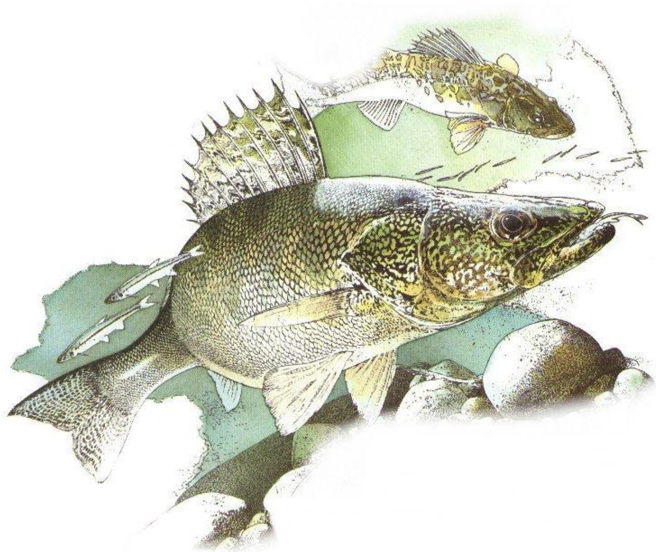
Report for 2013 by the

LAKE ERIE WALLEYE TASK GROUP

March 2014



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***Note**: Data and management summaries contained in this report are provisional. Every effort has been made to insure their correctness. Contact individual agencies for complete state and provincial data.*

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Charges to the Walleye Task Group, 2013-2014

The charges from the Lake Erie Committee's (LEC) Standing Technical Committee (STC) to the Walleye Task Group (WTG) for the period from April 2013 to March 2014 were to:

1. Maintain and update centralized time series of datasets required for population models and assessment including:
    a. Tagging and population indices (abundance, growth, maturity).
    b. Fishing harvest and effort by grid.
2. Improve existing population models to produce the most scientifically-defensible and reliable method for estimating and forecasting abundance, recruitment, and mortality.
    a. Explore additional recruitment indices for incorporation into catch-at-age model.
    b. Explore ways to account for tag loss and non-reporting in natural mortality (M) estimates for Statistical Catch at Age modeling.
3. Report Recommended Allowable Harvest (RAH) levels for 2014.
4. Review jaw and PIT tagging study results and provide guidance/recommendations for future tagging strategies to the LEC.

Review of Walleye Fisheries in 2013

Fishery effort and Walleye harvest data were combined for all fisheries, jurisdictions and Management Units (Figure 1) to produce lake-wide summaries. The 2013 total estimated lake-wide harvest of Walleye was 2.538 million Walleye (Table 1), with a total of 2.413 million Walleye harvested in the total allowable catch (TAC) area. This harvest represents 72% of the 2013 TAC (3.356 million Walleye) and includes Walleye harvested in commercial and sport fisheries in Management Units 1, 2, and 3. An additional 125,476 Walleye (5% of the lake-wide total) were harvested outside of the TAC area in Management Units 4 and 5 (referred to as Unit 4 in the Tables; Table 1). The estimated sport fish harvest of 1.280 million Walleye in 2013 represents a 13% increase from the 2012 harvest of 1.138 million, this harvest is 54% below the long-term (1975-2012) average of 2.374 million fish. The 2013 Ontario commercial harvest was approximately 1.260 million Walleye lake-wide, with 1.229 million caught in the TAC area (Table 2). Ontario does not conduct angler creel surveys on an annual basis, thus recent estimates of harvest and effort for this fishery component are not compiled for Ontario waters. The most recent Ontario creels were completed in 2008, 2004, and 2003 in Walleye MUs 1, 2-3, and 4-5, respectively. Assuming an average number of Walleye were harvested by the sport fishery in Ontario within the TAC area during 2013 (i.e., 46,000 fish), the total harvest of Walleye in Ontario waters was 1.275 million Walleye, representing 88% of the 2013 Ontario TAC allocation of 1.445 million Walleye. The lakewide Ontario commercial harvest was 6% lower than in 2012, and the 2013 harvest is 39% below the long-term average (1978-2012; Table 2, Figure 2).

Sport fishing effort increased 2% in 2013 from 2012, to a total of 2.641 million angler hours (Table 3, Figure 3). Compared to 2012, sport effort in 2013 increased in Management Units 1 (5%) and 3 (30%) and decreased in Management Unit 2 (10%) and Management Unit 4 (10%). Lake-wide commercial gill net effort in 2013 (9,503 km) decreased 3% from 2012 and is the

10th lowest observed effort since 1976 (Table 3, Figure 4).

Sport harvest per unit of effort (Walleye/angler hour) for agencies combined increased in Management Unit 1 (0.51; +13%), Management Unit 3 (0.58; +13%) and Management Units 4&5 (0.32; +29%), and decreased in Management Unit 2 (0.38; -9%) and in Michigan waters of Management Unit 1 (0.30; -17%) in 2013 compared to 2012. In all Management Units, the sport harvest rate was above the long-term average (Table 4, Figure 5). Management Unit 1 was 11% above the long-term average of 0.46 Walleye/angler hour and was 17% and 59% above the long-term means in Management Units 2 and 3, respectively. The sport harvest rates in Management Units 4&5 were 50% above the long-term mean of 0.21 Walleye/angler hour. The 2013 lake-wide average sport HUE of 0.47 Walleye/angler hours was higher (9%) than the long-term mean of 0.43 Walleye/angler hour.

In 2013, total commercial gill net harvest per unit effort (HUE; 132.5 Walleye/kilometer of net) decreased 3% relative to 2012, and was 8% above the long-term lake-wide average (122.6 Walleye/kilometer; Table 4, Figure 5). When compared to 2012 commercial gill net harvest rates, the catch rates increased in 2013 for Management Unit 1 (9%) and Management Unit 4 (25%) and decreased in Management Unit 2 (7%) and in Management Unit 3 (11%).

For the commercial and recreational fisheries, the harvest was dominated by Walleye originating from the 2010 (age 3), and 2003 (ages 7 and older group) year classes with moderate contributions by 2009 (age 4) and 2007 (age 6) (Tables 5 and 6). Ages 7-and-older Walleye comprised 33% and 25% of the lake-wide sport and commercial fishery harvest respectively. The 2010 year class represented 26% of the total sportfish and commercial fish harvest. Finally the 2009 and 2007 year classes each represented 11% and 12% of the total sport harvest and 12% and 13%, respectively, of the total commercial harvest. The proportion of older fish (age 7+) was greater in Management Unit 3 (50%) and Management Unit 4 (63%) compared to Management Unit 1 (22%) and Management Unit 2 (28%).

Across all jurisdictions, the mean age of Walleye in the 2013 harvest ranged from 4.3 to 8.9 years old in the sport fishery, and from 4.6 to 7.4 years old in Ontario's commercial fishery (Table 7, Figure 6). The change from 2012 in mean age of Walleye harvested varied by fishery and Management Unit. The mean age in the sport fishery (6.0 years) was above the long-term mean (1975-2012) of 4.3 years, and was the 3rd highest on record since 1975. In the commercial fishery, the mean age was 5.2 years, higher than the long-term mean (1975-2012) of 3.7 years, and is the fourth highest value in the time series. The mean age of the total harvest (sport and commercial fisheries) in 2013 (5.6 years) was the 2nd highest in the time series (1975-2012). This reflects the continued dependence of the fisheries on the 2003 (age-7+) and 2007 (age-6) year classes, with contributions to the fisheries from the 2010 (age-3) and 2009 (age-4) cohorts in 2013.

Walleye Management Plan and Lake Erie Percid Management Advisory Group

In 2005, the Lake Erie Walleye Task Group and LEC completed the first Lake Erie Walleye Management Plan (WMP; Locke et al. 2005). Within this plan, it was recommended that the actions, and the outcomes of these actions, be reviewed on a five-year basis in order to measure the success of the plan and evaluate its objectives. In 2010-2011, the STC conducted an internal review which concluded that the performance of the WMP varied. While some fishery catch rate objectives were achieved, other factors such as instability in harvest and TAC, due in part to recruitment patterns, caused concern for fisheries managers and stakeholders.

In order to move forward with updating the management plans for Walleye and yellow perch with increased stakeholder engagement and transparency, the LEC formed the Lake Erie Percid Management Advisory Group (LEPMAG). This group consists of stakeholders from all jurisdictions surrounding Lake Erie, along with Lake Erie managers and agency staff, and is being facilitated by Michigan State University's Quantitative Fisheries Center (QFC). In early 2013, LEPMAG terms of reference were modified to include Walleye and Yellow Perch Task Groups Members.

From November, 2010 through February, 2012, LEPMAG members were involved in a series of five facilitated workshops that defined common fisheries objectives for the Lake Erie Walleye population, described the current assessment programs, data sources, stock assessment model and LEC harvest policy. At the final workshop of the first round of LEPMAG meetings in February 2012, a Technical Review Panel comprised of modeling and fisheries management experts reviewed the statistical catch at age (SCAA) stock assessment model and made recommendations for the LEPMAG to consider with respect to potential improvements within the stock assessment model. The QFC incorporated these recommendations into a formal Walleye Management Strategy Evaluation (MSE).

Walleye Stock Assessment Model and Harvest Control Rules

The LEPMAG process has dedicated twelve meetings over past four years (2010-2013) to identify common goals, with the opportunity for stakeholders to provide direct advice to the LEC specific to Walleye management objectives, alternatives, and to evaluate trade-offs between various management options. In December of 2013, after a review of the data, presentation of analyses, and comments and suggestions by stakeholders with respect to the Walleye assessment model and harvest control rule, the LEC announced that as of 2014, the WTG will employ an updated recruitment integrated Walleye assessment model. This updated model includes: 1) estimating selectivity for all ages within the model without the assumptions of known selectivity at age; 2) integrating age-0 trawl survey data into the model; 3) using a multinomial distribution for the age composition data; and 4) allowing catchability to vary from year to year using a random walk for fishery and survey data including the age-0 trawl survey.

The LEC also announced that beginning in 2014, the Walleye harvest policy will set a target fishing rate of 60% Fmsy, with an accompanying limit reference point which would reduce the targeted fishing rate beginning at 20% of the unfished spawning stock biomass (or 20% SSB_0) threshold. The LEC will also incorporate a 20% constraint on varying the annual Total Allowable Catch (TAC) to ensure a level stability to the TAC through time.

In addition to the LEC decisions that were made in 2014 regarding the adoption of an integrated Walleye assessment model, the LEC has charged the WTG to continue to explore other LEPMAG recommendations including incorporating additional data sets into the assessment model to estimate incoming age-2 recruits. These datasets include additional age-0 trawl survey abundance indices, age-1 trawl survey abundance indices, and age-1 gill net survey abundance indices.

Second, the LEPMAG was provided with information and analysis from a recently completed interagency tagging study on Lake Erie. This tagging survey, which used different tagging methodologies, indicated that the historic tagging studies used to estimate instantaneous natural mortality rates (*M*) may be improved by recognizing tag loss and variable non-reporting rates across fisheries. Based upon historic tagging results, which did not recognize the effects of tag loss and addressed reporting rates differently, *M* was assumed to be constant at 0.32 for all ages and years. The more recent tagging results, which demonstrate that tag loss and variable non-reporting rates occur, suggest that an exploration of methods to estimate *M* incorporating this information is more accurate. These analyses suggested that allowing *M* to vary by age fit the data much better. LEPMAG recommended continued work on this charge until completion.

Third, the LEPMAG discussed eastern basin Walleye stocks, which are comprised of resident stocks along with an annual migration of western basin stocks. This migration, and uncertainty about dynamics that affect Walleye movements, increase the complexity of conducting a viable independent stock assessment. Additionally, population parameters, such as growth rates and *M,* may be variable for different stocks. As a result, the eastern basin has not yet been formally incorporated into LEC harvest decisions. The LEPMAG recognized the importance of pursuing a more integrated approach to assessment and management of Walleye lakewide, and recommended continued analysis of eastern basin Walleye datasets to achieve a broader based approach to Walleye assessment and management.

Walleye Management Strategy Evaluation

Concurrent with the above detailed activities addressing the stock assessment model recommendations, the LEPMAG also developed a range of harvest policies based upon various reference points, and simulations were used to evaluate the performance of each harvest policy based upon a number of jointly developed performance indicators. The harvest strategies included a range of maximum Target Reference Points (TRP) based on the Maximum Sustainable Yield ($F_{40\%MSY,}$ $F_{60\%MSY,}$ $F_{80\%MSY,}$ $F_{100\%MSY}$) and threshold Limit Reference Points (LRP) of (20% or 40%) of the unfished spawning stock biomass (SSB_0). When spawning stock biomass falls below this reference point, target fishing rates will decrease, as in methods previously employed in the sliding F formula. The LEPMAG also considered an inter-annual change constraint on TAC in the range of 10%, 20%, and an unconstrained harvest policy.

Lastly, the QFC presented a means for implementing a probabilistic control rule, or P-star (P*). A probabilistic control rule accounts for uncertainty in determining the risk of a harvest decision. This control rule calculates the probability that the spawning stock biomass will go below the SSB_0 threshold in the year following TAC implementation. P* can be viewed as an evaluation of the risk of falling below the 20% of SSB_0 threshold in the immediate future, based on the decision of where the TAC is set. It was suggested that incorporating a P* of 0.05 (no more than a 5% chance that spawning stock biomass would go below 20%SSB_0 based on the TAC implemented in the upcoming fishing year) could be used as a reference point. All harvest policies were evaluated by running 250 simulations over 100 year time period, and information was summarized for each performance metric and presented to the LEPMAG.

As a result of the ongoing discussions with the LEPMAG, and the majority approval of the Harvest Control Rule process detailed above, as presented by the QFC, the Lake Erie Committee has chosen to implement the following Harvest Policy beginning in March 2014:

- *Target Fishing Mortality* of **60%** of the Maximum Sustainable Yield (60%F_{MSY}) ;
- Threshold *Limit Reference Point* of **20%** of the Unfished Spawning Stock Biomass (20%SSB_0);
- Probabilistic Control Rule, P-star, P*=**0.05** ;
- A limitation on the annual change in TAC of $\pm$**20%**.

Catch-at-Age Population Analysis and Abundance

The WTG uses a SCAA model to estimate the abundance of Walleye in Lake Erie between the 1978 and 2013 time period. The stock assessment model estimates population abundance utilizing both fishery dependent and independent data sources. The model includes fishery-dependent data from the Ontario commercial fishery (Management Units 1-3) and sport fisheries in Ohio (Management Units 1-3) and Michigan (Management Unit 1). Since 2002, the WTG model has included data collected from three fishery-independent, gill net assessment surveys (i.e., Ontario Partnership, Michigan and Ohio). Due to similarities between Michigan and Ohio surveys and the desire for improved precision, Michigan gill net survey data were pooled with Ohio's data in the SCAA model. As stated earlier, *M* is assumed to be constant (0.32) among years (1978-2013) and ages (ages 2 through 7+, i.e., seven and older). The abundances-at-age were derived from the estimated parameters using an exponential survival equation.

Based on the 2014 integrated SCAA model, the 2013 west-central population (Management Units 1-3) estimate was 26.864 million age 2 and older Walleye (Table 8, Figure 7). The estimated number of age-3 fish originating from the 2010 year class in 2013 was 7.657 million fish and represented 29% of the Walleye (age 2 and older) in the population. The second most abundant age group (28%) was age-2 Walleye, followed by the age 7 and older fish (17%). Based on the integrated model, the number of age-2 recruits entering the population in 2014 (2012 year-class) and 2015 (2013 year-class) will be 5.644 and 8.353 million Walleye, respectively (Table 10; Figure 8). The projected abundance of age 2 and older Walleye in the west-central population in 2014 is 23.229 million fish (Table 8; Figure 7).

Harvest Policy and Recommended Allowable Harvest (RAH) for 2014

Using results from the 2014 integrated SCAA model, the estimated abundance of 23.229 million age 2 and older Walleye in 2014, and a harvest policy (TRP =$F_{60\%MSY}$; LRP =20%SSB_0), the calculated mean RAH for 2014 is 4.207 million Walleye, with a range from 3.156 (minimum) to 5.258 (maximum) million Walleye (Table 10). The WTG RAH range estimate is an ADMB-generated value based on estimating +/- one standard deviation of the mean RAH. ADMB uses a statistical technique called the delta method to determine this standard deviation for the calculated RAH, incorporating the standard errors from abundance estimate at age and combined gear selectivity at age that go into the calculation of the RAH.

The target fishing rate, ($F_{60\%MSY}$ =0.320) in the harvest policy was applied since the probability that the projected spawner biomass in 2015 (23.191 million kg) could fall below the limit reference point ($SSB_{20\%}$ = 10.042 million kg) after fishing at $F_{60\%MSY}$ in 2014 was less than 5% (P=0.0001). Thus the probabilistic control rule that could have reduced the target fishing rate to conserve spawner biomass will not be invoked during the 2014 process to determine RAH.

In addition to the RAH, the Harvest Control Rule conceived by LEPMAG is to be implemented this year which limits the annual change in TAC to ± 20%. If the LEC were to invoke the 20% maximum change rule from the previous year's TAC, then the 2014 TAC range would be/vary (+) or (-) 20% of the 2013 TAC (3.356 million fish). This 2014 TAC range for LEC consideration would be from 2.685 million fish to 4.027 million fish.

Other Walleye Task Group Charges

Centralized Databases

The WTG members currently manage several databases. These databases consist of harvest and population assessment surveys conducted by the respective agencies that manage the Walleye population in Lake Erie. Annually, information from these surveys is compiled to assist WTG members in the decision-making process regarding recommended harvest levels and current status and trends of the Walleye population. Use of WTG databases by non-members is only permitted following a specific protocol established in 1994, described in the 1994 WTG Report, and reprinted in the 2003 WTG Report (WTG 2003).

Fishery harvest and population assessment survey information are annually compiled by the WTG and are used for estimating the population abundance of Walleye in Lake Erie via SCAA analysis (Deriso et al. 1985). A spatially-explicit version of agency-specific harvest data (e.g., harvest-at-age and fishery effort by management unit) and population assessment (e.g., the interagency trawl program and gill net surveys) databases are maintained by the WTG. Annual population abundance estimates are used to assist LEC members with setting TACs for the upcoming year as well as to evaluate past harvest policy decisions.

The Lake Erie Walleye Tagging database consists of biological information collected from Walleye tagged in the tributaries and main lake areas of Lake Erie. The tagging program dates back to 1986, and is currently maintained at the Sandusky office of the Ohio Department of Natural Resources, Division of Wildlife. Annually, agencies submit information regarding tagging activities in their jurisdictions. In addition to updating the database with new tagging information, the database also maintains a record of the tagged Walleye which are reported as harvested in a given year. The information is used to estimate the movements of different spawning stocks within the lake proper and connecting waters of Lake Erie. In 2012, Vandergoot et al. (2012) published the findings of an interagency tag-loss study conducted between 2005 and 2009. Additionally, Vandergoot et al. (2012) estimated fishery and region specific jaw-tag reporting rates from the high-reward tagging studies conducted in 1990 and 2000. The results of this study were used to generate spatially explicit mortality parameters for Lake Erie Walleye and a manuscript describing this work has been submitted for peer review.

Additional Walleye Task Group Activities and Endeavors

Investigating Auxiliary Recruitment Indices

In response to Charge 2a, the WTG identified juvenile Walleye indices among agencies that may be eligible for inclusion as part of a composite recruitment index integrated into the SCAA Walleye model. This information was presented to LEPMAG in 2013, along with limitations, challenges, and options for proceeding. Currently, an interagency west basin young-of-the-year (YOY) Walleye bottom trawl index is integrated in the SCAA model to contribute to age 2 abundance estimates and forecasts. While this survey is considered to be a reliable predictor of recruitment, the inclusion of additional recruitment data may compliment and improve the recruitment estimation process. Although both young-of-the-year and yearling indices are candidates for a composite index, yearling Walleye indices cannot be used to forecast recruitment 2 years in advance, a requirement for the probabilistic control rule P* adopted by LEPMAG and the WTG. Since yearling data are not compatible with this control rule, options include the exclusion of yearling data from the composite index, removal of the P* control rule or running two (2) integrated SCAA models; one with YOY and yearling data and the second model using only YOY data.

Multi-agency trawl and gill net YOY and yearling Walleye indices were used in Principal Components Analyses (PCA) as an approach to combine and weight indices objectively. While this approach has merit, challenges include varying lengths of data sets and missing years of data. Including all available data sets reduces the sample size for PCA significantly, which may necessitate exclusion of some data. Other considerations include gear bias of gill nets and fishing power differences among trawl data sources. Ongoing trawl and gill net standardization studies (WTG 2013) may address these biases. The principal components of PCA may be used to generate a composite recruitment index but could require scaling for integration with the SCAA model. Progress on this charge is anticipated, following consensus on aspects of the RAH process and the challenges discussed in this report.

In 2011 and 2012, the WTG used comparable components of the Ontario (ON Partnership), New York (NYDEC warmwater) and Ohio (ODNR) bottom monofilament gillnet assessment programs to investigate the dynamics, production and relative abundance of yearling walleye throughout the lake. The 2012 exercise was expanded to include yearling catches observed in the suspended monofilament gillnet assessment conducted by the ON Partnership and the suspended multifilament gillnet assessments from combined ODNR and Michigan (MDNR) surveys (WTG 2013). While acknowledging several limitations to incorporating the suspended gillnet data (lack of suspended gillnet data in NY; difficulty standardizing the catches across jurisdictions; trends in growth rates), the exercise was through to have merit and was repeated with 2013 data.

Viewed separately, the comparable bottom set data showed differences in yearling abundance (2012 year class) between east and west in 2013; south shore eastern catches were notably larger than those of more western locations (Figure 9). North shore eastern and east-central basin catches were lower. This was similar to the pattern seen in 2011 (2010 year class) but not 2012 (2011 year class). The spatial distribution of yearlings in suspended nets in 2013 showed the highest abundance in Ohio, followed by Michigan waters. Yearling catches from suspended monofilament nets in Ontario waters, similar to Michigan catches in the west basin, declined as one moves from west to the east. It is important to re-iterate that differences in observed catches between programs using suspended nets are not directly quantitatively comparable and that caution needs to be taken before deriving definitive inferences from this exercise.

This endeavor represents another step toward identifying auxiliary data sources for assessing the status of the walleye resource in Lake Erie. It will benefit from gear standardization exercises such as the collaborative gillnet comparison study currently being conducted by USGS (Lake Erie Biological Station), OMNR and ODNR. The WTG will continue to explore ways of standardizing assessment data, modifying methodologies, and examining historic data in the coming year.

East Basin Walleye Assessment

Catch-at-age assessment models assume that information collected from fisheries and surveys track the same cohorts through time. However, many studies have shown the Walleye resource in the east basin during harvest season is a mixture of Walleye sub-populations from both west basin and east basin (Einhouse and MacDougall 2010). In a recent study, Zhao et al. (2011) used a mark-recapture analysis to quantify the contribution of both sources. They estimated that, on average, about 90% of all Walleye harvested in the east basin were seasonal migrants from the west basin. However, there exists a large amount of uncertainty and variation associated with the annual age and size structure of the Walleye population migrating from the west basin. Further, it is unlikely that this migration occurs in a consistent way by exactly the same segment of the population each year. The study suggests that catch-at-age information cannot track the same cohort of Walleye from year to year in the east basin and the core assumption of tracking cohorts in a cohort-based model is likely violated.

The WTG member agencies from the east basin continue assessment surveys to track changes in the abundance of Walleye population, and Walleye fisheries are closely monitored and regulated in the east basin. WTG members will continue to examine the Walleye resource inhabiting eastern Lake Erie to develop a multi-jurisdictional assessment that recognizes both expansive seasonal movements from the west-central quota management area, as well as the dynamics of smaller and localized east basin spawning stocks. This may include a stock assessment approach that does not utilize a catch-at-age modeling of absolute abundance.

Walleye Spatial Ecology Study

In 2010, an inter-lake walleye spatial ecology telemetry study was initiated between the Michigan Department of Natural Resources, Ohio Department of Natural Resources, United States Geological Survey, Carlton University, and Great Lakes Fishery Commission. The objectives of the study are to 1) determine the proportion of walleyes spawning in the Tittabawassee River or in the Maumee River that reside in the Lake Huron main basin population, move into and through the Huron-Erie-Corridor, and reside in Lake Erie, 2) identify the environmental characteristics associated with the timing and extent of walleye movement from riverine spawning grounds into Lake Huron and back again, 3) determine whether walleye demonstrate spawning site fidelity, and 4) compare unbiased estimates of mortality parameters of walleyes from Saginaw Bay and the Maumee River.

A similar spatial ecology study was initiated during the spring of 2013. One hundred sixty-five walleye (n=100 male and 65 female) were collected with gill nets during the spawning period on (males) or in the vicinity of (females) Toussaint Reef. Each fish was implanted with an acoustic transmitter and had an external reward tag ($100US) attached. Captured fish should be reported to the phone number listed on the tags, via the internet by logging onto http://data.glos.us/glatos , or by contacting one of the LEC agencies.

The objectives of this study are to: 1) determine the proportion of walleye originating from two western basin spawning stocks (i.e., Toussaint Reef and Maumee River) that migrate out of the western basin of Lake Erie after spawning, 2) compare spawning site fidelity rates between these two spawning stocks, 3) determine if female walleye from these spawning stocks are annual spawners, and 4) compare total mortality rates (i.e., fishing and natural) for these spawning stocks. This telemetry study is funded by the Great Lakes Fishery Commission, Ohio Department of Natural Resources and the Ontario Ministry of Natural Resources and will be a collaborative effort of the LEC agencies, the United States Geological Survey and Carleton University.

Results from these telemetry studies will be forthcoming over the course of the next year.

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Table 1. Annual Lake Erie walleye total allowable catch (TAC, top) and measured harvest (Har; bottom, bold), in numbers of fish from 1980 to 2013. TAC allocations for 2010 on are based on water area: Ohio, 51.11%; Ontario, 43.06%; and Michigan, 5.83%. New York and Pennsylvania do not have assigned quotas, but are included in annual total harvest.

		TAC Area (MU-1, MU-2, MU-3)				Non-TAC Area (MUs 4&5)				All Areas
Year		Michigan	Ohio	Ontario [a]	Total	NY	Penn.	Ontario	Total	Total
1980	TAC	261,700	1,558,600	1,154,100	2,974,400				0	2,974,400
	Har	**183,140**	**2,169,800**	**1,049,269**	**3,402,209**				**0**	**3,402,209**
1981	TAC	367,400	2,187,900	1,620,000	4,175,300				0	4,175,300
	Har	**95,147**	**2,942,900**	**1,229,017**	**4,267,064**				**0**	**4,267,064**
1982	TAC	504,100	3,001,700	2,222,700	5,728,500				0	5,728,500
	Har	**194,407**	**3,015,400**	**1,260,852**	**4,470,659**				**0**	**4,470,659**
1983	TAC	572,000	3,406,000	2,522,000	6,500,000				0	6,500,000
	Har	**145,847**	**1,864,200**	**1,416,101**	**3,426,148**				**0**	**3,426,148**
1984	TAC	676,500	4,028,400	2,982,900	7,687,800				0	7,687,800
	Har	**351,169**	**4,055,000**	**2,178,409**	**6,584,578**				**0**	**6,584,578**
1985	TAC	430,700	2,564,400	1,898,800	4,893,900				0	4,893,900
	Har	**460,933**	**3,730,100**	**2,435,627**	**6,626,660**				**0**	**6,626,660**
1986	TAC	660,000	3,930,000	2,910,000	7,500,000				0	7,500,000
	Har	**605,600**	**4,399,400**	**2,617,507**	**7,622,507**				**0**	**7,622,507**
1987	TAC	490,100	2,918,500	2,161,100	5,569,700				0	5,569,700
	Har	**902,500**	**4,433,600**	**2,688,558**	**8,024,658**				**0**	**8,024,658**
1988	TAC	397,500	3,855,000	3,247,500	7,500,000				0	7,500,000
	Har	**1,996,788**	**4,890,367**	**3,054,402**	**9,941,557**	**85,282**			**85,282**	**10,026,839**
1989	TAC	383,000	3,710,000	3,125,000	7,218,000				0	7,218,000
	Har	**1,091,641**	**4,191,711**	**2,793,051**	**8,076,403**	**129,226**			**129,226**	**8,205,629**
1990	TAC	616,000	3,475,500	2,908,500	7,000,000				0	7,000,000
	Har	**747,128**	**2,282,520**	**2,517,922**	**5,547,570**	**47,443**			**47,443**	**5,595,013**
1991	TAC	440,000	2,485,000	2,075,000	5,000,000				0	5,000,000
	Har	**132,118**	**1,577,813**	**2,266,380**	**3,976,311**	**34,137**			**34,137**	**4,010,448**
1992	TAC	329,000	3,187,000	2,685,000	6,201,000				0	6,201,000
	Har	**249,518**	**2,081,919**	**2,497,705**	**4,829,142**	**14,384**			**14,384**	**4,843,526**
1993	TAC	556,500	5,397,000	4,546,500	10,500,000				0	10,500,000
	Har	**270,376**	**2,668,684**	**3,821,386**	**6,760,446**	**40,032**			**40,032**	**6,800,478**
1994	TAC	400,000	4,100,000	3,500,000	8,000,000				0	8,000,000
	Har	**216,038**	**1,468,739**	**3,431,119**	**5,115,896**	**59,345**			**59,345**	**5,175,241**
1995	TAC	477,000	4,626,000	3,897,000	9,000,000				0	9,000,000
	Har	**107,909**	**1,435,188**	**3,813,527**	**5,356,624**	**26,964**			**26,964**	**5,383,588**
1996	TAC	583,000	5,654,000	4,763,000	11,000,000				0	11,000,000
	Har	**174,607**	**2,316,425**	**4,524,639**	**7,015,671**	**38,728**	**89,087**		**127,815**	**7,143,486**
1997	TAC	514,000	4,986,000	4,200,000	9,700,000				0	9,700,000
	Har	**122,400**	**1,248,846**	**4,072,779**	**5,444,025**	**29,395**	**88,682**		**118,077**	**5,562,102**
1998	TAC	546,000	5,294,000	4,460,000	10,300,000				0	10,300,000
	Har	**114,606**	**2,303,911**	**4,173,042**	**6,591,559**	**34,090**	**124,814**	**47,000**	**205,904**	**6,797,463**
1999	TAC	477,000	4,626,000	3,897,000	9,000,000				0	9,000,000
	Har	**140,269**	**1,033,733**	**3,454,250**	**4,628,252**	**23,133**	**89,038**	**87,000**	**199,171**	**4,827,423**
2000	TAC	408,100	3,957,800	3,334,100	7,700,000				0	7,700,000
	Har	**252,280**	**932,297**	**2,287,533**	**3,472,110**	**28,599**	**77,512**	**67,000**	**173,111**	**3,645,221**
2001	TAC	180,200	1,747,600	1,472,200	3,400,000				0	3,400,000
	Har	**159,186**	**1,157,914**	**1,498,816**	**2,815,916**	**14,669**	**52,796**	**39,498**	**106,963**	**2,922,879**
2002	TAC	180,200	1,747,600	1,472,200	3,400,000				0	3,400,000
	Har	**193,515**	**703,000**	**1,436,000**	**2,332,515**	**18,377**	**22,000**	**36,000**	**76,377**	**2,408,892**
2003	TAC	180,200	1,747,600	1,472,200	3,400,000				0	3,400,000
	Har	**128,852**	**1,014,688**	**1,457,014**	**2,600,554**	**27,480**	**43,581**	**32,692**	**103,753**	**2,704,307**
2004	TAC	127,200	1,233,600	1,039,200	2,400,000				0	2,400,000
	Har	**114,958**	**859,366**	**1,419,237**	**2,393,561**	**8,400**	**19,969**	**29,864**	**58,233**	**2,451,794**
2005	TAC	308,195	2,988,910	2,517,895	5,815,000				0	5,815,000
	Har	**37,599**	**610,449**	**2,933,393**	**3,581,441**	**27,370**	**20,316**	**17,394**	**65,080**	**3,646,521**
2006	TAC	523,958	5,081,404	4,280,638	9,886,000				0	9,886,000
	Har	**305,548**	**1,868,520**	**3,494,551**	**5,668,619**	**37,161**	**151,614**	**68,774**	**257,549**	**5,926,168**
2007	TAC	284,080	2,755,040	2,320,880	5,360,000				0	5,360,000
	Har	**165,551**	**2,160,459**	**2,159,965**	**4,485,975**	**29,134**	**116,671**	**37,566**	**183,371**	**4,669,346**
2008	TAC	209,530	1,836,893	1,547,576	3,594,000				0	3,594,000
	Har	**121,072**	**1,082,636**	**1,574,723**	**2,778,431**	**29,017**	**74,250**	**34,906**	**138,173**	**2,916,604**
2009	TAC	142,835	1,252,195	1,054,970	2,450,000				0	2,450,000
	Har	**94,048**	**967,476**	**1,095,500**	**2,157,024**	**13,727**	**42,422**	**27,725**	**83,874**	**2,240,898**
2010	TAC	128,260	1,124,420	947,320	2,200,000				0	2,200,000
	Har	**55,248**	**958,366**	**983,397**	**1,997,011**	**34,552**	**54,056**	**23,324**	**111,932**	**2,108,943**
2011	TAC	170,178	1,491,901	1,256,921	2,919,000				0	2,919,000
	Har	**50,490**	**417,314**	**1,224,057**	**1,691,861**	**31,506**	**45,369**	**28,873**	**105,748**	**1,797,609**
2012	TAC	203,292	1,782,206	1,501,502	3,487,000				0	3,487,000
	Har	**86,658**	**921,390**	**1,355,522**	**2,363,570**	**36,975**	**44,796**	**28,260**	**110,031**	**2,473,601**
2013	TAC	195,655	1,715,252	1,445,094	3,356,000				0	3,356,000
	Har	**54,167**	**1,083,395**	**1,274,945**	**2,412,507**	**34,553**	**60,332**	**30,591**	**125,476**	**2,537,983**

[a] Ontario sport harvest values were estimated from the most recent creel surveys in each basin; 2008 in Unit 1, 2004 in Units 2 and 3, and 2003 in Unit 4. These values are included in Ontario's total walleye harvest, but are not used in catch-at-age analysis.

Table 2. Annual harvest (thousands of fish) of Lake Erie walleye by gear, management unit, and agency. Means contain data from 1975 to 2012.

	Sport Fishery															Commercial Fishery					
	Unit 1				Unit 2			Unit 3			Units 4 & 5					Unit 1	Unit 2	Unit 3	Unit 4		Grand
Year	OH	MI	ON[a]	Total	OH	ON[a]	Total	OH	ON[a]	Total	ON[a]	PA	NY	Total	Total	ON	ON	ON	ON	Total	Total
1975	77	4	7	88	10	--	10	--	--	--	--	--	--	0	98	--	--	--	--	0	98
1976	605	30	50	685	35	--	35	--	--	--	--	--	--	0	720	113	44	--	--	157	877
1977	2,131	107	69	2,307	37	--	37	--	--	--	--	--	--	0	2,344	235	67	--	--	302	2,645
1978	1,550	72	112	1,734	37	--	37	--	--	--	--	--	--	0	1,771	274	60	--	--	334	2,106
1979	3,254	162	79	3,495	60	--	60	--	--	--	--	--	--	0	3,555	625	30	--	--	655	4,211
1980	2,096	183	57	2,336	49	--	49	24	--	24	--	--	--	0	2,409	953	40	--	--	993	3,402
1981	2,857	95	70	3,022	38	--	38	48	--	48	--	--	--	0	3,108	1,037	119	3	--	1,159	4,268
1982	2,959	194	49	3,202	49	--	49	8	--	8	--	--	--	0	3,259	1,077	134	2	--	1,213	4,470
1983	1,626	146	41	1,813	212	--	212	26	--	26	--	--	--	0	2,051	1,129	167	80	--	1,376	3,427
1984	3,089	351	39	3,479	787	--	787	179	--	179	--	--	--	0	4,445	1,639	392	108	--	2,139	6,584
1985	3,347	461	57	3,865	294	--	294	89	--	89	--	--	--	0	4,248	1,721	432	225	--	2,378	6,627
1986	3,743	606	52	4,401	480	--	480	176	--	176	--	--	--	0	5,057	1,651	558	356	--	2,565	7,622
1987	3,751	902	51	4,704	550	--	550	132	--	132	--	--	--	0	5,386	1,611	622	405	--	2,638	8,024
1988	3,744	1,997	18	5,759	584	--	584	562	--	562	--	--	85	85	6,990	1,866	762	409	--	3,037	10,026
1989	2,891	1,092	14	3,997	867	35	902	434	80	514	--	--	129	129	5,542	1,656	621	386	--	2,663	8,206
1990	1,467	747	35	2,249	389	14	403	426	23	449	--	--	47	47	3,148	1,615	529	302	--	2,446	5,595
1991	1,104	132	39	1,275	216	24	240	258	44	302	--	--	34	34	1,851	1,446	440	274	--	2,160	4,011
1992	1,479	250	20	1,749	338	56	394	265	25	290	--	--	14	14	2,447	1,547	534	316	--	2,397	4,844
1993	1,846	270	37	2,153	450	26	476	372	12	384	--	--	40	40	3,053	2,488	762	496	--	3,746	6,800
1994	992	216	21	1,229	291	20	311	186	21	207	--	--	59	59	1,806	2,307	630	432	--	3,369	5,176
1995	1,161	108	32	1,301	159	7	166	115	27	141	--	--	27	27	1,635	2,578	681	489	--	3,748	5,384
1996	1,442	175	17	1,634	645	8	653	229	27	256	--	89	39	128	2,671	2,777	1,107	589	--	4,473	7,143
1997	929	122	8	1,059	188	2	190	132	5	138	--	89	29	118	1,505	2,585	928	544	--	4,057	5,563
1998	1,790	115	34	1,939	215	5	220	299	5	304	19	125	34	178	2,641	2,497	1,166	462	28	4,153	6,793
1999	812	140	34	986	139	5	144	83	5	88	19	89	23	131	1,349	2,461	631	317	68	3,477	4,827
2000	674	252	34	961	165	5	170	93	5	98	19	78	29	125	1,354	1,603	444	196	48	2,291	3,645
2001	941	160	34	1,135	171	5	176	46	5	51	19	53	15	87	1,449	1,004	310	141	20	1,475	2,924
2002	516	194	34	744	141	5	146	46	5	51	19	22	18	59	1,000	937	309	146	17	1,409	2,409
2003	715	129	34	878	232	5	237	68	5	73	2	44	27	73	1,261	948	283	182	14	1,427	2,688
2004	515	115	34	664	272	2	274	72	0	72	2	20	8	30	1,040	866	334	175	11	1,386	2,426
2005	374	38	27	438	110	2	112	126	0	126	2	20	27	49	725	1,878	625	401	15	2,920	3,645
2006	1,194	306	27	1,526	503	2	505	170	0	170	2	152	37	191	2,392	2,137	784	545	66	3,532	5,924
2007	1,414	166	27	1,607	578	2	580	169	0	169	2	116	29	147	2,502	1,348	450	333	35	2,167	4,669
2008	524	121	44	689	333	2	335	225	0	225	2	74	29	105	1,354	954	335	241	35	1,565	2,919
2009	553	94	44	691	287	2	288	128	0	128	2	42	14	58	1,166	705	212	135	28	1,079	2,244
2010	587	55	44	686	257	2	259	114	0	115	2	54	37	93	1,152	607	184	147	23	962	2,115
2011	224	50	44	318	104	2	106	89	0	90	2	45	32	79	593	736	262	181	29	1,208	1,801
2012	596	87	44	726	233	2	235	93	0	93	2	45	37	84	1,138	834	285	191	28	1,338	2,476
2013	757	54	44	855	190	2	192	136	0	136	2	60	35	97	1,280	737	297	195	31	1,260	2,540
Mean	1,568	275	40	1,882	276	10	283	166	12	175	8	68	36	57	2,374	1,417	440	288	31	2,063	4,437

[a] Ontario sport harvest values were estimated from the most recent creel surveys in each basin; 2008 in Unit 1, 2004 in Units 2 and 3, and 2003 in Unit 4. These values are included in Ontario's total walleye harvest, but are not used in catch-at-age analysis.

Table 3. Annual fishing effort for Lake Erie walleye by gear, management unit, and agency. Means contain data from 1975 to 2012.

	Sport Fishery [a]															Commercial Fishery [b]				
	Unit 1				Unit 2			Unit 3			Units 4 & 5					Unit 1	Unit 2	Unit 3	Units 4&5	
Year	OH	MI	ON[c]	Total	OH	ON[c]	Total	OH	ON[c]	Total	ON[c]	PA	NY	Total	Total	ON	ON	ON	ON	Total
1975	486	30	46	562	61	--	61	--	--	--	--	--	--	0	623	--	--	--	--	--
1976	1,356	84	98	1,538	163	--	163	--	--	--	--	--	--	0	1,701	1,796	1,933	--	--	3,729
1977	2,768	171	130	3,069	151	--	151	--	--	--	--	--	--	0	3,220	4,282	1,572	--	--	5,854
1978	2,880	176	148	3,204	154	--	154	--	--	--	--	--	--	0	3,358	5,253	436	--	--	5,689
1979	4,179	257	97	4,533	169	--	169	--	--	--	--	--	--	0	4,702	5,798	1,798	--	--	7,596
1980	3,938	624	92	4,654	237	--	237	187	--	187	--	--	--	0	5,078	6,229	1,565	--	--	7,794
1981	5,766	447	138	6,351	264	--	264	382	--	382	--	--	--	0	6,997	6,881	2,144	622	--	9,647
1982	5,928	449	108	6,484	223	--	223	114	--	114	--	--	--	0	6,821	10,531	2,913	689	--	14,133
1983	4,168	451	118	4,737	568	--	568	128	--	128	--	--	--	0	5,433	11,205	5,352	5,814	--	22,371
1984	4,077	557	82	4,716	1,322	--	1,322	392	--	392	--	--	--	0	6,430	11,550	6,008	2,438	--	19,996
1985	4,606	926	84	5,616	1,078	--	1,078	464	--	464	--	--	--	0	7,158	7,496	2,800	2,983	--	13,279
1986	6,437	1,840	107	8,384	1,086	--	1,086	538	--	538	--	--	--	0	10,008	7,824	5,637	3,804	--	17,265
1987	6,631	2,193	84	8,908	1,431	--	1,431	472	--	472	--	--	--	0	10,811	6,595	4,243	3,045	--	13,883
1988	7,547	4,362	87	11,996	1,677	--	1,677	1,081	--	1,081	--	--	462	462	15,216	7,495	5,794	3,778	--	17,067
1989	5,246	3,794	81	9,121	1,532	77	1,609	883	205	1,088	--	--	556	556	12,374	7,846	5,514	3,473	--	16,833
1990	4,116	1,803	121	6,040	1,675	33	1,708	869	83	952	--	--	432	432	9,132	9,016	5,829	5,544	--	20,389
1991	3,616	440	144	4,200	1,241	79	1,320	724	155	880	--	--	440	440	6,840	10,418	5,055	3,146	--	18,619
1992	3,955	715	105	4,775	1,169	81	1,249	640	145	786	--	--	299	299	7,109	9,486	6,906	6,043	--	22,435
1993	3,943	691	125	4,759	1,349	70	1,418	1,062	125	1,187	--	--	305	305	7,669	16,283	11,656	7,420	--	35,359
1994	2,808	788	125	3,721	1,025	65	1,090	599	130	729	--	--	355	355	5,894	16,698	9,968	6,459	--	33,125
1995	3,188	277	125	3,589	803	65	868	355	130	485	--	--	259	259	5,201	20,521	12,113	7,850	--	40,484
1996	3,060	521	125	3,706	1,132	65	1,197	495	130	625	--	316	256	572	6,101	19,976	15,685	10,990	--	46,651
1997	2,748	374	88	3,210	864	45	909	492	91	583	--	388	273	661	5,363	15,708	11,588	9,094	--	36,390
1998	3,010	374	103	3,487	635	51	686	409	55	464	217	390	280	887	5,524	19,027	19,397	13,253	818	52,495
1999	2,368	411	--	2,779	603	--	603	323	--	323	--	397	171	568	4,699	21,432	10,955	7,630	1,444	41,461
2000	1,975	540	--	2,516	540	--	540	281	--	281	--	244	177	421	3,757	22,238	11,049	7,896	1,781	43,054
2001	1,952	362	--	2,314	697	--	697	261	--	261	--	241	163	404	3,676	9,372	5,746	5,021	639	20,778
2002	1,393	606	--	1,999	444	--	444	246	--	246	--	130	132	262	2,951	4,431	4,212	4,427	445	13,515
2003	1,719	326	--	2,045	675	--	675	236	--	236	30	159	162	351	3,307	4,476	3,946	3,725	365	12,512
2004	1,257	504	--	1,761	736	27	763	178	7	185	--	88	101	189	2,898	3,875	2,977	2,401	240	9,493
2005	1,180	212	40	1,392	573	--	573	261	--	261	--	109	142	251	2,477	7,083	4,174	4,503	174	15,934
2006	1,757	587	--	2,344	899	--	899	260	--	260	--	239	137	376	3,879	5,689	4,008	3,589	822	14,107
2007	2,076	448	--	2,524	1,147	--	1,147	321	--	321	--	232	135	367	4,358	4,509	2,927	2,665	383	10,484
2008	1,027	392	63	1,419	809	--	809	356	--	356	--	187	156	343	2,927	4,990	3,193	1,909	497	10,590
2009	1,063	310	--	1,373	777	--	777	289	--	289	--	124	100	224	2,663	3,537	2,164	1,746	478	7,925
2010	1,403	226	--	1,629	652	--	652	219	--	219	--	188	140	328	2,828	1,918	1,371	1,401	247	4,937
2011	862	165	--	1,026	346	--	346	217	--	217	--	156	145	301	1,891	2,646	1,884	1,572	489	6,591
2012	1,283	242	--	1,525	560	--	560	182	--	182	--	160	169	329	2,597	4,674	2,480	2,298	352	9,804
2013	1,424	182	--	1,606	503	--	503	236	--	236	--	154	143	297	2,641	3,802	2,774	2,624	304	9,503
Mean	3,099	728	102	3,895	775	60	793	422	114	460	124	220	238	262	5,360	9,156	5,594	4,601	612	18,980

[a] Sport units of effort are thousands of angler hours.

[b] Estimated Standard (Total) Effort in kilometers of gill net = (walleye targeted effort x walleye total harvest) / walleye targeted harvest.

[c] Ontario sport fishing effort was estimated from the most recent creel surveys in each basin; 2008 in Unit 1, 2004 in Units 2 and 3, and 2003 in Unit 4.

Table 4. Annual catch per unit effort for Lake Erie walleye by gear, management unit, and agency. Means contain data from 1975 to 2012.

	Sport Fishery [a]															Commercial Fishery [b]				
	Unit 1				Unit 2			Unit 3			Units 4 & 5					Unit 1	Unit 2	Unit 3	Unit 4	
Year	OH	MI	ON[c]	Total	OH	ON[c]	Total	OH	ON[c]	Total	ON[c]	PA	NY	Total	Total	ON	ON	ON	ON	Total
1975	0.16	0.13	0.16	0.16	0.17	--	0.17	--	--		--	--	--		0.16					
1976	0.45	0.36	0.50	0.45	0.22	--	0.22	--	--		--	--	--		0.42	63.0	22.9			42.2
1977	0.77	0.62	0.53	0.75	0.24	--	0.24	--	--		--	--	--		0.73	54.9	42.6			51.6
1978	0.54	0.41	0.76	0.54	0.24	--	0.24	--	--		--	--	--		0.53	52.2	138.2			58.8
1979	0.78	0.63	0.81	0.77	0.36	--	0.36	--	--		--	--	--		0.76	107.9	16.7			86.3
1980	0.53	0.29	0.62	0.50	0.21	--	0.21	0.13	--	0.13	--	--	--		0.47	153.0	25.3			127.3
1981	0.50	0.21	0.51	0.48	0.14	--	0.14	0.12	--	0.12	--	--	--		0.44	150.7	55.4	4.9		120.1
1982	0.50	0.43	0.45	0.49	0.22	--	0.22	0.07	--	0.07	--	--	--		0.48	102.2	45.9	2.8		85.8
1983	0.39	0.32	0.34	0.38	0.37	--	0.37	0.20	--	0.20	--	--	--		0.38	100.7	31.2	13.7		61.5
1984	0.76	0.63	0.48	0.74	0.60	--	0.60	0.46	--	0.46	--	--	--		0.69	141.9	65.3	44.4		107.0
1985	0.73	0.50	0.68	0.69	0.27	--	0.27	0.19	--	0.19	--	--	--		0.59	229.6	154.5	75.6		179.1
1986	0.58	0.33	0.49	0.52	0.44	--	0.44	0.33	--	0.33	--	--	--		0.51	211.0	99.0	93.7		148.6
1987	0.57	0.41	0.61	0.53	0.38	--	0.38	0.28	--	0.28	--	--	--		0.50	244.2	146.5	133.1		190.0
1988	0.50	0.46	0.21	0.48	0.35	--	0.35	0.52	--	0.52	--	--	0.18	0.18	0.46	249.0	131.4	108.2		177.9
1989	0.55	0.29	0.17	0.44	0.57	0.45	0.56	0.49	0.39	0.47	--	--	0.23	0.23	0.45	211.1	112.7	111.2		158.3
1990	0.36	0.41	0.29	0.37	0.23	0.42	0.24	0.49	0.28	0.47	--	--	0.11	0.11	0.34	179.1	90.7	54.5		120.0
1991	0.31	0.30	0.27	0.30	0.17	0.30	0.18	0.36	0.28	0.34	--	--	0.08	0.08	0.27	138.8	87.0	87.1		116.0
1992	0.37	0.35	0.19	0.37	0.29	0.69	0.32	0.41	0.18	0.37	--	--	0.05	0.05	0.34	163.1	77.3	52.3		106.8
1993	0.47	0.39	0.30	0.45	0.33	0.37	0.34	0.35	0.09	0.32	--	--	0.13	0.13	0.40	152.8	65.4	66.8		106.0
1994	0.35	0.27	0.17	0.33	0.28	0.31	0.28	0.31	0.16	0.28	--	--	0.17	0.17	0.31	138.2	63.2	66.9		101.7
1995	0.36	0.39	0.25	0.36	0.20	0.12	0.19	0.32	0.21	0.29	--	--	0.10	0.10	0.31	125.7	56.2	62.2		92.6
1996	0.47	0.34	0.13	0.44	0.57	0.13	0.55	0.46	0.21	0.41	--	0.28	0.15	0.22	0.44	139.0	70.6	53.6		95.9
1997	0.34	0.33	0.10	0.33	0.22	0.04	0.21	0.27	0.06	0.24	--	0.23	0.11	0.17	0.28	164.6	80.1	59.8		111.5
1998	0.59	0.31	0.33	0.56	0.34	0.10	0.32	0.73	0.08	0.65	0.09	0.32	0.12	0.18	0.48	131.3	60.1	34.8	34.2	79.1
1999	0.34	0.34	--	0.34	0.23	--	0.23	0.26	--	0.26	--	0.22	0.14	0.22	0.27	114.8	57.6	41.6	47.4	83.9
2000	0.34	0.47	--	0.37	0.31	--	0.31	0.33	--	0.33	--	0.32	0.16	0.32	0.34	72.1	40.2	24.8	27.1	53.2
2001	0.48	0.44	--	0.48	0.25	--	0.25	0.18	--	0.18	--	0.22	0.09	0.22	0.38	107.1	54.0	28.1	32.1	71.0
2002	0.37	0.32	--	0.36	0.32	--	0.32	0.19	--	0.19	--	0.17	0.14	0.17	0.32	211.5	73.4	33.0	37.4	104.3
2003	0.42	0.40	--	0.41	0.34	--	0.34	0.29	--	0.29	0.07	0.28	0.17	0.21	0.37	211.8	71.7	48.9	38.4	114.1
2004	0.41	0.23	--	0.36	0.37	0.06	0.36	0.40	--	0.40	--	0.23	0.08	0.15	0.35	223.5	112.2	73.0	45.3	146.0
2005	0.32	0.18	0.67	0.31	0.19	--	0.19	0.48	--	0.48	--	0.18	0.19	0.19	0.29	265.2	149.8	89.1	86.4	183.2
2006	0.68	0.52	--	0.64	0.56	--	0.56	0.65	--	0.65	--	0.63	0.27	0.50	0.61	375.7	195.6	151.9	80.8	250.4
2007	0.68	0.37	--	0.63	0.50	--	0.50	0.53	--	0.53	--	0.50	0.21	0.40	0.57	298.9	153.8	124.9	91.4	206.7
2008	0.51	0.31	--	0.45	0.41	--	0.41	0.63	--	0.63	--	0.40	0.19	0.30	0.45	191.2	104.9	126.2	70.4	147.8
2009	0.52	0.30	--	0.47	0.37	--	0.37	0.44	--	0.44	--	0.34	0.14	0.25	0.42	199.2	97.9	77.1	58.0	136.1
2010	0.42	0.24	--	0.39	0.39	--	0.39	0.52	--	0.52	--	0.29	0.26	0.28	0.39	316.7	134.5	105.0	94.5	194.9
2011	0.26	0.31	--	0.27	0.30	--	0.30	0.41	--	0.41	--	0.29	0.22	0.26	0.29	278.3	138.9	115.0	59.0	183.3
2012	0.46	0.36	--	0.45	0.42	--	0.42	0.51	--	0.51	--	0.28	0.22	0.25	0.42	178.4	114.8	83.1	80.3	136.5
2013	0.53	0.30	--	0.51	0.38	--	0.38	0.58	--	0.58	--	0.39	0.24	0.32	0.47	194.0	107.0	74.2	100.7	132.5
Mean	0.48	0.37	0.40	0.46	0.33	0.27	0.32	0.37	0.19	0.36	0.08	0.30	0.16	0.21	0.43	174.3	87.5	70.2	58.8	122.6

[a] Sport CPE = Number/angler hour

[b] Commercial CPE = Number/kilometer of gill net

[c] Ontario sport fishing CPE was estimated from the most recent creel surveys in each basin; 2008 in Unit 1, 2004 in Units 2 and 3, and 2003 in Unit 4.

Table 5. Catch at age of walleye harvest by management unit, gear, and agency in Lake Erie during 2013. Units 4 and 5 are combined in Unit 4.

		Commercial	Sport					All Gear
Unit	Age	Ontario	Ohio	Michigan	New York	Pennsylvania	Total	Total
1	1	19,289	0	0	--	--	0	19,289
	2	120,354	107,116	8,583	--	--	115,699	236,053
	3	214,374	235,141	21,994	--	--	257,135	471,509
	4	88,537	102,066	7,281	--	--	109,347	197,884
	5	41,054	55,696	4,628	--	--	60,324	101,378
	6	95,828	84,715	3,780	--	--	88,495	184,323
	7+	157,974	172,446	7,901	--	--	180,347	338,321
	Total	737,410	757,180	54,167	--	--	811,347	1,548,757
2	1	3,054	0	--	--	--	0	3,054
	2	66,872	8,896	--	--	--	8,896	75,768
	3	92,227	33,098	--	--	--	33,098	125,325
	4	30,941	19,147	--	--	--	19,147	50,088
	5	18,329	22,694	--	--	--	22,694	41,023
	6	28,471	25,086	--	--	--	25,086	53,557
	7+	56,853	81,387	--	--	--	81,387	138,240
	Total	296,747	190,308	--	--	--	190,308	487,055
3	1	0	0	--	--	--	0	0
	2	3,172	3,642	--	--	--	3,642	6,814
	3	22,883	9,552	--	--	--	9,552	32,435
	4	25,467	9,183	--	--	--	9,183	34,650
	5	17,072	10,497	--	--	--	10,497	27,569
	6	39,405	23,475	--	--	--	23,475	62,880
	7+	86,789	79,558	--	--	--	79,558	166,347
	Total	194,788	135,907	--	--	--	135,907	330,695
4	1	0	--	--	0	0	0	0
	2	0	--	--	98	164	262	262
	3	2,327	--	--	8,075	7,050	15,125	17,452
	4	840	--	--	0	3,607	3,607	4,447
	5	6,842	--	--	4,160	3,443	7,603	14,445
	6	3,545	--	--	1,664	4,590	6,254	9,799
	7+	17,037	--	--	20,556	41,478	62,034	79,071
	Total	30,591	--	--	34,553	60,332	94,885	125,476
All	1	22,343	0	0	0	0	0	22,343
	2	190,398	119,654	8,583	98	164	128,499	318,897
	3	331,811	277,791	21,994	8,075	7,050	314,909	646,720
	4	145,785	130,396	7,281	0	3,607	141,284	287,069
	5	83,297	88,887	4,628	4,160	3,443	101,118	184,415
	6	167,249	133,276	3,780	1,664	4,590	143,311	310,560
	7+	318,653	333,391	7,901	20,556	41,478	403,327	721,980
	Total	1,259,536	1,083,395	54,167	34,553	60,332	1,232,447	2,491,983

[a] Ontario sport harvest values were not estimated from creel surveys in 2013; they are not used in catch-at-age analysis.

Table 6. Age composition (in percent) of walleye harvest by management unit, gear, and agency in Lake Erie during 2013. Units 4 and 5 are combined in Unit 4.

		Commercial	Sport					All Gears
Unit	Age	Ontario	Ohio	Michigan	New York	Pennsylvania	Total	Total
1	1	2.6	0.0	0.0	--	--	0.0	1.2
	2	16.3	14.1	15.8	--	--	14.3	15.2
	3	29.1	31.1	40.6	--	--	31.7	30.4
	4	12.0	13.5	13.4	--	--	13.5	12.8
	5	5.6	7.4	8.5	--	--	7.4	6.5
	6	13.0	11.2	7.0	--	--	10.9	11.9
	7+	21.4	22.8	14.6	--	--	22.2	21.8
	Total	100.0	100.0	100.0	--	--	100.0	100.0
2	1	1.0	0.0	--	--	--	0.0	0.6
	2	22.5	4.7	--	--	--	4.7	15.6
	3	31.1	17.4	--	--	--	17.4	25.7
	4	10.4	10.1	--	--	--	10.1	10.3
	5	6.2	11.9	--	--	--	11.9	8.4
	6	9.6	13.2	--	--	--	13.2	11.0
	7+	19.2	42.8	--	--	--	42.8	28.4
	Total	100.0	100.0	--	--	--	100.0	100.0
3	1	0.0	0.0	--	--	--	0.0	0.0
	2	1.6	2.7	--	--	--	2.7	2.1
	3	11.7	7.0	--	--	--	7.0	9.8
	4	13.1	6.8	--	--	--	6.8	10.5
	5	8.8	7.7	--	--	--	7.7	8.3
	6	20.2	17.3	--	--	--	17.3	19.0
	7+	44.6	58.5	--	--	--	58.5	50.3
	Total	100.0	100.0	--	--	--	100.0	100.0
4	1	0.0	--	--	0.0	0.0	0.0	0.0
	2	0.0	--	--	0.3	0.3	0.3	0.2
	3	7.6	--	--	23.4	11.7	15.9	13.9
	4	2.7	--	--	0.0	6.0	3.8	3.5
	5	22.4	--	--	12.0	5.7	8.0	11.5
	6	11.6	--	--	4.8	7.6	6.6	7.8
	7+	55.7	--	--	59.5	68.8	65.4	63.0
	Total	100.0	--	--	100.0	100.0	100.0	100.0
All	1	1.8	0.0	0.0	0.0	0.0	0.0	0.9
	2	15.1	11.0	15.8	0.3	0.3	10.4	12.8
	3	26.3	25.6	40.6	23.4	11.7	25.6	26.0
	4	11.6	12.0	13.4	0.0	6.0	11.5	11.5
	5	6.6	8.2	8.5	12.0	5.7	8.2	7.4
	6	13.3	12.3	7.0	4.8	7.6	11.6	12.5
	7+	25.3	30.8	14.6	59.5	68.8	32.7	29.0
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 7. Annual mean age (years) of Lake Erie walleye by gear, management unit, and agency. Means include data from 1975 to 2012.

	Sport Fishery															Commercial Fishery					All Gears
	Unit 1				Unit 2			Unit 3			Units 4 & 5					Unit 1	Unit 2	Unit 3	Unit 4		
Year	OH	MI	ON	Total	OH	ON	Total	OH	ON	Total	ON	PA	NY	Total	Total	ON	ON	ON	ON	Total	Total
1975	2.53	2.53	3.26	2.59	1.53	--	1.53	--	--	--	--	--	--	--	2.48	--	--	--	--	--	2.42
1976	2.49	2.49	2.35	2.48	2.05	--	2.05	--	--	--	--	--	--	--	2.46	1.51	1.51	--	--	1.51	2.29
1977	3.29	3.29	2.64	3.27	2.44	--	2.44	--	--	--	--	--	--	--	3.26	2.74	2.74	--	--	2.74	3.21
1978	3.50	3.62	3.07	3.48	3.33	--	3.33	--	--	--	--	--	--	--	3.48	2.69	2.69	--	--	2.69	3.37
1979	2.71	2.71	2.67	2.71	2.29	--	2.29	--	--	--	--	--	--	--	2.70	2.83	2.83	--	--	2.83	2.72
1980	3.00	3.00	2.84	3.00	2.92	--	2.92	2.65	--	2.65	--	--	--	--	2.99	2.96	2.96	--	--	2.96	2.98
1981	3.61	2.97	3.47	3.59	2.62	--	2.62	2.72	--	2.72	--	--	--	--	3.56	3.00	3.00	2.99	--	3.00	3.41
1982	3.25	3.25	2.76	3.24	2.58	--	2.58	2.51	--	2.51	--	--	--	--	3.23	2.81	2.81	2.81	--	2.81	3.12
1983	3.03	3.03	3.17	3.03	2.25	--	2.25	2.07	--	2.07	--	--	--	--	2.94	3.47	3.47	3.47	--	3.47	3.15
1984	2.64	2.64	2.90	2.64	2.61	--	2.61	2.68	--	2.68	--	--	--	--	2.64	2.89	2.89	2.89	--	2.89	2.72
1985	3.36	3.36	3.17	3.36	3.24	--	3.24	3.58	--	3.58	--	--	--	--	3.35	3.04	3.04	3.04	--	3.04	3.24
1986	3.73	3.61	3.54	3.71	3.69	--	3.69	4.08	--	4.08	--	--	--	--	3.72	3.61	3.70	4.22	--	3.71	3.72
1987	3.83	3.32	3.78	3.73	3.68	--	3.68	4.10	--	4.10	--	--	--	--	3.73	3.71	3.47	3.40	--	3.61	3.69
1988	3.97	3.43	4.58	3.78	3.81	--	3.81	5.37	--	5.37	--	--	4.87	4.87	3.93	3.27	3.15	3.89	--	3.32	3.74
1989	4.48	3.75	4.29	4.28	4.65	4.29	4.64	5.13	4.29	5.00	--	--	5.59	5.59	4.44	3.49	3.51	4.22	--	3.60	4.16
1990	4.44	4.64	5.00	4.52	5.31	5.41	5.31	6.41	5.41	6.36	--	--	5.70	5.70	4.90	3.91	3.90	4.60	--	3.99	4.49
1991	4.91	5.29	5.01	4.95	6.22	6.03	6.20	6.70	5.91	6.58	--	--	6.36	6.36	5.41	4.21	4.63	5.14	--	4.41	4.85
1992	4.60	3.49	3.45	4.43	4.89	6.72	5.15	5.67	6.42	5.73	--	--	6.35	6.35	4.71	4.03	4.23	5.49	--	4.27	4.46
1993	4.60	4.41	4.09	4.57	5.79	6.45	5.83	5.98	6.17	5.99	--	--	6.15	6.15	4.96	3.64	4.38	5.21	--	4.00	4.42
1994	4.53	4.19	5.84	4.49	5.38	6.41	5.45	6.22	6.85	6.28	--	--	6.49	6.49	4.93	3.65	4.36	5.60	--	4.03	4.32
1995	4.04	3.55	4.74	4.02	6.07	7.29	6.12	6.08	7.17	6.33	--	--	6.80	6.80	4.48	3.38	4.63	5.92	--	3.94	4.08
1996	3.98	3.46	4.31	3.93	4.22	7.22	4.26	6.06	7.57	6.22	--	--	6.47	6.47	4.35	3.57	3.36	5.21	--	3.73	3.91
1997	4.21	3.99	4.21	4.18	5.30	5.30	5.30	6.27	6.27	6.22	--	--	6.25	6.25	4.67	3.87	3.68	4.83	--	3.96	4.11
1998	3.74	3.13	3.15	3.69	4.66	8.09	4.74	4.64	7.81	4.69	9.55	--	10.13	9.92	4.32	3.26	4.00	5.26	7.00	3.72	3.82
1999	3.72	3.16	3.43	3.63	5.35	9.17	5.48	5.95	10.00	6.18	8.15	--	10.29	9.32	4.55	3.41	4.29	5.28	6.76	3.81	3.89
2000	3.94	3.27	--	3.76	4.12	--	4.12	6.36	--	6.36	--	--	9.75	9.75	4.55	3.69	4.67	5.65	6.46	4.11	4.12
2001	3.66	3.02	--	3.57	4.09	--	4.09	6.14	--	6.14	--	7.70	9.09	8.01	3.99	3.19	3.77	5.52	6.00	3.57	3.75
2002	3.80	3.83	--	3.81	4.57	--	4.57	5.46	--	5.46	--	6.59	8.05	7.25	4.21	3.22	3.50	5.37	5.80	3.54	3.78
2003	4.67	4.16	--	4.59	4.67	--	4.67	5.87	--	5.87	3.35	7.50	10.01	8.31	4.90	3.68	4.36	5.58	6.59	4.09	4.46
2004	4.77	4.41	--	4.70	5.11	6.56	5.12	6.42	--	6.42	--	5.86	11.11	7.41	5.01	2.96	2.59	3.49	6.07	2.96	3.82
2005	5.33	4.26	3.35	5.12	4.21	--	4.21	5.53	--	5.53	--	6.61	6.72	6.68	5.15	3.61	3.16	4.64	4.70	3.66	3.96
2006	3.86	3.24	--	3.73	3.68	--	3.68	4.57	--	4.57	--	4.10	6.38	4.55	3.85	3.19	3.19	3.44	4.82	3.26	3.50
2007	4.64	4.42	--	4.62	4.79	--	4.79	4.89	--	4.89	--	4.89	6.80	5.27	4.71	4.20	4.29	4.25	6.55	4.26	4.50
2008	5.42	5.60	--	5.46	5.90	--	5.90	5.21	--	5.21	--	5.67	7.21	6.10	5.57	5.21	5.38	5.06	8.28	5.29	5.42
2009	5.39	4.78	--	5.30	6.14	--	6.14	6.43	--	6.43	--	6.47	6.84	6.56	5.70	4.67	5.17	5.40	7.45	4.93	5.33
2010	5.72	5.38	--	5.69	6.37	--	6.37	7.30	--	7.30	--	7.16	7.16	7.16	6.12	4.11	4.82	6.14	7.79	4.64	5.44
2011	5.98	4.35	--	5.68	7.79	--	7.79	8.03	--	8.03	--	8.40	7.76	8.13	6.74	4.86	5.26	6.73	8.33	5.31	5.78
2012	4.97	4.46	--	4.91	5.78	--	5.78	8.13	--	8.13	--	8.92	7.65	8.35	5.60	4.86	5.33	7.15	7.25	5.34	5.47
2013	5.16	4.26	--	5.10	6.91	--	6.91	8.09	--	8.09	--	8.79	8.13	8.55	5.95	4.91	4.64	7.09	7.36	5.24	5.60
Mean	4.06	3.72	3.66	4.01	4.32	6.58	4.34	5.31	6.72	5.32	7.02	6.66	7.44	6.95	4.27	3.52	3.75	4.75	6.66	3.70	3.94

Table 8. Estimated abundance at age, survival (S), fishing mortality (F) and exploitation (u) for Lake Erie walleye, 1980-2014 (from ADMB 2014 catch at age analysis recruitment integrated model, M=0.32).

	Age							Ages 2+		
Year	2	3	4	5	6	7+	Total	S	F	u
1980	9,952,940	8,699,580	533,604	1,453,650	497,154	103,364	21,240,292	0.591	0.206	0.160
1981	6,929,390	6,310,500	4,864,970	288,605	776,224	306,816	19,476,505	0.553	0.272	0.205
1982	16,405,700	4,277,620	3,357,580	2,484,460	145,016	509,785	27,180,161	0.599	0.193	0.151
1983	9,478,990	10,417,400	2,385,020	1,817,980	1,332,470	322,063	25,753,923	0.615	0.167	0.132
1984	72,857,200	6,247,290	6,178,360	1,394,990	1,062,550	946,114	88,686,504	0.661	0.094	0.077
1985	6,216,720	48,929,500	3,865,340	3,772,860	849,975	1,188,060	64,822,455	0.645	0.118	0.095
1986	22,240,300	4,250,170	31,481,400	2,457,950	2,391,770	1,254,670	64,076,260	0.628	0.146	0.116
1987	22,045,100	14,872,600	2,614,850	19,085,400	1,493,540	2,161,840	62,273,330	0.633	0.137	0.110
1988	51,620,200	14,773,300	9,205,470	1,594,240	11,676,900	2,164,780	91,034,890	0.631	0.141	0.113
1989	11,116,000	34,058,800	8,869,370	5,431,730	949,856	8,100,260	68,526,016	0.626	0.149	0.119
1990	9,484,220	7,471,510	21,165,400	5,443,280	3,364,210	5,429,630	52,358,250	0.633	0.137	0.110
1991	4,744,610	6,428,530	4,694,730	13,192,300	3,418,410	5,422,840	37,901,420	0.643	0.122	0.099
1992	15,510,100	3,250,250	4,116,410	2,989,940	8,434,510	5,566,240	39,867,450	0.637	0.131	0.105
1993	20,968,400	10,462,700	2,013,240	2,532,890	1,851,220	8,546,330	46,374,780	0.611	0.172	0.136
1994	3,191,270	13,748,800	6,065,080	1,159,730	1,473,370	5,903,940	31,542,190	0.596	0.198	0.154
1995	17,525,700	2,112,280	8,108,180	3,565,070	689,719	4,323,680	36,324,629	0.606	0.180	0.142
1996	18,791,600	11,402,700	1,192,330	4,571,320	2,036,280	2,822,990	40,817,220	0.578	0.228	0.176
1997	2,089,650	11,885,400	6,044,050	630,385	2,456,990	2,571,130	25,677,605	0.563	0.255	0.194
1998	19,191,600	1,349,110	6,611,820	3,351,680	354,137	2,784,040	33,642,387	0.578	0.228	0.176
1999	9,203,920	11,993,400	694,507	3,397,600	1,753,410	1,609,260	28,652,097	0.590	0.207	0.161
2000	8,194,710	5,970,560	6,725,570	389,014	1,931,260	1,893,100	25,104,214	0.601	0.189	0.148
2001	24,965,300	5,370,170	3,426,240	3,857,210	226,550	2,211,790	40,057,260	0.664	0.090	0.073
2002	2,997,440	17,047,600	3,410,140	2,165,460	2,451,060	1,522,110	29,593,810	0.661	0.094	0.077
2003	19,844,300	2,080,500	11,220,800	2,237,150	1,428,700	2,604,130	39,415,580	0.674	0.075	0.062
2004	302,675	13,757,200	1,366,430	7,339,810	1,468,430	2,615,570	26,850,115	0.669	0.081	0.067
2005	80,664,100	214,356	9,221,460	912,578	4,917,050	2,708,960	98,638,504	0.693	0.046	0.039
2006	2,868,410	56,583,000	140,903	6,057,840	602,539	5,015,920	71,268,612	0.658	0.099	0.081
2007	5,544,740	2,016,170	37,135,900	92,149	3,978,510	3,641,940	52,409,409	0.658	0.099	0.081
2008	1,480,830	3,906,190	1,324,770	24,258,300	60,318	4,922,090	35,952,498	0.663	0.090	0.074
2009	13,830,900	1,043,310	2,585,660	874,503	16,080,900	3,265,360	37,680,633	0.680	0.066	0.055
2010	5,387,360	9,776,790	696,210	1,719,680	583,497	12,840,800	31,004,337	0.675	0.072	0.060
2011	5,945,790	3,824,900	6,594,240	467,641	1,157,050	8,899,140	26,888,761	0.678	0.069	0.057
2012	10,981,500	4,202,070	2,564,620	4,416,550	314,498	6,722,020	29,201,258	0.661	0.094	0.077
2013	7,558,560	7,657,260	2,698,540	1,641,750	2,842,530	4,465,840	26,864,480	0.655	0.104	0.085
2014	5,644,130	5,276,620	4,914,880	1,723,610	1,052,400	4,616,870	23,228,510			

Table 9. Western basin age 0 walleye recruitment index observed in bottom trawls by the Ontario Ministry of Natural Resources (ONT) and Ohio Department of Natural Resources (OH) between 1988 and 2013.

Year Class	Year of Recruitment to Fisheries	OH+ONT Trawl Age-0 CPHa
1988	1990	18.280
1989	1991	6.094
1990	1992	39.432
1991	1993	59.862
1992	1994	6.711
1993	1995	108.817
1994	1996	63.921
1995	1997	2.965
1996	1998	85.340
1997	1999	24.185
1998	2000	14.313
1999	2001	44.189
2000	2002	4.113
2001	2003	28.499
2002	2004	0.139
2003	2005	183.015
2004	2006	5.402
2005	2007	12.665
2006	2008	2.051
2007	2009	25.408
2008	2010	7.238
2009	2011	7.107
2010	2012	26.260
2011	2013	6.502
2012	2014	6.417
2013	2015	10.584

Table 10. Estimated harvest of Lake Erie walleye for 2014, and population projection for 2015 when fishing with 60% Fmsy. The 2014 and 2015 projected spawning stock biomass values are from the ADMB-2014 recruitment-integrated model. The range in the RAH was calculated using ± one standard deviation from the mean RAH.

SSB_0=	50.208	million kilograms
20% SSB_0=	10.042	million kilograms
F_{msy} =	0.534	

	2014 Stock Size (millions of fish)	60% F_{msy}		Rate Functions			2014 RAH (millions of fish)			Projected 2015 Stock Size (millions)
Age	**Mean**	**F**	**sel(age)**	**(F)**	**(S)**	**(u)**	**Min.**	**Mean**	**Max.**	**Mean**
2	5.644		0.265	0.085	0.667	0.070	0.289	0.395	0.501	8.353
3	5.277		0.851	0.273	0.553	0.206	0.827	1.085	1.343	3.764
4	4.915		0.890	0.285	0.546	0.214	0.797	1.052	1.307	2.917
5	1.724		0.857	0.275	0.552	0.207	0.267	0.357	0.447	2.683
6	1.052		0.897	0.287	0.545	0.215	0.169	0.227	0.284	0.951
7+	4.617		1.000	0.320	0.527	0.237	0.808	1.092	1.377	3.007
Total (2+)	23.229	0.320				0.181	3.156	4.207	5.258	21.676
Total (3+)	17.584						2.868	3.813	4.758	13.323
SSB	28.886	mil. kgs								23.191 mil. kgs
		probability of 2014 spawning stock biomass being less than 20% SSB_0 =								0.062%

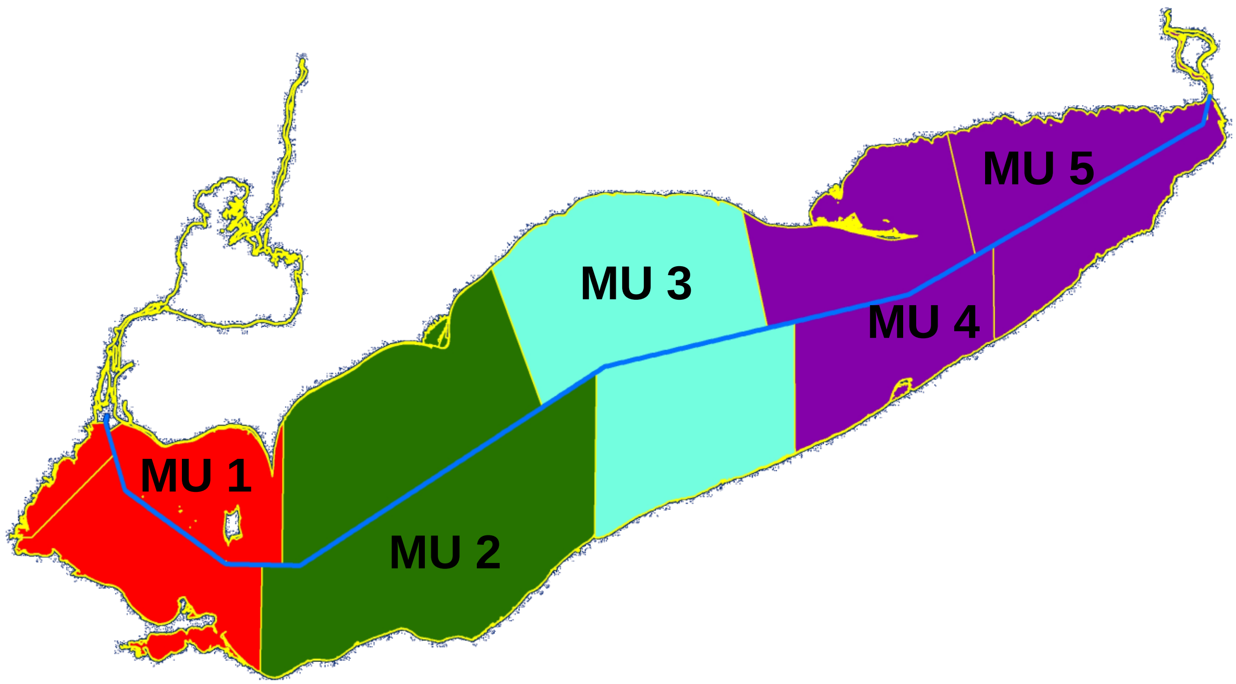

Figure 1. Map of Lake Erie with management units recognized by the Walleye Task Group for interagency management of Walleye.

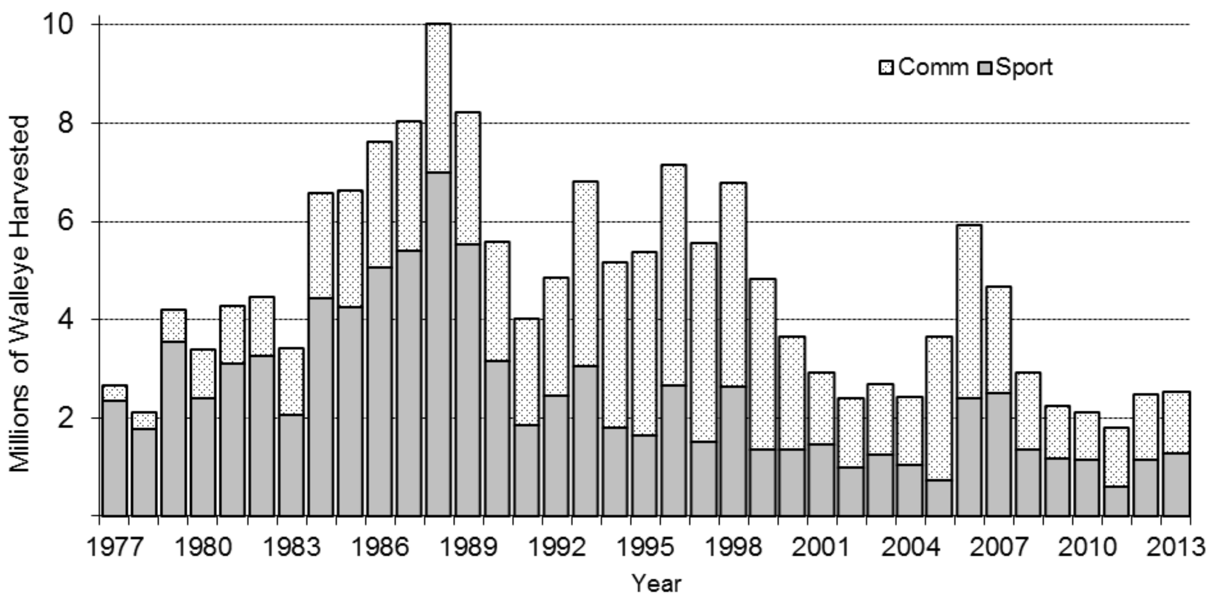

Figure 2. Lake-wide harvest of Lake Erie Walleye by sport and commercial fisheries, 1977-2013.

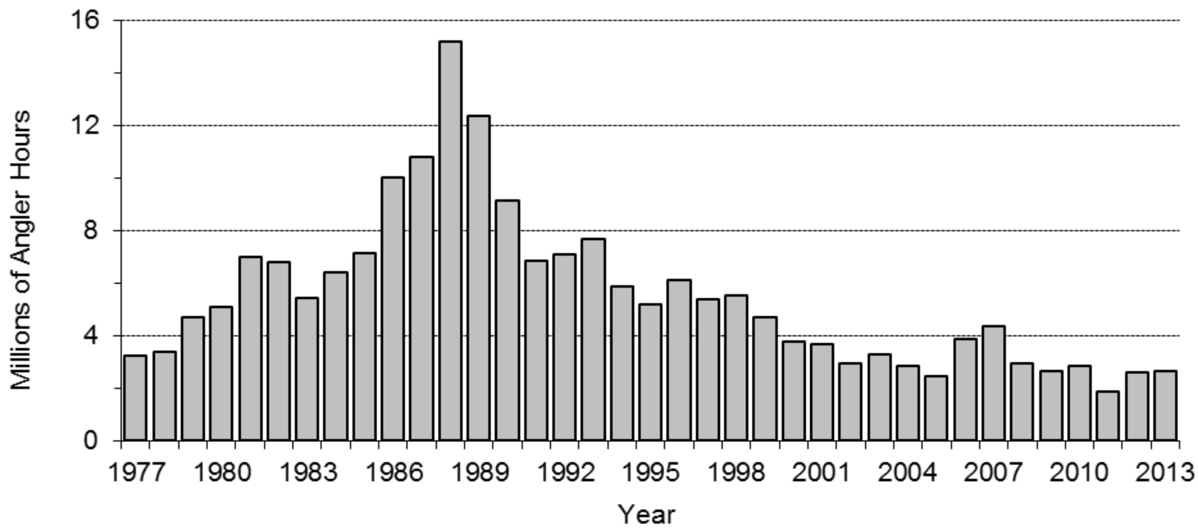

Figure 3. Lake-wide total effort (angler hours) by sport fisheries for Lake Erie Walleye, 1977-2013. Years 1999-2013 exclude Ontario sport effort.

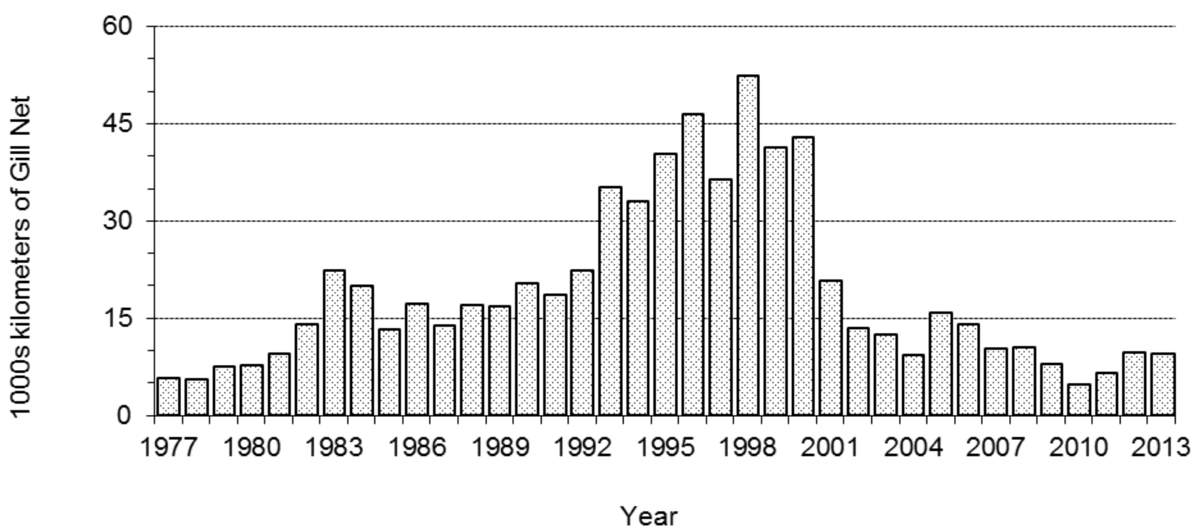

Figure 4. Lake-wide total effort (kilometers of gill net) by commercial fisheries for Lake Erie Walleye, 1977-2013.

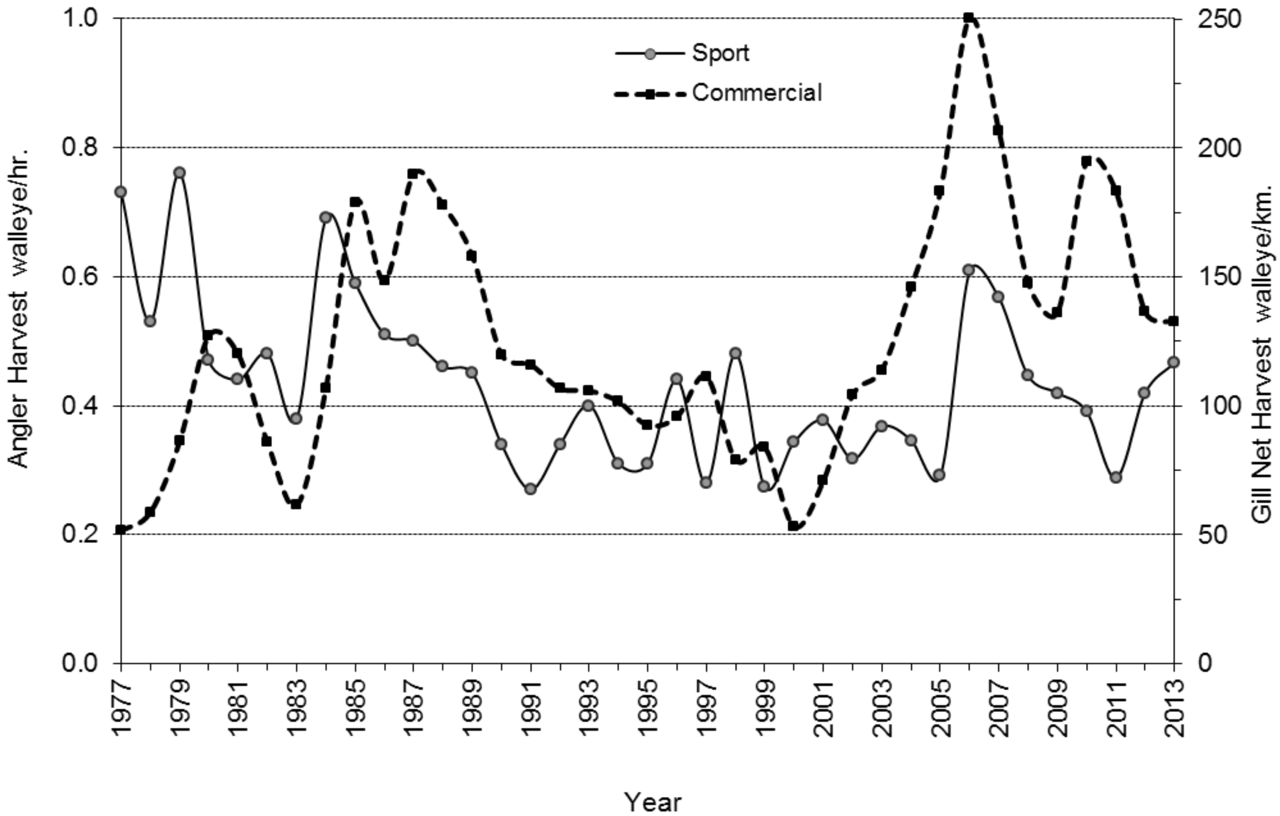

Figure 5. Lake-wide harvest per unit effort (HPE) for Lake Erie sport and commercial Walleye fisheries, 1975-2013.

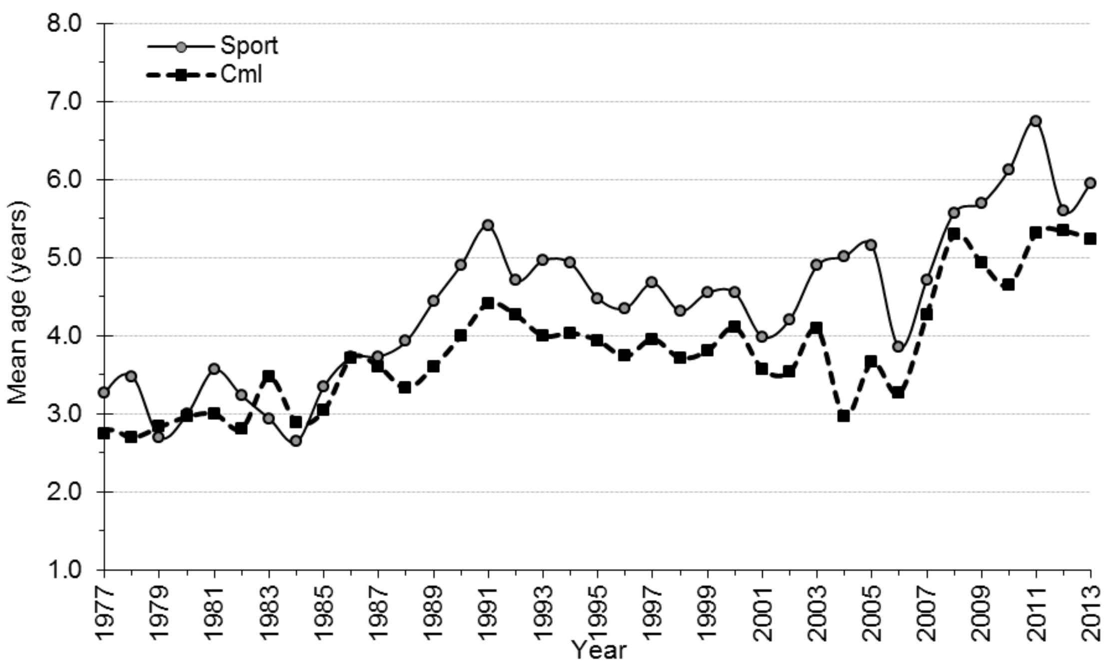

Figure 6. Lake-wide mean age of Lake Erie Walleye in sport and commercial harvests, 1975-2013.

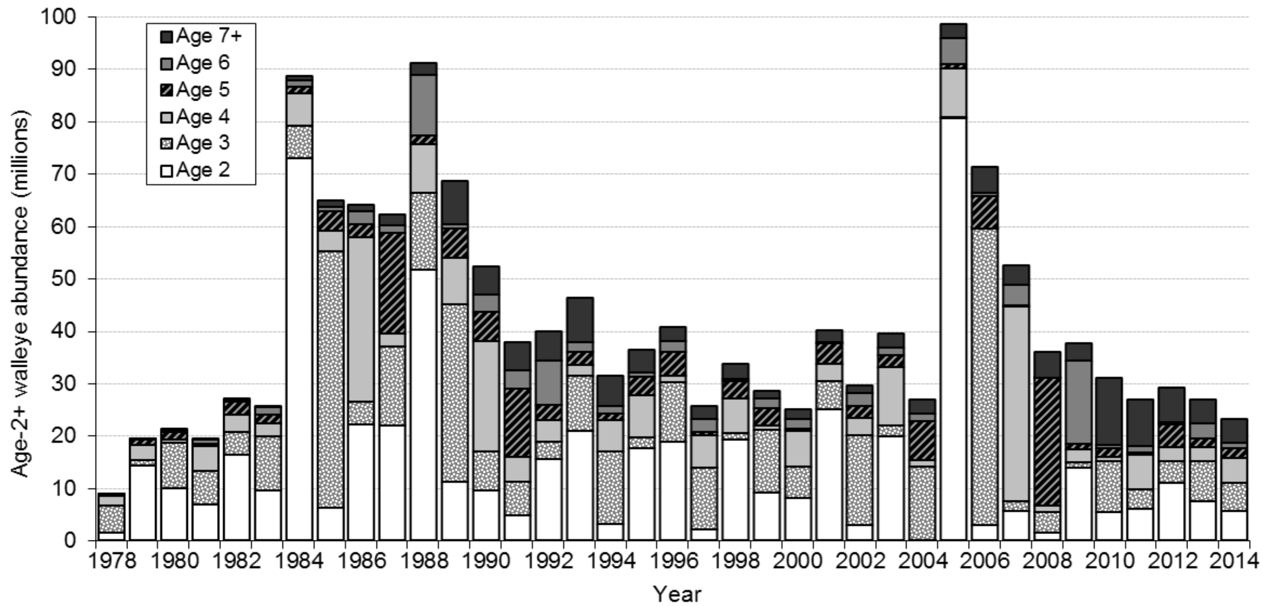

Figure 7. Estimates of abundance by age of Lake Erie Walleye 1978-2013. 2014 ADMB statistical catch at age model. Data shown are from Table 8.

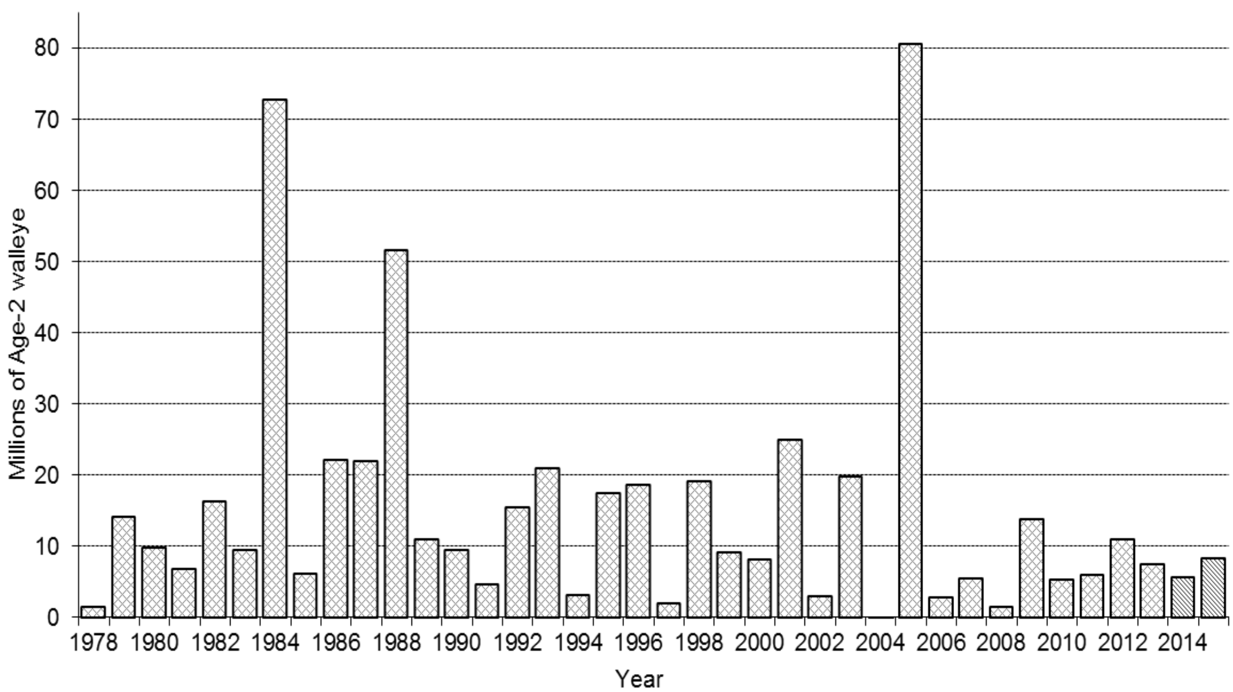

Figure 8. Estimated (1978 – 2013) and projected (2014 and 2015) number of age 2 Walleye in the west-central Lake Erie Walleye population between using the 2014 ADMB statistical catch at age model.

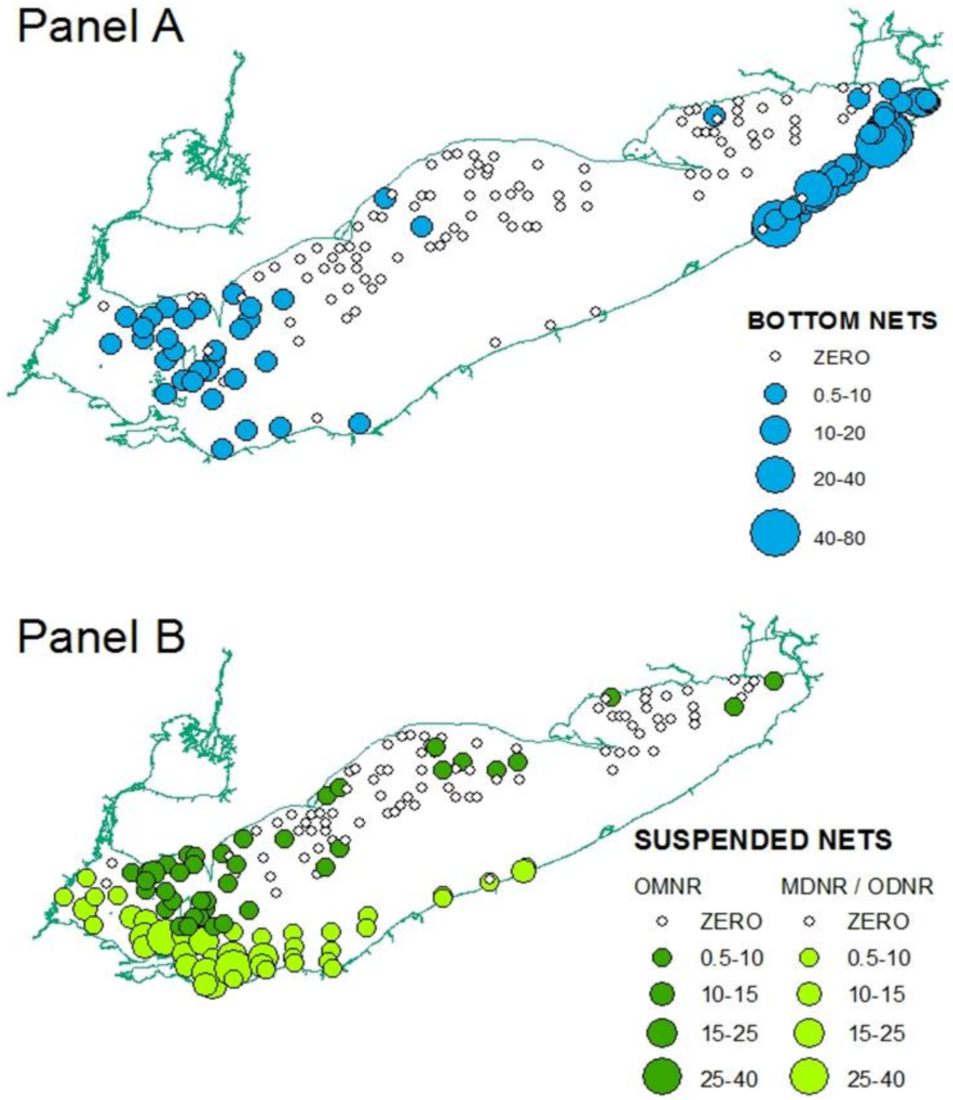

Figure 9. Relative abundance of yearling walleye captured in bottom-set (Panel A) and suspended or kegged multifilament (Panel B) gillnets from Michigan, Ohio, New York, and Ontario waters in 2013. Catches in the bottom-set nets have been adjusted to reflect panel length (standardized to 50ft panels of monofilament) and differences in the presence of large mesh (>5”). Catches in the kegged multifilament gillnets are the observed catches