 4. Adult yellow perch gill net catch-per-unit-effort and percent female in the catch at four southern Lake Michigan ports (Grand Haven, Saugatuck, South Haven, and St. Joseph, MI). (MDNR; data from April-June, 1996 – 2008.)

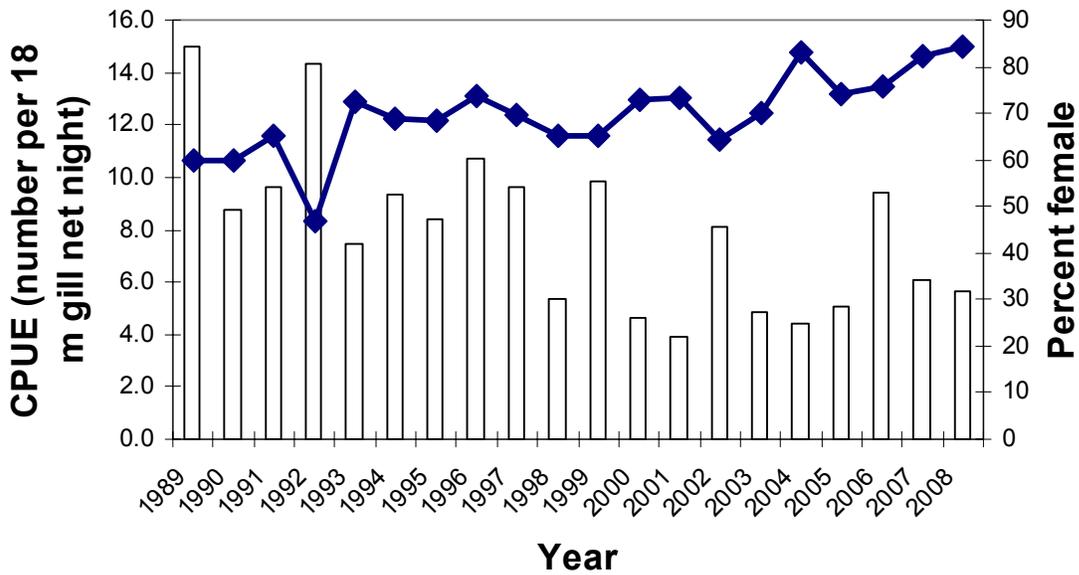


Figure 5. Adult yellow perch gill net catch-per-unit-effort and percent female in the catch in Bays de Noc. (MDNR; data from June to September, 1989 – 2008.)

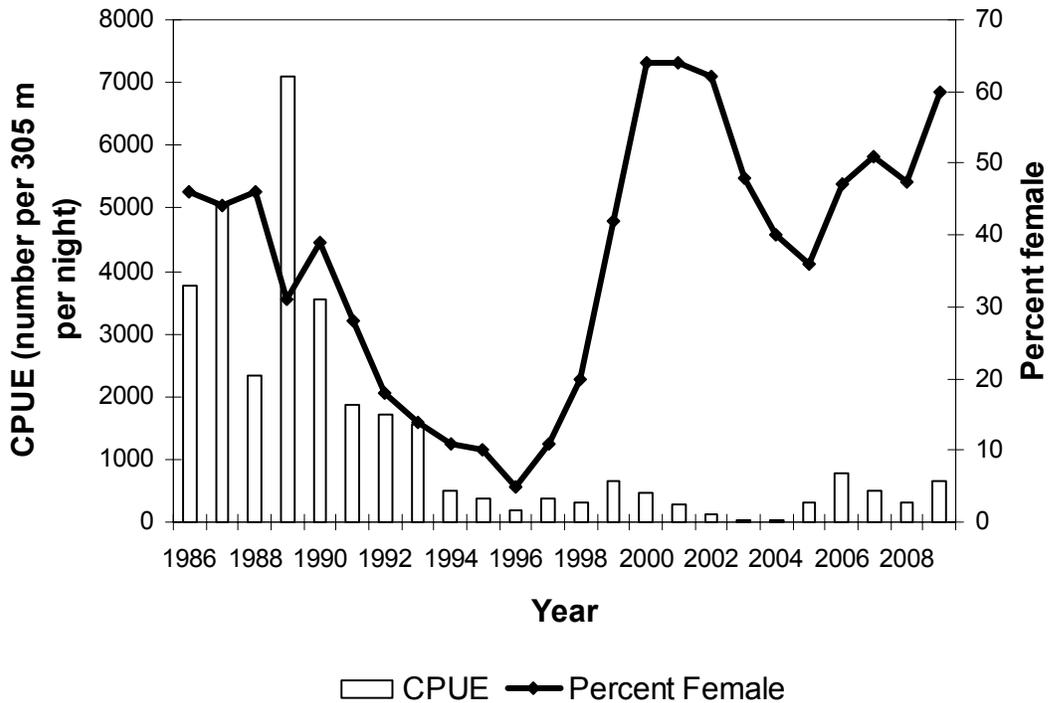


Figure 6. Adult yellow perch relative abundance and percent female in the Wisconsin waters of Lake Michigan. (WDNR; data from winter gill net assessment, Milwaukee, WI, 1986 – 2009.)

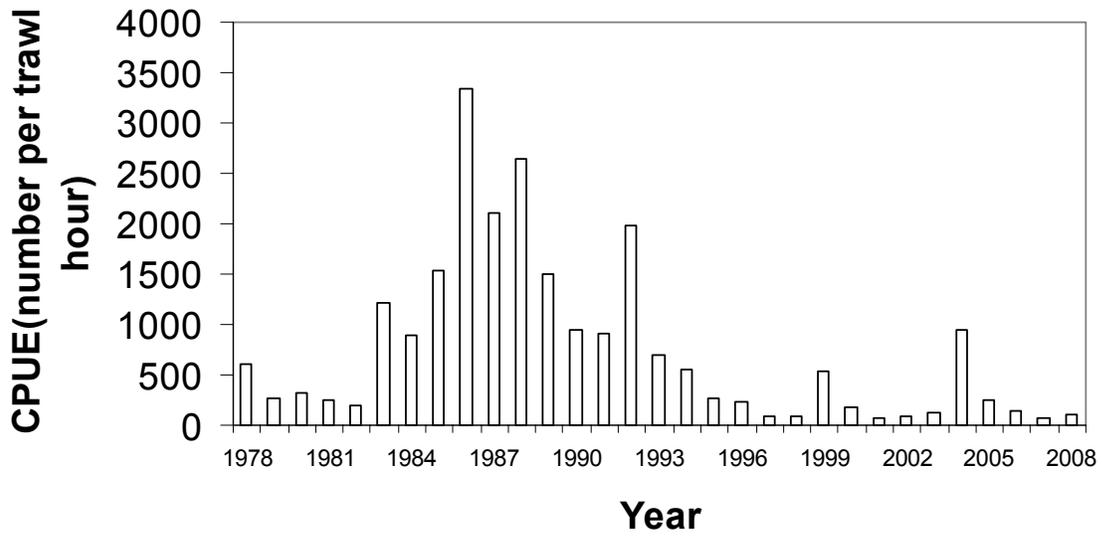


Figure 7. Adult yellow perch relative abundance in the Wisconsin waters of Green Bay. (WDNR; data from summer trawl assessment, Green Bay, WI, 1978 – 2008.)

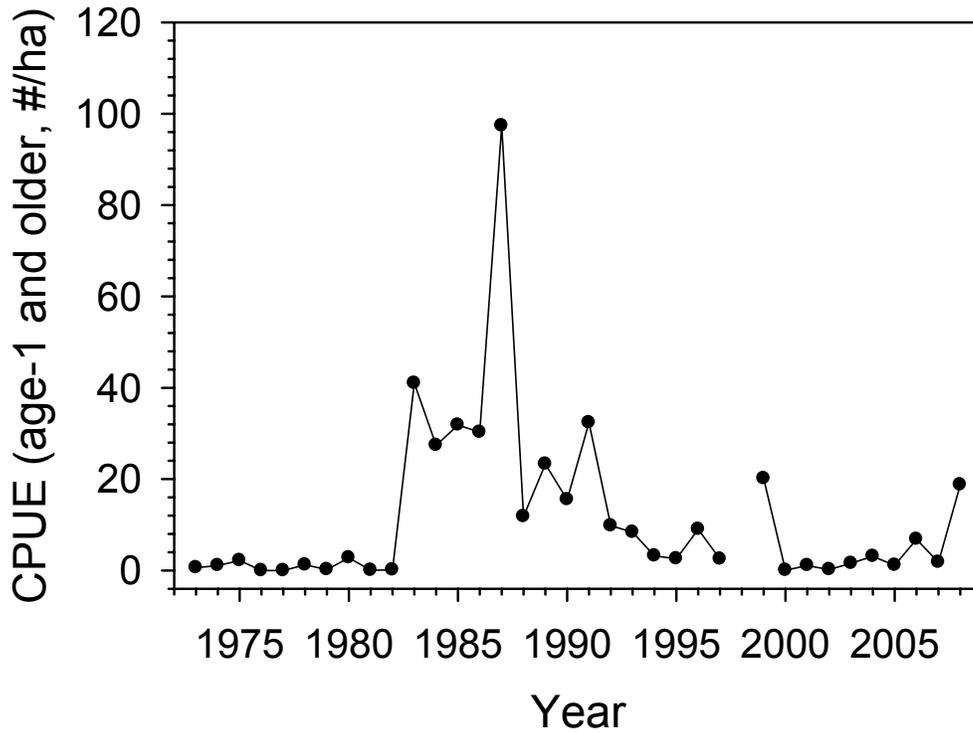


Figure 8. Age 1 and older yellow perch relative abundance, lakewide. (USGS; data from fall bottom trawl assessment, 1973 – 2008.)

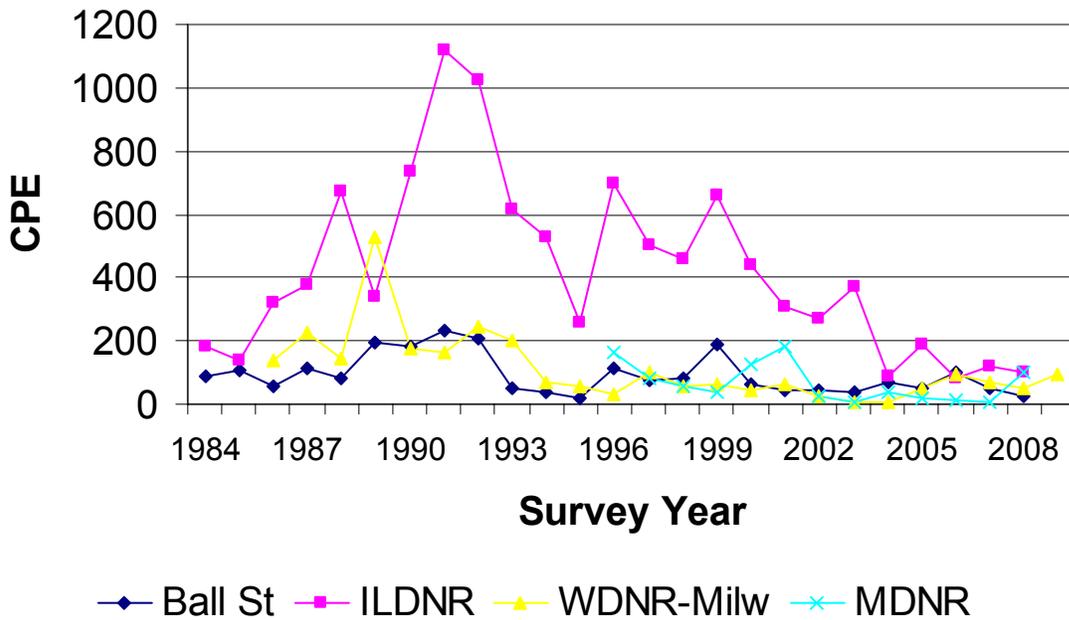


Figure 9. Yellow perch CPE (number of fish per 305 m) in graded mesh gill net consisting of equal length panels of 51-mm, 64-mm, and 76-mm stretched mesh, 1984-2009. (Data from BSU, ILDNR, WDNR, and MDNR; 1997-2000 & 2002-2007 MDNR values calculated from 1996 and 2001 selectivity evaluations.)

## **Population Age Structure**

The yellow perch adult population age structure was determined by evaluating scales, otoliths, opercles, or spines. Although differences in aging techniques and collection methods and times occur among agencies, assessments continued to show contribution to the adult population from the 2002-2003 year classes. In addition, strong recruitment of the 2005 year class is apparent in data collected in most assessments (Figures 10, 12-15); yellow perch from the 2005 year class made up from approximately 20-60% of the adult population in the various state waters. Continued survival of the 1998 year class (age 10) is also apparent in data collected in Illinois (Figure 10; >5% of the adult population), and Wisconsin (Figure 14; >10% of the adult population) waters of Lake Michigan.

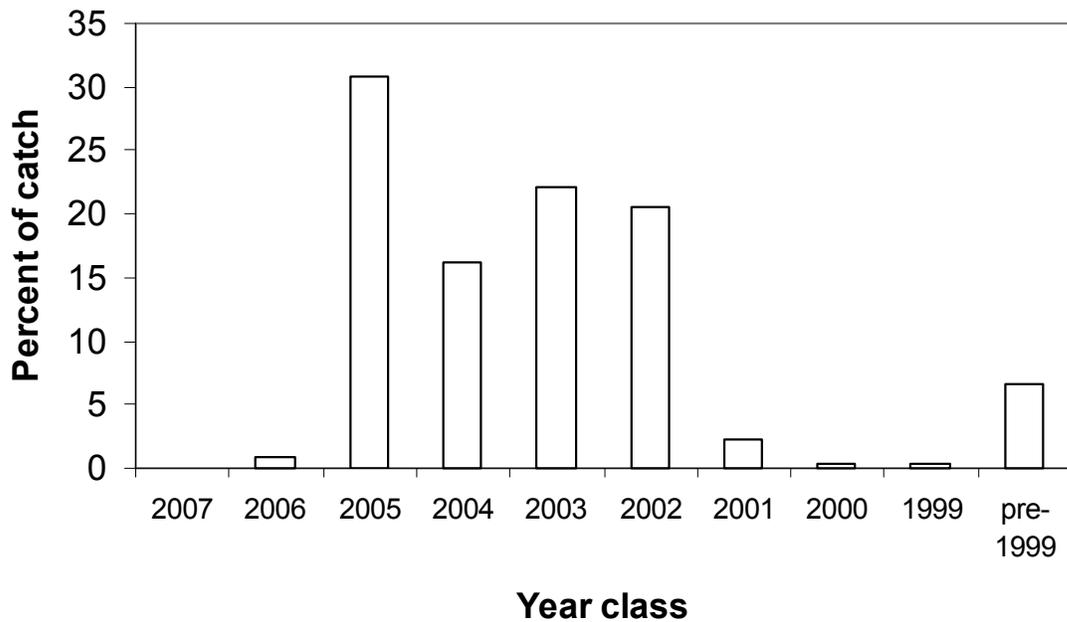


Figure 10. Yellow perch age structure from the Illinois waters of Lake Michigan. (ILDNR; data from spring gill net assessment, Chicago and Lake Bluff, IL, 2008. Ages determined using otoliths.)

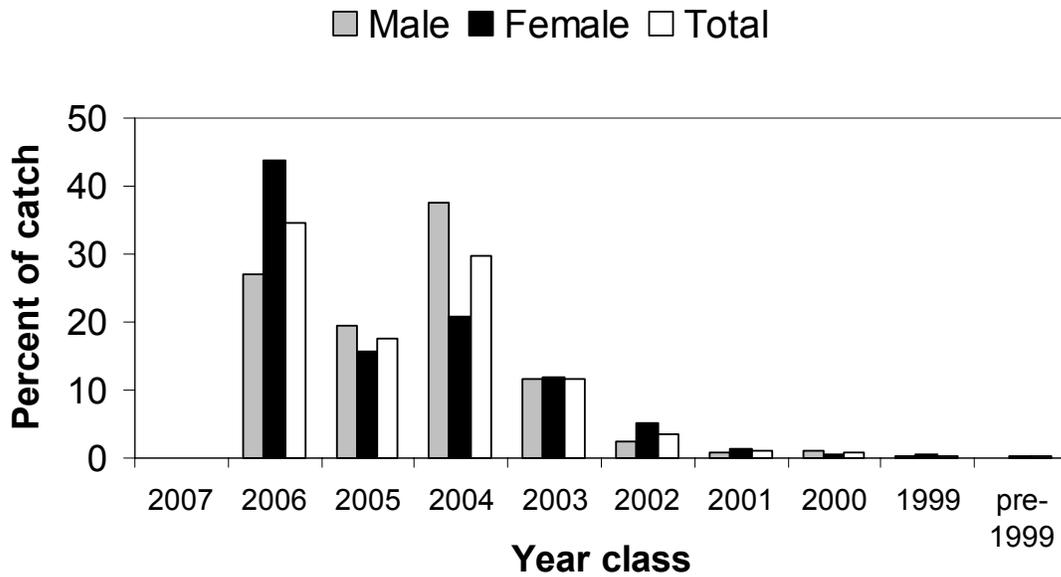


Figure 11. Yellow perch age structure from the Indiana waters of Lake Michigan. (Ball State University; data from summer trawl survey at sites M and K, Indiana, 2008. Ages determined using opercles.)

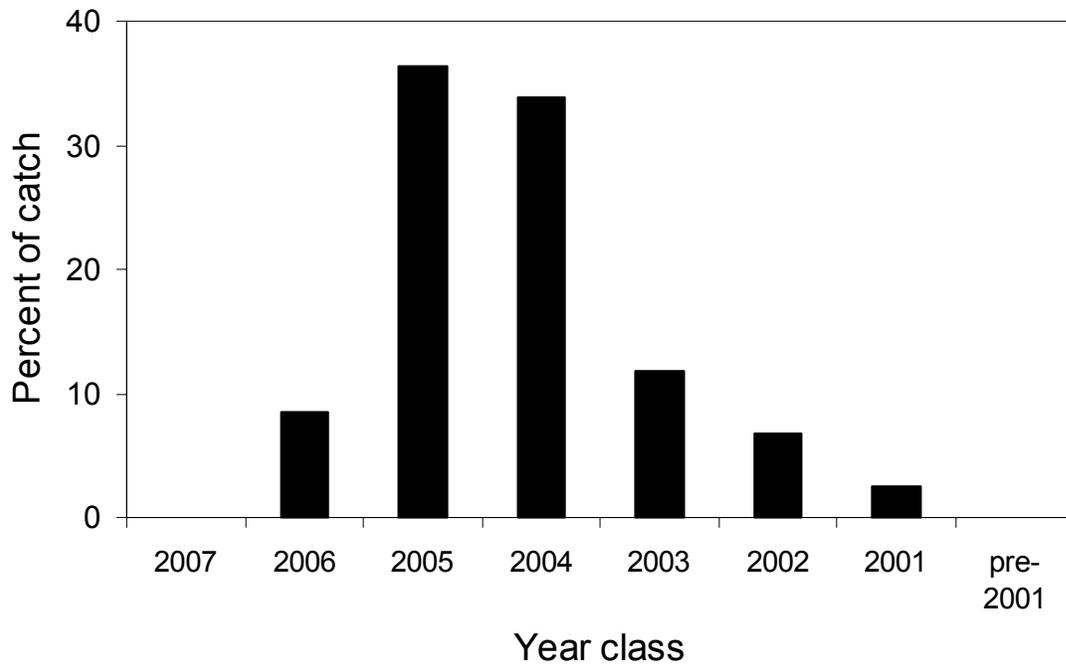


Figure 12. Yellow perch age structure from northern Lake Michigan. (LTBB data from spring / summer gill net assessment, 2008. Age determined using scales.)

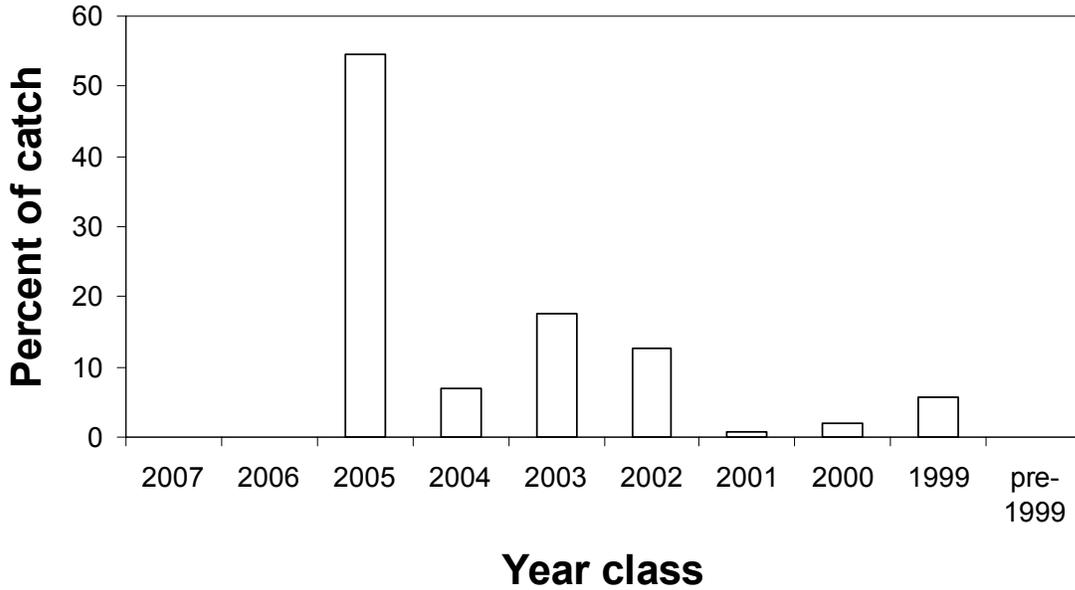


Figure 13. Yellow perch age structure from the Michigan waters of Lake Michigan. (MDNR data from spring gill net assessment, combined four southern Lake Michigan ports – Grand Haven, Saugatuck, South Haven, and St. Joseph, MI – 2008. Age determined using spines.)

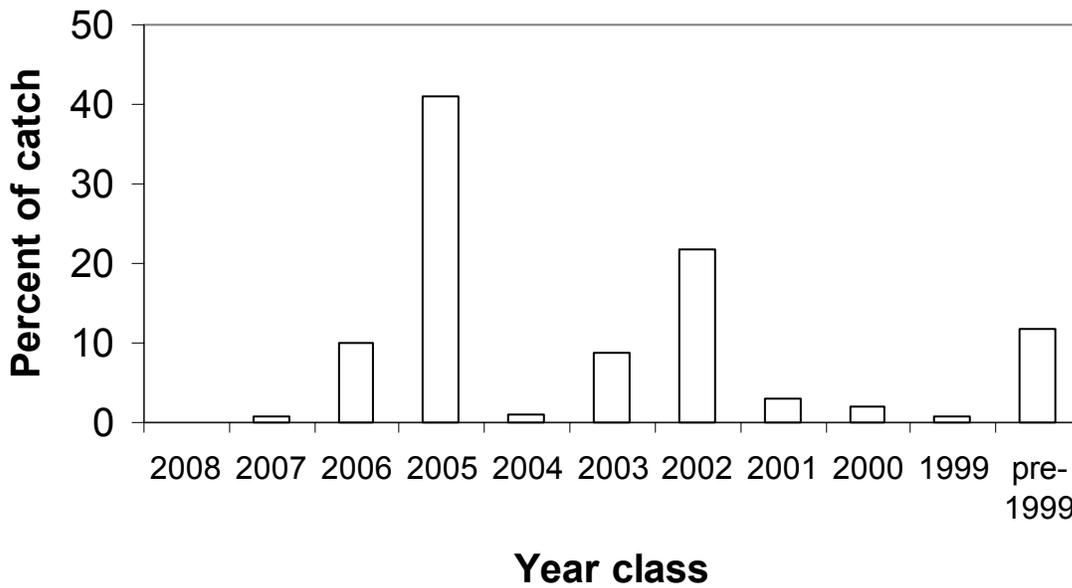


Figure 14. Yellow perch age structure from the Wisconsin waters of Lake Michigan. (WDNR; data from winter gill net assessment, Milwaukee, WI, 2009. Ages determined using spines.)

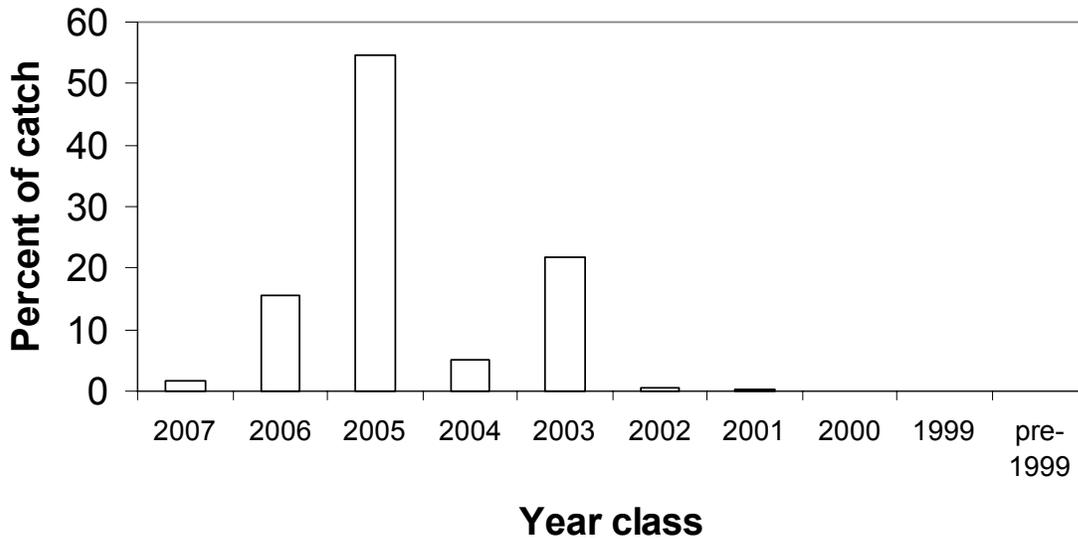


Figure 15. Yellow perch age structure from the Wisconsin waters of Green Bay. (WDNR; data from commercial harvest – all gear types, Green Bay, WI, 2008. Ages determined using spines.)

## **Recruitment**

Having a reliable indicator of future inputs to an adult population is vital to understanding the dynamics of the fish population and helping predict changes in abundance. An early indicator of recruitment is most beneficial to managers. In Lake Michigan, indicators of yellow perch recruitment have traditionally been collected using bottom trawls or beach seines.

While catch of age-0 yellow perch was slightly greater than that observed in 2007 in some areas of southern Lake Michigan (Figures 17-19), recruitment in 2008 was relatively low (weak) in most areas of the lake, in comparison to long-term averages. Recruitment in all areas of the lake was significantly less than that observed in 2005, when young-of-year production was the highest observed in at least 16 years for all areas of the lake.

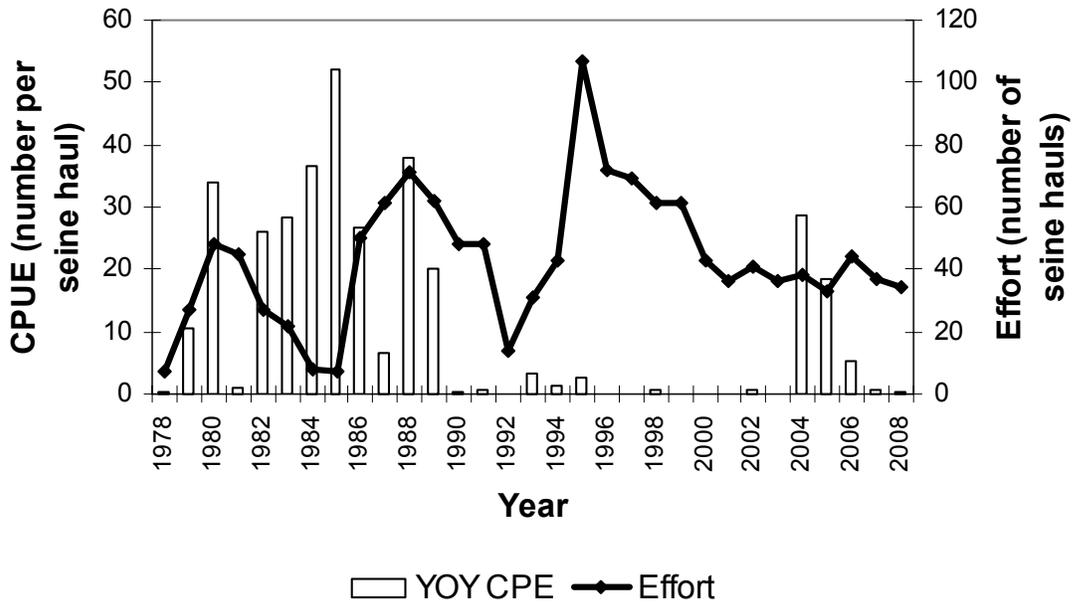


Figure 16. CPUE of YOY yellow perch from the Illinois waters of Lake Michigan. (ILDNR; data from summer beach seining along the Illinois shoreline, 1978 – 2008.)

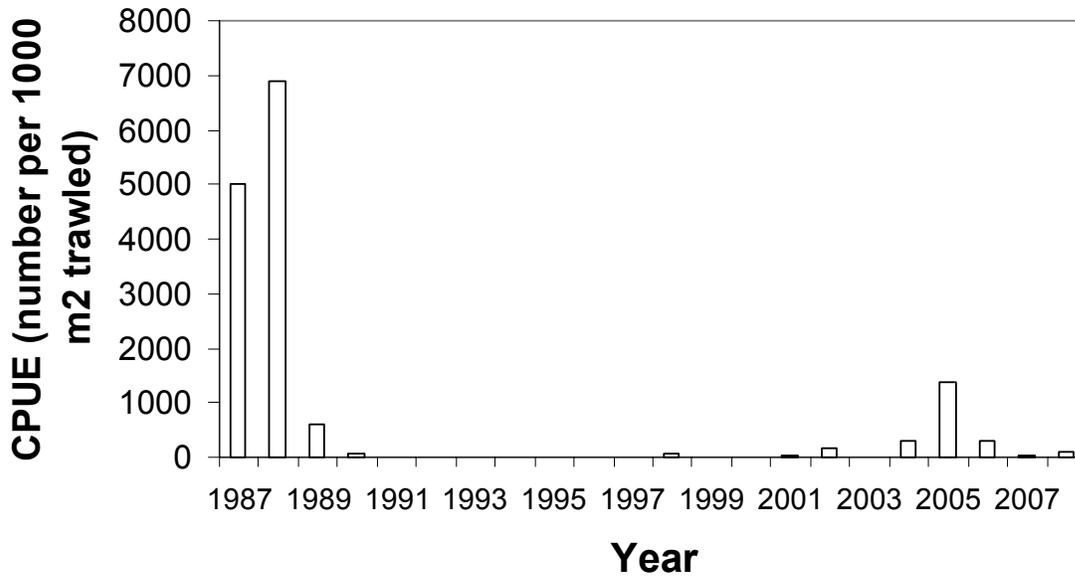


Figure 17. CPUE of age-0 yellow perch in the Illinois waters of Lake Michigan. (INHS; data from summer and fall bottom trawls off Waukegan, IL, 1987 – 2008.)

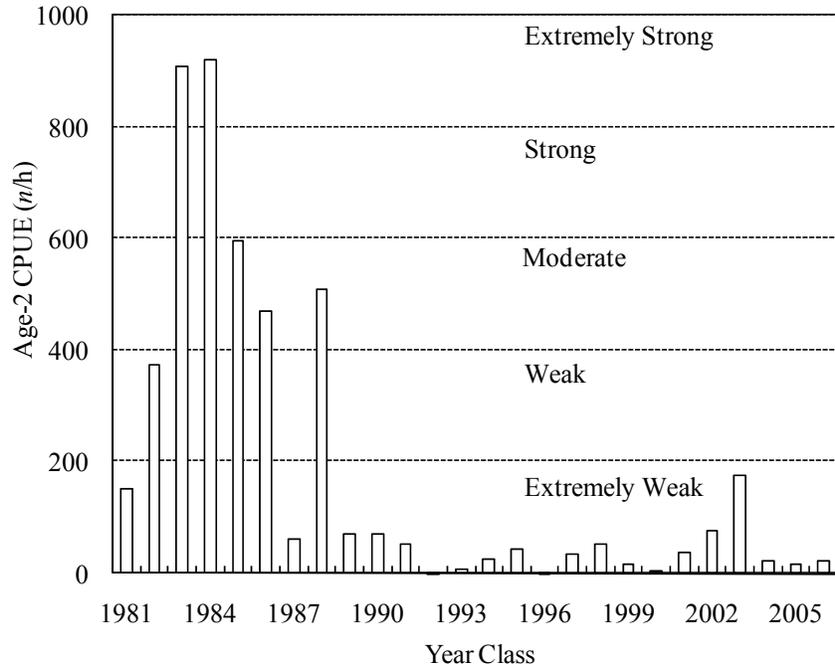


Figure 18. CPUE of age-2 yellow perch from the Indiana waters of Lake Michigan. (Ball State University; data from summer bottom trawl assessments, 1981 – 2008).

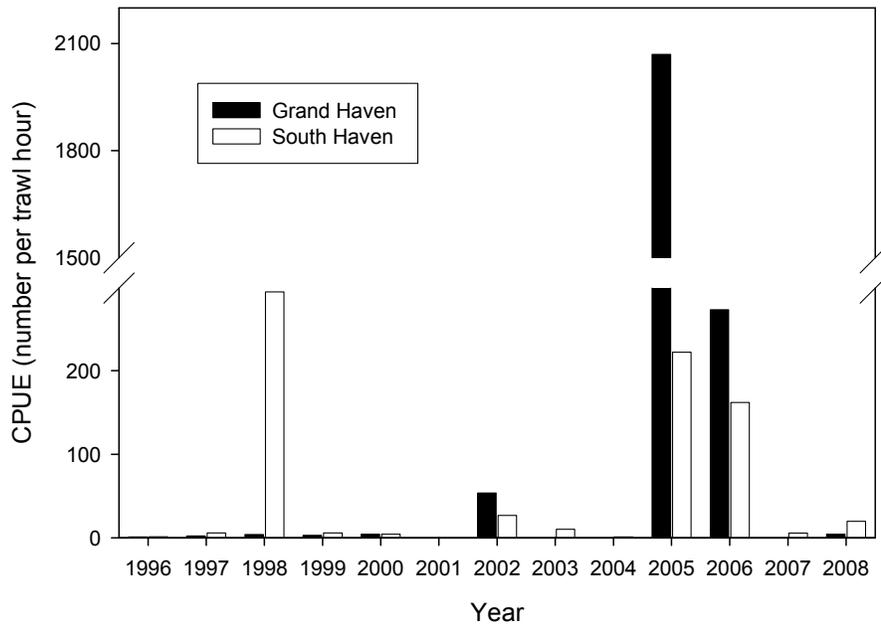


Figure 19. CPUE of age-0 yellow perch in the Michigan waters of Lake Michigan. (MDNR; late summer bottom trawl data from Grand Haven and South Haven 1996 - 2008. Grand Haven was not sampled in 2003.)

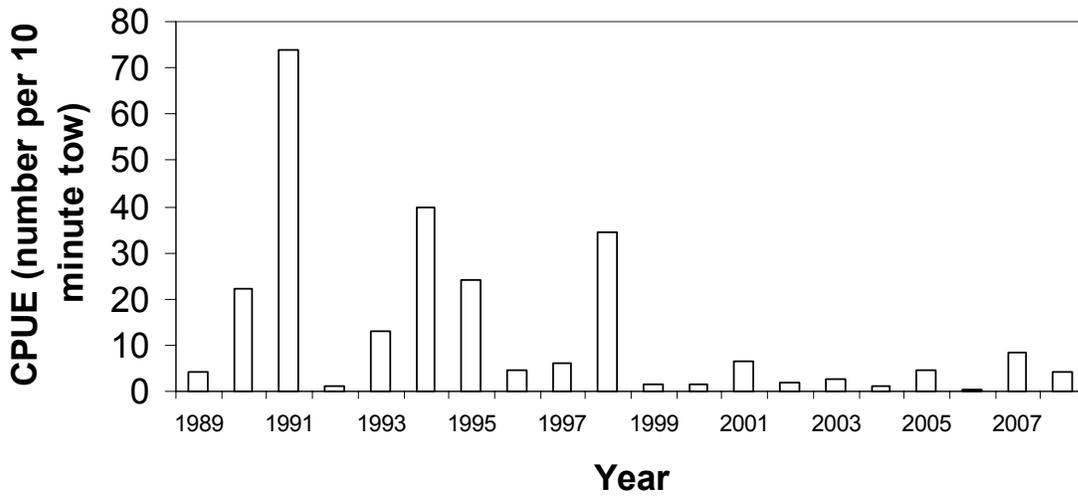


Figure 20. CPUE of age-0 yellow perch in Bays de Noc, Lake Michigan. (MDNR; summer bottom trawl data, 1989 - 2008.)

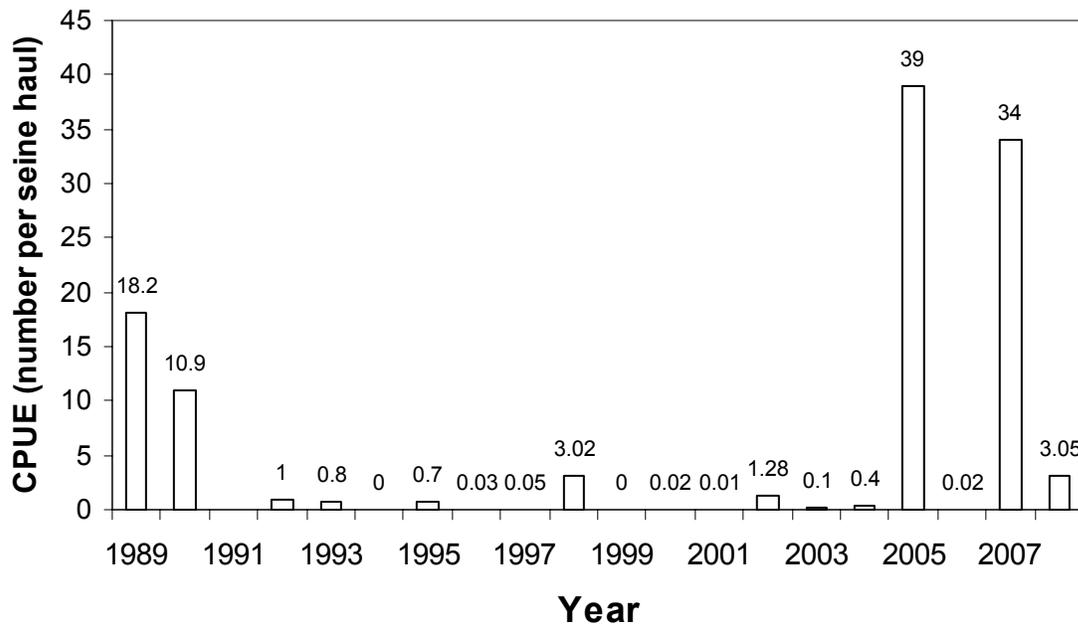


Figure 21. CPUE of age-0 yellow perch from the Wisconsin waters of Lake Michigan. (WDNR; data from summer beach seine assessments along the southern Wisconsin shoreline, 1989 – 2008.)

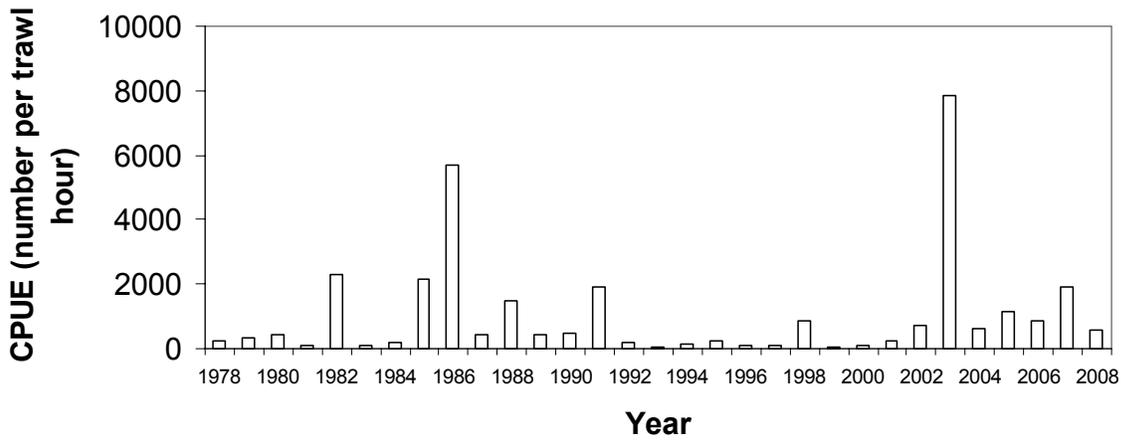


Figure 22. CPUE of age-0 yellow perch from the Wisconsin waters of Green Bay. (WDNR; data from summer trawl assessments, 1978 – 2008.)

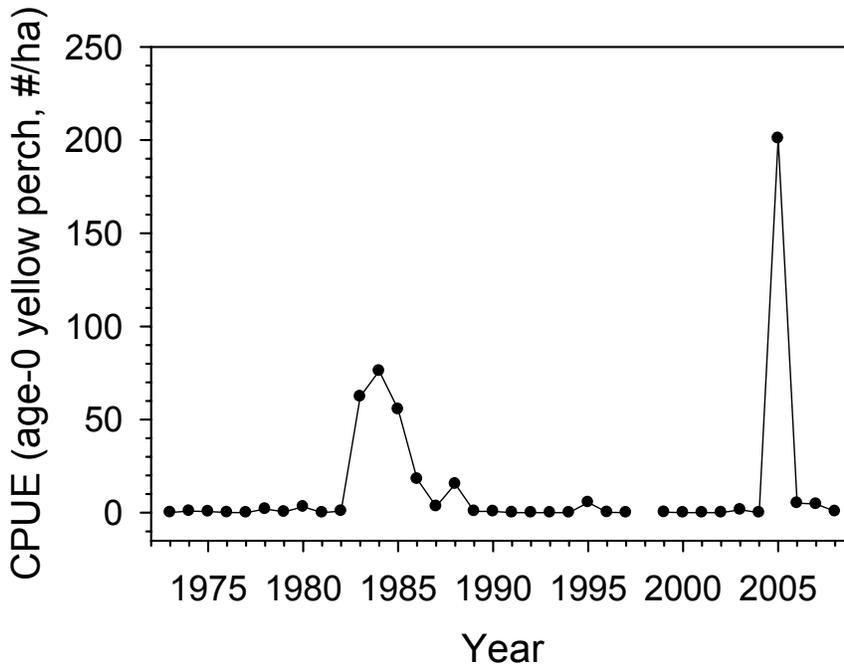


Figure 23. CPUE of age-0 yellow perch, lakewide. (USGS; data from fall bottom trawl assessments, 1973 – 2008.)

## **2009 Yellow Perch Harvest Restrictions**

### Sportfishing regulations:

- Illinois
  - July closed to sportfishing for yellow perch (exception: under 16 years of age – 10 fish bag limit)
  - Daily bag limit 15 fish
- Indiana
  - No closed season for yellow perch
  - Daily bag limit 15 fish
- Michigan
  - No closed season for yellow perch
  - Daily bag limit; 35 fish (south of the 45<sup>th</sup> parallel) / 50 fish (north of 45<sup>th</sup> parallel and Grand Traverse Bays)
- Wisconsin (Lake Michigan)
  - May 1 through June 15; closed to sportfishing for yellow perch
  - Daily bag limit 5 fish
- Wisconsin (Green Bay)
  - March 16 through May 19; closed to sportfishing for yellow perch
  - Daily bag limit 15 fish

### Commercial regulations:

- Illinois perch fishery remained closed
- Indiana perch fishery remained closed
- Michigan does not allow a commercial harvest (outside of 1836 Treaty waters)
- Wisconsin perch fishery remained closed (outside of Green Bay, where quota for 2009 is 100,000 pounds)

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

The Yellow Perch Task Group (YPTG) was formally given four charges by the Lake Michigan Committee in May 2000, an additional fifth charge in March 2003, and an additional (informal) sixth charge in October 2008:

- 1. Develop a Lakewide Assessment Plan for yellow perch and associated fish species by formalizing the procedures utilized to achieve compatibility of information and to standardized sampling methodology for yellow perch;**
- 2. Formally summarize, in a GLFC report, a Fisheries article, or through other means, the work previously conducted by the Yellow Perch Task Group that addressed the original hypothesis set forward for yellow perch recruitment failure;**
- 3. Identify any additional work necessary to address the original hypotheses for yellow perch recruitment failure;**
- 4. Develop and implement a lakewide population model that describes the yellow perch population in Lake Michigan providing estimates of total abundance, age and size structure, and geographical distribution;**
- 5. Complete a review of assessment data collected during 2003, and advise the LMC about potential risks to Lake Michigan yellow perch populations if current harvest regulations are maintained; and,**
- 6. Use results of YPTG Decision Analysis (DA) project to identify a lakewide “F”, with goals of managing away from the disparity among agencies while maintaining yellow perch population(s) (i.e., sustaining recruitment). This might include a progressive approach with higher “F” when spawner abundance is higher. Additionally, resolve custody and future maintenance of the DA model.**

Charge #2 has been completed, as described in the 2006 Yellow Perch Task Group annual report (Makauskas and Clapp 2006). In addition, Charges #4 and #5 have, for the most part, been incorporated into Charge #6 – as an ongoing task to develop management tools and make annual recommendations to the LMC concerning current status of Lake Michigan yellow perch populations. The following section of this report provides a brief summary of the progress made in addressing Charges #1, #3, and #6 during 2008-09.

**Charge #1: Lakewide Assessment Plan.** A Lakewide Assessment Plan being developed by the YPTG will formalize the standard procedures utilized to sample yellow perch throughout Lake Michigan. The yellow perch section of the Lakewide Assessment Plan will be appended to the plans previously developed for lake trout, burbot, and Chinook salmon by the Lake Michigan Technical Committee. Work to address this charge is ongoing; this report addresses, in part, the charge to “achieve compatibility of information”.

During the winter 2006 YPTG meeting, member agencies agreed to implement standardized spring adult yellow perch assessments (beginning in spring 2007), to coincide with other LMTC spring lakewide assessments (for lake trout and burbot). The results of this standardized spring adult yellow perch sampling are presented in the first section of this report (Figure 9, including *post hoc* standardized data from years prior to 2007). In addition, the YPTG agreed to implement a lakewide summer “micromesh” gill net assessment (beginning in summer 2007) to standardize assessment of young-of-year yellow perch production, especially in areas where standard trawl and seine surveys cannot be implemented. Some preliminary sampling with micromesh nets had been conducted prior to 2007 (Jude and Janssen 2008; Janssen and Luebke 2004); agencies were able to implement this new survey lakewide in summer 2007, and expanded sampling (locations and mesh sizes) occurred in 2008 (Table 1; see also Makauskas and Clapp 2008). In 2008, catches were highest in Indiana and Illinois waters, and peak catches came in 12.5 and 16.0 mm (stretched) mesh nets. Indications from the first two summers of implementation are that this will be a valuable assessment for providing a comparable measure of young-of-year yellow perch abundance across all nearshore habitats in Lake Michigan.

Table 1. Summary of micromesh gill net surveys by YPTG member agencies in Lake Michigan, August-October 2008.

State	Agency	Number of survey events	Mesh sizes (stretched, mm)	# of YOY yellow perch captured	Comments
Indiana	Ball State University	8	12.5, 16.0, 20.0, 25.0	<943	Total catch, N=943. Separation of age 0 and age 1+ fish is ongoing.
Illinois	Illinois Natural History Survey	13	12.5, 16.0, 20.0, 25.0	69	
Michigan	Michigan DNR	13	12.5, 16.0	22	
Wisconsin	Wisconsin DNR	6	12.5, 20.0, 25.0	23	

**Charge #3: Identify any additional work to address yellow perch recruitment failure.** 2008 marked the twelfth year of the lakewide research initiative implemented by the Lake Michigan management agencies in 1997. The goal of this research effort is to identify likely causes for the lack of perch recruitment observed in Lake Michigan in the early 1990s, as well as to provide increased understanding of the factors influencing Lake Michigan yellow perch population dynamics. The Lake Michigan Yellow Perch Task Group has addressed several hypotheses that may be limiting the survival of yellow perch (see Clapp and Dettmers 2004 for a list of hypotheses and description of the work conducted to address these hypotheses). Additional work to address questions related to recruitment of Great Lakes yellow perch is ongoing.

**Charge #6: YPTG Decision Analysis (DA) implementation.** During 2008-09, population modeling work has continued as part of an effort to develop decision analysis tools, and to apply these tools to evaluate harvest policies for yellow perch in the southern portion of the main basin of Lake Michigan. Statistical catch-at-age models were developed for each region (Wisconsin, Illinois, and Indiana-Michigan) of the Lake Michigan yellow perch fishery (Wilberg et al. 2005). Initially, Indiana and Michigan were combined due to a limited long-term data set from Michigan and insufficient commercial fishery data from Indiana. During 2007-08, researchers at the Chesapeake Biological Laboratory and Michigan State University continued work to incorporate new data and develop separate population models for Michigan and Indiana waters. Currently, a stochastic simulation model that projects the age, sex, size, and spatial dynamics of the yellow perch population is being used to evaluate the performance of alternative harvest policies. In addition, USFWS personnel have provide assistance to WDNR biologists in continued development and refinement of a yellow perch population model for Green Bay waters.

A decision analysis “technology transfer” workshop was held in conjunction with the summer 2008 LMTC meeting in Traverse City, Michigan. Participants included QFC investigators, YPTG members, LMC, and other invited agency managers. Preliminary suggestions from this workshop were to adaptively change yellow perch regulations and use currently-available assessments and other tools to measure response of angler effort, harvest, and F to these regulation changes. Following extensive discussions among YPTG members of the information presented at the workshop, along with results of most recent assessments (presented earlier in this report), a “will live with” consensus was reached to recommend (to the LMC) maintenance of current Lake Michigan yellow perch regulations / fishing mortality levels. The rationale for this recommendation was that recent assessments have not shown a significant (expected) population response that could be attributed to the reduced mortality levels brought about by regulation changes implemented during the 1995-2000 period. The absence of an expected response may be the result of a “regime shift” brought about by the ongoing effects of invasive species (primarily zebra and quagga mussels) on the Lake Michigan ecosystem. Annual or semi-annual YPTG meetings will continue to be held to develop regular status reports / management recommendations for LMC members, as well as to continue discussions of ways to implement improved use of DA tools in Lake Michigan yellow perch management.

## **Task Group Meetings**

A Decision Analysis (DA) workshop was held in conjunction with the summer 2008 LMTC meeting in Traverse City, Michigan (July 22-23, 2008). Participants included QFC investigators, YPTG members, LMC, and other invited agency managers. Workshop agenda included overview of DA project and results, as well as discussion of how to begin implementation of DA results in lakewide management of yellow perch populations (common policy, comfort level with various levels of fishing mortality).

A winter 2009 meeting of the YPTG was held on January 7, 2009, at the Indiana DNR office in Michigan City. Agenda items at this meeting included discussion of the Decision Analysis project, regulation criteria and potential regulation changes, standard assessment protocols (including added lakewide assessments), annual report guidelines and preparation, impediments to further recovery of yellow perch stocks, and direction / additional charges from the LMC.

## **References**

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Appendix 1. Lake Michigan statistical districts.

