

STUDY PERFORMANCE REPORT

State: Michigan

Project No.: F-81-R-16

Study No.: 230695

Title: Northern Lake Huron coolwater fish community assessment

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

Study Objective: To collect relative abundance, growth rate, and other biological data to assess responses of coolwater fish communities in the Les Cheneaux Islands region and the St. Marys River to exploitation, management initiatives, effects of invasive species, and changing environmental and biological conditions.

Summary: Gill-net catch rates of Yellow Perch *Perca flavescens* in the annual Les Cheneaux Islands survey declined for the fourth year in a row during 2014 but were commensurate with the overall higher catch rates observed since recovery of the population in the mid-2000s. A fifth year of lower Yellow Perch recruitment likely contributed to the observed decline. Other Yellow Perch population metrics were generally consistent with sustained recovery after the collapse of the population and fishery from 2000 to 2004. Mean age remained unchanged in 2014 at 4.28 years compared to a mean of 2.18 years during the collapsed period. Mean length of Yellow Perch at age 3 dropped to 175 mm in 2014. Total annual mortality of Yellow Perch in the Les Cheneaux Islands increased to 41% in 2014 but is still regarded as sustainable. Northern Pike *Esox lucius* gill-net catch per-unit-effort (CPUE) was the greatest ever measured in the entire Les Cheneaux Islands time series, which dates back to 1969. The St. Marys River was not surveyed in 2014.

Findings: Jobs 1, 2, 3, 4 and 6 were scheduled for 2014-15, and progress is reported below.

Job 1. Survey design and coordination.—The design of the St. Marys River portion of this study is under review by the member agencies of the St. Marys River Fisheries Task Group (SMRFTG), a subcommittee of the Great Lakes Fishery Commission Lake Huron Technical Committee. Progress on the redesign has been deferred within the SMRFTG to draw upon the findings and recommendations of Schaeffer et al. (2011) and the experiences of the most recent (2013) survey. The SMRFTG is expected to have redesign options ready by the March 2016 Great Lakes Fisheries Commission Lakes Meetings and in time for implementation during the 2017 St. Marys River survey.

Job 2. Conduct survey and process samples.—A total of six gill-net lifts spanning three stations in the Les Cheneaux Islands were conducted in 2014. The 2015 survey will be conducted during the first week of October 2015 and will be reported on in next year's reporting cycle. Sample collections and analysis were conducted as planned for the 2014 survey. The St. Marys River was not slated for sampling in the current reporting cycle, but was surveyed in 2013 with project partners using nonfederal funds. Under the 2014 study renewal, the St. Marys River is scheduled for surveying again in 2017.

Job 3. Maintain data – maintain databases.—Databases for the Les Cheneaux Islands survey were updated with information from the 2014 collections.

Job 4. Analyze data.—The geometric mean Yellow Perch gill-net catch rate (Fielder 2010) index of abundance continued to decline for the fourth year in a row in 2014 (Figure 1). The decline was particularly evident at the Hessel Bay sampling station, the longest continually-sampled location within the survey (Figure 1). While the catch rates of Yellow Perch remain above those observed during the depressed state of the population from 1985-2004, the continued decline is disconcerting for the overall status of the fishery. It appears that lower catch rates may be driven by lower recruitment, as the catch rate of age-2 Yellow Perch (the survey's principal recruitment index) in 2014 continued a five-year trend of relatively weak year-class strength (Figure 2).

Total annual mortality of Les Cheneaux Islands Yellow Perch (see Fielder 2010) rose in 2014 but remained lower than that observed during the pre-2004 period of higher cormorant abundance (Figure 3). The mean age of Yellow Perch has remained unchanged since 2011 and persists at an improved level relative to the 2000–2004 population collapse (Figure 4). This is believed to stem from reduced cormorant predation resulting from the cormorant management measures implemented in 2004. The decrease in mean length-at-age that has also occurred since the implementation of cormorant management in the Les Cheneaux Islands has been viewed as evidence of increasing Yellow Perch abundance stemming from density-dependent growth (Fielder 2010). In contrast to this expectation, mean length at age 3 in 2014 (Figure 5) declined with the gill-net catch rate abundance index (Figure 1), suggesting other factors including prey availability and interspecific competition may be affecting Yellow Perch growth rates.

In summary, there are conflicting indices on the status of the Yellow Perch population in the Les Cheneaux Islands with gill-net catch rates indicating a decline in abundance but other population metrics consistent with a stable population level. It is hoped that the 2015 survey will help clarify the situation. Additional analyses such as those performed by Fielder (2010), which tested predictive forces over time, are needed to provide insights into the forces affecting the Yellow Perch population today. For example, Northern Pike have greatly increased in abundance and the arithmetic mean CPUE in 2014 (27.33 fish per gill-net lift) was the highest measured in the time series, which began in 1969. It is possible that Northern Pike, whose increase in abundance likely stems from lower mortality since the implementation of cormorant reductions and higher water levels which often favor their reproductive success, are having an effect on the Yellow Perch population, but more analysis is needed to affirm this possible relationship. Application of statistical catch-at-age methods to the Yellow Perch population would also provide additional information in the form of age-specific mortality rates.

There are no new findings for the St. Marys River survey which is between reporting cycles. The most recent findings for the St. Marys River portion of the Northern Lake Huron Coolwater Assessment are reported in Schaeffer et al. (2011). Analysis of the 2013 survey data is continuing.

Job 6. Write annual performance report.—This performance report was written. In addition, a project summary was prepared (Attachment 1).

Literature cited:

Fielder, D. G. 2010. Response of yellow perch in Les Cheneaux Islands, Lake Huron to declining numbers of double-crested cormorants stemming from control activities. *Journal of Great Lakes Research*. 36:207–214.

Schaeffer, J. S., D. G. Fielder, N. Godby, A. Bowen, L. O'Connor, J. Parrish, S. Greenwood, S. Chong, and G. Wright. 2011. Long-term trends in the St. Marys River open water fish community. *Journal of Great lakes Research* 37:70–79.

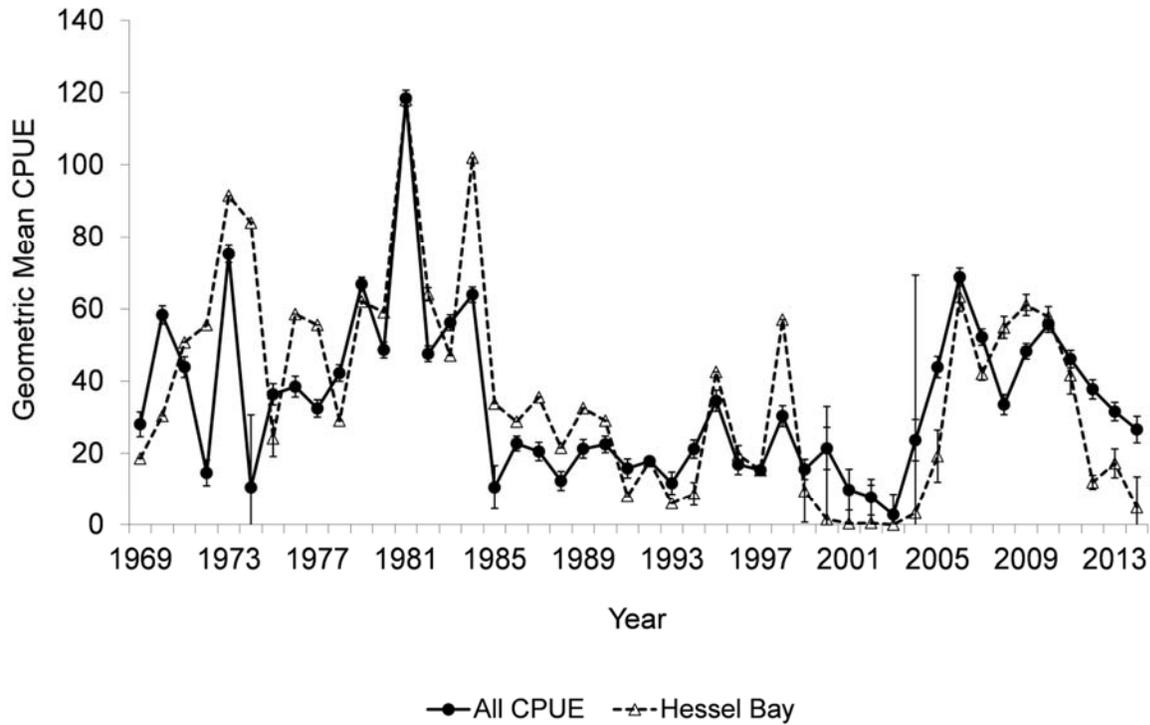


Figure 1.—Geometric mean gill-net catch-per-unit-effort (CPUE, number per net lift) of Yellow Perch at all sampling stations in the Les Cheneaux Islands (All CPUE) and Hessel Bay, 1969-2014. Error bounds represent two standard errors of the geometric mean.

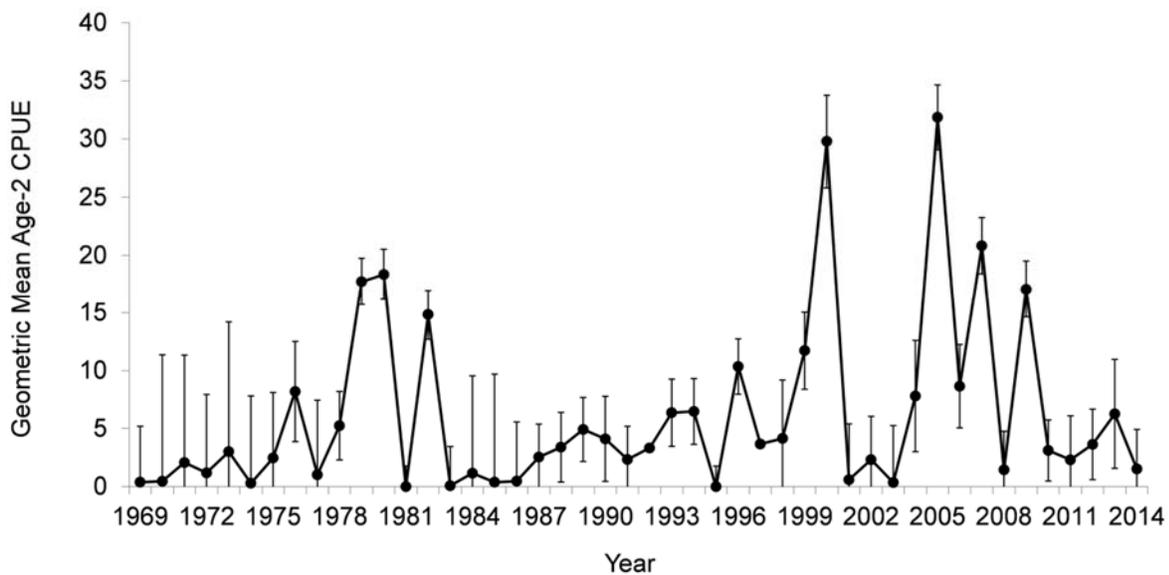


Figure 2.—Geometric mean gill-net catch-per-unit-of-effort (CPUE, number per net lift) of age-2 yellow perch in the Les Cheneaux Islands, 1969-2014. Error bounds represent two standard errors of the geometric mean.

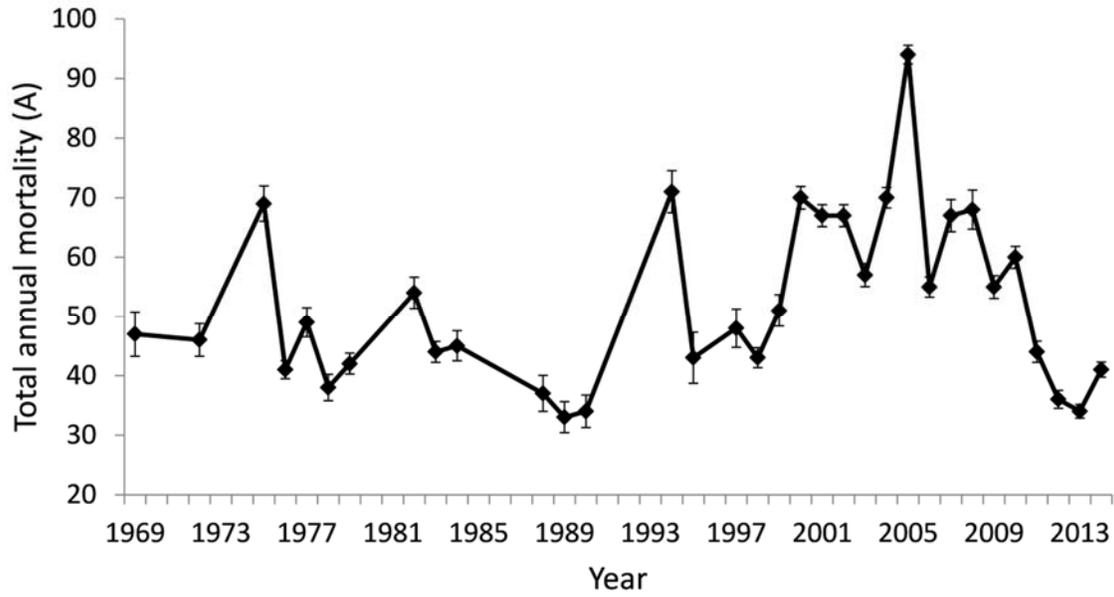


Figure 3.—Total annual mortality (percent) of Yellow Perch in the Les Cheneaux Islands, 1969-2014. Error bounds represent 95% confidence interval of the regression slope.

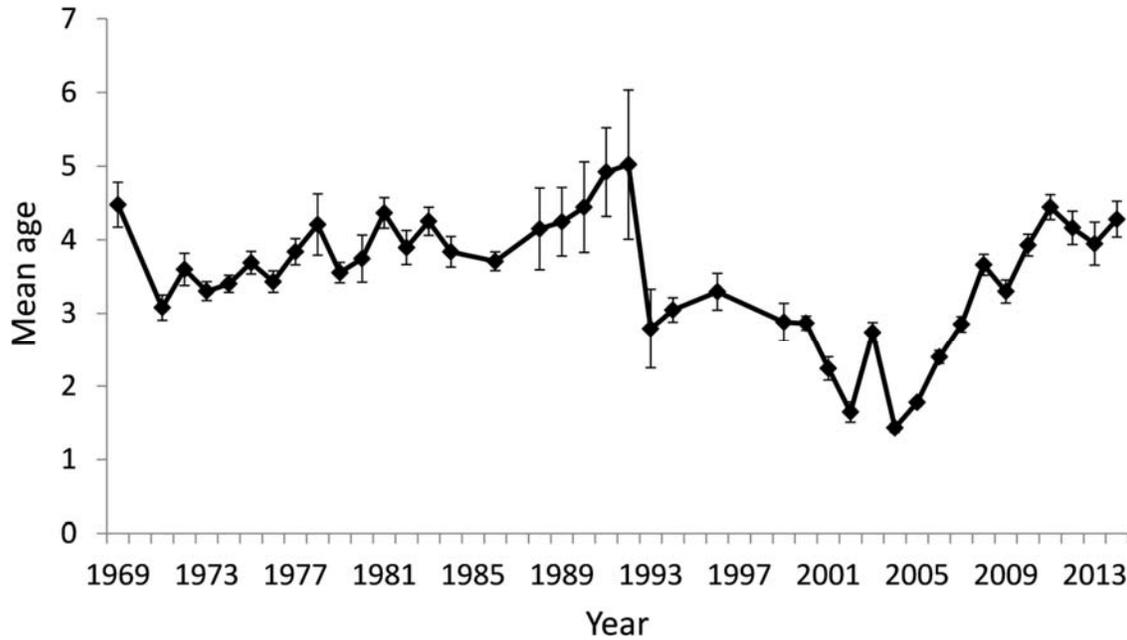


Figure 4.—Mean age (years) of Yellow Perch in the Les Cheneaux Islands, 1969-2014. Error bounds represent two standard errors of the arithmetic mean.

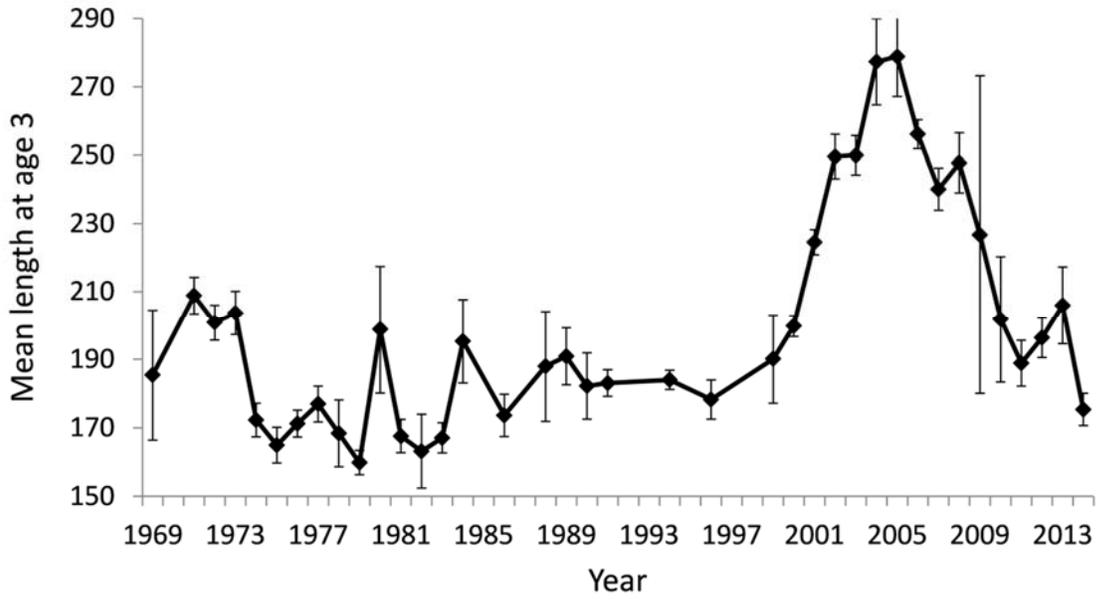


Figure 5.—Mean length (millimeters) of age-3 Yellow Perch in the Les Cheneaux Islands, 1969-2014. Error bounds represent two standard errors of the arithmetic mean.

Northern Lake Huron Coolwater Fish Community Assessment

David G. Fielder, Ph.D.
Alpena Fisheries Research Station

Background

The St. Marys River and Les Cheneaux Islands region of Lake Huron support unique fisheries that are an economic asset for local communities and important to many anglers. This study consists of two surveys that generate the information necessary for the management of each fishery: 1) an annual assessment of the Les Cheneaux Islands (LCI) fish community; and 2) a periodic assessment of the St. Marys River (SMR; Photo 1). The LCI survey, which has been completed each year since 1969, is one of the longest continuous Great Lakes surveys conducted by Fisheries Division uses gill nets for one week in early October each year. The SMR fish community assessment began in 1975 and is conducted about every five years on average. This survey is a very large effort (40 gill-net sets) that is jointly conducted by the Great Lakes Fisheries Commission (GLFC) St. Marys River Fisheries Task Group (Fisheries Division, the Ontario Ministry of Natural Resources and Forestry, the United States Fish and Wildlife Service, Fisheries and Oceans Canada, and the Chippewa-Ottawa Resource Authority). Additional help for the SMR survey is sometimes provided by staff and students from Lake Superior State University. Fisheries Division's portion of the SMR survey is conducted jointly by Fisheries Division's Alpena Fisheries Research Station and Northern Lake Huron Management Unit, with each crew sampling for about a week in August.



Photo 1. Fisheries Division's Research Vessel (R/V) Chinook sampling in the Les Cheneaux Islands.

Like other fish community surveys, the information collected during this project and Fisheries Division's creel surveys form the basis for the knowledge about the LCI and SMR fish populations. Information on fish abundance, age and growth, reproduction, survival, and the presence or absence of invasive species are just some of the data that is generated from these surveys. In addition, one of the most well-known analyses of double-crested cormorant (effects on the fish community and effectiveness of double-crested cormorant management comes from the LCI data set (in fact, some have mistakenly characterized the fish community survey in the LCI as a "cormorant study"). The ongoing fish community assessment, when coupled with additional double-crested cormorant nest counts and diet work, enabled Fisheries Division to complete analyses that has served as a basis for adaptive cormorant management in the region. The resulting recovery of yellow perch in the LCI area is hailed as a fisheries and wildlife management success story.

What are the recent key results?

Assessment catch rates of Yellow Perch in the annual Les Cheneaux Islands survey declined for the fourth year in a row during 2014 but were similar to the overall higher catch rates observed since recovery of the population in the mid-2000s. A fifth year of lower Yellow Perch reproduction likely contributed to the observed decline. Other Yellow Perch population metrics were generally consistent with sustained recovery after the collapse of the population and fishery from 2000 to 2004. Yellow Perch mean age in the assessment catch remained unchanged in 2014 at 4.3 years compared to a mean of 2.2 years during the collapsed period. Mean length of Yellow Perch at Age 3 dropped to 175 mm in 2014. Total annual mortality of Yellow Perch in the Les Cheneaux Islands increased to 41% in 2014 but is still regarded a sustainable level. Northern Pike (*Esox lucius*) assessment catches were the highest ever measured in the entire Les Cheneaux Islands time series, which dates back to 1969. The St. Marys River was not surveyed in 2014.

Where can I find the results?

Results from the LCI fish community survey are presented annually at the local Michigan Sea Grant Lake Huron fishery workshop and a number of reports using these data are available on Fisheries Division's web page (http://www.michigan.gov/dnr/0,4570,7-153-10364_52259_19056-333302--,00.html). The SMR survey results are published on the GLFC web page (<http://www.glfc.org>), and the results of the 2009 survey were published in the Journal of Great Lakes Research, a citation for which is also available on the GLFC web page or from project biologist.

What does this project do for fisheries managers and anglers?

This project provides fisheries managers the fundamental information needed to make stocking decisions (if and when to stock fish, and how many) and 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. Data are also used in allocation of shared fisheries resources, establishment of recovery targets for certain fish species, gaging of progress towards recovery, and examining the presence and effects of invasive species. Fishing regulations for Michigan's waters of the SMR, including the LCI region, can be found by clicking "Rules & Regs" on Fisheries Division's website at <http://www.michigan.gov/fishing>.