

## STUDY PERFORMANCE REPORT

State: Michigan

Project No.: F-81-R-16

Study No.: 230460

Title: Dynamics of Lake Erie Walleye *Zander vitreus* and Yellow Perch *Perca flavescens* populations and fisheries

Period Covered: October 1, 2014 to September 30, 2015

**Study Objective:** The purpose of this study is to carry out annual surveys of Walleye and Yellow Perch populations and fisheries in Lake Erie to meet the objective of providing the necessary data to annually update fish population models used to develop interagency (Ohio, Pennsylvania, New York, Ontario, and Michigan) harvest quotas for Walleye and Yellow Perch.

**Summary:** In 2014 and 2015, Walleye and Yellow Perch samples were collected from a fall gill-net survey, an on-site creel survey (conducted under Study 230499), and a late summer trawl survey. To fulfill interagency objectives, Michigan's survey data and data analyses were shared with the other Lake Erie fishery management agencies. The interagency task groups combined their Walleye and Yellow Perch survey data to produce estimates of abundance which drove harvest quota recommendations for the lake-wide recreational and commercial percid fisheries.

**Findings:** Jobs 1 through 6 were scheduled for 2014-15, and progress is reported below.

**Job 1. Survey design and coordination.**—All sampling locations, gear, and protocols for the fall gill-net survey and on-site creel survey were consistent with previous years. During August 2015, a bottom trawl survey was completed at eight sites, previously established and sampled by the United States Geological Survey, in Michigan waters of Lake Erie. The survey objective is to develop an index of abundance of young-of-year Walleye and Yellow Perch and to describe the composition and abundance of the forage fish community. The trawl survey consisted of a single 5- or 10-minute tow at each site using a 10.66-m headrope otter trawl, with a 9-mm stretch mesh cod end, deployed with a single warp and a 45.7-m bridle.

Coordination activities included interactions with biologists from other Lake Erie fishery agencies regarding sampling strategies and coordination of collection of “value-added” samples for other agencies. Data summaries and analyses for 2014 Michigan Department of Natural Resources (MDNR) surveys were completed and presented as computer files and hard copies to the Lake Erie Scientific Technical Committee, the Walleye Task Group (WTG), and the Yellow Perch Task Group (YTG). Interagency Walleye tag data for 2014 were compiled and disseminated to each agency. Extensive Walleye and Yellow Perch population modeling was done using the interagency tag, survey, and fishery data sets.

**Job 2. Conduct surveys and process samples.**—The 2014 fall gill-net survey included two 396-meter sets of variable-mesh multi-filament gill net at the Stoney Point and Luna Pier index stations. A total of 283 Walleye were captured and sampled for age and growth information. Spine samples taken from Walleye captured in 2014 fall gill nets have been processed and aged.

Sport-caught Walleye and Yellow Perch from Michigan's Lake Erie waters have been sampled for length, weight, and age data as part of Michigan's Great Lakes creel survey (Study 230499). In 2014, a total of 155 Walleye were sampled for length, weight, and spines for age estimation. A total of 124 Yellow Perch from the sport harvest were sampled for length, weight, and age.

The August 2015 trawl survey covered eight stations and included five 10-minute and three 5-minute tows. A total of 6,982 fish representing 17 species were captured during the eight tows, including 1,388 Yellow Perch and 35 Walleye. Spine samples taken from Walleye and Yellow Perch captured in the 2015 trawl survey will be processed this winter along with age structures taken from the upcoming fall 2015 gill-net survey.

**Job 3. Manage data and maintain databases.**—Data from the fall 2014 gill-net survey and August 2015 trawl survey were scanned from original data sheets to digital files. All data files were proofed against the original data sheets for scanning errors and added to relational Microsoft Access databases. Data summaries from the Michigan gill-net surveys were shared with the other Lake Erie management agencies. Spine samples from Walleye and Yellow Perch collected during the 2014 on-site creel survey (Study 230499) were augmented with spine samples collected by participants in a volunteer angler diary program (conducted under Study 230488) to estimate the catch-at-age for the Michigan Lake Erie sport fishery in 2014. The Michigan catch-at-age data were shared with the other agencies and incorporated into the input data files for the AD-model builder programs used in the population estimation process by the WTG and YPTG.

Recovery data from Walleye tagged during past spring trap-net and electrofishing surveys were received through reports from cooperating anglers; during the 2014-15 fishing season there were 11 reported recoveries of tagged Walleye from all years of tagging. The geographical distribution of the Walleye tag returns in 2014-15 is as follows: St. Clair-Detroit River System (including Lake St. Clair) 27%; Western Basin Lake Erie (including the Huron, Raisin, and Maumee rivers) 73%; and the Central and Eastern basins-Lake Erie 0%. Eighty-two percent of the recoveries were reported during the months of April (55%) and May (27%). The remaining recoveries were reported in June and December.

**Job 4. Analyze data.**—Gill-net data were summarized and age-specific catch rates were determined for the year-classes included in the 2014 survey catch. The total Walleye catch-per-effort of 71 fish/net lift for the index sites was a 63% increase from the previous year and the 4<sup>th</sup> highest on record for 2005–2014 (Table 1). Catch rates for the 2013 cohort were also the 4<sup>th</sup> highest yearling CPUE observed from 2005–2014. Both the total and yearling Walleye CPUE from the 2014 survey catch were near the 30<sup>th</sup> percentile for the entire 1978–2014 time series. Yearling catch rates in the index gill-net survey time series indicate the 2007, 2010, and 2011 cohorts are stronger than the other relatively weak cohorts observed during much of 2005–2014.

Ages were estimated for the Michigan Lake Erie Walleye and Yellow Perch harvests in 2014 based on samples collected from the recreational fishery. Because the number of spine samples collected during the on-site creel survey (Study 230499) were low, we supplemented the data with spine samples collected as part of a volunteer angler diary program (Study 230488). Age distribution by month was used to estimate the total harvest in numbers of fish for both species. For Walleye, age-3 through age-5 fish from the 2009–2011 year classes accounted for the largest portion (54%) of the Walleye recreational harvest, with a notable contribution (15%) from the strong 2003 year class. The average length (533 mm) of harvested Walleye observed in the Michigan sport creel during 2014 was larger than 2013 (480 mm). No trend in growth was apparent for sport-caught Walleye over the past ten years. For Yellow Perch, the 2009 and 2010 year classes continued to be dominant in 2014, accounting for 68% of the total harvest. The average length of Yellow Perch harvested by Michigan sport anglers during 2014 was 258 mm, again larger than 2013 (227 mm). Like Walleye, no obvious trend in growth was apparent for sport-caught Yellow Perch over the past eight years.

Data from the August trawl survey suggest that the abundances of Walleye and Yellow Perch from the 2015 year class were higher than 2014 at Michigan's Western Basin trawl sites. Catch rates of age-0 Walleye (4.8 fish/ha) were near the 10<sup>th</sup> percentile of fall catch rates observed in similar Western

Basin trawl surveys completed by the Ontario Ministry of Natural Resources and the Ohio Department of Natural Resources, while age-0 Yellow Perch catch rates (367.5 fish/ha) approached the 70<sup>th</sup> percentile of the same Ontario-Ohio data set. White Perch *Morone americana* were the most abundant species (40%) in the catch at Michigan's Western Basin trawl sites, followed by Mimic Shiner *Notropis volucellus* (27%), Yellow Perch (19%), Round Goby *Neogobius melanostomus* (6%), Freshwater Drum *Aplodinotus grunniens* (3%), and Channel Catfish *Ictalurus punctatus* (1%). Spottail Shiner *Notropis hudsonius*, Trout-Perch *Percopsis omiscomaycus*, Logperch *Percina caprodes*, Walleye, White Bass *Morone chrysops*, Gizzard Shad *Dorosoma cepedianum*, Rainbow Smelt *Osmerus mordax*, White Sucker *Catostomus commersonii*, Quillback *Carpionodes cyprinus*, Shorthead Redhorse *Moxostoma macrolepidotum*, and Smallmouth Bass *Micropterus dolomieu* accounted for the remaining 4% of the total catch.

**Job 5. Write annual performance report.**—This progress report was prepared. In addition a study summary was completed (Attachment 1).

**Job 6. Write manuscripts for publication.**—Data collected during this study were presented in the annual status report prepared each winter by the Lake St. Clair Fisheries Research Station for the Great Lakes Fisheries Commission's Lake Erie Committee Annual Meeting:

Thomas, M. V., and T. C. Wills. 2015. Status of the fisheries in Michigan waters of Lake Erie and Lake St. Clair 2014. Report to the Lake Erie Committee of the Great Lakes Fisheries Commission. Michigan Department of Natural Resources, Harrison Township. Available: [http://www.michigan.gov/documents/dnr/LSCFRS\\_2014AnnualReport\\_484984\\_7.pdf?20150914161711](http://www.michigan.gov/documents/dnr/LSCFRS_2014AnnualReport_484984_7.pdf?20150914161711).

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**Date:** September 30, 2015

Table 1.—Walleye catch per unit effort (CPUE, number per net lift), by cohort, in multi-filament gill nets during fall surveys on Michigan waters of Lake Erie, 2005 to 2014.

Year class	Total CPUE	Survey year									
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
1984	147.2	—	—	—	—	—	—	—	—	—	—
1985	176.7	—	—	—	—	—	—	—	—	—	—
1986	294.3	—	—	—	—	—	—	—	—	—	—
1987	114.3	—	—	—	—	—	—	—	—	—	—
1988	122.7	—	—	—	—	—	—	—	—	—	—
1989	50.1	—	—	—	—	—	—	—	—	—	—
1990	119	—	—	—	—	—	—	—	—	—	—
1991	164.6	—	—	—	—	—	—	—	—	—	—
1992	17	—	—	—	—	—	—	—	—	—	—
1993	170.3	0.3	—	—	—	—	—	—	—	—	—
1994	132.4	0.5	—	—	—	—	—	—	—	—	—
1995	10.4	0.8	0.5	0.3	—	—	—	—	—	—	—
1996	180	0.3	0	0	—	—	—	—	—	—	—
1997	134.4	1	0.3	0.5	—	—	0.3	—	0.3	—	—
1998	83.2	1	0.3	0	—	—	0.5	—	0	—	—
1999	181.6	6.8	1.5	1.3	0.3	0.5	0.3	—	0.3	—	—
2000	22.8	2	0.8	1	0	0	0.3	0.3	0.8	—	—
2001	134.9	10	1.8	1.8	1	0	0.3	0.3	0	0.3	0.3
2002	15.3	6.5	2.3	0.8	0	0	0	0	0.3	0.3	0.3
2003	338.6	157.5	48.3	28	7.5	7.8	1	2	3.3	0.3	1.3
2004	13.1	3.8	2.3	3.3	0.5	0.3	0.5	0.3	1.8	0.3	0
2005	38.8	—	12.3	17	2.5	3.8	0.5	0.8	0.8	0.3	0.8
2006	8.5	—	—	1.8	1.3	0.8	0.5	0.5	2.8	0.3	0.5
2007	128.2	—	—	1	69	32.8	11.5	4.5	6.3	2.3	0.8
2008	31.4	—	—	—	—	11.8	5.5	2	9	1.3	1.8
2009	39.2	—	—	—	—	—	12.3	7	14.3	4.3	1.3
2010	85.6	—	—	—	—	—	1	24	39.8	12.5	8.3
2011	61.6	—	—	—	—	—	—	—	21.8	17.5	22.3
2012	17.3	—	—	—	—	—	—	—	—	3.3	14
2013	19.3	—	—	—	—	—	—	—	—	0.3	19
Total		190.5	70.4	56.8	82.1	57.8	34.5	41.7	101.6	43.3	70.7
Net lifts		4	4	4	4	4	4	4	4	4	4

## Dynamics of Lake Erie Walleye and Yellow Perch Populations and Fisheries

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### *Background*

Walleye and Yellow Perch are the most valuable fishery resources in the lower Great Lakes, where they are targeted extensively by recreational anglers in the United States as well as recreational anglers and commercial fishers in the Canadian Province of Ontario (Photo 1). The spawning success of Walleye and Yellow Perch is extremely variable and greatly influences their abundance, growth, and mortality, which in turn can contribute to the success of those who fish for these species. The Fisheries Division conducts annual surveys of Lake Erie Walleye and Yellow Perch populations (also known as stocks) and fisheries through a multi-agency agreement coordinated by the international Great Lakes Fishery Commission (GLFC) (Photo 2). The information generated from this survey is shared with our partner fisheries agencies in Ohio, Pennsylvania, New York, and Ontario. The data are used to improve understanding of fish population dynamics, estimate Walleye and Yellow Perch fish abundance, and directly drive the determination of harvest quotas and fishing regulations for these recreationally and commercially important fisheries.



Photo 1. Angler caught walleye from Lake Erie.



Photo 2. Yellow Perch collected during Fisheries Division's annual Lake Erie surveys.

### *What are some of the current results?*

Results from the annual fall Walleye gill-net survey show that the 2014 Walleye net catch (also known as Catch-Per-Effort or CPE) of 71 fish/net lift was 63% higher than 2013 and is the 4<sup>th</sup> highest on record for 2005–2014. Catch rates for the 2013 year class were the 4<sup>th</sup> highest yearling CPE observed from 2005 to 2014. However, both the total and yearling Walleye CPE from the 2014 gill-net survey catch were below the average for the entire 1978-2014 time series. Processing of data and age structures from the fall 2015 gill-net survey is underway.

In the 2014 recreational fishery, 3- and 5-year-old fish from the 2009–2011 year classes accounted for the largest portion (54%) of the Walleye recreational harvest, with a notable contribution (15%) from the strong 2003 year class. The average length of harvested Walleye observed in the Michigan sport creel during 2014 (21 inches) was larger than 2013 (19 inches). For Yellow Perch, the 2009 and 2010 year classes were dominant in 2014, accounting for 68% of

the total harvest. The average length of Yellow Perch harvested by Michigan sport anglers during 2014 was 10 inches, again larger than the 2013 average length of 9 inches. Angler survey data and age structures collected from the 2015 recreational fishery are currently being processed.

Data from the August 2015 trawl survey suggest that the abundance of young-of-year Walleye from the 2015 year class was higher than the 2014 year class at Michigan's Western Basin trawl sites, but lower than other Lake Erie sites surveyed by our partner agencies. Michigan's average catch rate of age-0 Walleye (2 fish/acre) for 2015 was near the 10<sup>th</sup> percentile of fall catch rates observed in similar Western Basin trawl surveys completed by the Ontario Ministry of Natural Resources and the Ohio Department of Natural Resources. In contrast, young-of-year Yellow Perch catch rates in 2015 (149 fish/acre) were relatively higher, approaching the 70<sup>th</sup> percentile of the same Ontario-Ohio data set. White Perch were the most abundant species in the catch (40%) at Michigan's 2015 Western Basin trawl sites, followed by Mimic Shiner (27%), Yellow Perch (19%), Round Goby (6%), Freshwater Drum (3%), and Channel Catfish (1%). Spottail Shiner, Trout Perch, Logperch, Walleye, White Bass, Gizzard Shad, Rainbow Smelt, White Sucker, Quillback, Shorthead Redhorse, and Smallmouth Bass accounted for the remaining 4% of the total catch.

#### *Where can I find the details?*

Survey data from Michigan, Ohio, Pennsylvania, New York, and Ontario are reported annually in proceedings of the GLFC Lake Erie Committee's Walleye and Yellow Perch task groups, which are available online by visiting <http://www.glfc.org/lakecom/lec/lehome.php>. The Fisheries Division's Lake St. Clair Fisheries Research Station also publishes an annual report describing the status of the important Walleye and Yellow Perch fisheries in Michigan's waters of Lake Erie. This report is available on the web by visiting [http://www.michigan.gov/dnr/0,4570,7-153-10364\\_52259\\_10951---,00.html](http://www.michigan.gov/dnr/0,4570,7-153-10364_52259_10951---,00.html) and clicking on "Lake St. Clair". Additional information is available at [http://www.michigan.gov/dnr/0,4570,7-153-10364\\_52259\\_19056-333302--,00.html](http://www.michigan.gov/dnr/0,4570,7-153-10364_52259_19056-333302--,00.html).

#### *What does this project do for fisheries managers and anglers?*

Fisheries managers use the information from this project to set fishing regulations, such as minimum size limits and daily bag limits, which specify the size and number of fish that an angler can harvest in one day. Walleye regulations for Michigan's waters of Lake Erie are updated each April and can be found along with the rules for Yellow Perch and other species by clicking "Rules & Regs" on the Michigan Department of Natural Resources' Fisheries Division website at <http://www.michigan.gov/fishing>.