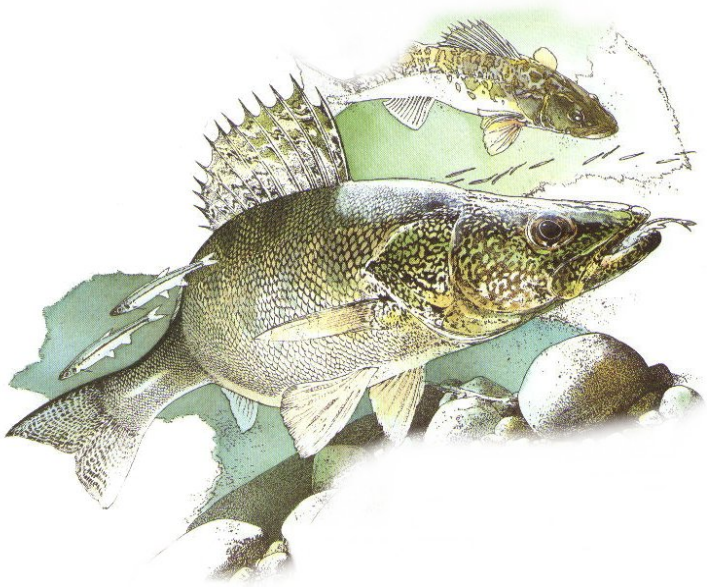
Report for 2008 by the

LAKE ERIE WALLEYE TASK GROUP

March 2009



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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, 2008-2009

The charges from the Lake Erie Committee's (LEC) Standing Technical Committee (STC) to the Walleye Task Group (WTG) for the period from March 2008 to February 2009 were to:

1. Maintain and update a centralized data base for population modeling; including tagging, fishing harvest and effort by grid, growth, maturity, and abundance indices. Continue development of eastern basin catch-at-age analyses for walleye.
2. Report recommended allowable harvest (RAH) levels for 2009.
3. Review different methods for calculation of lambdas for use in catch-at-age analyses; implement the most scientifically defensible method for weighting data sources used in analyses.
4. Review the results of the Lake Erie walleye tagging studies. Provide guidance/recommendations for future tagging strategies to LEC.
5. Assist Habitat Task Group with identification and collection of habitat metrics for the purpose of re-examining the extent of suitable adult walleye habitat in Lake Erie.

Review of Walleye Fisheries in 2008

Fishery effort and walleye harvest data were combined for all jurisdictions and Management Units (Figure 1) to produce lake-wide estimates. The 2008 total estimated lake-wide harvest of walleye was 2.917 million fish (Tables 1 and 2) with a total of 2.778 million fish harvested in the total allowable catch (TAC) area. This harvest represents 77% of the 2008 TAC of 3.594 million walleye and includes walleye harvested in commercial and sport fisheries in Management Units 1, 2 and 3. An additional 138,173 fish were harvested outside of the TAC area in Management Units 4 and 5. The sport fish harvest of 1.354 million fish was below the long term (1975-2008) average (2.534 million) and 46% below 2007. The 2008 Ontario harvest was approximately 1.575 million fish (Table 2, Figure 2), taken mainly in the commercial fishery, and was 102% of the Ontario TAC allocation of 1.545 million walleye. Ontario harvest data were not adjusted by -3.3% which Ontario allows on individual transferable quotas for icing fish, indicating Ontario was within TAC. The Ontario commercial harvest was 28% lower than the 2007 harvest and 72% of the long term average (1978-2008; Table 2, Figure 2).

Sport fishing effort decreased 33% in 2008 from 2007, to a total 2.9 million angler hours (Table 3, Figure 3). Compared to 2007, Management Unit 1 experienced a 44% decrease in effort, while Management Unit 2 effort decreased by 29%. Management Unit 3 increased 11%, and Management Units 4 and 5 (combined) decreased slightly (7%). Lake-wide commercial gill net effort in 2008 (10,590 km) remained about the same (+1%) as 2007 (10,484 km; Table 3, Figure 4).

Harvest-per-unit-effort (HUE, walleye/angler hour) in Unit 1 (0.45 walleye per angler hour) and Unit 2 (0.41 walleye per angler hour) dropped by 27% and 18% in 2008, respectively, compared to 2007; however, harvest rates remained close to or above the long term average in both units (0.46 and 0.32 walleye per angler hour; Table 4, Figure 5). In contrast, Unit 3 harvest rate in 2008 (0.63 walleye per angler hour) increased 20% from 2007 and was 81% above the long term mean. The lake-wide average sport catch rate of 0.45 fish per angler hour in 2008 was 3% higher than the long term mean of 0.43 fish per angler hour (Table 4, Figure 5).

Although total commercial gill net harvest per unit effort (HUE) decreased 28% relative to 2007, the 2008 commercial gill net HUE (148 walleye per kilometer of net) was 26% above the long term lake wide average (118 walleye/km; Table 4, Figure 5). Commercial gill net harvest rates in 2008 decreased in Unit 1 (36%), Unit 2 (32%) and Unit 4 (23%), but remained approximately the same (+1%) as 2007 in Unit 3.

Fishing success was largely based on the strong 2003 year-class (age-5 walleye) evident from the age composition in the harvest. Age-5 walleye comprised 74% of the lake-wide sport fishery harvest and 76% of the total commercial fishery harvest (Tables 5 and 6). The 2005 year-class (age-3 walleye) represented 8% of the total sport harvest and 9% of the total commercial harvest (Table 6). Older fish (age-7+) represented 11% of the total harvest lake wide, but were better represented in Units 4 and 5 (18%). Age-7+ walleye contributed 14% to the sport fishery but only 8% to the commercial fishery (Tables 5 and 6). The 2005, and 2003 year-classes contributed 8% and 75%, respectively, to the total lake-wide harvest.

Across all jurisdictions, the mean age of walleye in the harvest in the sport fishery ranged from 4.9 to 6.4 years old and from 4.8 to 5.7 years old in Ontario's commercial fishery (Table 7, Figure 6). The mean age of fish increased in both the sport and commercial fisheries from 2007 values. The mean age in the sport fishery was 5.4 years, above the long-term mean of 4.1 years (1975-2008). In the commercial fishery, the mean age was 5.0 years, higher than the long-term (1975-2008) mean of 3.5 years. The mean age of the total harvest in 2008 (5.2) was the highest in the time series (1975-2008), reflecting the dominance of the 2003 year class (age 5) in the fisheries.

Walleye Management Plan

The Coordinated Percid Management Strategy (CPMS) was used to manage walleye from 2001-2003 (Lake Erie Committee 2004). During 2004-2005, the Walleye Management Plan (WMP) was drafted, and it includes a strategy to manage walleye from 2005 into the future (Locke et al. 2005). The WMP established quality objectives that the LEC employs as the basis for walleye management. The plan focuses primarily on the walleye stocks that spawn on shoals and in tributaries of the western basin, and generally inhabit the west and central basins of Lake Erie. This is the primary population of interest to LEC walleye management as it provides most of the benefits to users throughout Lake Erie. There are additional stocks within the lake, and these are found in Presque Isle Bay, the Grand River (Ontario), and New York shoals and tributaries of the eastern basin. Catch-at-age

modeling and population estimates for this eastern population are ongoing, but it is clear that the eastern population is small relative to the western population (Ryan et al. 2003). Incorporating the effects of migrating adult walleye remains challenging. The eastern Lake Erie walleye population is briefly described in the WMP.

Central to the WMP are two main components: the first is a set of population objectives that define the biological and fishery quality characteristics that the LEC has determined, in cooperation with stakeholders, for the Lake Erie walleye population. The second is an exploitation policy that has been designed to help meet these objectives and at the same time recognize the economic and social importance of the walleye fishery to the diverse stakeholders. These components are described in the WMP, as are walleye fishery and population objectives, actions and tasks developed in support of the WMP plan implementation, and measures of success/targets for evaluation.

The Walleye Management Plan stated that the overall status of walleye relative to changes in carrying capacity should be reviewed on a five-year basis. Following the 2009 fishing year, the LEC, STC and WTG will examine the performance of the WMP over the five-year period, with recommendations and direction for proceeding into the future. Public input is welcome.

Catch-at-Age Population Analysis and Relative Abundance

The WTG continued to use the Automatic Differentiating Model Builder (ADMB) catch-at-age analysis to estimate walleye population abundance in 2008 (Walleye Task Group 2001). The model continues to include fishery data from the Ontario commercial fishery (west and central basins) and sport fisheries in Ohio (west and central basins) and Michigan (west basin). In addition to fishery data, this model includes assessment data from three index gill net surveys from: Michigan (west basin), Ohio (including west and west-central basins combined) and Ontario (west, west-central, and east-central basins combined).

The model assumes log-normal distributions for catch-at-age (ages 2 through 7+, i.e. seven and older) and fishing effort. Natural mortality (M) is fixed in the model for all ages and years at 0.32. The key parameters including age-2 recruitment and population size in the first year of the model, fisheries catchability and selectivity are estimated using a maximum likelihood approach with a concentrated likelihood configuration. The abundances-at-age were derived from the estimated parameters using an exponential survival equation. The weightings (or lambdas) of effort data in the model are calculated by the ratio of the variance of observed log-catch to log-effort (Quinn and Deriso, 1999). Weightings of fishery catch and survey catch rates are solved iteratively until convergence occurs (i.e., lambdas remain constant within a range less than 0.1). While lambdas within similar parameter groups (i.e., catch, effort and survey) are solved and weighted unequally, the groups themselves are given equal weight (i.e., the maximum lambda value in the catch, effort and survey groups is 1.0). The walleye population in the east basin was modeled separately (see section: “Eastern Basin Catch-At-Age Analysis”) using similar

model techniques, and includes fishery and survey data from Ontario, New York and Pennsylvania, but incorporates data from ages 2-11+ with a natural mortality rate of M=0.16.

The 2008 west-central population estimate from the standard model was 17.178 million age-2 and older walleye (Table 8, Figure 7) with approximately 13.4 million age-4 and older walleye. The very strong 2003 year-class was estimated to contribute approximately 11.4 million age-5 fish to the population in 2008. Statistical catch at age analysis estimated the abundance of the 2003 year-class to be 50.2 million walleye at age-2, which is higher than the strong 1982 (Year 1984) and 1986 year-classes (Year 1988; Table 8).

The size of the 2003 year class and total population estimates decreased in magnitude with an additional year of data (2008) added. In last year's 2008 report, population size was projected to be 22.7 million walleye and the 2003 year class was 55.8 million walleye at age 2 in 2005. While changes from one year to the next are not unprecedented, this model run and the subsequent projection to 2009 abundance is highly significant in the context of the WMP variable fishing rate policy. This "creeping down effect" in population estimates will be discussed further in the "Review of Lambda Weightings" section.

Recruitment Estimator for Incoming Age-2 Walleye and 2009 Population Size Projection

A linear regression model was used to estimate age-2 walleye recruitment for 2009 and 2010. This regression utilized estimates of age-2 walleye abundance from the catch-at-age analysis of the standard model and walleye catches from pooled Ontario and Ohio trawling reported as number of young-of-the-year walleye per hectare (Tables 8 and 9, Figure 8). As in the past, the most recent (2008) age-2 estimate from catch-at-age analysis has the widest error bounds, and therefore this value was not used in the linear regression to estimate recruitment. The cohort strength of the 2007 cohort appears moderate while the 2008 year class is weaker. The 2007 year-class is expected to contribute 8.3 million age-2 fish to the 2009 population, and the 2008 year-class is predicted to contribute 3.6 million age-2 fish to the walleye population in 2010. Based on the standard model configuration (1978-2007), an average of 12.7 million age-2 recruits enter the population annually, but with considerable variation from year to year (Table 9, Figure 9).

The stock size estimate for 2009 was projected using catch-at-age analysis estimates of the 2008 population size, estimated survival rates by age group in 2008, and the age-2 recruitment estimate for 2009 (Table 10). The 2009 estimated abundance of age-2 and older walleye is approximately 18.4 million (Table 10, Figure 10). It is projected that the 2003 year-class will make up approximately 36% (6.6 million), whereas the 2007 year class will comprise 45% (8.3 million) of the population in 2009.

The 2003 cohort, will represent the majority (70%) of the projected abundance of age-4 and older (9.3 million) spawners in 2009 (Table 8). Walleye spawner abundance in 2009

(ages 4 and older) remains higher than values in 19 of the 31 previous years modeled (1978-2008). However, the spawner-recruit relationship for Lake Erie walleye is poorly understood, with recruitment influenced by a combination of abiotic and biotic factors.

Harvest Policy and Recommended Allowable Harvest for 2009

The harvest management policy adopted by the LEC in the Walleye Management Plan is a sliding F-scale that has a feedback, or state-dependent approach, and that varies targeted fishing mortality rate according to population abundance (Figure 11). The policy stipulates that when the walleye abundance is 20-40 million walleye, the targeted fishing mortality rate should be between F=0.2 and F=0.35 and when it is between 15-20 million walleye the fishing rate should be between F=0.1 and F=0.2 (Figure 11; Locke et al. 2005). Using results from the standard model with the estimated abundance of 18.420 million walleye in 2009, and the sliding-F harvest policy with F=0.168, the calculated (RAH) for 2009 is 1.558 million walleye (Table 11).

The RAH is determined by the exploitation policy and population estimates produced by the standard model. The Walleye Task Group reviewed alternative model configurations during 2008-2009, described in the *Review of Lambda Weightings* charge.

Other Walleye Task Group Charges

Centralized Databases

Walleye Task Group 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 are 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 (Walleye Task Group 2003).

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 maintained at the Lake St. Clair Fisheries Research Station of the Michigan Department of Natural Resources. 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 fish which are reported 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. Estimates of survival and exploitation are also generated with this information.

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 catch-at-age 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 Lake Erie Committee members with setting TACs for the upcoming year as well as to evaluate past harvest policy decisions.

Review of Lambda Weightings

Since 2005-2006, the WTG has been charged with reviewing the methodology of assigning weighting factors to data sources in the catch-at-age model. The current weighting methodology is described in Charge 1 and in this section of the report. The Lake Erie Walleye and Yellow Perch Task Groups have been working with Dr. James Bence and Travis Brenden of Michigan State University's Quantitative Fisheries Center (QFC), Dr. Yingming Zhao of the Ontario Ministry of Natural Resources and more recently, QFC graduate research assistant Aaron Berger to study lambda weighting and catchability configurations in the ADMB catch-at-age models. Previous external reviews by QFC modelers and Myers and Bence (2001) have shown the current methods, while adequate, could be improved.

Work in 2007 and 2008 involved testing Bayesian approaches to data weightings and evaluating models according to total sums of squares, degree of retrospectivity, and deviance information criteria. While some progress was made, the WTG felt more configurations needed to be examined. Standard model configurations employed in the interim will suffice until an alternative emerges as superior according to past criteria and possibly additional measures of model robustness.

In the "Catch-at-Age Population Analysis and Relative Abundance" section, it was discussed that population estimates from the 2009 run with 2008 data produced lower projections for 2009 compared to earlier forecasts presented in the 2008 WTG report. The consequences of such a lower population estimate put the 2009 population in a "Rehabilitation" category according to the WMP (Locke et al. 2005). The task group compared all data sources to see whether indicators of 2008 population status were consistent with this designation. There was a broad range in the description of the current walleye status, with differences apparent between fisheries and surveys, and within fisheries and surveys. Survey data generally produced the most pessimistic assessment to varying degrees.

The task group also compared model performance and current population status based on several model configurations. Other models evaluated included a Bayesian approach, a version with pooled OH and MI surveys, surveys weighted according to the number of sites fished, and a version with all data weighted equally. Although these model configurations may be revisited in the future, the task group intends to continue testing other methodology before adopting a new model. Results of the comparison exercise were discussed at the annual pre-LEC meeting.

A doctoral student, Aaron Berger (QFC) will investigate the structure of the yellow perch and walleye models with a focus on dataset weightings (lambdas) during the next 2 years. Task groups' modelers can incorporate model improvements as they become available upon presentation and discussion with the STC and LEC. At this time, the WTG is continuing to utilize the standard population abundance estimation models which weight fishery effort sources by the ratio of variance of observed log-catch to log-effort and other data sources by inverse variance ratios within each data group.

Eastern Basin Catch-At-Age Analysis

The WTG has been developing an ADMB catch-at-age model for eastern Lake Erie's walleye population. This developing stock assessment model incorporates walleye harvest-at-age and fishing effort values from Ontario commercial gill nets, New York and Pennsylvania sport fisheries, and survey data from Ontario and New York. A long-term New York walleye tagging study provided the instantaneous natural mortality estimate (M) of 0.16 used for this model.

The current eastern basin model description for walleye population dynamics is provided in this report for illustrative purposes only. The current configuration of this eastern basin model does not account for walleye movements into the basin by the much larger western basin spawning stocks which confounds estimates of survival, exploitation, and abundance. These movements must be incorporated in the model for it to be a viable tool for walleye population estimation and therefore, at this time, it cannot be used for yield calculation and quota determination for eastern basin stocks. However, the model has been shown in recent years that it has become a better surrogate of fishery and assessment indices.

Currently, the 2008 estimate of walleye abundance in the eastern basin model is 2.5 million walleye (Table 12). The eastern basin model output also estimates that 62% of the eastern basin abundance is age-5 (2003 year class) walleye. This 2003 year class represents a larger proportion of the total population estimate compared to the NYSDEC survey index (24%) at age 5, and slightly more than Ontario's survey share of age-5 walleye (54%) in eastern Lake Erie. Size-selective fishery harvest in 2008 contrasted with that of surveys, with age 5 walleye representing 73% of the sport harvest and 76% of the commercial harvest (Table 6). Model estimates reflect both fishery and survey age compositions, the relative weighting of data sources, and model assumptions related to catchability.

Relative to the robust western basin walleye stock assessment model, the eastern basin's model is somewhat limited by a more truncated data series, but limited more by the problematic issue of modeling seasonal movements by western basin walleye into the eastern basin. In 2008, the Walleye Task Group analyzed the inter-agency walleye tagging database. Results suggested that migration from western stocks was density dependent. Also, the estimated natural mortality for eastern basin walleye was 0.22, in contrast with previous work suggesting M=0.16.

Lake Erie Walleye Tagging Study

In 2005 a lake-wide research tagging initiative was undertaken by the WTG. The project was funded by the United States Fish and Wildlife Services (USFWS) Restoration Act Program through 2006, and an additional year of funding was provided by the respective Lake Erie Committee agencies. The objectives of the study were to: (1) assess the use of Passive Integrated Transponder (PIT) tags as an alternative to jaw tags in estimating walleye exploitation rates in Lake Erie and Saginaw Bay, Lake Huron, in terms of tag retention, cost/benefit analysis, sample size considerations, and precision of exploitation estimates; (2) assess temporal patterns in loss rates of jaw and PIT tags through double-tagging for use in correcting exploitation estimates; (3) determine walleye exploitation rates for different fishery components (i.e., commercial, private, and charter) and determine individual stock contribution to each fishery and (4) obtain additional information regarding walleye movement patterns in each lake through recapture of tagged walleye by fishers.

Since 2005, more than 31,000 walleye were PIT tagged on Lake Erie. A subset of PIT-tagged walleye was double-tagged with jaw tags to assess tag loss rates for both jaw and PIT tags. In 2008, 57 walleye PIT tags were recovered by Lake Erie agencies. Equal numbers of PIT tags were recovered from sport and commercial fisheries in 2008 (26 from each), with the remaining 5 tags recovered from surveys (4) and enforcement activity (1). PIT and jaw tagging studies support WTG efforts to quantify exploitation of walleye and estimate absolute abundance. A report on this project will be completed in 2009. The report will provide preliminary estimates of tag loss and exploitation; however, a comprehensive analysis of the data will not be available until 2011 or 2012 when Chris Vandergoot completes his PhD program at the QFC.

Habitat Metrics for Suitable Walleye Habitat

During this year, the members of the WTG and STC communicated with members of the Lake Erie Habitat Task Group to discuss methods, data sources, and timelines for redefining and calculating available walleye habitat in the western and central basins. This process will incorporate GIS technology, habitat mapping, and spatial calculations, to assess the available area of walleye habitat for their movement throughout the western and central basins during their annual migrations, and will assess their potential use of these areas throughout the year. Work on this task was initiated in 2009 and is expected to continue for at least another year before results are presented and discussed within the task groups, STC and the LEC.

Acknowledgments

The WTG would like to express its appreciation for support during the past year from the Great Lakes Fishery Commission which continued to disperse reward tag payments. The WTG would also like to thank the Quantitative Fisheries Center at Michigan State for their assistance with the ADMB models currently used to estimate walleye abundance in Lake

Erie, and members of the Habitat Task Group for their work addressing the walleye habitat charge.

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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 2008. TAC allocations for 2008 are based on water areas: 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 (MU-4)				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**

[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 2008.

	Sport Fishery															Commercial Fishery					
	Unit 1				Unit 2			Unit 3			Unit 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
Mean	1,694	299	39	2,032	283	12	290	174	15	185	10	75	37	55	2,534	1,502	465	306	33	2,171	4,705

[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 2008.

	Sport Fishery [a]															Commercial Fishery [b]				
	Unit 1				Unit 2			Unit 3			Unit 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	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	810	--	810	357	--	357	--	187	156	343	2,929	4,990	3,193	1,909	497	10,590
Mean	3,328	786	102	4,190	798	60	817	449	114	492	124	240	257	258	5,697	9,879	6,033	5,008	692	20,394

[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 harvest per unit effort for Lake Erie walleye by gear, management unit, and agency. Means contain data from 1975 to 2008.

	Sport Fishery [a]														Commercial Fishery [b]				
	Unit 1				Unit 2			Unit 3			Unit 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	0.18	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	0.24	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	0.16	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	0.15	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	0.22	0.37	211.8	71.7	48.9	38.4	114.1
2004	0.41	0.23	--	0.36	0.37	0.06	0.37	0.40	--	0.40	--	0.23	0.08	0.16	0.35	223.5	112.2	73.0	45.3	146.0
2005	0.32	0.18	0.67	0.30	0.19	--	0.19	0.48	--	0.48	--	0.18	0.19	0.19	0.28	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	0.45	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	0.36	0.57	298.9	153.8	124.9	91.4	206.7
2008	0.51	0.31	0.70	0.45	0.41	--	0.41	0.63	--	0.63	--	0.40	0.19	0.29	0.45	191.2	104.9	126.2	70.4	147.8
Mean	0.48	0.37	0.41	0.46	0.32	0.27	0.32	0.36	0.19	0.35	0.08	0.31	0.15	0.19	0.43	165.9	83.4	66.7	53.7	117.7

Table 5. Catch at age of walleye harvest by management unit, gear, and agency in Lake Erie during 2008. 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	27,789	296	0	--	--	296	28,085
	2	14,258	9,190	698	--	--	9,888	24,147
	3	99,862	39,506	17,075	--	--	56,581	156,442
	4	31,990	10,993	3,695	--	--	14,688	46,679
	5	706,852	380,745	93,701	--	--	474,446	1,181,297
	6	9,903	2,145	0	--	--	2,145	12,048
	7+	63,664	81,498	5,903	--	--	87,401	151,066
	Total	954,318	524,373	121,072	--	--	645,445	1,599,763
2	1	6,381	0	--	--	--	0	6,381
	2	6,396	6,648	--	--	--	6,648	13,044
	3	31,605	27,335	--	--	--	27,335	58,940
	4	13,276	5,559	--	--	--	5,559	18,835
	5	259,817	250,528	--	--	--	250,528	510,345
	6	5,841	2,912	--	--	--	2,912	8,753
	7+	11,844	40,332	--	--	--	40,332	52,176
	Total	335,159	333,314	--	--	--	333,314	668,473
3	1	131	0	--	--	--	0	131
	2	2	2,541	--	--	--	2,541	2,543
	3	1,536	12,054	--	--	--	12,054	13,590
	4	1,631	1,733	--	--	--	1,733	3,364
	5	192,244	171,921	--	--	--	171,921	364,165
	6	4,564	3,908	--	--	--	3,908	8,472
	7+	40,655	32,790	--	--	--	32,790	73,445
	Total	240,763	224,947	--	--	--	224,947	465,710
4	1	133	--	--	0	0	0	133
	2	0	--	--	892	835	1,727	1,727
	3	2,382	--	--	630	3,961	4,591	6,973
	4	0	--	--	735	569	1,304	1,304
	5	26,602	--	--	18,260	56,485	74,745	101,347
	6	142	--	--	210	1,286	1,496	1,638
	7+	5,647	--	--	8,290	10,768	19,058	24,705
	Total	34,906	--	--	29,017	73,904	102,921	137,827
All	1	34,433	296	0	0	0	296	34,729
	2	20,656	18,379	698	892	835	20,804	41,460
	3	135,384	78,895	17,075	630	3,961	100,561	235,945
	4	46,897	18,285	3,695	735	569	23,284	70,181
	5	1,185,514	803,194	93,701	18,260	56,485	971,640	2,157,154
	6	20,450	8,965	0	210	1,286	10,461	30,911
	7+	121,811	154,620	5,903	8,290	10,768	179,581	301,392
	Total	1,565,145	1,082,634	121,072	29,017	73,904	1,306,627	2,871,773

[a] Ontario sport harvest values were not estimated from creel surveys in 2008; they are not used in catch-at-age analysis.

Table 6. Percent age composition of walleye harvest by management unit, gear, and agency in Lake Erie during 2008. 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	2.9	0.1	0.0	--	--	0.0	1.8
	2	1.5	1.8	0.6	--	--	1.5	1.5
	3	10.5	7.5	14.1	--	--	8.8	9.8
	4	3.4	2.1	3.1	--	--	2.3	2.9
	5	74.1	72.6	77.4	--	--	73.5	73.8
	6	1.0	0.4	0.0	--	--	0.3	0.8
	7+	6.7	15.5	4.9	--	--	13.5	9.4
	Total	100.0	100.0	100.0	--	--	100.0	100.0
2	1	1.9	0.0	--	--	--	0.0	1.0
	2	1.9	2.0	--	--	--	2.0	2.0
	3	9.4	8.2	--	--	--	8.2	8.8
	4	4.0	1.7	--	--	--	1.7	2.8
	5	77.5	75.2	--	--	--	75.2	76.3
	6	1.7	0.9	--	--	--	0.9	1.3
	7+	3.5	12.1	--	--	--	12.1	7.8
	Total	100.0	100.0	--	--	--	100.0	100.0
3	1	0.1	0.0	--	--	--	0.0	0.0
	2	0.0	1.1	--	--	--	1.1	0.5
	3	0.6	5.4	--	--	--	5.4	2.9
	4	0.7	0.8	--	--	--	0.8	0.7
	5	79.8	76.4	--	--	--	76.4	78.2
	6	1.9	1.7	--	--	--	1.7	1.8
	7+	16.9	14.6	--	--	--	14.6	15.8
	Total	100.0	100.0	--	--	--	100.0	100.0
4	1	0.4	--	--	0.0	0.0	0.0	0.1
	2	0.0	--	--	3.1	1.1	1.7	1.3
	3	6.8	--	--	2.2	5.4	4.5	5.1
	4	0.0	--	--	2.5	0.8	1.3	0.9
	5	76.2	--	--	62.9	76.4	72.6	73.5
	6	0.4	--	--	0.7	1.7	1.5	1.2
	7+	16.2	--	--	28.6	14.6	18.5	17.9
	Total	100.0	--	--	100.0	100.0	100.0	100.0
All	1	2.2	0.0	0.0	0.0	0.0	0.0	1.2
	2	1.3	1.7	0.6	3.1	1.1	1.6	1.4
	3	8.6	7.3	14.1	2.2	5.4	7.7	8.2
	4	3.0	1.7	3.1	2.5	0.8	1.8	2.4
	5	75.7	74.2	77.4	62.9	76.4	74.4	75.1
	6	1.3	0.8	0.0	0.7	1.7	0.8	1.1
	7+	7.8	14.3	4.9	28.6	14.6	13.7	10.5
	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 present.

	Sport Fishery															Commercial Fishery					All Gears
	Unit 1				Unit 2			Unit 3			Unit 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	8.45	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	5.11	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	5.23	4.21	--	4.21	5.53	--	5.53	--	6.61	6.72	6.68	5.22	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	5.43	4.89	5.12	5.33	5.36	--	5.36	5.52	--	5.52	--	5.52	6.40	5.77	5.40	4.84	4.77	5.69	5.48	4.97	5.17
Mean	3.89	3.58	3.71	3.84	4.04	6.58	4.06	5.02	6.72	5.04	7.02	6.10	7.42	6.83	4.06	3.38	3.56	4.54	6.02	3.53	3.75

Table 8. Estimated abundance at age, survival (S), fishing mortality (F) and exploitation (u) for Lake Erie walleye, 1980-2008 (from ADMB catch at age analysis, M=0.32). Projected 2009 ages 3 to 7+ population is based on survival from 2008, and 2009 age-2 projection is from the regression of pooled trawl YOY data and ADMB age-2 walleye abundance (see Table 9).

	Age							Ages 2+		
Year	2	3	4	5	6	7+	Total	S	F	u
1980	10,873,000	9,729,080	515,863	1,007,470	189,029	34,751	22,349,193	0.574	0.235	0.180
1981	6,872,370	7,046,250	4,915,180	258,018	503,905	112,087	19,707,810	0.459	0.459	0.319
1982	11,319,700	4,101,610	2,726,520	1,879,720	98,674	236,036	20,362,260	0.538	0.300	0.224
1983	7,252,820	7,016,670	1,794,910	1,179,560	813,213	145,878	18,203,051	0.565	0.252	0.192
1984	45,223,900	4,710,370	3,587,410	902,643	593,190	483,435	55,500,948	0.618	0.162	0.128
1985	5,787,330	29,183,600	2,356,160	1,767,540	444,737	533,769	40,073,136	0.610	0.174	0.138
1986	18,012,400	3,952,170	17,460,700	1,398,140	1,048,850	583,036	42,455,296	0.600	0.191	0.150
1987	17,075,800	11,981,000	2,202,980	9,612,590	769,711	902,061	42,544,142	0.601	0.189	0.148
1988	44,228,300	11,366,600	6,710,610	1,222,010	5,332,190	931,789	69,791,499	0.611	0.172	0.136
1989	13,289,400	28,968,800	6,122,570	3,576,620	651,308	3,343,390	55,952,088	0.582	0.221	0.171
1990	10,648,600	8,816,600	16,174,100	3,384,540	1,977,140	2,225,150	43,226,130	0.611	0.172	0.136
1991	5,905,610	7,219,770	5,228,750	9,501,070	1,988,160	2,479,970	32,323,330	0.622	0.154	0.123
1992	12,823,200	4,054,610	4,418,910	3,165,870	5,752,650	2,720,240	32,935,480	0.616	0.165	0.131
1993	19,545,200	8,662,940	2,364,060	2,542,170	1,821,310	4,893,670	39,829,350	0.593	0.202	0.158
1994	3,444,660	12,839,900	4,637,240	1,239,850	1,333,270	3,570,130	27,065,050	0.561	0.258	0.196
1995	12,747,900	2,281,620	7,064,610	2,496,990	667,618	2,678,560	27,937,298	0.582	0.222	0.171
1996	14,560,900	8,345,910	1,208,860	3,646,950	1,289,020	1,760,620	30,812,260	0.535	0.306	0.228
1997	1,636,210	9,099,950	3,836,420	537,242	1,620,780	1,379,820	18,110,422	0.514	0.345	0.252
1998	14,090,500	1,055,180	4,609,200	1,888,690	264,487	1,495,090	23,403,147	0.550	0.278	0.209
1999	6,466,930	8,764,930	477,945	2,014,630	825,524	790,716	19,340,675	0.541	0.294	0.220
2000	5,352,950	4,138,650	4,340,490	229,460	967,218	786,854	15,815,622	0.534	0.307	0.228
2001	16,115,900	3,410,120	2,027,170	2,061,700	108,992	843,810	24,567,692	0.613	0.169	0.134
2002	1,390,340	10,584,900	1,821,860	1,063,230	1,081,340	507,251	16,448,921	0.608	0.178	0.140
2003	11,845,400	948,322	6,376,940	1,085,000	633,201	949,277	21,838,140	0.619	0.159	0.127
2004	386,232	7,929,730	537,687	3,556,700	605,153	890,627	13,906,129	0.613	0.169	0.134
2005	50,200,900	271,458	4,858,470	326,325	2,158,580	912,501	58,728,234	0.637	0.131	0.105
2006	1,477,310	33,182,900	138,600	2,404,910	161,529	1,533,130	38,898,379	0.603	0.186	0.146
2007	3,810,080	1,039,260	19,884,500	82,369	1,429,210	1,014,050	27,259,469	0.589	0.209	0.162
2008	1,118,400	2,652,190	600,660	11,357,400	47,046	1,401,810	17,177,506	0.587	0.213	0.165
2009	8,338,247	777,166	1,551,754	346,897	6,559,206	846,527	18,419,797			

Table 9. Data used to estimate the recruitment of age-2 walleye by linear regression. Y is the ADMB estimate of age-2 walleye and X is the mean catch per hectare of age-0 walleye for combined Ohio and Ontario August trawls. Values in bold are the regression estimates and are used for RAH projections in 2009 and forecast estimates of recruits in 2010. Regression statistics are given at the bottom of the page.

Year Class	Year of Recruitment to Fisheries	OH+ONT Trawl Age-0 CPHa	ln (OH+ONT Trawl CPHa)	ADMB-estimated Age-2 walleye recruits (in millions)	ln (ADMB-estimated Age-2 walleye recruits in millions)
1988	1990	18.28	2.906	10.649	2.365
1989	1991	6.09	1.807	5.906	1.776
1990	1992	39.43	3.675	12.823	2.551
1991	1993	59.86	4.092	19.545	2.973
1992	1994	6.71	1.904	3.445	1.237
1993	1995	105.91	4.663	12.748	2.545
1994	1996	63.92	4.158	14.561	2.678
1995	1997	2.96	1.087	1.636	0.492
1996	1998	85.34	4.447	14.091	2.646
1997	1999	24.18	3.186	6.467	1.867
1998	2000	14.31	2.661	5.353	1.678
1999	2001	44.19	3.788	16.116	2.780
2000	2002	4.11	1.414	1.390	0.330
2001	2003	28.67	3.356	11.845	2.472
2002	2004	0.14	-1.965	0.386	-0.951
2003	2005	183.02	5.210	50.201	3.916
2004	2006	5.33	1.673	1.477	0.390
2005	2007	12.67	2.539	3.810	1.338
2006	2008	2.05	0.718	1.118	
2007	2009	25.41	3.235	**8.338**	
2008	2010	7.24	1.979	**3.607**	

[1] This regression estimate is for 2009 age-2 recruitment projection.

[2] This regression estimate is for 2010 age-2 recruitment projection.

Note: The regression equation, with standard errors in parentheses, was,

Y = 0.6673 (0.0578) X -0.0379 (0.1880)

with n = 18, F = 133, $p < 0.0001$ and $r^2 = 0.8929$.

Table 10. Estimated population of Lake Erie walleye for 2009 based on fishing mortality (F) and survival (S) at age from ADMB. Age-2 walleye estimates are from regressions presented in Table 9.

	2008 Parameters				Rate Functions					2009 Parameters			
	Stock Size (numbers)				Mortality Rates				Survival Rate		Stock Size (numbers)		
Age	**Mean**	**Std. Err.**	**Min.**	**Max.**	**(F)**	**(Z)**	**(A)**	**(u)**	**(S)**	**Age**	**Mean**	**Min.**	**Max.**
2	1.118	0.349	0.769	1.468	0.044	0.364	0.305	0.037	0.695	2	8.338	5.731	12.132
3	2.652	0.599	2.053	3.251	0.216	0.536	0.415	0.167	0.585	3	0.777	0.535	1.020
4	0.601	0.119	0.482	0.719	0.229	0.549	0.422	0.176	0.578	4	1.552	1.201	1.902
5	11.357	2.100	9.257	13.458	0.229	0.549	0.422	0.176	0.578	5	0.347	0.278	0.416
6	0.047	0.009	0.039	0.056	0.229	0.549	0.422	0.176	0.578	6	6.559	5.346	7.772
7+	1.402	0.241	1.161	1.643	0.217	0.537	0.416	0.168	0.584	7+	0.847	0.701	0.992
Total	17.178		13.761	20.594	0.213	0.533	0.413	0.165	0.587	Total	18.420	13.792	24.234
(3+)	16.059		12.991	19.127	0.226	0.546	0.421	0.174	0.579	(3+)	10.082	8.061	12.102

Table 11. Estimated harvest of Lake Erie walleye for 2009 and population projections for 2010. Fishing mortality for the fully-selected age groups is derived from the regression equation described in the Harvest Policy section of this report. Abundance of age 2 and older walleye is from ADMB catch-age results and trawl regressions. Stock size and catch in numbers are in millions of fish.

	2009 Stock Size (millions)		Rate Functions					2009 RAH (millions of fish)	Projected 2010 Stock Size (millions)
Age	**Mean**	**F**	**sel(age)**	**(F)**	**(Z)**	**(S)**	**(u)**	**Mean**	**Mean**
2	8.338		0.194	0.033	0.353	0.703	0.027	0.229	3.607
3	0.777		0.943	0.158	0.478	0.620	0.126	0.098	5.861
4	1.552		1.000	0.168	0.488	0.614	0.133	0.206	0.482
5	0.347		1.000	0.168	0.488	0.614	0.133	0.046	0.953
6	6.559		1.000	0.168	0.488	0.614	0.133	0.872	0.213
7+	0.847		0.947	0.159	0.479	0.619	0.126	0.107	4.551
Total	18.420	0.168					0.085	1.558	15.666
(3+)	10.082								12.058

	2010 Stock Size (millions)		Rate Functions					Projected 2010 RAH (millions of fish)	Projected 2011 Stock Size (millions)
Age	**Mean**	**F**	**sel(age)**	**(F)**	**(Z)**	**(S)**	**(u)**	**Mean**	**Mean**
2	3.607		0.194	0.022	0.342	0.710	0.019	0.067	*
3	5.861		0.943	0.107	0.427	0.653	0.087	0.508	2.563
4	0.482		1.000	0.113	0.433	0.649	0.092	0.044	3.826
5	0.953		1.000	0.113	0.433	0.649	0.092	0.087	0.312
6	0.213		1.000	0.113	0.433	0.649	0.092	0.020	0.618
7+	4.551		0.947	0.107	0.427	0.652	0.087	0.396	3.107
Total	15.666	0.113					0.072	1.123	--
(3+)	12.058								10.425

* No estimate of the 2009 cohort recruiting in 2011 is available.

Table 12. Eastern basin walleye ADMB catch-at-age 2008 model results in numbers of fish (a) and biomass (b) by age, based on PA, NY and ONT Units 4 and 5 data; M=0.16.

(a)

Abundance	Age										
Year	2	3	4	5	6	7	8	9	10	11+	Total
1993	227,879	377,223	169,371	266,422	58,493	200,013	105,664	142,292	19,922	44,406	1,611,686
1994	94,790	193,940	314,052	125,947	191,781	42,106	143,977	76,061	102,427	47,166	1,332,247
1995	338,658	80,577	157,569	194,625	76,216	116,055	25,480	87,127	46,028	92,551	1,214,886
1996	632,401	288,169	67,054	122,037	139,136	54,486	82,967	18,216	62,286	99,832	1,566,583
1997	47,630	537,325	233,375	44,269	71,643	81,681	31,987	48,707	10,694	97,728	1,205,038
1998	389,635	40,533	446,670	171,895	31,522	51,015	58,162	22,777	34,682	79,216	1,326,107
1999	104,268	331,522	33,599	324,951	119,859	21,980	35,572	40,556	15,882	81,114	1,109,301
2000	502,326	88,677	273,172	24,432	216,359	79,804	14,635	23,684	27,003	65,928	1,316,020
2001	406,234	426,946	72,059	176,517	14,751	130,628	48,182	8,836	14,300	58,302	1,356,755
2002	37,354	345,557	352,094	50,528	118,657	9,916	87,810	32,389	5,939	50,343	1,090,586
2003	589,079	31,793	288,164	265,261	36,799	86,417	7,222	63,951	23,588	41,859	1,434,132
2004	33,019	501,258	26,364	206,663	185,714	25,764	60,502	5,056	44,773	46,887	1,136,000
2005	6,516,470	28,122	423,012	21,222	164,127	147,490	20,461	48,049	4,015	73,210	7,446,179
2006	28,638	5,551,000	23,806	346,398	17,242	133,341	119,825	16,623	39,036	63,215	6,339,125
2007	456,023	24,373	4,618,270	17,475	248,310	12,359	95,583	85,895	11,916	74,703	5,644,907
2008	356,841	385,971	18,158	1,539,230	5,696	80,940	4,029	31,157	27,998	33,867	2,483,887

(b)

Biomass (kgs)	Age										
Year	2	3	4	5	6	7	8	9	10	11+	Total
1993	130,119	404,383	182,073	391,907	96,163	452,829	250,742	422,181	66,062	154,533	2,550,992
1994	65,026	203,443	389,739	240,811	508,028	95,917	390,177	221,034	308,204	164,137	2,586,516
1995	234,352	86,056	208,779	378,546	136,198	238,841	72,949	266,608	138,498	313,100	2,073,927
1996	404,105	267,997	106,347	220,887	277,299	112,133	214,220	52,934	187,419	347,415	2,190,756
1997	30,436	499,712	370,133	80,126	142,785	168,100	82,590	141,541	32,177	340,092	1,887,692
1998	248,977	37,696	708,418	311,129	62,824	104,988	150,175	66,189	104,359	275,672	2,070,426
1999	90,192	358,375	55,471	637,879	241,515	46,773	93,873	111,730	40,371	266,135	1,942,315
2000	362,679	118,118	426,149	41,290	451,541	183,869	37,026	77,163	77,201	205,035	1,980,070
2001	280,301	485,010	102,756	338,384	23,557	277,585	152,835	26,799	46,802	192,047	1,926,076
2002	20,993	426,071	498,917	89,333	248,467	19,366	219,173	91,595	15,627	165,023	1,794,564
2003	411,177	44,796	443,485	412,746	68,703	216,387	20,278	151,500	57,438	124,238	1,950,749
2004	22,156	584,968	33,455	396,793	392,600	57,917	150,589	12,690	110,187	116,468	1,877,823
2005	3,603,610	27,981	574,451	39,346	343,517	331,705	52,953	127,619	9,882	191,665	5,302,728
2006	38,834	10,030,700	44,137	881,928	38,776	264,548	522,195	58,895	203,419	234,212	12,317,643
2007	274,070	25,323	5,186,310	24,797	373,211	24,521	235,040	171,016	21,830	173,760	6,509,878
2008	233,374	390,217	24,241	2,447,380	7,280	177,015	9,906	82,783	72,880	83,009	3,528,084

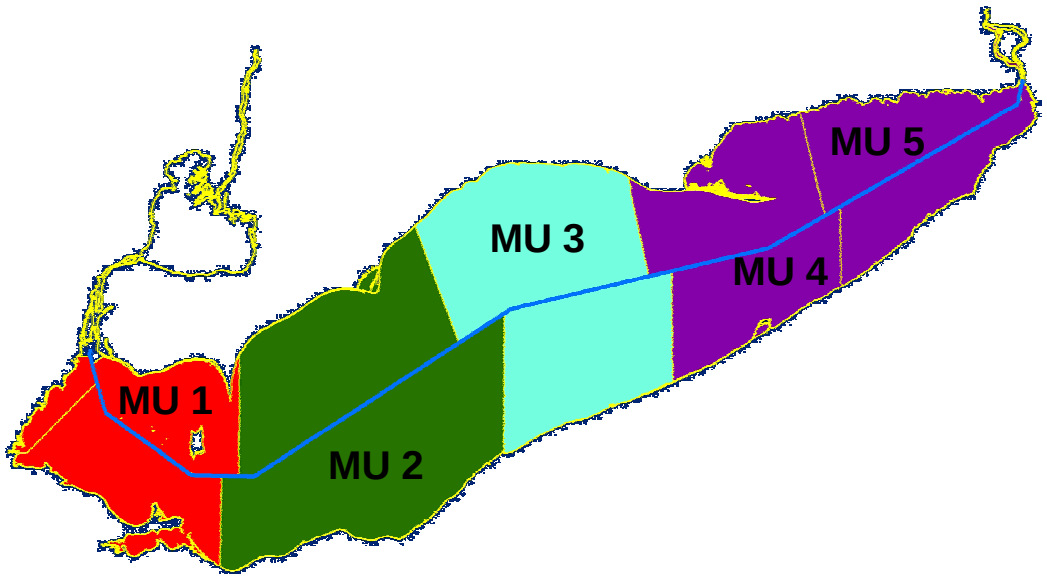

Figure 1. Map of Lake Erie with management units recognized by the Walleye Task Group for interagency management of walleye.

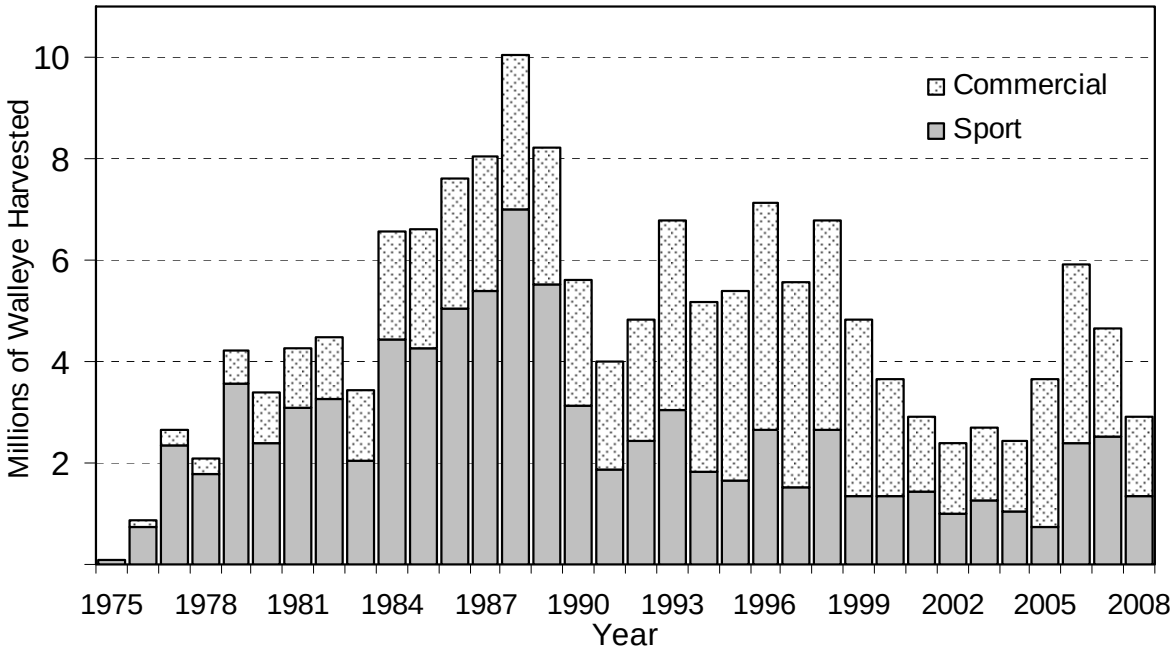

Figure 2. Lake-wide harvest of Lake Erie walleye by sport and commercial fisheries, 1975-2008.

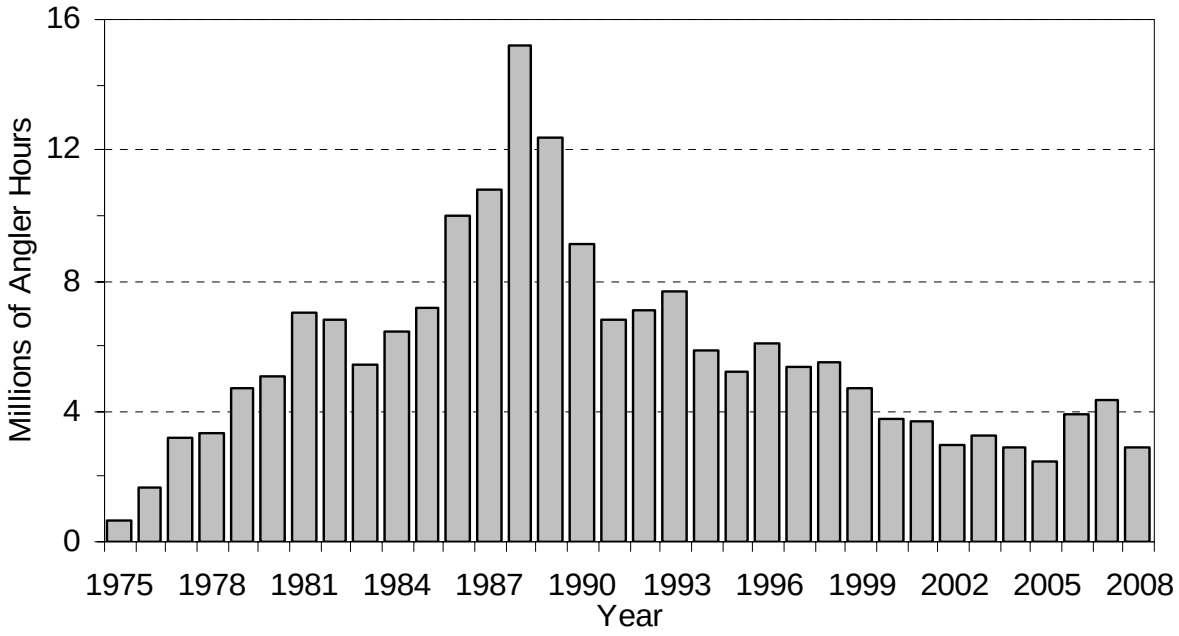

Figure 3. Lake-wide total effort (angler hours) by sport fisheries for Lake Erie walleye, 1975-2008. Years 1999-2008 exclude Ontario sport effort.

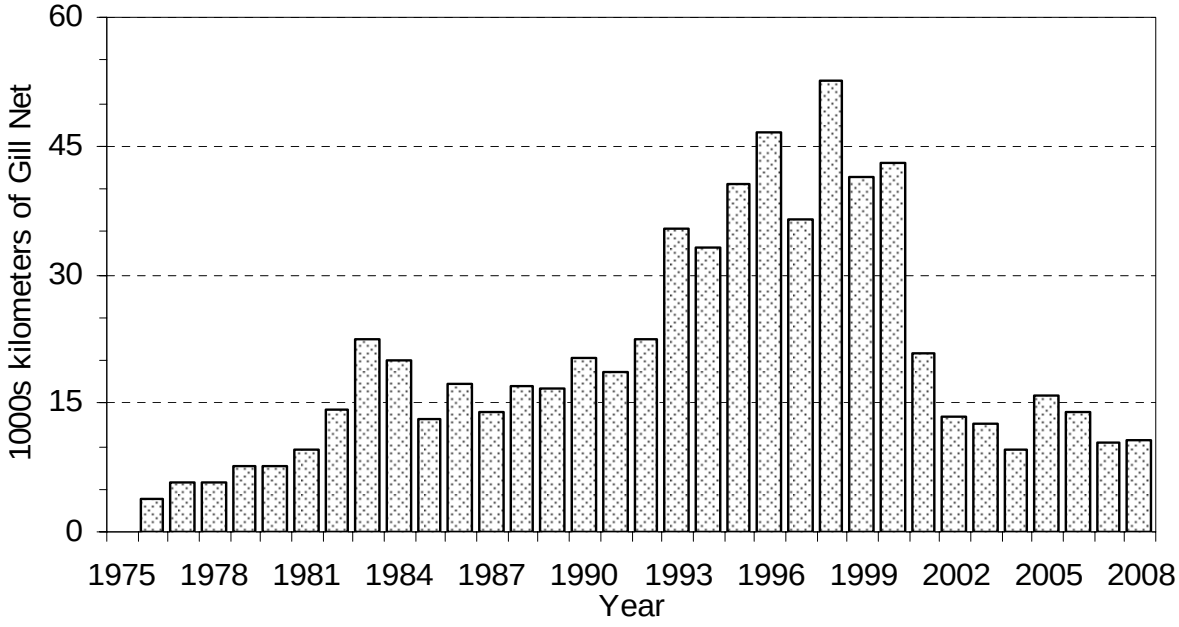

Figure 4. Lake-wide total effort (kilometers of gill net) by commercial fisheries for Lake Erie walleye, 1975-2008.

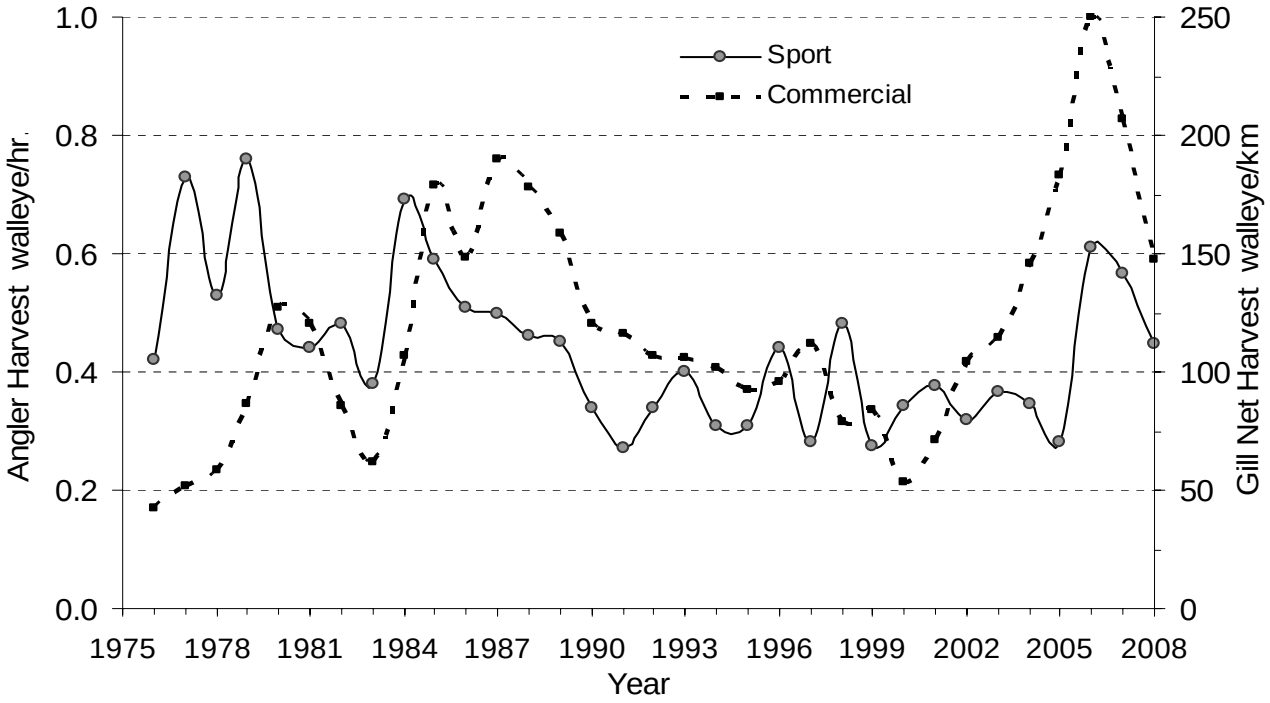

Figure 5. Lake-wide harvest per unit effort (HPE) for Lake Erie sport and commercial walleye fisheries, 1975-2008.

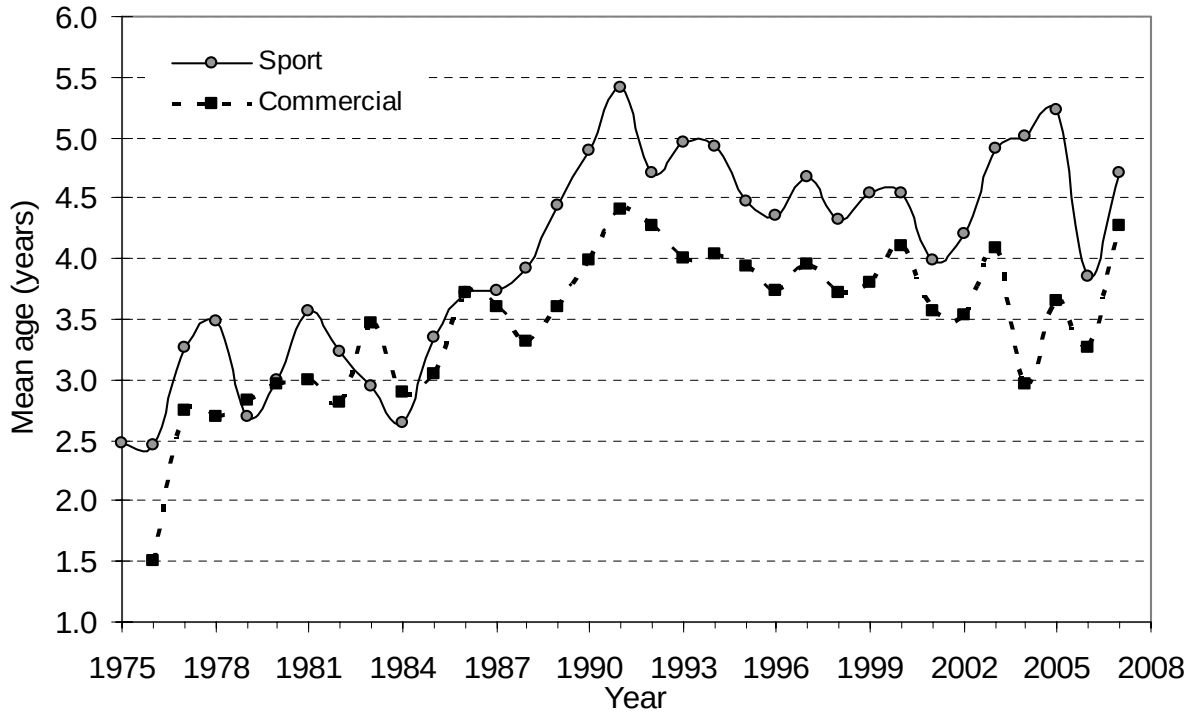

Figure 6. Lake-wide mean age of Lake Erie walleye in sport and commercial harvests, 1975-2008.

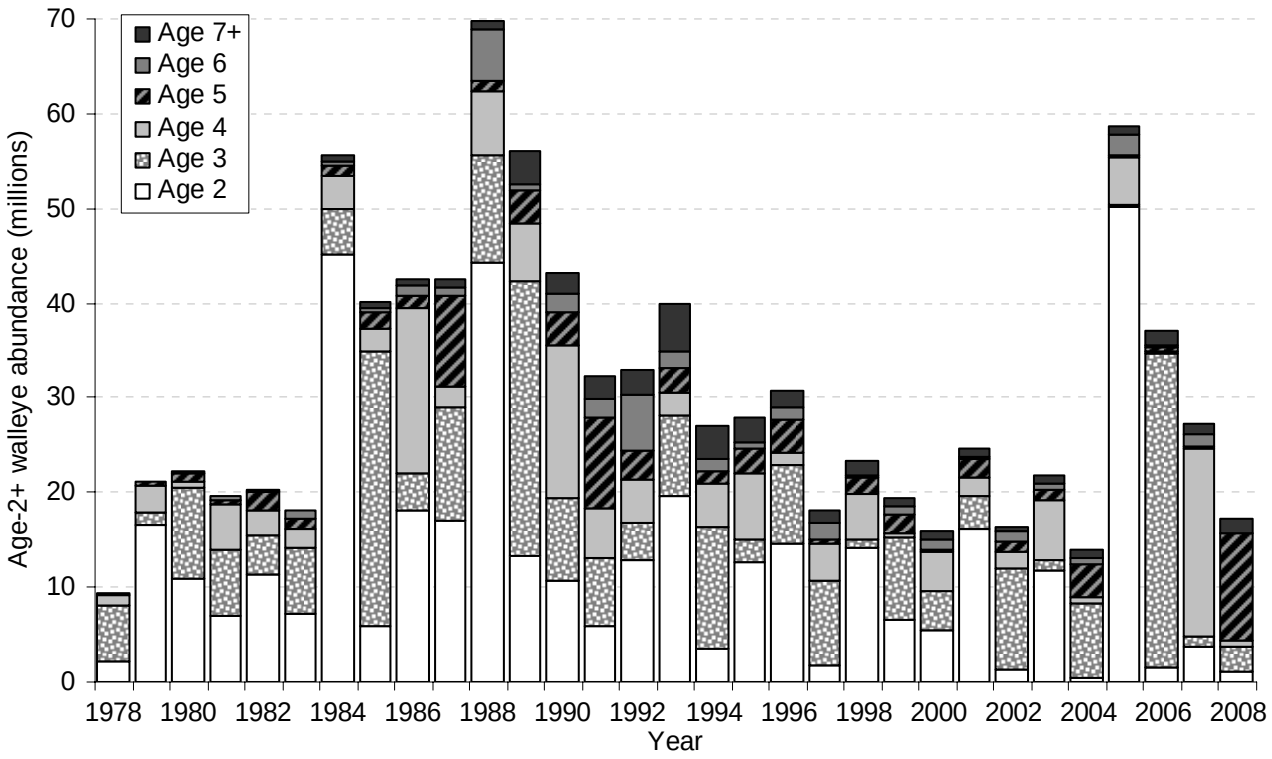

Figure 7. Estimates of abundance by age of Lake Erie walleye 1978-2008. Data are from Table 8.

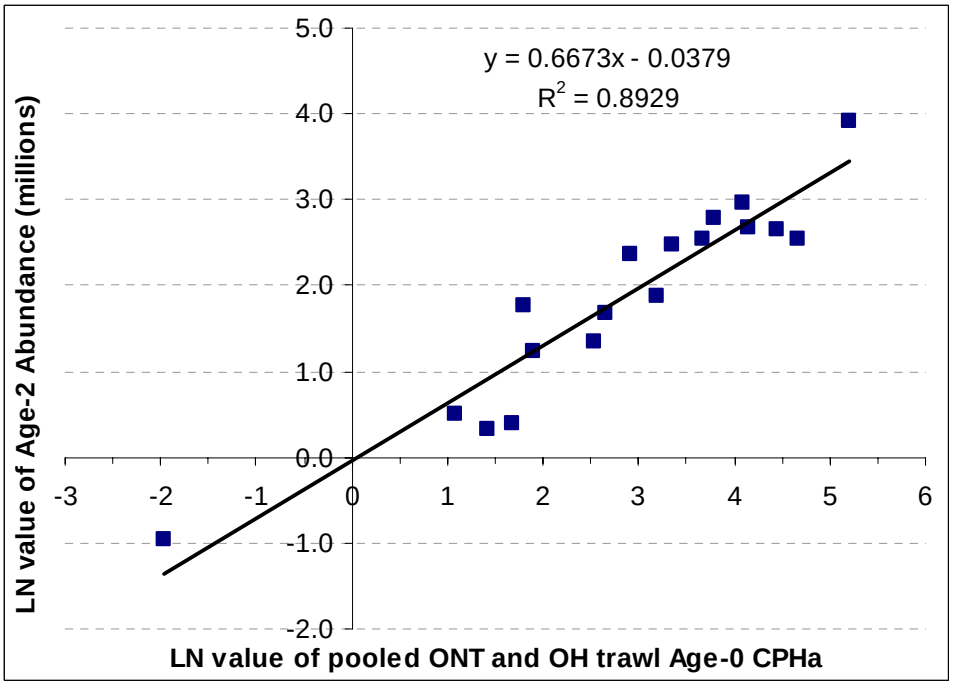

Figure 8. Regression estimates of abundance for age-2 Lake Erie walleye using natural logarithm transformed ADMB 2009 model catch-at-age estimates (y) and pooled Ontario and Ohio young-of-the-year trawl indices (x).

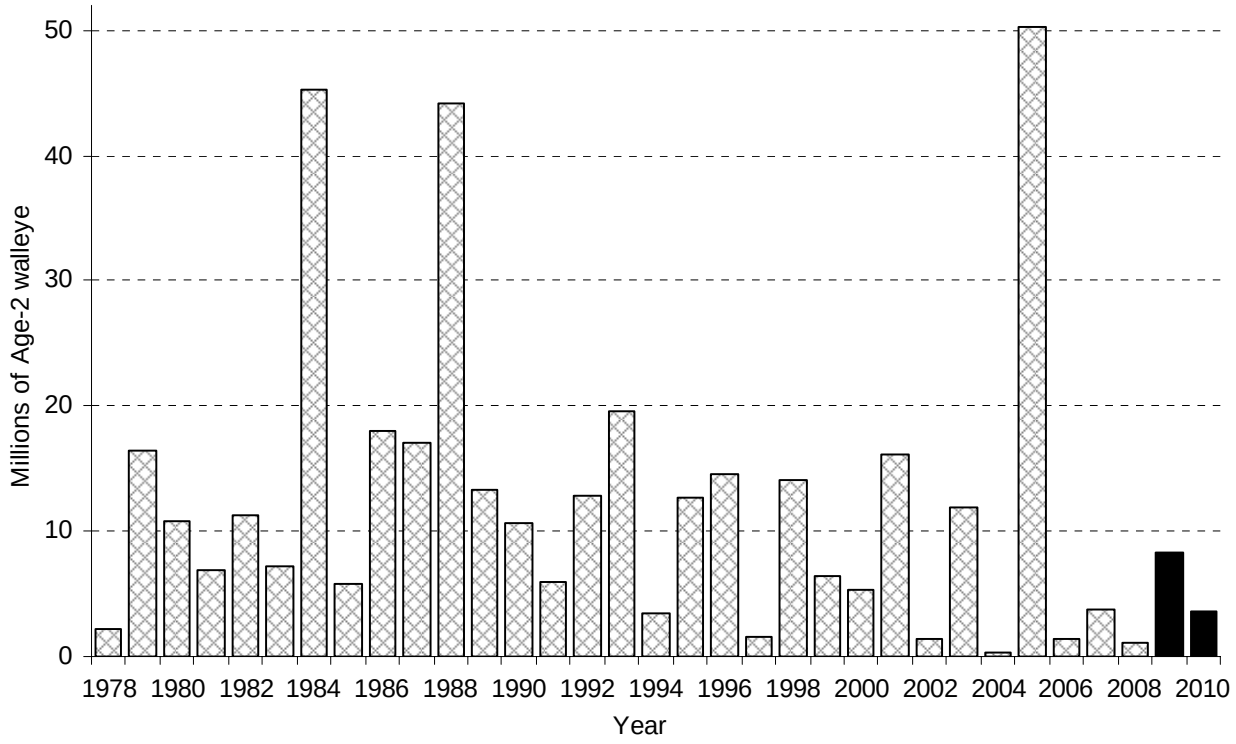

Figure 9. Catch-at-age estimates of age-2 Lake Erie walleye for 1978 to 2008. Estimates for 2009-2010 are from the regression of YOY catch per hectare and numbers of age-2 from catch-at-age analysis (see Table 9).

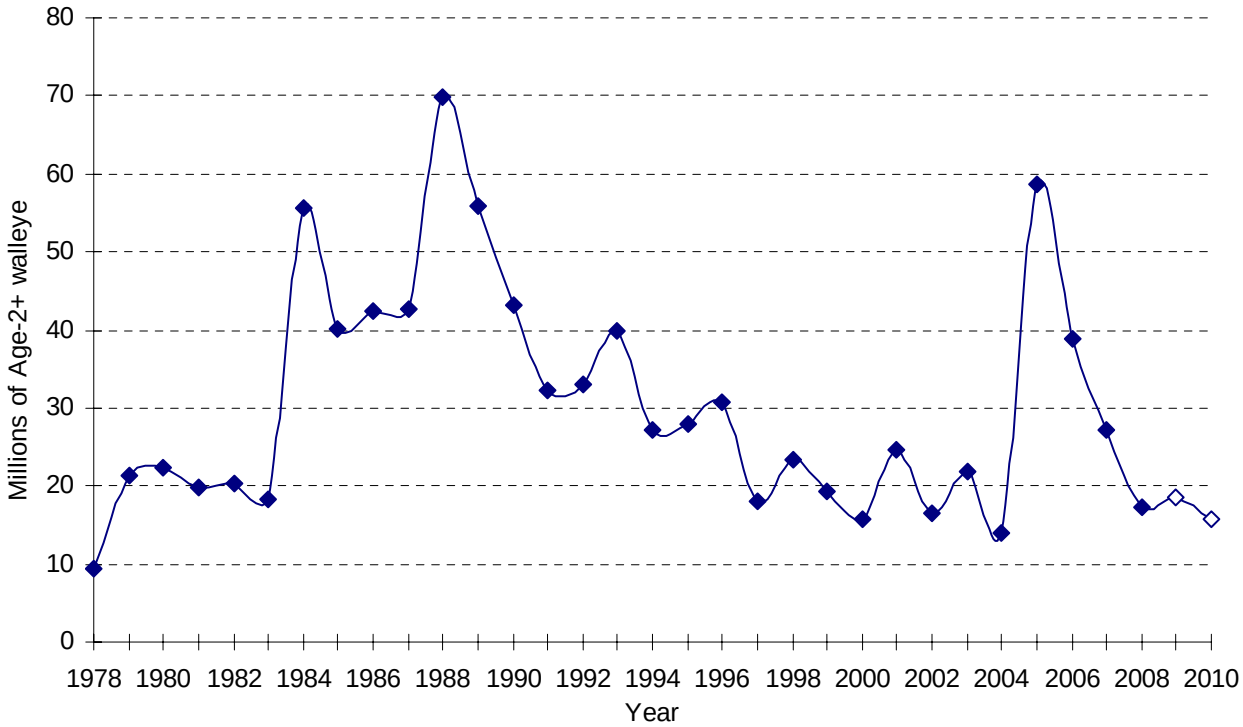

Figure 10. Abundance of Lake Erie walleye from 1978-2010, forecasting two years of population abundance from regressions (open diamonds).

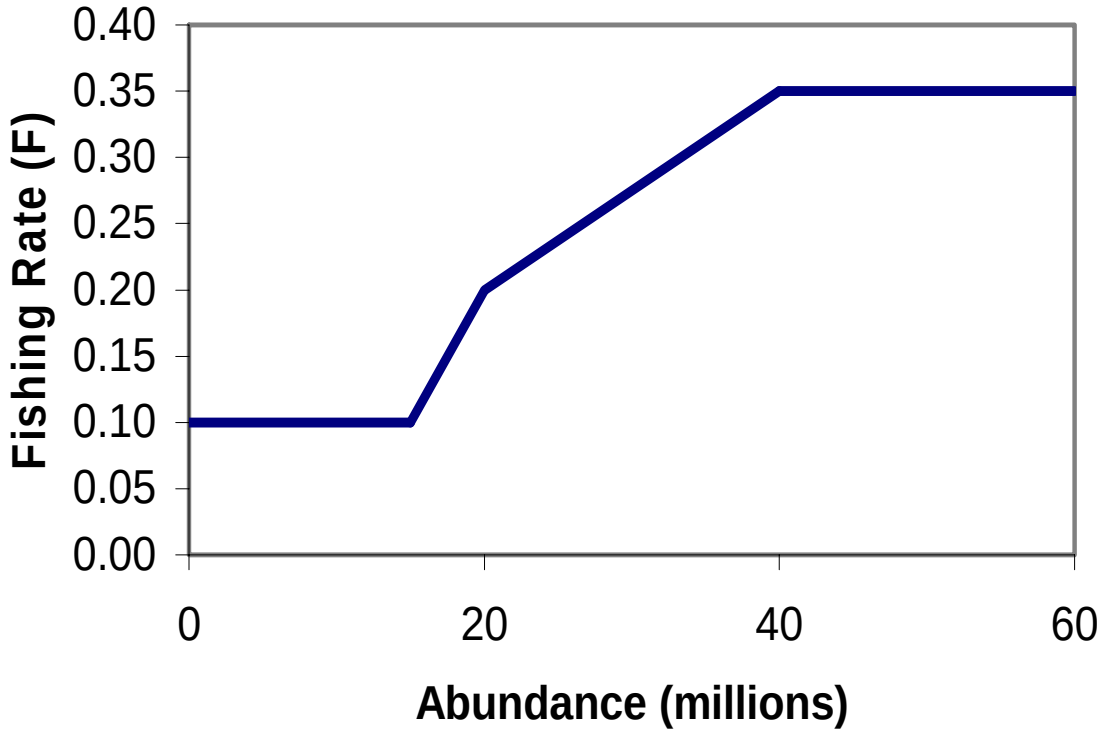

Figure 11. Lake Erie walleye harvest policy for age-2 and older walleye: below 15 million fish, F=0.1; between 15 and 20 million fish, F= 0.02(N)-0.02 (N is abundance in millions of fish); between 20 and 40 million fish, F= 0.0075(N)+0.05; and at 40 million fish and above, F=0.35.