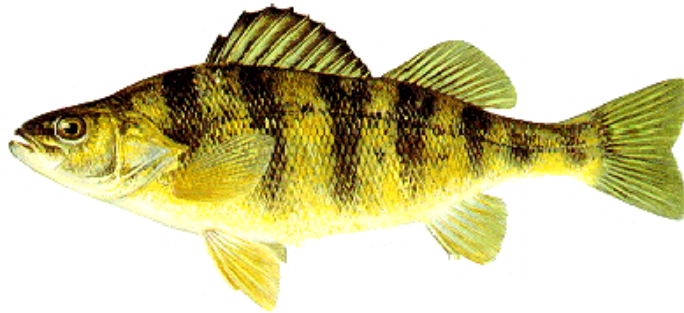


# Report of the Lake Erie Yellow Perch Task Group

March 27<sup>th</sup>, 2014



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Standing Technical Committee  
Lake Erie Committee  
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**Note:** The data and management summaries contained in this report are provisional. Every effort has been made to ensure their accuracy. Contact individual agencies for complete state and provincial data. Data reported in pounds for years prior to 1996 have been converted from metric tonnes. Please contact the Yellow Perch Task Group or individual agencies before using or citing data published herein.

## Introduction

From April 2013 through March 2014, the Yellow Perch Task Group (YPTG) addressed the following charges:

1. Maintain and update centralized time series of datasets required for population models and assessment including:
  - a. Fishery harvest, effort, age composition, biological and stock parameters
  - b. Survey indices of young of year, juvenile and adult abundance, size at age and biological parameters
  - c. Fishing harvest and effort by grid.
2. Report Recommended Allowable Harvest (RAH) levels for 2014.
3. Participate in the LEPMAG Yellow Perch harvest strategy evaluation process by assisting the STC with the development of new catch-at-age models and exploitation strategies for Yellow Perch, leading to the development of a Yellow Perch Management Plan.

### Charge 1: 2013 Fisheries Review and Population Dynamics

The lakewide total allowable catch (TAC) in 2013 was 12.237 million pounds. This allocation represented a 10.2% decrease from a TAC of 13.637 million pounds in 2012. For Yellow Perch assessment and allocation, Lake Erie is partitioned into four management units (Units, or MUs; Figure 1.1). The 2013 TAC allocation by management unit was 1.800, 4.000, 5.600, and 0.837 million pounds for Units 1 through 4, respectively. In 2013, the Lake Erie Committee (LEC) set the TAC for MU1, MU2, MU3, and MU4 higher than the mean RAH values suggested in the March 2013 YPTG report which were 1.570, 3.711, 4.053, and 0.789 million pounds, respectively. The lakewide harvest of Yellow Perch in 2013 was 9.583 million pounds, or 78.3% of the total 2013 TAC. This was an 11.2% decrease from the 2012 harvest of 10.786 million pounds. Harvest from Yellow Perch Management Units 1 through 4 was 1.476, 3.522, 3.894, and 0.691 million pounds, respectively (Table 1.1). The portion of TAC harvested was 82.0%, 88.0%, 69.5%, and 82.5%, in MUs 1 through 4, respectively. In 2013, Ontario harvested 5.933 million pounds, followed by Ohio (3.224 million lbs.), Pennsylvania (229 thousand lbs.), New York (120 thousand lbs.), and Michigan (77 thousand lbs.).

Ontario's fraction of allocation harvested was 88.8% in MU1, 98.9% in MU2, 101.9% in MU3, and 102.3% in MU4 (see comments below regarding Ontario's harvest reporting and commercial ice allowance policy). Ohio fishers attained 82.9% of their TAC in the western basin (MU1), 79.0% in the west central basin (MU2), and 41.6% in the east central basin (MU3).

Michigan anglers in MU1 attained 46.9% of their TAC. Pennsylvania fisheries harvested 18.1% of their TAC in MU3 and 80.7% of their TAC in MU4. New York fisheries attained 46.2% of their TAC in MU4.

Ontario's portion of the lakewide Yellow Perch harvest decreased slightly to 61.9% in 2013 from 64.0% in 2012 (Table 1.1). Ohio's proportion of lakewide harvest increased to 33.6% in 2013, from 32.3% in 2012. Harvest in Michigan, Pennsylvania, and New York waters combined represented 4.4% of the lakewide harvest in 2013.

Ontario continued to employ a commercial ice allowance policy implemented in 2002, by which 3.3% is subtracted from commercial landed weight. This step was taken so that ice was not debited towards fishers' quotas. Ontario's landed weights in the YPTG report have not been adjusted to account for ice content. Ontario's reported Yellow Perch harvest in tables and figures is represented exclusively by the commercial gill net fishery. Reported sport harvests for Michigan, Ohio, Pennsylvania, and New York are based on creel survey estimates. Ohio, Pennsylvania, and New York trap net harvest and effort are based on commercial catch reports of landed fish. Additional fishery documentation is available in annual agency reports.

Harvest, fishing effort, and fishery harvest rates are summarized for the time period of 2000 to 2013 by management unit, year, agency, and gear type in Tables 1.2 to 1.5. Trends over a longer time series (1975 to 2013) are depicted graphically for harvest (Figure 1.2), fishing effort (Figure 1.3), and harvest rates (Figure 1.4) by management unit and gear type. The spatial distributions of harvest (all gears) and effort by gear type for 2013 in ten-minute interagency grids are presented in Figures 1.5 through 1.8.

Ontario's Yellow Perch harvest from large mesh (3 inches or greater) gill nets in 2013 was 6.3%, 8.1%, and 5.5% of the gill net harvest in Management Units 1, 2 and 3, respectively, but was negligible in MU4 (0.6%). Harvest, effort, and catch per unit effort from (1) small mesh Yellow Perch effort (<3 inch stretched mesh) and (2) larger mesh sizes, are distinguished in Tables 1.2 to 1.5. Harvest from targeted small mesh gill nets in 2013 decreased by 15.4% in MU1, 22.9% in MU3, 1.4% in MU4, and increased 6.9% in MU2 from the 2012 harvest. Ontario trap net harvest was minimal (26 pounds in 2013) and is included in the total harvest of Yellow Perch in MU1 (Tables 1.1 and 1.2). Ontario commercial smelt trawlers incidentally catch Yellow Perch in Management Units 2, 3 and 4, and this harvest is included in Tables 1.3 to 1.5. In 2013, 398 pounds of Yellow Perch were harvested in trawl nets in MU2, with an additional 586 pounds harvested in MU3, and 1,655 pounds in MU4.

Targeted (i.e. small mesh) gill net effort in 2013 increased from 2012 by 52.1% in MU1, 47.8% in MU2, and 9.2% in MU4, but decreased 23.1% in MU3. Gill net effort in 2013 remained lower when compared to the 1990s and earlier decades (Figure 1.3). Targeted gill net harvest rates in 2013 decreased by 44.3% in MU1, 18.2% in MU2, and 9.7% in MU4 from 2012, but increased 0.3% in MU3 (Figure 1.4).

In 2013, sport harvest in U.S. waters decreased by 15.3% in MU1, and 13.9% in MU2, but increased by 43.7% in MU3 and 37.0% in MU4 compared to the 2012 harvest (Figure 1.2). Angling effort in U.S. waters increased in 2013 from 2012 in MU1 (+5.2%), MU3 (+25.0%), and MU4 (+5.2%), but decreased in MU2 (-6.2%; Figure 1.3). Yellow Perch sport harvest from Ontario waters is assessed periodically, but creel surveys were not performed in 2013.

Sport fishing harvest rates are commonly expressed as fish harvested per angler hour for those anglers seeking Yellow Perch. These harvest rates are presented in Tables 1.2 to 1.5. Compared to 2012 rates, harvest per angler hour increased in Ohio waters of MU3 (+11.8%), in Pennsylvania waters of MU3 (+11.1%) and MU4 (+17.6%), and in New York waters of MU4 (+19.4%), but decreased in Michigan waters of MU1 (-29.2%) and in Ohio waters of MU1 (-23.6%) and MU2 (-15.2%).

Angler harvest in kilograms per angler hour is presented graphically in Figure 1.4 for each management unit, by pooling jurisdictions' harvest weights and effort. In 2013, the sport harvest rate (in kg/hr) increased in MU3 (0.87; +15%), and MU4 (0.71; +30%), but decreased in MU1 (0.35; -20%), and MU2 (0.52; -8%) from 2012 rates.

Harvest from Ohio, Pennsylvania, and New York commercial trap nets in 2013 decreased 4.3% in MU2, 37.9% in MU3, and 10.7% in MU4. Compared to 2012, trap net effort (lifts) in 2013 decreased in MU2 (-15.4%), MU3 (-51.9%), and MU4 (-15.0%). There was no Ohio trap net harvest or effort in MU1 in 2013. In 2013, trap net harvest rates increased from 2012 in MU2 (+13.2%), MU3 (+29.2%), and MU4 (+5.0%).

### ***Age Composition and Growth***

Lakewide, the Yellow Perch harvest in 2013 consisted mostly of age-5 fish (2008 year class, 35.4%) and the pooled older cohorts (Ages 6+, 31.9%), with a fair contribution of age-3 fish (2010 year class, 21.9%; Table 1.6). In MU1, age-3 (2010 year class, 33.1%), age-5 (2008 year class, 28.0%), and age-4 fish (2009 year class, 19.5%) contributed most to the fishery. In MU2, the major age groups were age-5 (2008 year class, 38.8%), the pooled older cohorts (ages 6+ 31.2%), and age-3 (2010 year class 19.6%). In MU3, the pooled older cohorts (ages 6+

43.1%) and age-5 (2008 year class, 38.7%) fish contributed most to the fishery. In MU4 age-3 fish (2010 year class, 58.6%) and age-5 fish (2008 year class, 17.4%) contributed most to the fishery.

Yellow Perch growth differs among life stages and between basins as illustrated by trends in total length-at-age (Figure 1.9). For simplicity, Figure 1.9 is comprised of young-of-the-year data from summer and fall interagency trawls, while data for ages 1 through 4 are from Ontario Partnership gill net surveys (MUs 1 and 4) and Ohio fall trawls (MUs 2 and 3). As these data are taken from fall surveys, caution must be exercised when evaluating these figures. Seasonal exploitation patterns and density-dependent effects may alter the overall picture of growth trends. In addition, separate surveys in the same MU may show dissimilar trends in size-at-age due to north-south growth differences or fishery influences; however, size-at-age long-term time series results describe relatively stable length-at-age for ages 0 through 4 across the management units. Yellow Perch condition (K) in Figure 1.10 is comprised of data from Ontario Partnership gill net surveys (MUs 1 and 4) and Ohio fall trawls (MUs 2 and 3). Trends in condition may be influenced by seasonal differences in sampling. Additional data from Long Point Bay trawl surveys are used to determine condition of age-0 Yellow Perch in MU4.

The task group continues to update Yellow Perch growth data in: (1) weight-at-age values recorded annually in the harvest and (2) length- and weight-at-age values taken from interagency trawl and gill net surveys. These values are applied in the calculation of population biomass and the forecasting of harvest in the approaching year. Therefore, changes in weight-at-age factor into the changes in overall population biomass and determination of recommended allowable harvest (RAH). The YPTG uses a three-year average of weight-at-age to minimize the impacts of weak year classes on determining the mean weight-at-age of Yellow Perch in the population and in the harvest.

### ***Statistical Catch-at-Age Analysis***

Population size for each management unit was estimated by statistical catch-at-age analysis (SCAA) using the Auto Differentiation Model Builder (ADMB) computer program (Fournier et al. 2012), with a standard version that incorporates commercial gill net catchability coefficients based on the seasonal distribution of harvest and relative catch rates. Estimates of population size from 1993 to 2013, and projections for 2014 based on 2013 fishing, mortality and recruitment rates, are presented in Table 1.7. Abundance, biomass, survival, and exploitation rates are presented by management unit graphically for 1975 to 2013 in Figures 1.11 to 1.14. Mean

weights-at-age from assessment surveys were applied to abundance estimates to generate population biomass estimates (Table 1.8 and Figure 1.12). Population abundance and biomass estimates are critical to monitoring the status of stocks and determining recommended allowable harvest.

Abundance estimates should be interpreted with several caveats. Inclusion of abundance estimates from 1975 to 2013 implies that the time series are continuous. Lack of data continuity for the entire time series weakens the validity of this assumption. Survey data from multiple agencies are represented only in the latter part of the time series (since the late 1980s); methods of fishery data collection have also varied. Some model parameters are constrained to constants, such as natural mortality, catchability, and selectivity blocks. This technique lessens our ability to directly compare abundance levels over three decades. In addition, commercial gill net selectivity is estimated independently in the latter part of the time series using gill net selectivity curves derived from index gillnet data by the method of Helser (1998), involving back calculation of length-at-age and weightings based on the monthly distribution of harvest-at-age. With catch-at-age analysis the most recent year's population estimates inherently have the widest error bounds; this is to be expected for cohorts that remain at-large under less than full selectivity in the population.

The Partnership survey catchability estimate in MU4 was revised in 2014 to use a single time block for the entire survey time series. Previously, MU4 Partnership survey catchability was estimated using two time blocks (due to two missing years in the data set). However, this was inconsistent with the constant catchability assumption applied in MUs 1 through 3. Estimating a single time block for MU4 Partnership survey catchability ensures consistency with how Partnership survey catchability is estimated in the model.

In the catch-at-age model, population estimates are derived by minimizing an objective function weighted by data sources, including fishery effort, fishery catch, and survey catch rates. In 2011-2012, the YPTG group determined data weightings (referred to as lambdas in ADMB) using an expert opinion approach for evaluating potential sources of bias in data sets that could negatively influence model performance (YPTG 2012). These data weightings were also used again in 2013-2014 and are presented in Appendix A Table 1.

### ***Recruitment Estimator for Incoming Age-2 Yellow Perch***

In 2014, the YPTG implemented a multi-model inference (MMI) based approach for predicting age-2 recruitment. Previously, age-2 recruitment was predicted by robust regression of juvenile Yellow Perch trawl and gill net indices against catch-at-age analysis estimates of two-year-old abundance in each management unit. Only young-of-year and yearling indices that performed well in the regressions ( $r^2 > 0.50$ ) with age-2 abundance estimates were used for predicting age-2 recruitment (YPTG 2013) and mean values were generated from averaging results from those significant models. The new approach, developed by Michigan State University's Quantitative Fishery Center (QFC) during the LEPMAG process, provides a more objective response by using a multi-model information-theoretic recruitment estimate that is calculated using R code (Calcagno 2013). This approach generates a list of all possible ( $2^n$ ) non-redundant model formulas from a list of  $n$  explanatory variables (i.e. surveys) and fits each model with a pre-specified function (i.e. Generalized Linear Model or glm). All models falling within 2 AIC units of the 'best' model comprise the confidence set of models which generate the model-averaged coefficients. Surveys are not weighted equally in the models; the surveys which are more highly correlated with ADMB age-2 estimates are weighted more, thus having greater influence on the predictions. One caveat with the new approach is that years with any missing survey data cannot be used in the model, thereby truncating the time series. Furthermore, any survey required for the current year age-2 projection that was not performed must be removed from the list of  $n$  explanatory variables used by the *glmulti* analysis to generate possible candidate models. Only survey data from within each individual management unit was used to predict age-2 abundance in that management unit. Estimates of 2014 age-2 Yellow Perch recruitment (the 2012 year class) were 8.238, 30.396, 42.295, and 3.911 million fish in Management Units 1 through 4, respectively (Table 1.7, Appendix A Table 2a). Parameter estimates for the model-averaged coefficients for each MU are detailed in Appendix A Table 2b. A time-series comparison of model fit between the prior robust regression approach to predicting age-2 recruitment and the new MMI-based approach shows that the MMI method, on average, fits the ADMB age-2 estimates better for all management units (Figure 1.15). Despite low age-2 selectivity, the 2012 year class will make a moderate contribution to the fishery in management units 2 and 3, and a more minimal contribution in management units 1 and 4, in 2013.

Data from trawl and gill net index series for the time period examined are presented in Appendix A Table 3, while a key that summarizes abbreviations used for the trawl and gill net series is presented as a Legend in Appendix A Table 4. A subset of surveys listed in Appendix A



Table 3 were excluded from the multi-model estimation. Excluded surveys (shaded grey) included unblocked versions of the Ohio fall and summer trawl surveys, and redundant composite survey components in MU1 (OHS10 and OHS11) and MU4 (OLPN40, OLPN41, ILP40, ILP41, and OLPO41). Unblocked surveys were excluded because they failed to account for unequal sampling among depth strata, and composite survey components were excluded because their data was incorporated into composite surveys that better represent the distribution of age-0 and age-1 Yellow Perch abundance.

### ***2014 Population Size Projection***

Stock size estimates for Yellow Perch ages-3-and-older in 2014 were projected from statistical catch-at-age analysis (SCAA) estimates of 2013 population size and age-specific survival rates in 2013 (Table 1.8). Projected age-2 Yellow Perch recruitment from the 2012 year class (method described above) was added to the 2014 population estimate for older fish in each unit, producing the total standing stock in 2014 (Table 1.8). Standard errors and ranges for estimates are provided for each age in 2013 and following estimated survival from SCAA, for 2014. Descriptions of *min*, *mean*, and *max* population estimates refer to the age-specific mean estimates minus or plus one standard deviation (Table 1.8).

Stock size estimates for 2013 from SCAA in this report (Table 1.7) were lower than those projected previously in management units 1 through 4 (YPTG 2013). Differences in stock size estimates were due to additional data in the model. Current estimates of age-2 fish in 2013 are from the SCAA's first assessment of this cohort and, as such, have the widest error bounds.

Stock size estimates projected for 2014 were lower than 2013 in management units 1 and 4, but higher in management units 2 and 3 (Table 1.8, Figure 1.11). Abundance projections for 2014 were 17.859, 51.892, 70.273, and 14.694 million age-2-and-older Yellow Perch in management units 1 through 4, respectively. Abundance estimates of age-2-and-older Yellow Perch in 2014 are projected to increase by 21.0% and 39.9% in MU2 and MU3, and decrease by 11.0% and 19.2% in MU1 and MU4 compared to the 2013 abundance estimates. Ages-3-and-older Yellow Perch abundance in 2014 is projected to be 9.621, 21.496, 27.978, and 10.783 million fish in Units 1 through 4, respectively. Model estimates of abundance for age-3-and-older Yellow Perch for 2014 are projected to decrease from the 2013 estimates by 43.1%, 37.3%, 38.8%, and 27.8% in management units 1 through 4, respectively.

As a function of population estimates and mean weight-at-age from surveys, total biomass estimates of age-2-and-older Yellow Perch for 2014 are projected to decline in MU1 (-17.7%),

MU2 (-11.7%), MU3 (-4.5%), and MU4 (-11.7%) compared to 2013 (Table 1.8 and Figure 1.12). In 2014, age-2 (2012 year class) and ages 6+ (pooled cohorts) Yellow Perch are expected to represent the largest fraction of biomass in MUs 2 and 3. In MU1, age-2, age-4 (2010 year class), and ages 6+ Yellow Perch are expected to comprise the largest fraction of biomass. In MU4, age-4 Yellow Perch and ages-6+ Yellow Perch are expected to represent the largest fraction of total biomass.

Estimates of Yellow Perch survival for ages-3-and-older in 2012 were 49.0%, 52.3%, 54.7%, and 56.8% in MUs 1 through 4, respectively (Figure 1.13). In 2013, estimated survival rates of ages-3-and-older fish were 45.5%, 47.1%, 54.9%, and 58.0% in Units 1 through 4 (Table 1.8 and Figure 1.13). Estimates of Yellow Perch survival in 2013 for ages-2-and-older fish were: 48.0% in MU1, 50.1% in MU2, 55.7% in MU3, and 59.3% in MU4 (Table 1.8 and Figure 1.13). Survival estimates are a function of natural mortality and age-specific fishing mortality. Yellow Perch SCAA models used in this report assume that natural mortality is 0.4.

Estimated exploitation rates of ages-3-and-older Yellow Perch in 2012 were 22.3%, 18.3%, 15.3%, and 12.7% in Management Units 1 through 4, respectively. Exploitation rates for Yellow Perch ages-3-and-older fish in 2013 were estimated at 26.8%, 24.7%, 15.0%, and 11.1%, for MUs 1 through 4, respectively (Figure 1.14). Estimates of Yellow Perch exploitation for ages-2-and-older fish in 2013 were: 23.7% in MU1, 21.0% in MU2, 14.0% in MU3, and 9.5% in MU4 (Table 1.8 and Figure 1.14).

## **Charge 2: Harvest Strategy and RAH**

Fishing rates applied in 2014 are presented in Table 2.1, along with associated recommended allowable harvest (RAH) values for each management unit. These fishing rates are the same as those used in 2013. These interim harvest strategies were developed for a draft Yellow Perch Management Plan (YPMP; see Charge 3: Lake Erie Yellow Perch Management Plan) and tested using a Yellow Perch simulation (see YPTG 2010 report). The Yellow Perch simulation determined that fishing rates that were one-half of  $F_{msy}$  could support viable sport and commercial fisheries without inviting excessive biological risk. These target fishing rates applied to population estimates and their standard errors, were used to determine *min*, *mean*, and *max* RAH's for 2013 for each management unit (Tables 2.1 and 2.2).

Quota allocation by management unit and jurisdiction for 2014 was determined by the same methods applied in 2009-2013, using GIS applications of jurisdictional surface area of waters within each MU (Figure 2.1).

The allocation of shares by management unit and jurisdiction are:

Allocation of TAC within Management Unit and Jurisdiction, 2014:

<u>MU1:</u>	ONT	40.6%	OH	50.3%	MI	9.1%
<u>MU2:</u>	ONT	45.6%	OH	54.4%		
<u>MU3:</u>	ONT	52.3%	OH	32.4%	PA	15.3%
<u>MU4:</u>	ONT	58.0%	NY	31.0%	PA	11.0%

### **Charge 3: Yellow Perch Management Plan and Lake Erie Percid Management Advisory Group Management Strategy Evaluation**

With guidance from the Standing Technical Committee (STC), the YPTG was charged with supporting the development of a Lake Erie Yellow Perch Management Plan (YPMP). In February 2009, a draft YPMP was submitted to Michigan State University's Quantitative Fisheries Center (QFC) for a technical review of the background material, exploitation strategies, and associated Yellow Perch simulation. Despite changes in simulation methodology that followed, risk assessment, population and fishery objectives remain outstanding. Interim fishing rates, developed for the draft YPMP, currently applied in calculating RAH in MUs 1, 2 and 3, are  $\frac{1}{2}F_{msy}$ . They are 0.67, 0.67, and 0.70 for Management Units 1–3, respectively. In MU4, a more conservative fishing rate of 0.30 was chosen.

Pursuant to the goal of developing the YPMP, the Lake Erie Committee (LEC), STC, QFC, and stakeholder groups from all Lake Erie jurisdictions have formed the Lake Erie Percid Management Advisory Group (LEPMAG), to address stakeholder objectives, modeling concerns, and exploitation policies for Lake Erie percids. In 2013, LEPMAG, facilitated by the QFC, continued to review existing YPTG models and data sources, and continued discussions on stakeholder objectives and catch-at-age modeling concerns for Yellow Perch. These discussions are expected to produce updated SCAA models and new harvest control/exploitation strategies that lead to the completion of a new Lake Erie Yellow Perch Management Plan.

In 2013, the LEPMAG reviewed output from QFC-proposed changes to existing Yellow Perch management models including changes made to the estimation of catchability, selectivity, recruitment, and age composition, along with an evaluation of the potential consequences of migration between management units. Preliminary results show improvements in model fit for Management Units 1 through 3, attributed to incorporating random walk catchability for fishery

dependent and fishery independent datasets, and estimating selectivity for all datasets within the models. Model performance in MU4 remains an issue. Migration rates between management units were found to have low to modest impact on estimated spawner abundance when migration rates across MUs were low (less than 20%), but migration rates greater than 20% were confounding catchability with abundance, indicating that the current models have difficulty accounting for movement rates that exceed 20%. Future tagging studies will be necessary to quantify Yellow Perch movement rates across management unit border delineations. Existing data suggests that movement rates among management units are less than the 20% threshold for all units. QFC also proposed a new approach for projecting age-2 recruitment using multi-model inference (MMI), which was evaluated and subsequently implemented in 2014 and is described above in this report.

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**Table 1.1.** Lake Erie Yellow Perch harvest in pounds by management unit (Unit) and agency, 2000-2013.

Year	Ontario*		Ohio		Michigan		Pennsylvania		New York		Total Harvest
	Harvest	%	Harvest	%	Harvest	%	Harvest	%	Harvest	%	
<b>Unit 1</b>											
2000	980,323	47	1,038,650	50	67,010	3	--	--	--	--	2,085,983
2001	813,066	45	915,641	51	70,910	4	--	--	--	--	1,799,617
2002	1,454,105	50	1,316,553	45	147,065	5	--	--	--	--	2,917,723
2003	1,179,667	44	1,406,385	53	84,878	3	--	--	--	--	2,670,930
2004	1,698,761	59	1,090,669	38	94,732	3	--	--	--	--	2,884,162
2005	1,513,890	60	965,231	38	49,485	2	--	--	--	--	2,528,606
2006	1,325,464	54	1,055,378	43	62,854	3	--	--	--	--	2,443,696
2007	727,678	41	982,677	55	62,815	4	--	--	--	--	1,773,170
2008	580,050	56	409,705	39	47,934	5	--	--	--	--	1,037,689
2009	853,137	61	463,564	33	87,319	6	--	--	--	--	1,404,020
2010	879,358	47	889,512	48	83,725	5	--	--	--	--	1,852,595
2011	870,802	48	796,447	44	145,960	8	--	--	--	--	1,813,209
2012	752,872	44	883,245	51	93,291	5	--	--	--	--	1,729,408
2013	648,884	44	750,052	51	76,994	5	--	--	--	--	1,475,930
<b>Unit 2</b>											
2000	1,484,125	56	1,169,234	44	--	--	--	--	--	--	2,653,359
2001	1,794,275	51	1,747,069	49	--	--	--	--	--	--	3,541,344
2002	2,190,621	52	1,986,730	48	--	--	--	--	--	--	4,177,351
2003	2,107,639	50	2,113,285	50	--	--	--	--	--	--	4,220,924
2004	2,051,473	48	2,246,264	52	--	--	--	--	--	--	4,297,737
2005	2,666,231	59	1,843,190	41	--	--	--	--	--	--	4,509,421
2006	3,102,269	69	1,393,732	31	--	--	--	--	--	--	4,496,001
2007	1,847,139	45	2,244,656	55	--	--	--	--	--	--	4,091,795
2008	1,990,237	50	2,005,000	50	--	--	--	--	--	--	3,995,237
2009	2,495,611	58	1,801,978	42	--	--	--	--	--	--	4,297,589
2010	1,888,876	56	1,457,823	44	--	--	--	--	--	--	3,346,699
2011	1,665,258	54	1,399,503	46	--	--	--	--	--	--	3,064,761
2012	1,877,615	50	1,851,846	50	--	--	--	--	--	--	3,729,461
2013	1,803,684	51	1,718,270	49	--	--	--	--	--	--	3,521,954
<b>Unit 3</b>											
2000	771,646	62	443,250	36	--	--	32,613	3	--	--	1,247,509
2001	999,450	64	464,811	30	--	--	91,211	6	--	--	1,555,472
2002	1,192,691	60	640,104	32	--	--	140,821	7	--	--	1,973,616
2003	1,667,133	72	481,558	21	--	--	177,516	8	--	--	2,326,207
2004	1,453,419	62	659,447	28	--	--	244,063	10	--	--	2,356,929
2005	1,771,800	75	457,593	19	--	--	142,028	6	--	--	2,371,421
2006	3,451,499	90	271,144	7	--	--	106,260	3	--	--	3,828,903
2007	2,997,101	84	391,285	11	--	--	193,065	5	--	--	3,581,451
2008	2,200,168	74	629,366	21	--	--	155,014	5	--	--	2,984,548
2009	2,266,727	74	597,214	20	--	--	190,742	6	--	--	3,054,683
2010	3,370,099	85	476,808	12	--	--	117,640	3	--	--	3,964,547
2011	3,366,412	81	636,686	15	--	--	153,233	4	--	--	4,156,331
2012	3,768,183	81	746,999	16	--	--	161,751	3	--	--	4,676,933
2013	2,983,539	77	755,193	19	--	--	155,193	4	--	--	3,893,925
<b>Unit 4</b>											
2000	35,686	73	--	--	--	--	10,950	22	2,458	5	49,094
2001	35,893	60	--	--	--	--	8,337	14	15,319	26	59,549
2002	87,541	54	--	--	--	--	46,903	29	26,903	17	161,347
2003	84,772	60	--	--	--	--	39,821	28	16,511	12	141,104
2004	98,733	49	--	--	--	--	46,344	23	54,862	27	199,939
2005	195,347	67	--	--	--	--	42,226	15	53,468	18	291,041
2006	230,226	69	--	--	--	--	57,005	17	48,107	14	335,338
2007	185,954	78	--	--	--	--	25,859	11	25,935	11	237,748
2008	240,270	77	--	--	--	--	31,325	10	40,809	13	312,404
2009	272,579	72	--	--	--	--	37,991	10	70,030	18	380,600
2010	467,612	89	--	--	--	--	19,989	4	37,730	7	525,331
2011	468,001	80	--	--	--	--	37,040	6	80,848	14	585,889
2012	502,778	77	--	--	--	--	41,362	6	106,499	16	650,639
2013	496,666	72	--	--	--	--	74,277	11	119,869	17	690,812
<b>Lakewide Totals</b>											
2000	3,271,780	54	2,651,134	44	67,010	1	43,563	<1	2,458	<1	6,035,945
2001	3,642,684	52	3,127,521	45	70,910	1	99,548	1	15,319	<1	6,955,982
2002	4,924,958	53	3,943,387	43	147,065	2	187,724	2	26,903	<1	9,230,037
2003	5,039,211	54	4,001,228	43	84,878	1	217,337	2	16,511	<1	9,359,165
2004	5,302,386	54	3,996,380	41	94,732	1	290,407	3	54,862	<1	9,738,767
2005	6,147,268	63	3,266,014	34	49,485	<1	184,254	2	53,468	<1	9,700,489
2006	8,109,458	73	2,720,254	24	62,854	<1	163,265	1	48,107	<1	11,103,938
2007	5,757,872	59	3,618,618	37	62,815	<1	218,924	2	25,935	<1	9,684,164
2008	5,010,725	60	3,044,071	37	47,934	<1	186,339	2	40,809	<1	8,329,878
2009	5,888,054	64	2,862,756	31	87,319	1	228,733	3	70,030	1	9,136,892
2010	6,605,945	68	2,824,143	29	83,725	1	137,629	1	37,730	<1	9,689,172
2011	6,370,473	66	2,832,636	29	145,960	2	190,273	2	80,848	1	9,620,190
2012	6,901,448	64	3,482,090	32	93,291	1	203,113	2	106,499	1	10,786,441
2013	5,932,773	62	3,223,515	34	76,994	1	229,470	2	119,869	1	9,582,621

\*processor weight (quota debit weight) to 2001; fisher/observer weight from 2002 to 2013 (negating ice allowance).

**Table 1.2.** Harvest, effort and harvest per unit effort summaries for Lake Erie Yellow Perch fisheries in Management Unit 1 (Western Basin) by agency and gear type, 2000-2013.

	Year	Unit 1					
		Michigan	Ohio		Ontario	Gill Nets	Ontario
		Sport	Trap Nets	Sport	Small Mesh	Large Mesh*	Trap Nets
<b>Harvest</b> (pounds)	2000	67,010	240,541	798,109	980,323	--	--
	2001	70,910	179,234	736,407	711,745	101,321	--
	2002	147,065	337,829	978,724	1,359,637	94,468	--
	2003	84,879	250,456	1,155,929	1,151,358	28,309	--
	2004	94,732	289,136	801,533	1,637,488	61,273	--
	2005	49,485	357,182	608,049	1,402,523	111,082	--
	2006	62,854	235,852	819,526	1,264,370	61,094	--
	2007	62,815	200,818	781,859	671,536	56,142	--
	2008	47,934	0	409,705	484,409	49,378	46,263
	2009	87,319	0	463,564	728,012	125,024	70
	2010	83,725	195,674	693,838	815,170	64,188	--
	2011	145,960	156,138	640,309	792,336	78,363	103
	2012	93,291	0	883,245	718,585	34,172	115
	2013	76,994	0	750,052	608,241	40,617	26
<b>Harvest</b> (Metric) (tonnes)	2000	30	109	362	445	--	--
	2001	32	81	334	323	46	--
	2002	67	153	444	617	43	--
	2003	38	114	524	522	13	--
	2004	43	131	364	743	28	--
	2005	22	162	276	636	50	--
	2006	29	107	372	573	28	--
	2007	28	91	355	305	25	--
	2008	22	0	186	220	22	20.98
	2009	40	0	210	330	57	0.03
	2010	38	89	315	370	29	--
	2011	66	71	290	359	36	0.05
	2012	42	0	401	326	15	0.05
	2013	35	0	340	276	18	0.01
<b>Effort</b> (a)	2000	122,447	4,026	965,628	6,741	--	--
	2001	97,761	1,518	720,923	2,167	2,142	--
	2002	190,573	2,715	900,289	4,546	739	--
	2003	121,638	2,213	1,182,694	3,725	395	--
	2004	206,902	4,351	833,690	6,052	901	--
	2005	98,429	3,903	816,959	5,170	1,182	--
	2006	118,628	3,517	683,994	5,194	787	--
	2007	181,698	2,951	823,624	2,230	1,125	--
	2008	95,925	0	519,050	1,653	899	--
	2009	130,556	0	578,303	3,058	1,680	--
	2010	132,852	2,607	798,240	3,152	845	--
	2011	139,344	3,219	729,369	2,571	682	--
	2012	128,013	0	896,083	2,244	438	--
	2013	130,809	0	946,138	3,412	547	--
<b>Harvest Rates</b> (b)	2000	2.2	27.1	3.0	66.0	--	--
	2001	2.9	53.5	3.4	149.0	21.5	--
	2002	2.5	56.4	3.4	135.6	58.0	--
	2003	2.4	51.3	3.5	140.2	32.5	--
	2004	1.6	30.1	3.0	122.7	30.8	--
	2005	1.7	41.5	3.1	123.0	42.6	--
	2006	1.7	30.4	4.2	110.4	35.2	--
	2007	1.0	30.9	3.4	136.6	22.6	--
	2008	1.5	--	2.7	132.9	24.9	--
	2009	2.7	--	3.1	108.0	33.8	--
	2010	2.3	34.0	3.4	117.3	34.4	--
	2011	3.4	22.0	3.5	139.8	52.1	--
	2012	2.4	--	3.6	145.3	35.4	--
	2013	1.7	--	2.8	80.8	33.7	--

(a) sport effort in angler-hours; gill net effort in km; trap net effort in lifts

(b) harvest rates for sport in fish/hr, gill net in kg/km, trap net in kg/lift

(\*) large mesh catch rates are not targeted and therefore of limited value

**Table 1.3.** Harvest, effort and harvest per unit effort summaries for Lake Erie Yellow Perch fisheries in Management Unit 2 (western Central Basin) by agency and gear type, 2000-2013.

	Year	Unit 2				
		Ohio		Ontario Gill Nets		Ontario
		Trap Nets	Sport	Small Mesh	Large Mesh*	Trawls
<b>Harvest</b> (pounds)	2000	565,009	604,225	1,484,125	--	--
	2001	905,088	841,891	1,593,704	200,571	
	2002	1,099,971	886,759	1,892,070	298,551	
	2003	1,255,205	858,080	2,019,617	88,022	
	2004	1,287,747	958,517	1,893,871	157,602	
	2005	1,162,746	680,444	2,446,007	219,723	
	2006	744,452	649,280	2,981,793	120,476	
	2007	1,701,552	543,104	1,561,287	173,699	112,153
	2008	1,376,588	628,412	1,669,682	253,984	66,203
	2009	1,338,616	463,362	1,994,208	482,402	15,439
	2010	935,616	522,207	1,410,051	470,926	7,899
	2011	1,070,817	328,686	1,312,168	339,404	13,686
	2012	1,285,336	566,510	1,550,104	314,440	13,071
	2013	1,230,249	488,021	1,657,811	145,475	398
<b>Harvest</b> (Metric) (tonnes)	2000	256	274	673	--	
	2001	410	382	723	91	
	2002	499	402	858	135	
	2003	569	389	916	40	
	2004	584	435	859	71	
	2005	527	309	1,109	100	
	2006	338	294	1,352	55	
	2007	772	246	708	79	51
	2008	624	285	757	115	30
	2009	607	210	904	219	7
	2010	424	237	639	214	4
	2011	486	149	595	154	6
	2012	583	257	703	143	6
	2013	558	221	752	66	0
<b>Effort</b> (a)	2000	5,272	601,712	6,266	--	
	2001	4,747	594,741	3,445	4,975	
	2002	7,675	658,799	4,786	3,209	
	2003	10,214	632,813	5,311	1,555	
	2004	12,023	659,454	4,929	2,787	
	2005	9,103	784,942	9,716	2,173	
	2006	7,544	499,412	11,692	1,925	
	2007	9,158	498,843	2,966	2,826	
	2008	3,983	450,060	3,124	2,629	
	2009	6,317	417,660	5,545	4,241	
	2010	6,701	502,507	3,783	3,905	
	2011	5,707	395,407	4,214	3,789	
	2012	6,919	456,404	4,616	2,942	
	2013	5,851	428,187	6,821	1,951	
<b>Harvest Rates</b> (b)	2000	48.6	2.9	107.4	--	
	2001	86.5	3.2	209.9	18.3	
	2002	65.0	3.1	179.3	42.1	
	2003	55.7	3.3	172.5	25.7	
	2004	48.6	3.7	174.3	25.6	
	2005	57.9	2.8	114.2	45.9	
	2006	44.8	3.7	115.7	28.4	
	2007	84.3	2.8	238.7	27.9	
	2008	156.7	3.5	242.4	43.8	
	2009	96.1	3.0	163.1	51.6	
	2010	63.3	3.2	169.0	54.7	
	2011	85.1	2.6	141.2	40.6	
	2012	84.2	3.1	152.3	48.5	
	2013	95.4	2.6	124.5	33.8	

(a) sport effort in angler-hours; gill net effort in km; trap net effort in lifts

(b) harvest rates for sport in fish/hr, gill net in kg/km, trap net in kg/lift

(\*) large mesh catch rates are not targeted and therefore of limited value



**Table 1.4.** Harvest, effort and harvest per unit effort summaries for Lake Erie Yellow Perch fisheries in Management Unit 3 (eastern Central Basin) by agency and gear type, 2000-2013.

	Year	Unit 3						Ontario Trawls
		Ohio		Pennsylvania		Ontario Gill Nets		
		Trap Nets	Sport	Trap Nets	Sport	Small Mesh	Large Mesh*	
<b>Harvest</b> (pounds)	2000	156,510	286,740	5,930	26,683	771,646	--	
	2001	4,472	460,339	2,602	96,946	948,622	50,828	
	2002	0	640,104	2,009	138,812	1,094,894	97,797	
	2003	0	481,559	5,050	172,467	1,647,047	20,086	
	2004	0	659,447	7,753	236,310	1,443,314	10,105	
	2005	43,253	414,340	15,228	126,800	1,657,498	113,969	
	2006	70,310	200,834	20,467	85,793	3,332,037	119,461	
	2007	48,286	342,999	23,471	169,594	2,941,451	42,570	13,080
	2008	139,023	490,343	22,927	132,087	2,160,041	32,673	7,454
	2009	112,030	485,184	35,296	155,446	2,180,834	77,858	8,035
	2010	153,097	323,711	36,026	104,224	3,065,336	302,410	2,353
	2011	327,871	308,815	1,542	151,691	2,911,506	451,628	3,278
	2012	469,401	277,598	15,405	146,346	3,653,296	114,640	247
	2013	300,346	454,847	790	154,403	2,818,241	164,712	586
<b>Harvest</b> (Metric) (tonnes)	2000	71	130	2.7	12	350	--	
	2001	2.0	209	1.2	44	430	23	
	2002	0	290	0.9	63	497	44	
	2003	0	218	2.3	78	747	9.1	
	2004	0	299	3.5	107	655	4.6	
	2005	20	188	6.9	58	752	52	
	2006	32	91	9.3	39	1,511	54	
	2007	22	156	10.6	77	1,334	19	5.9
	2008	63	222	10.4	60	980	15	3.4
	2009	51	220	16.0	70	989	35	3.6
	2010	69	147	16.3	47	1,390	137	1.1
	2011	149	140	0.7	69	1,320	205	1.5
	2012	213	126	7.0	66	1,657	52	0.1
	2013	136	206	0.4	70	1,278	75	0.3
<b>Effort</b> (a)	2000	1,640	214,825	231	48,561	2,342	--	
	2001	32	269,062	175	90,214	2,451	1,047	
	2002	0	416,543	95	123,287	2,490	1,055	
	2003	0	256,890	87	138,720	4,617	316	
	2004	0	368,537	70	175,596	3,750	268	
	2005	947	305,885	129	127,462	5,098	743	
	2006	881	139,536	124	60,612	11,130	1,030	
	2007	713	218,683	88	135,611	6,115	614	
	2008	1,288	234,179	78	110,403	3,336	417	
	2009	482	289,602	121	139,438	4,050	728	
	2010	972	182,485	128	85,294	5,747	1,125	
	2011	1,108	182,630	37	94,025	6,093	1,481	
	2012	2,074	154,474	87	98,234	7,847	991	
	2013	1,014	232,234	25	83,739	6,037	968	
<b>Harvest Rates</b> (b)	2000	43.3	3.0	11.6	1.9	149.4	--	
	2001	63.4	2.9	6.7	2.6	175.4	22.0	
	2002	--	2.7	9.6	3.6	199.6	41.7	
	2003	--	3.1	26.3	5.3	161.8	28.8	
	2004	--	4.3	50.2	3.9	174.6	17.1	
	2005	20.7	3.1	53.5	2.9	147.4	69.6	
	2006	36.2	3.3	74.9	3.7	135.8	52.6	
	2007	30.7	3.4	121.0	3.8	218.2	31.4	
	2008	49.0	4.6	133.3	4.5	293.6	35.5	
	2009	105.4	3.5	132.3	4.8	244.2	48.5	
	2010	71.4	4.0	127.6	4.0	241.9	121.9	
	2011	134.2	4.1	18.9	5.3	216.7	138.3	
	2012	102.6	4.5	80.3	4.7	211.1	52.5	
	2013	134.3	5.0	14.3	5.2	211.7	77.2	

(a) sport effort in angler-hours; gill net effort in km; trap net effort in lifts

(b) harvest rates for sport in fish/hr, gill net in kg/km, trap net in kg/lift

(\*) large mesh catch rates are not targeted and therefore of limited value

**Table 1.5.** Harvest, effort and harvest per unit effort summaries for Lake Erie Yellow Perch fisheries in Management Unit 4 (Eastern Basin) by agency and gear type, 2000-2013.

	Year	Unit 4					
		New York		Pennsylvania		Ontario Gill Nets	
		Trap Nets	Sport	Trap Nets	Sport	Small Mesh	Large Mesh*
<b>Harvest</b> (pounds)	2000	625	1,833	0	10,950	35,686	--
	2001	27	15,292	0	8,337	34,284	1,608
	2002	1,951	24,952	29	46,874	85,935	1,606
	2003	1,048	15,464	0	39,822	84,648	124
	2004	3,907	50,955	0	90,514	98,716	17
	2005	7,726	45,742	0	42,226	195,258	52
	2006	9,423	38,684	0	57,005	229,063	1,163
	2007	9,511	16,424	0	25,859	179,595	3,076
	2008	11,136	29,673	0	31,325	234,366	2,689
	2009	13,476	56,554	0	37,991	266,425	4,738
	2010	11,772	25,958	0	26,263	465,775	1,517
	2011	15,045	65,803	0	37,040	464,331	2,761
	2012	17,709	88,790	0	41,362	499,359	833
	2013	15,814	104,055	0	74,277	492,233	2,778
<b>Harvest</b> (Metric) (tonnes)	2000	0.3	0.8	0	5.0	16.2	--
	2001	0.01	6.9	0	3.8	15.5	0.73
	2002	0.9	11.3	0.01	21.3	39.0	0.70
	2003	0.5	7.0	0	18.1	38.4	0.06
	2004	1.8	23.1	0	41.0	44.8	0.01
	2005	3.5	20.7	0	19.2	88.6	0.02
	2006	4.3	17.5	0	25.9	103.9	0.53
	2007	4.3	7.4	0	11.7	81.4	1.40
	2008	5.1	13.5	0	14.2	106.3	1.22
	2009	6.1	25.6	0	17.2	120.8	2.15
	2010	5.3	11.8	0	11.9	211.2	0.69
	2011	6.8	29.8	0	16.8	210.6	1.25
	2012	8.0	40.3	0	18.8	226.5	0.38
	2013	7.2	47.2	0	33.7	223.2	1.26
<b>Effort</b> (a)	2000	44	2,606	0	21,146	314	--
	2001	39	22,950	0	12,451	128	28.0
	2002	89	44,270	9	61,734	224	28.0
	2003	91	33,162	0	32,525	373	21.0
	2004	44	73,056	0	62,639	355	3.2
	2005	179	58,667	0	70,921	782	7.8
	2006	208	46,174	0	47,274	1,007	31.8
	2007	144	29,999	0	31,545	550	62.1
	2008	137	34,511	0	27,041	569	69.2
	2009	215	58,829	0	58,475	718	50.9
	2010	287	35,526	0	26,544	1,227	21.7
	2011	383	50,479	0	48,537	1,564	28.6
	2012	428	58,621	0	49,577	1,770	12.9
	2013	364	65,750	0	48,093	1,932	14.5
<b>Harvest Rates</b> (b)	2000	6.4	0.20	--	1.7	51.5	--
	2001	0.3	1.65	--	1.5	121.5	26.0
	2002	9.9	1.13	1.5	2.4	174.0	25.0
	2003	5.2	0.76	--	1.9	102.9	2.9
	2004	40.3	1.14	--	1.7	126.1	2.4
	2005	19.6	1.23	--	1.8	113.2	3.0
	2006	20.5	1.36	--	2.9	103.2	16.6
	2007	30.0	0.97	--	1.5	148.1	22.5
	2008	36.9	1.68	--	6.4	186.8	17.6
	2009	28.4	1.77	--	3.2	168.3	42.2
	2010	18.6	1.31	--	2.2	172.1	31.7
	2011	17.8	2.01	--	2.9	134.6	43.8
	2012	18.8	2.17	--	2.5	127.9	29.3
	2013	19.7	2.59	--	2.9	115.5	87.1

(a) sport effort in angler-hours; gill net effort in km; trap net effort in lifts

(b) harvest rates for sport in fish/hr, gill net in kg/km, trap net in kg/lift

(\*) large mesh catch rates are not targeted and therefore of limited value

**Table 1.6.** Estimated 2013 Lake Erie Yellow Perch harvest by age and numbers of fish by gear and management unit (Unit).

Gear	Age	Unit 1		Unit 2		Unit 3		Unit 4		Lakewide	
		Number	%	Number	%	Number	%	Number	%	Number	%
<b>Gill Nets</b>	1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	2	70,262	3.3	47,552	0.9	27,456	0.3	140,052	9.7	285,323	1.6
	3	564,787	26.4	1,297,852	23.9	987,987	11.0	960,602	66.3	3,811,228	21.2
	4	343,605	16.1	409,258	7.5	293,637	3.3	33,748	2.3	1,080,248	6.0
	5	736,762	34.4	2,150,998	39.6	3,589,871	40.0	194,697	13.4	6,672,328	37.1
	6+	424,536	19.8	1,527,381	28.1	4,076,764	45.4	119,633	8.3	6,148,314	34.2
<b>Total</b>		2,139,952	47.5	5,433,042	53.3	8,975,715	78.9	1,448,731	79.4	17,997,440	63.0
<b>Trap Nets</b>	1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	2	0	0.0	25,796	0.7	0	0.0	0	0.0	25,796	0.6
	3	0	0.0	449,276	12.6	120,656	14.6	1,800	4.7	571,732	12.9
	4	0	0.0	392,910	11.0	48,416	5.8	1,029	2.7	442,355	10.0
	5	0	0.0	1,418,010	39.7	328,922	39.7	11,057	28.7	1,757,989	39.6
	6+	0	0.0	1,281,572	35.9	331,226	39.9	24,684	64.0	1,637,482	36.9
<b>Total</b>		0	0.0	3,567,564	35.0	829,220	7.3	38,569	2.1	4,435,353	15.5
<b>Sport</b>	1	39,472	1.3	1,885	0.2	1,094	0.1	0	0.0	42,451	0.7
	2	116,490	3.9	66,854	5.6	78,929	5.0	7,533	2.2	269,806	4.4
	3	1,141,590	37.8	252,085	21.3	370,186	23.6	108,278	32.0	1,872,139	30.6
	4	664,263	22.0	113,095	9.5	141,725	9.0	20,640	6.1	939,723	15.4
	5	707,105	23.4	381,547	32.2	482,381	30.7	112,668	33.3	1,683,701	27.5
	6+	352,482	11.7	369,902	31.2	495,311	31.6	89,145	26.4	1,306,840	21.4
<b>Total</b>		3,021,402	58.5	1,185,368	11.6	1,569,626	13.8	338,264	18.5	6,114,660	21.4
<b>All Gear</b>	1	39,472	0.8	1,885	0.0	1,094	0.0	0	0.0	42,451	0.1
	2	186,752	3.6	140,202	1.4	106,385	0.9	147,585	8.1	580,925	2.0
	3	1,706,377	33.1	1,999,213	19.6	1,478,829	13.0	1,070,679	58.6	6,255,098	21.9
	4	1,007,868	19.5	915,263	9.0	483,778	4.3	55,417	3.0	2,462,325	8.6
	5	1,443,867	28.0	3,950,555	38.8	4,401,174	38.7	318,421	17.4	10,114,018	35.4
	6+	777,018	15.1	3,178,855	31.2	4,903,301	43.1	233,462	12.8	9,092,637	31.9
<b>Total</b>		5,161,354	18.1	10,185,974	35.7	11,374,561	39.8	1,825,564	6.4	28,547,454	100.0

Note: Values in italics delineate harvest percentage by gear in each Unit, while the values in the 'All Gear' boxes are for lakewide harvest percentage by Unit.

**Table 1.7.** Yellow Perch stock size (millions of fish) in each Lake Erie management unit. Abundance in the years 1993 to 2013 are estimated by ADMB catch-age analysis. The 2014 population estimates use age-2 Yellow Perch estimates derived from multi-model averaging of generalized linear models of ADMB age-2 abundance against YOY and yearling survey indices (see Appendix A) in an R program.

Age	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
<b>Unit 1</b>																							
2	3.840	9.377	23.381	29.289	22.724	44.186	10.518	34.366	33.765	7.834	41.024	3.253	53.632	1.598	9.330	10.254	24.550	15.860	9.662	13.693	3.144	8.238	
3	8.675	1.534	5.652	14.267	17.415	14.071	27.153	6.709	21.863	21.771	5.015	25.800	2.069	33.264	1.027	5.620	6.332	15.519	10.136	6.197	8.597	1.920	
4	1.931	2.207	0.647	2.515	6.133	8.041	7.000	14.806	3.676	12.904	11.239	2.750	11.961	1.022	13.275	0.555	2.944	3.268	8.199	5.511	3.251	4.131	
5	0.149	0.315	0.509	0.182	0.688	1.941	3.017	3.212	7.448	2.007	5.330	5.050	1.027	4.363	0.418	5.367	0.302	1.441	1.564	3.917	2.647	1.417	
6+	0.078	0.028	0.076	0.175	0.094	0.169	0.495	1.333	2.045	4.959	2.480	3.219	2.416	1.022	1.659	0.803	3.073	1.605	1.404	1.337	2.422	2.153	
<b>2 and Older</b>	14.673	13.460	30.266	46.429	47.054	68.408	48.183	60.427	68.797	49.475	65.088	40.071	71.105	41.268	25.709	22.600	37.200	37.693	30.965	30.656	20.061	17.859	
<b>3 and Older</b>	10.832	4.083	6.885	17.140	24.330	24.222	37.665	26.060	35.031	41.641	24.064	36.818	17.473	39.670	16.379	12.345	12.650	21.833	21.303	16.963	16.917	9.621	
<b>Unit 2</b>																							
2	6.343	12.731	13.213	27.120	14.434	62.077	15.499	54.983	48.506	11.352	88.664	5.095	198.889	5.327	23.907	27.413	55.748	47.702	7.717	18.549	8.574	30.396	
3	10.597	3.017	7.290	7.358	13.199	7.500	32.984	9.590	33.164	28.780	7.152	53.612	3.319	128.092	3.509	15.573	18.088	36.148	31.000	5.075	11.633	5.327	
4	2.399	4.043	1.060	2.659	2.902	4.264	3.215	18.342	5.282	18.780	15.417	4.014	28.461	1.924	72.895	2.095	9.468	10.723	21.529	19.045	3.017	6.340	
5	0.223	0.678	0.823	0.210	0.582	0.517	0.914	1.582	8.836	2.586	8.567	6.584	1.934	12.796	1.139	35.392	1.119	4.708	5.723	11.856	9.759	1.317	
6+	0.191	0.104	0.159	0.196	0.089	0.078	0.091	0.416	0.930	4.782	3.347	5.140	5.403	3.325	7.642	4.215	21.265	10.850	8.009	7.389	9.890	8.512	
<b>2 and Older</b>	19.753	20.573	22.544	37.542	31.206	74.435	52.703	84.913	96.718	66.280	123.147	74.445	238.007	151.465	109.092	84.687	105.688	110.130	73.978	61.914	42.873	51.892	
<b>3 and Older</b>	13.410	7.842	9.332	10.423	16.772	12.358	37.204	29.930	48.212	54.928	34.483	69.350	39.118	146.138	85.185	57.275	49.940	62.429	66.261	43.365	34.299	21.496	
<b>Unit 3</b>																							
2	3.005	6.425	7.266	13.714	10.816	44.317	12.498	47.317	27.522	6.895	38.804	4.625	158.112	6.281	32.336	48.326	44.459	51.340	5.000	25.139	4.507	42.295	
3	2.332	1.503	3.707	4.506	8.738	6.850	28.774	8.127	30.650	17.662	4.435	25.190	3.035	105.041	4.165	20.384	32.151	29.710	34.028	3.342	16.060	2.857	
4	1.323	0.998	0.792	2.182	2.655	4.859	4.155	18.470	5.157	19.489	11.048	2.754	15.579	1.881	59.089	2.563	12.903	21.050	19.001	22.347	1.993	9.247	
5	0.250	0.443	0.326	0.401	1.109	1.361	2.739	2.611	11.232	3.201	11.676	6.482	1.620	9.002	1.038	33.908	1.550	8.090	12.643	12.030	12.125	1.120	
6+	0.317	0.194	0.230	0.286	0.345	0.691	1.070	2.337	2.974	8.748	7.187	11.073	10.277	6.926	7.221	4.680	23.337	15.555	13.864	16.566	15.558	14.753	
<b>2 and Older</b>	7.227	9.563	12.322	21.089	23.663	58.079	49.236	78.861	77.534	55.995	73.151	50.123	188.622	129.131	103.848	109.861	114.400	125.744	84.536	79.423	50.244	70.273	
<b>3 and Older</b>	4.222	3.137	5.056	7.375	12.847	13.761	36.738	31.544	50.012	49.100	34.347	45.498	30.510	122.849	71.512	61.535	69.941	74.404	79.536	54.285	45.736	27.978	
<b>Unit 4</b>																							
2	0.246	0.146	1.299	0.775	0.349	4.137	1.645	13.260	2.857	1.910	7.115	1.308	10.089	0.867	7.934	8.480	7.012	11.643	1.269	14.228	3.252	3.911	
3	0.055	0.157	0.094	0.857	0.511	0.230	2.771	1.091	8.851	1.914	1.279	4.754	0.867	6.680	0.578	5.255	5.638	4.696	7.736	0.842	9.138	2.120	
4	0.158	0.025	0.077	0.055	0.500	0.297	0.151	1.767	0.720	5.914	1.268	0.836	3.067	0.543	3.971	0.375	3.407	3.720	2.983	4.814	0.525	5.449	
5	0.097	0.047	0.009	0.038	0.028	0.256	0.188	0.094	1.147	0.480	3.839	0.806	0.524	1.868	0.312	2.533	0.240	2.195	2.269	1.818	2.783	0.302	
6+	0.199	0.087	0.047	0.027	0.032	0.030	0.172	0.220	0.202	0.896	0.871	2.939	2.295	1.679	1.945	1.440	2.497	1.731	2.353	2.723	2.482	2.912	
<b>2 and Older</b>	0.755	0.463	1.526	1.752	1.420	4.950	4.927	16.432	13.777	11.114	14.372	10.643	16.843	11.638	14.740	18.082	18.795	23.984	16.610	24.426	18.179	14.694	
<b>3 and Older</b>	0.509	0.317	0.227	0.976	1.071	0.813	3.283	3.172	10.921	9.204	7.257	9.335	6.754	10.770	6.806	9.603	11.783	12.342	15.341	10.198	14.927	10.783	

**Table 1.8.** Projection of the 2014 Lake Erie Yellow Perch population. Stock size estimates are derived from survival from ADMB 2013 abundance, and age-2 estimates for 2014 are derived from multi-model averaging of generalized linear models of ADMB age-2 abundance against YOY and yearling survey indices (see Appendix A) in an R program. Standard errors are produced from ADMB catch-age and MMI analyses.

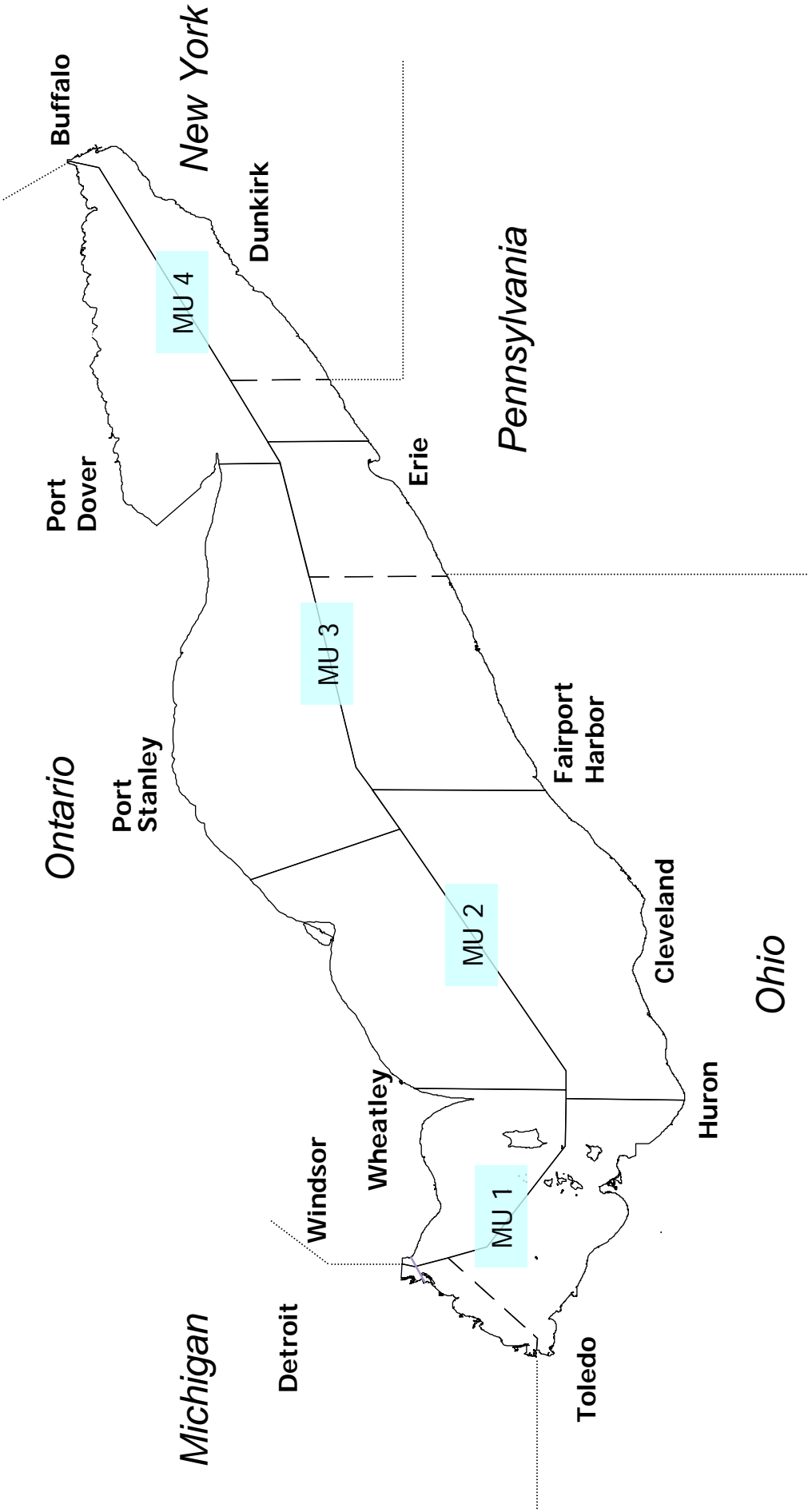
Age	2013 Parameters										2014 Parameters										Stock Biomass	
	Stock Size (millions of fish)					Mortality Rates					Survival Rate					Stock Size (millions of fish)					3-yr Mean Weight in Pop'n. (kg)	
	Mean	Std. Dev.	Min.	Max.	(F)	(Z)	(A)	(U)	(S)	Rate	Age	Min.	Mean	Max.	Min.	Mean	Max.	2013	2014			
<b>Unit 1</b>																						
2	3.144	1.896	1.248	5.039	0.093	0.493	0.389	0.073	0.611	2	6.865	8.238	9.885	0.068	0.223	0.560	0.223	0.560	1.235			
3	8.597	3.751	4.846	12.348	0.333	0.733	0.520	0.236	0.480	3	0.762	1.920	3.078	0.101	0.946	0.194	0.946	0.194	0.428			
4	3.251	1.220	2.031	4.471	0.430	0.830	0.564	0.292	0.436	4	2.328	4.131	5.933	0.133	0.436	0.549	0.436	0.549	1.211			
5	2.647	0.984	1.664	3.631	0.446	0.846	0.571	0.301	0.429	5	0.885	1.417	1.950	0.154	0.405	0.218	0.405	0.218	0.481			
6+	2.422	0.898	1.524	3.320	0.468	0.868	0.580	0.313	0.420	6+	1.354	2.153	2.952	0.235	0.453	0.506	0.453	0.506	1.116			
Total (3+)	20.061	11.312	28.809	33.770	0.335	0.735	0.520	0.237	0.480	Total	12.195	17.859	23.797	0.114	2.462	2.028	2.462	2.028	4.471			
	16.917	10.065	23.770	33.770	0.387	0.787	0.545	0.268	0.455	(3+)	5.330	9.621	13.912	0.153	2.239	1.468	2.239	1.468	3.236			
<b>Unit 2</b>																						
2	8.574	4.581	3.993	13.155	0.076	0.476	0.379	0.060	0.621	2	27.892	30.396	33.124	0.077	0.720	2.340	0.720	2.340	5.161			
3	11.633	4.538	7.094	16.171	0.207	0.607	0.455	0.155	0.545	3	2.481	5.327	8.173	0.123	1.640	0.655	1.640	0.655	1.445			
4	3.017	0.996	2.021	4.013	0.429	0.829	0.564	0.292	0.436	4	3.866	6.340	8.813	0.150	0.465	0.951	0.465	0.951	2.097			
5	9.759	3.069	6.690	12.828	0.439	0.839	0.568	0.297	0.432	5	0.882	1.317	1.752	0.181	1.932	0.526	1.932	0.526	0.526			
6+	9.890	2.874	7.016	12.763	0.434	0.834	0.566	0.294	0.434	6+	5.938	8.512	11.087	0.254	2.433	2.162	2.433	2.162	4.768			
Total (3+)	42.873	26.815	58.931	76.776	0.290	0.690	0.499	0.210	0.501	Total	41.059	51.892	62.948	0.122	7.190	6.347	7.190	6.347	13.995			
	34.299	22.822	45.776	76.776	0.352	0.752	0.529	0.247	0.471	(3+)	13.167	21.496	29.824	0.186	6.470	4.007	6.470	4.007	8.835			
<b>Unit 3</b>																						
2	4.507	2.822	1.686	7.329	0.056	0.456	0.366	0.045	0.634	2	35.119	42.295	50.938	0.060	0.356	2.538	0.356	2.538	5.596			
3	16.060	7.476	8.585	23.536	0.152	0.552	0.424	0.117	0.576	3	1.068	2.857	4.645	0.114	2.008	0.326	2.008	0.326	0.718			
4	1.993	0.807	1.186	2.800	0.176	0.576	0.438	0.134	0.562	4	4.943	9.247	13.552	0.138	0.275	1.276	0.275	1.276	2.814			
5	12.125	4.630	7.496	16.755	0.226	0.626	0.465	0.168	0.535	5	0.666	1.120	1.574	0.167	2.049	0.187	2.049	0.187	0.412			
6+	15.558	5.103	10.456	20.661	0.232	0.632	0.468	0.172	0.532	6+	9.566	14.753	19.941	0.243	3.594	3.585	3.594	3.585	7.905			
Total (3+)	50.244	29.407	71.080	101.880	0.185	0.585	0.443	0.140	0.557	Total	51.363	70.273	90.650	0.113	8.282	7.912	8.282	7.912	17.445			
	45.736	27.722	63.751	101.880	0.199	0.599	0.451	0.150	0.549	(3+)	16.244	27.978	39.712	0.192	7.926	5.374	7.926	5.374	11.850			
<b>Unit 4</b>																						
2	3.252	2.152	1.100	5.404	0.028	0.428	0.348	0.023	0.652	2	2.737	3.911	5.588	0.094	0.254	0.368	0.254	0.368	0.811			
3	9.138	4.678	4.460	13.816	0.117	0.517	0.404	0.091	0.596	3	0.717	2.120	3.523	0.153	1.444	0.324	1.444	0.324	0.715			
4	0.525	0.239	0.286	0.764	0.153	0.553	0.425	0.118	0.575	4	2.659	5.449	8.238	0.214	0.104	1.166	0.104	1.166	2.571			
5	2.783	1.240	1.543	4.022	0.195	0.595	0.448	0.147	0.552	5	0.164	0.302	0.439	0.253	0.718	0.076	0.718	0.076	0.168			
6+	2.482	1.078	1.404	3.560	0.189	0.589	0.445	0.144	0.555	6+	1.630	2.912	4.194	0.326	0.478	0.949	0.478	0.949	2.093			
Total (3+)	18.179	8.793	27.566	45.736	0.122	0.522	0.407	0.095	0.593	Total	7.908	14.694	21.982	0.196	3.267	2.884	3.267	2.884	6.359			
	14.927	7.693	22.162	45.736	0.144	0.544	0.420	0.111	0.580	(3+)	5.171	10.783	16.394	0.233	3.013	2.516	3.013	2.516	5.548			

**Table 2.1.** Estimated harvest of Lake Erie Yellow Perch for 2014 using the proposed fishing policy and selectivity-at-age from combined fishing gears.

Age	2014			Exploitation Rate			2014			3-yr Mean			2014 Harvest Range				
	Stock Size (millions of fish)			F (age)			Catch (millions of fish)			Harvest (kg)			Catch (millions of kg)				
	Min.	MEAN	Max.	F	s(age)	F (age)	(u)	Min.	MEAN	Max.	Min.	MEAN	Max.	Min.	MEAN	Max.	
<b>Unit 1</b>																	
2	6.865	8.238	9.885	0.670	0.145	0.097	0.077	0.526	0.631	0.757	0.097	0.051	0.061	0.073	0.112	0.135	0.162
3	0.762	1.920	3.078	0.670	0.575	0.385	0.267	0.203	0.512	0.821	0.116	0.024	0.059	0.095	0.052	0.131	0.210
4	2.328	4.131	5.933	0.670	0.756	0.507	0.333	0.775	1.376	1.976	0.134	0.104	0.184	0.265	0.229	0.406	0.584
5	0.885	1.417	1.950	0.670	0.786	0.527	0.343	0.304	0.487	0.669	0.146	0.044	0.071	0.098	0.098	0.157	0.215
6+	1.354	2.153	2.952	0.670	0.838	0.561	0.361	0.488	0.777	1.065	0.179	0.087	0.139	0.191	0.193	0.306	0.420
<b>Total (3+)</b>	12.195	17.859	23.797				0.212	2.297	3.782	5.288	0.136	0.310	0.515	0.722	0.684	1.136	1.592
	5.330	9.621	13.912				0.328	1.771	3.151	4.532	0.144	0.259	0.454	0.648	0.572	1.001	1.430
<b>Unit 2</b>																	
2	27.892	30.396	33.124	0.670	0.161	0.108	0.085	2.359	2.571	2.802	0.123	0.290	0.316	0.345	0.640	0.697	0.760
3	2.481	5.327	8.173	0.670	0.418	0.280	0.203	0.504	1.082	1.661	0.139	0.070	0.150	0.231	0.154	0.332	0.509
4	3.866	6.340	8.813	0.670	0.756	0.507	0.333	1.288	2.111	2.935	0.147	0.189	0.310	0.431	0.417	0.684	0.951
5	0.882	1.317	1.752	0.670	0.759	0.509	0.334	0.295	0.440	0.585	0.161	0.047	0.071	0.094	0.105	0.156	0.208
6+	5.938	8.512	11.087	0.670	0.790	0.529	0.345	2.047	2.934	3.821	0.186	0.381	0.546	0.711	0.839	1.203	1.567
<b>Total (3+)</b>	41.059	51.892	62.948				0.176	6.492	9.139	11.804	0.152	0.978	1.394	1.812	2.156	3.073	3.995
	13.167	21.496	29.824				0.306	4.133	6.568	9.003	0.164	0.688	1.077	1.467	1.516	2.376	3.235
<b>Unit 3</b>																	
2	35.119	42.295	50.938	0.700	0.081	0.057	0.046	1.599	1.925	2.319	0.108	0.173	0.208	0.250	0.381	0.458	0.552
3	1.068	2.857	4.645	0.700	0.304	0.213	0.159	0.170	0.455	0.739	0.137	0.023	0.062	0.101	0.051	0.137	0.223
4	4.943	9.247	13.552	0.700	0.648	0.454	0.305	1.508	2.821	4.134	0.147	0.222	0.415	0.608	0.489	0.914	1.340
5	0.666	1.120	1.574	0.700	0.699	0.489	0.324	0.216	0.363	0.510	0.160	0.035	0.058	0.082	0.076	0.128	0.180
6+	9.566	14.753	19.941	0.700	0.721	0.505	0.332	3.177	4.900	6.623	0.182	0.578	0.892	1.205	1.275	1.966	2.658
<b>Total (3+)</b>	51.363	70.273	90.650				0.149	6.669	10.464	14.325	0.156	1.030	1.635	2.246	2.272	3.605	4.953
	16.244	27.978	39.712				0.305	5.071	8.539	12.006	0.167	0.858	1.427	1.996	1.891	3.146	4.401
<b>Unit 4</b>																	
2	2.737	3.911	5.588	0.300	0.074	0.022	0.018	0.050	0.071	0.101	0.129	0.006	0.009	0.013	0.014	0.020	0.029
3	0.717	2.120	3.523	0.300	0.316	0.095	0.075	0.054	0.159	0.263	0.155	0.008	0.025	0.041	0.018	0.054	0.090
4	2.659	5.449	8.238	0.300	0.493	0.148	0.114	0.303	0.620	0.938	0.179	0.054	0.111	0.168	0.120	0.245	0.370
5	0.164	0.302	0.439	0.300	0.717	0.215	0.161	0.026	0.048	0.071	0.202	0.005	0.010	0.014	0.012	0.022	0.031
6+	1.630	2.912	4.194	0.300	0.737	0.221	0.165	0.268	0.480	0.691	0.230	0.062	0.110	0.159	0.136	0.243	0.350
<b>Total (3+)</b>	7.908	14.694	21.982				0.094	0.701	1.378	2.064	0.192	0.136	0.265	0.395	0.300	0.584	0.871
	5.171	10.783	16.394				0.121	0.651	1.307	1.963	0.196	0.130	0.256	0.382	0.286	0.564	0.842

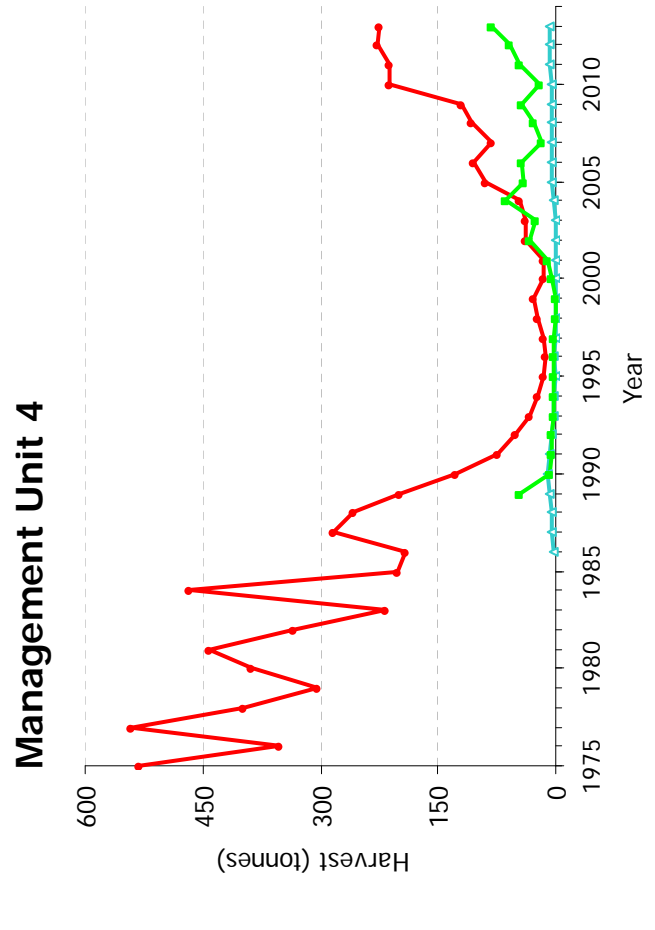
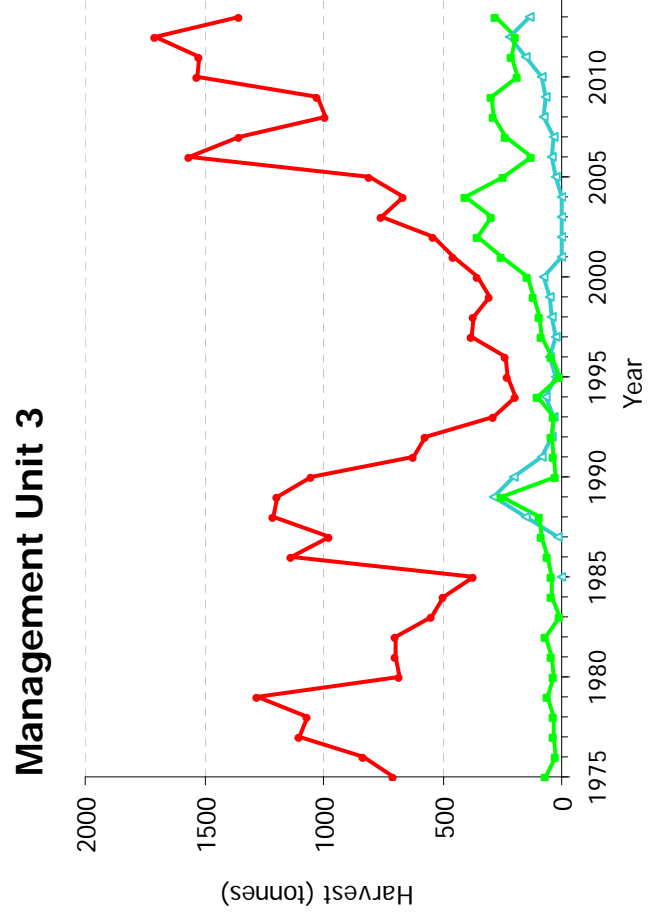
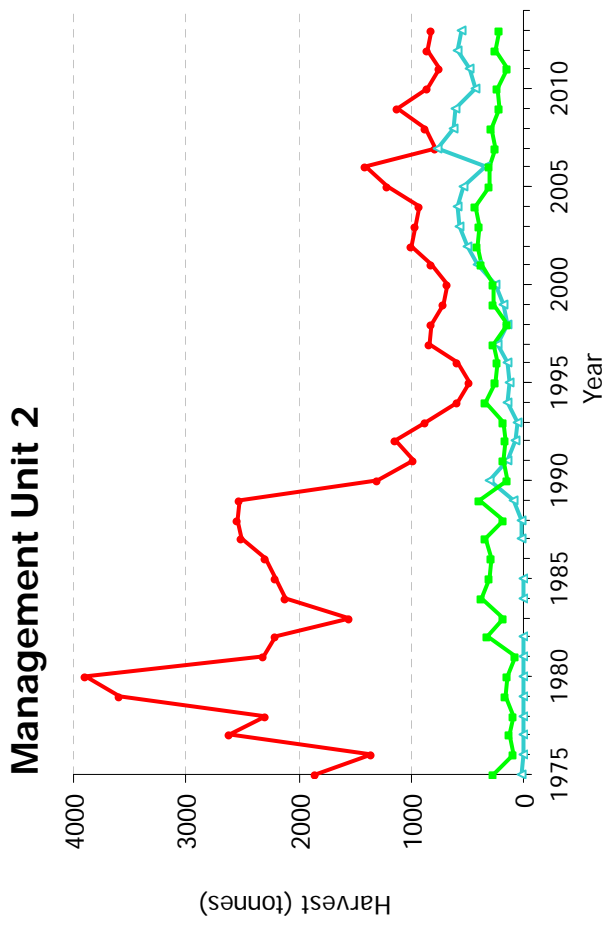
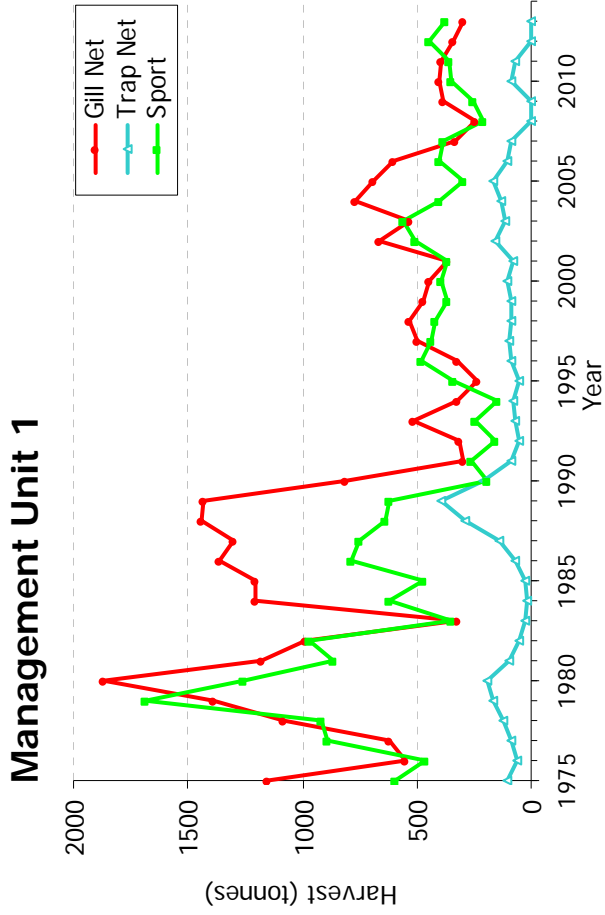
Table 2.2. Lake Erie Yellow Perch fishing rates and the Recommended Allowable Harvest (RAH; in millions of pounds) for 2014 by Management Unit (Unit).

<b>Unit</b>	<b>Fishing Rate</b>	<b>Recommended Allowable Harvest (millions lbs.)</b>		
		<b>MIN</b>	<b>MEAN</b>	<b>MAX</b>
<b>1</b>	0.670	0.684	1.136	1.592
<b>2</b>	0.670	2.156	3.073	3.995
<b>3</b>	0.700	2.272	3.605	4.953
<b>4</b>	0.300	0.300	0.584	0.871
<b>Total</b>		5.412	8.397	11.411

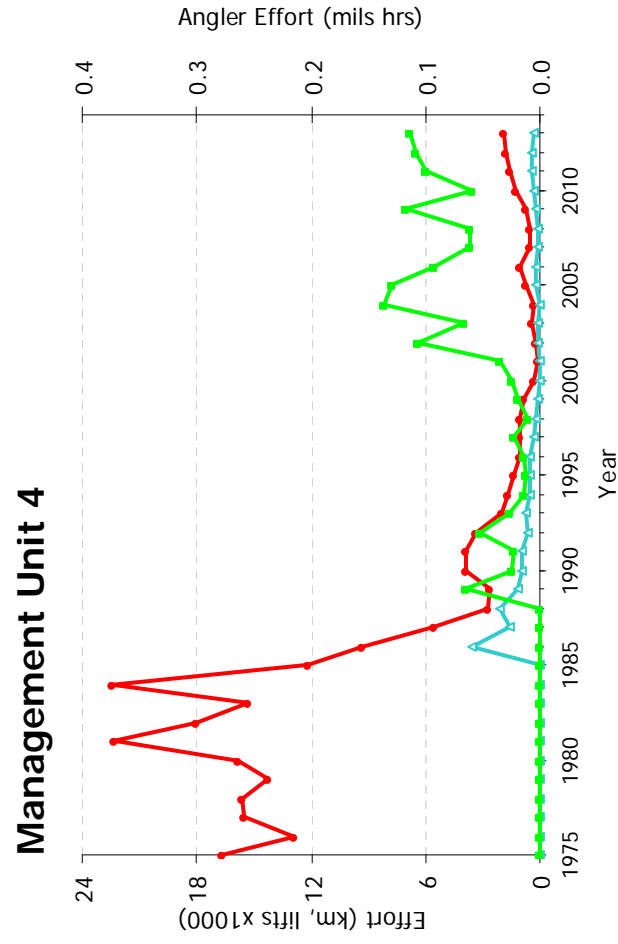
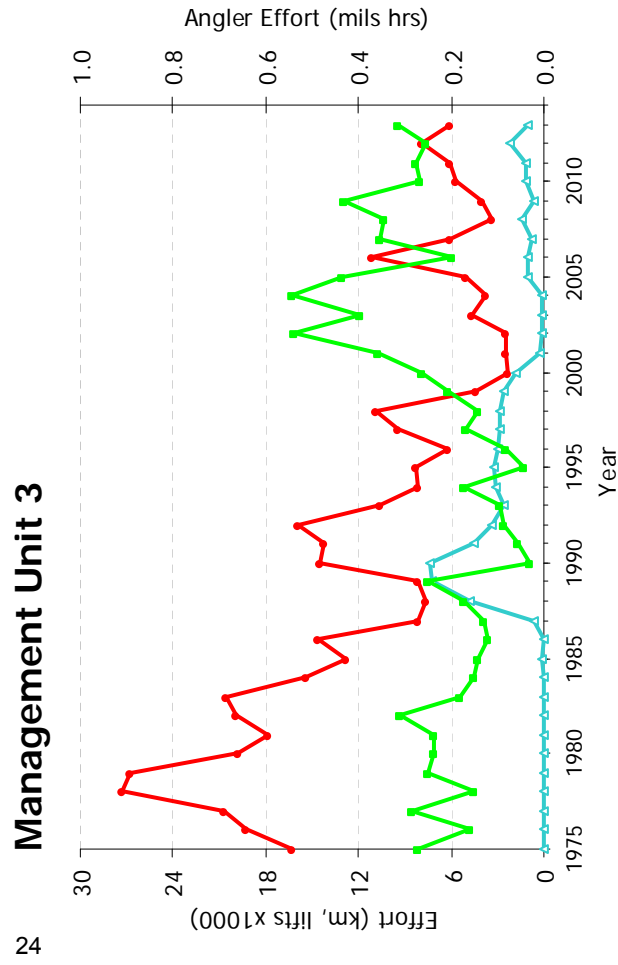
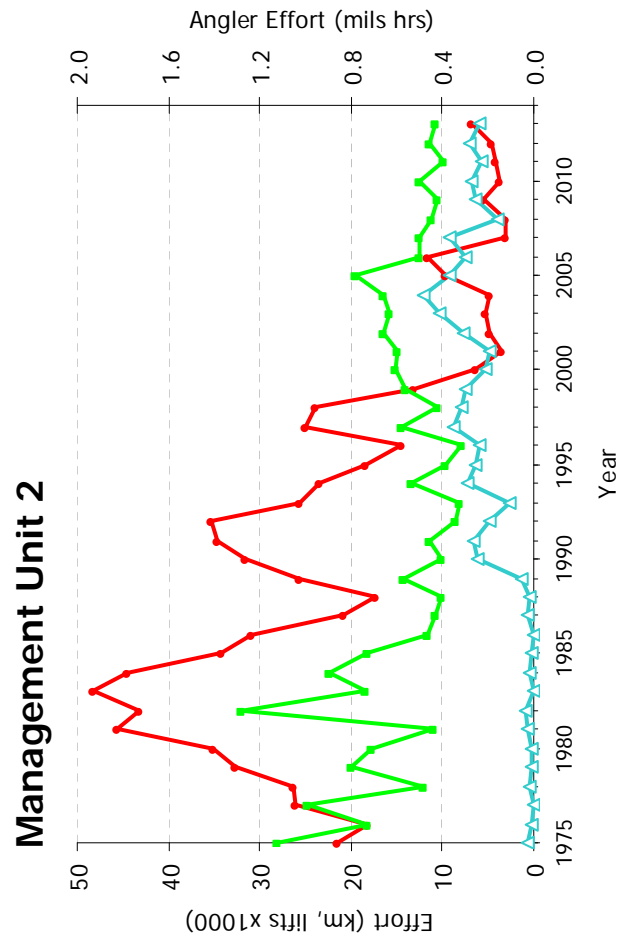
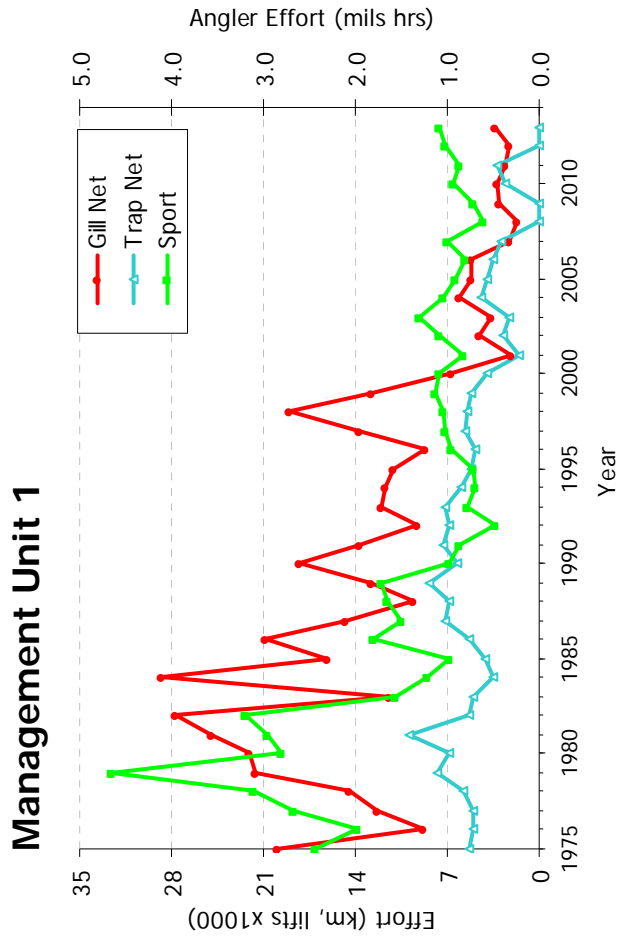


**Figure 1.1.** The Yellow Perch Management Units (MUs) of Lake Erie defined by the YPTG and LEC, for illustrative purposes.

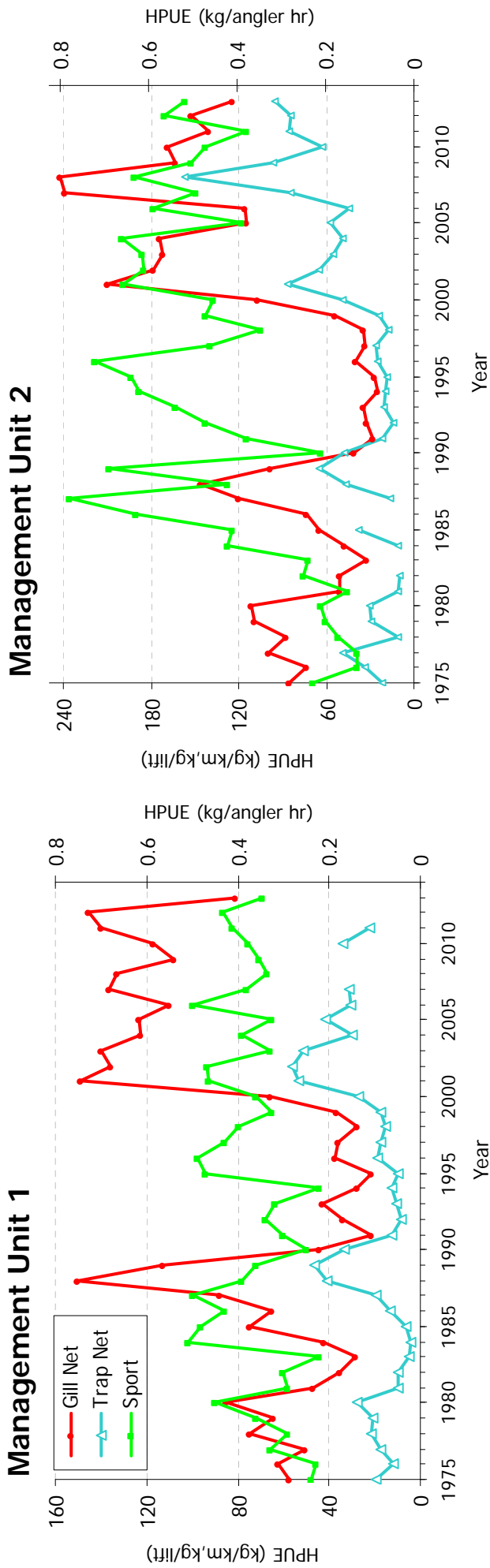




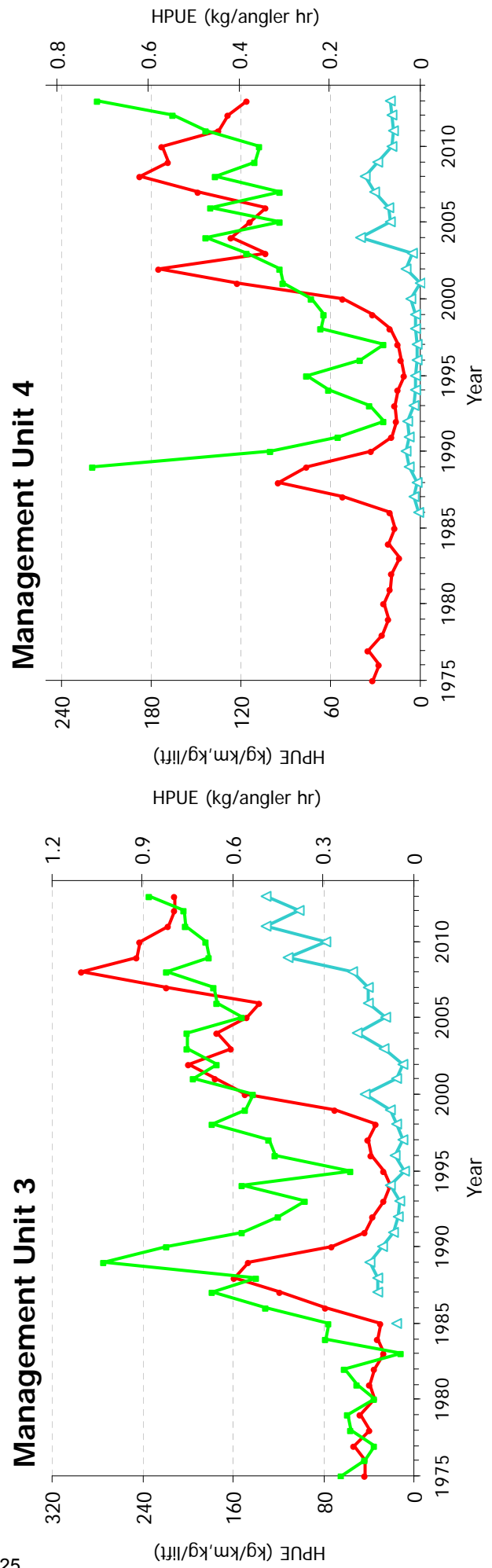
**Figure 1.2.** Historic Lake Erie Yellow Perch harvest (metric tonnes) by management unit and gear type.



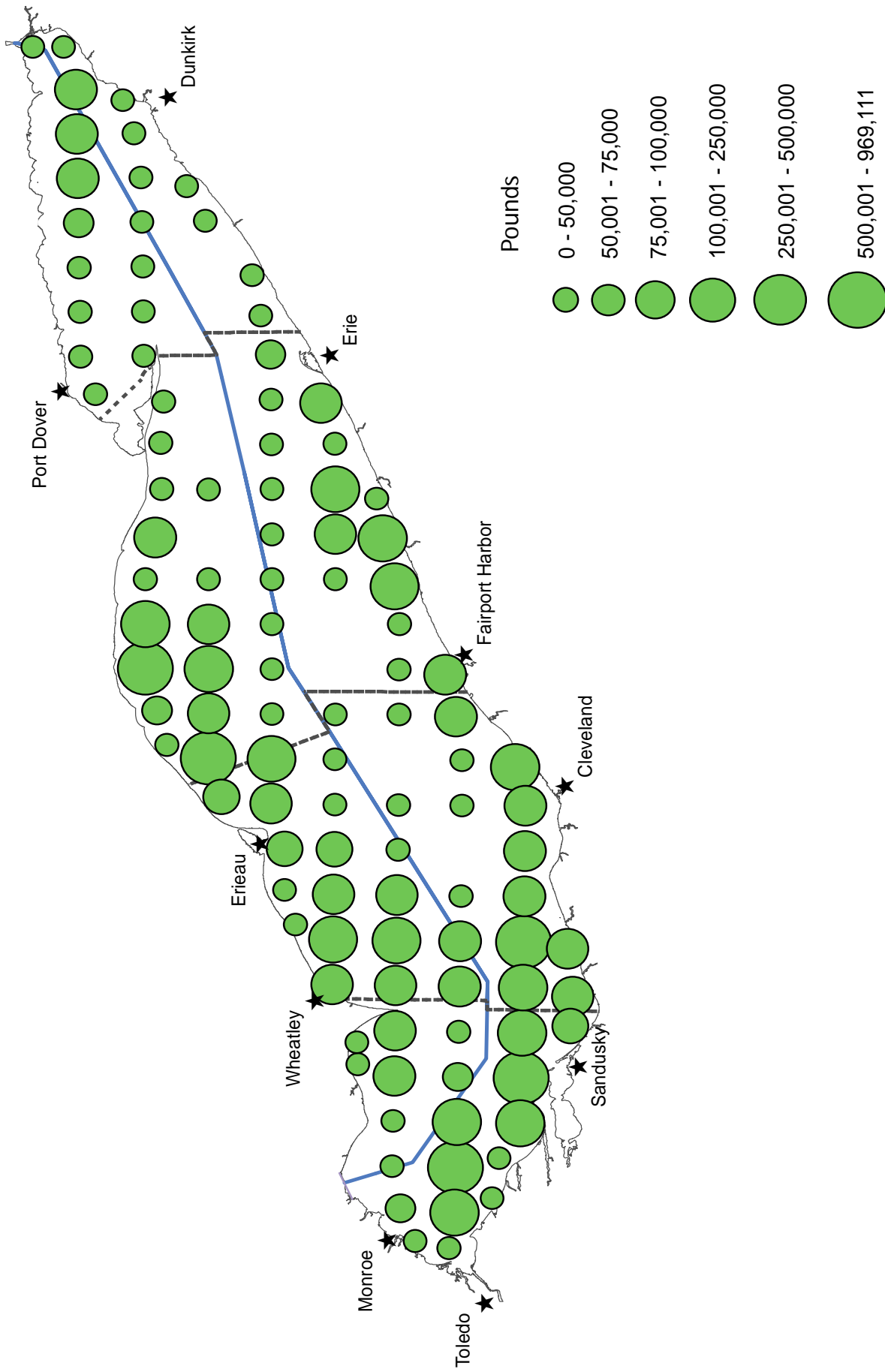
**Figure 1.3.** Historic Lake Erie Yellow Perch effort by management unit and gear type. Note: gill net effort presented is targeted effort with small mesh (< 3").



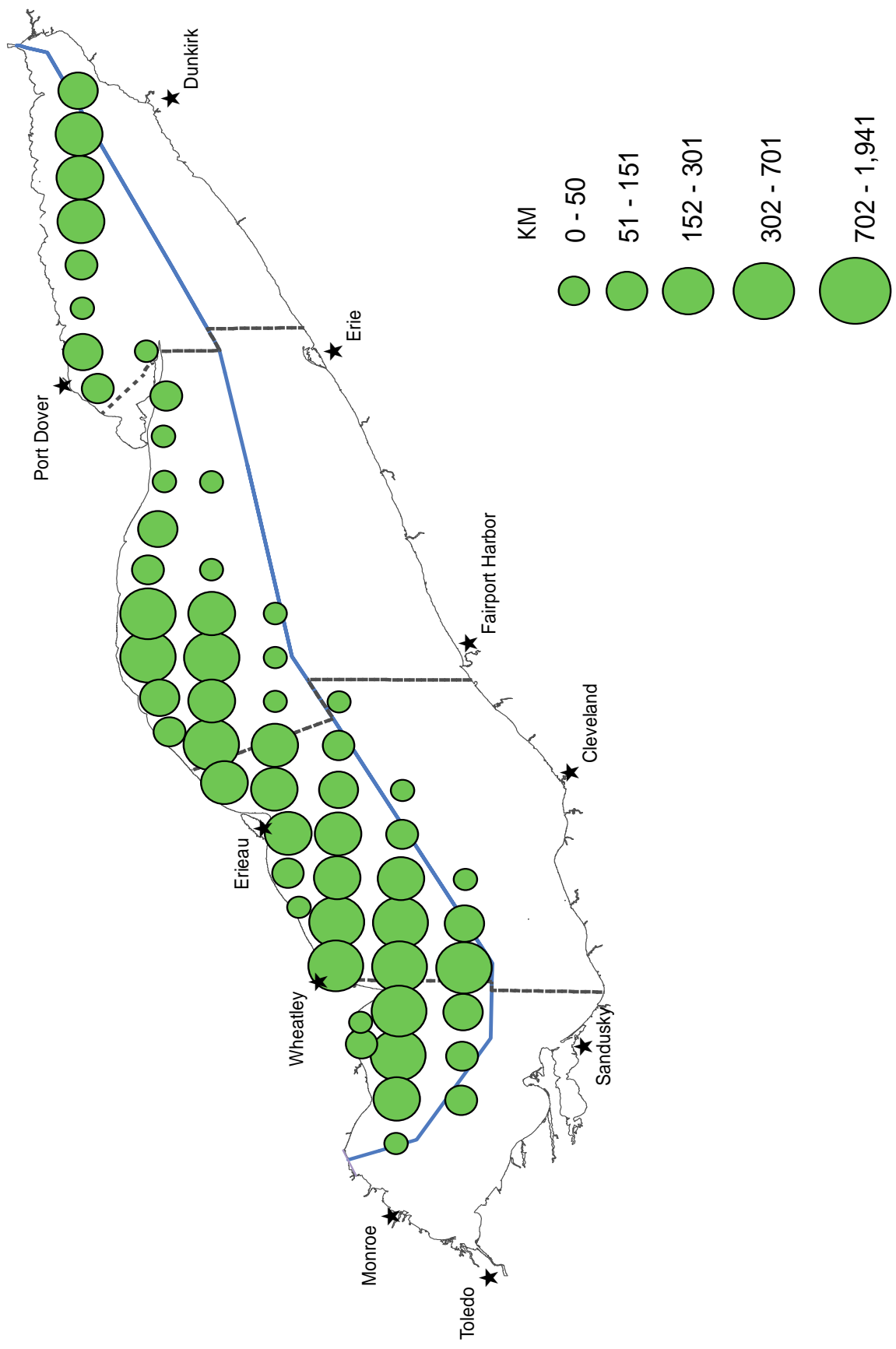
25



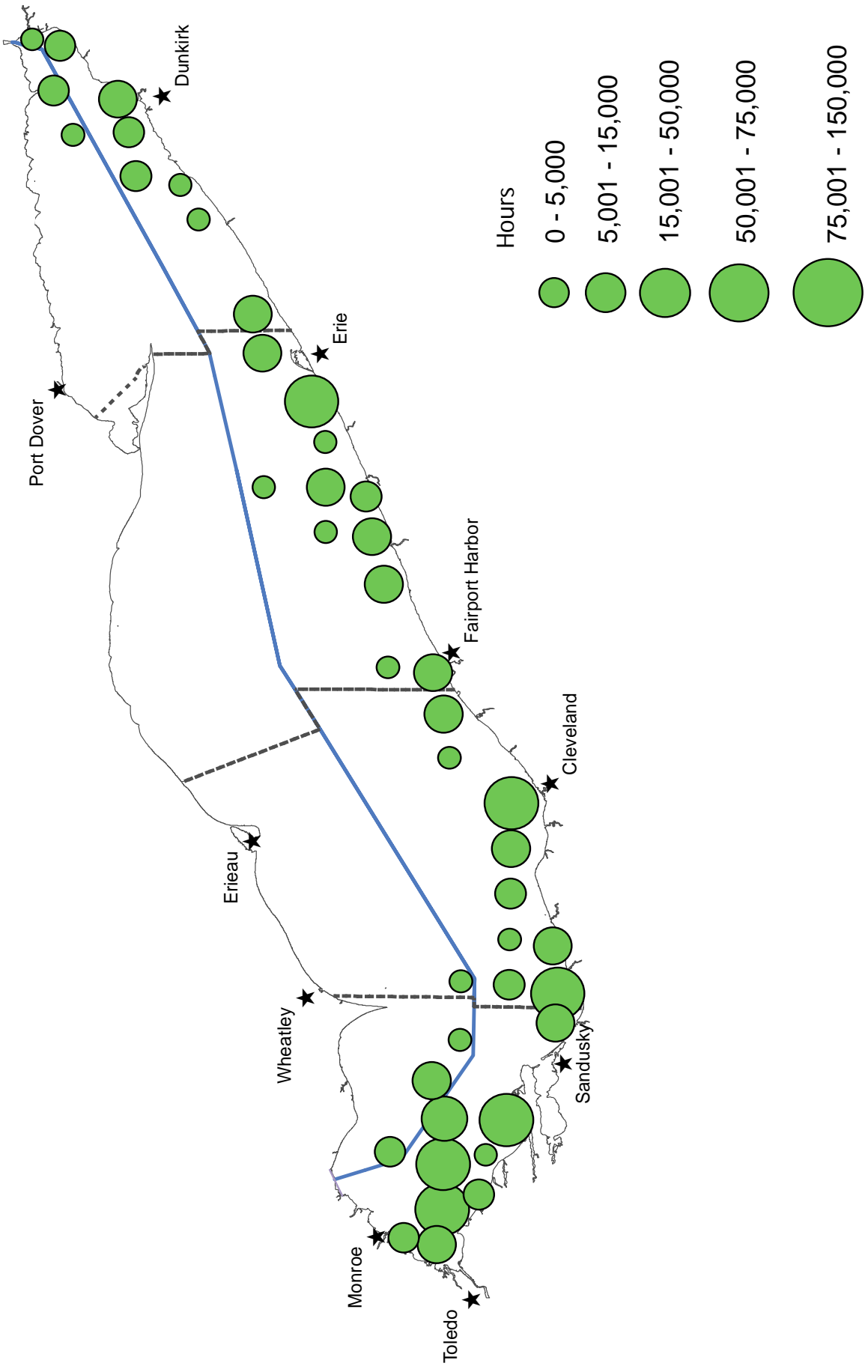
**Figure 1.4.** Historic Lake Erie Yellow Perch harvest per unit effort (HPUE) by management unit and gear type.  
 Note: gill net CPUE for 2001 to 2013 is for small mesh (< 3") only.



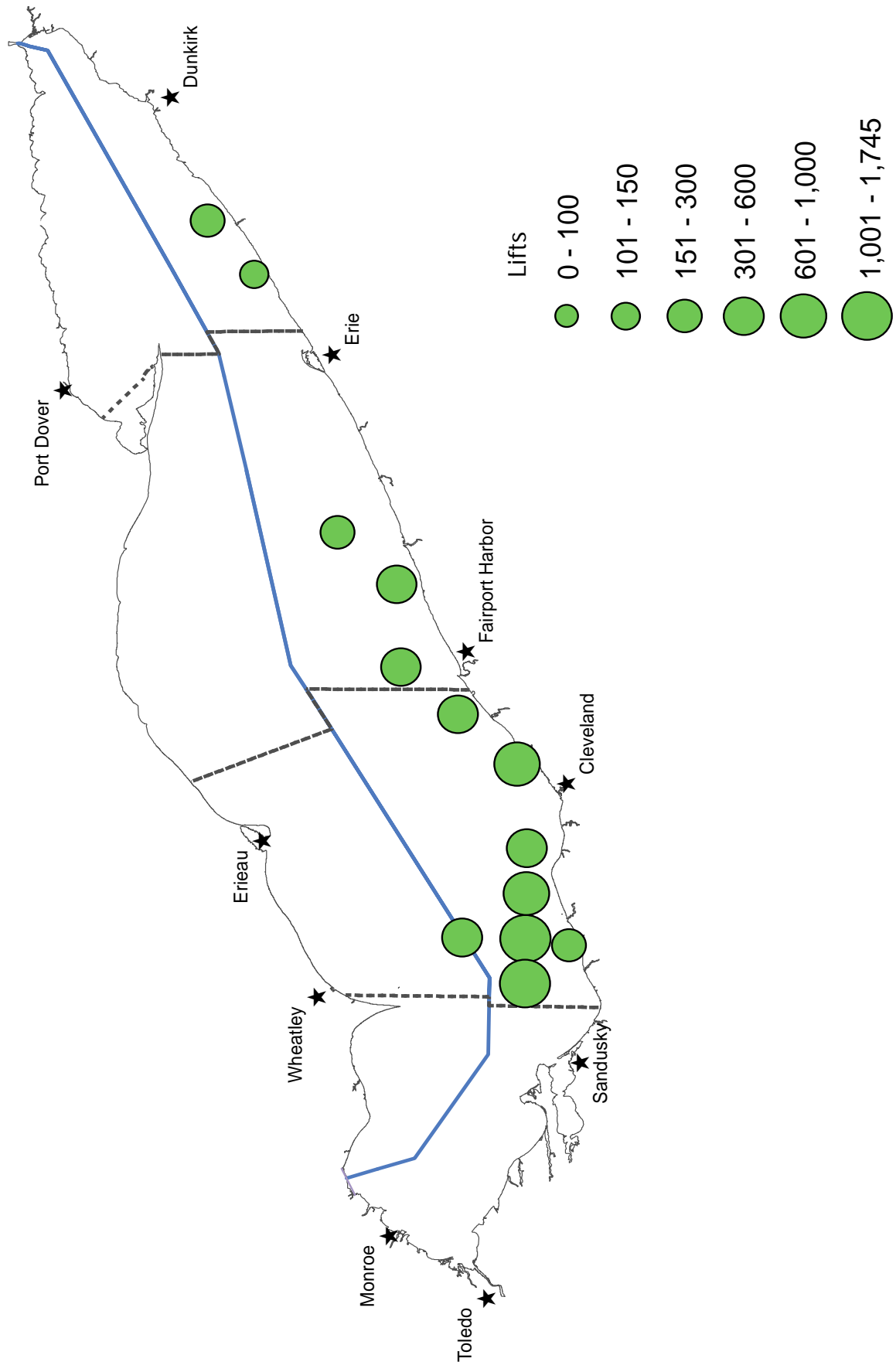
**Figure 1.5.** Spatial distribution of Yellow Perch total harvest (lbs.) in 2013 by 10-minute grid.



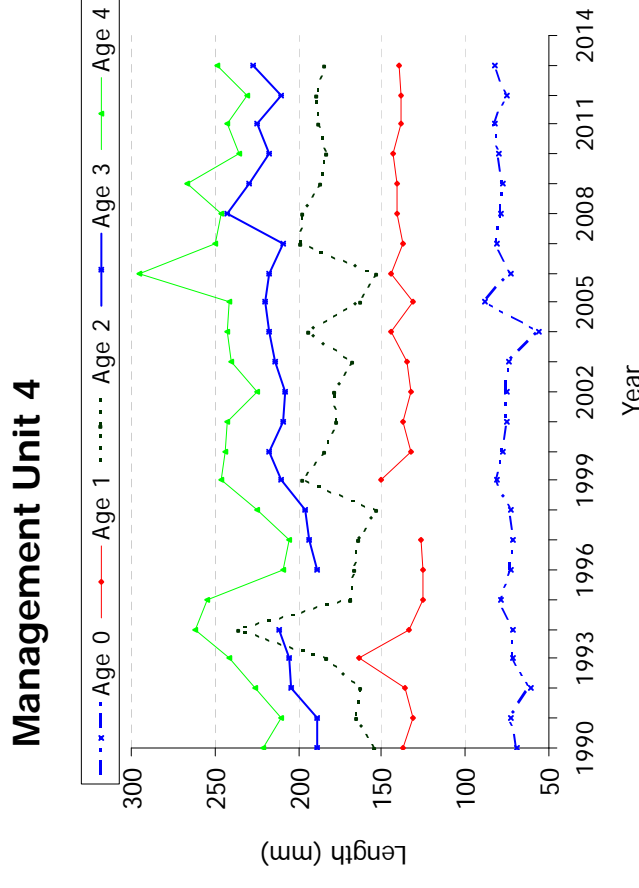
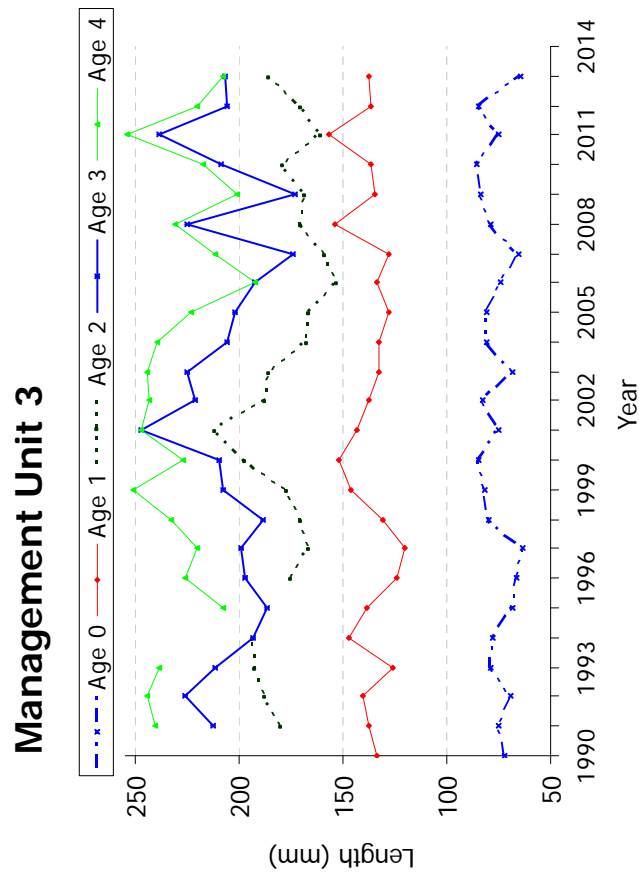
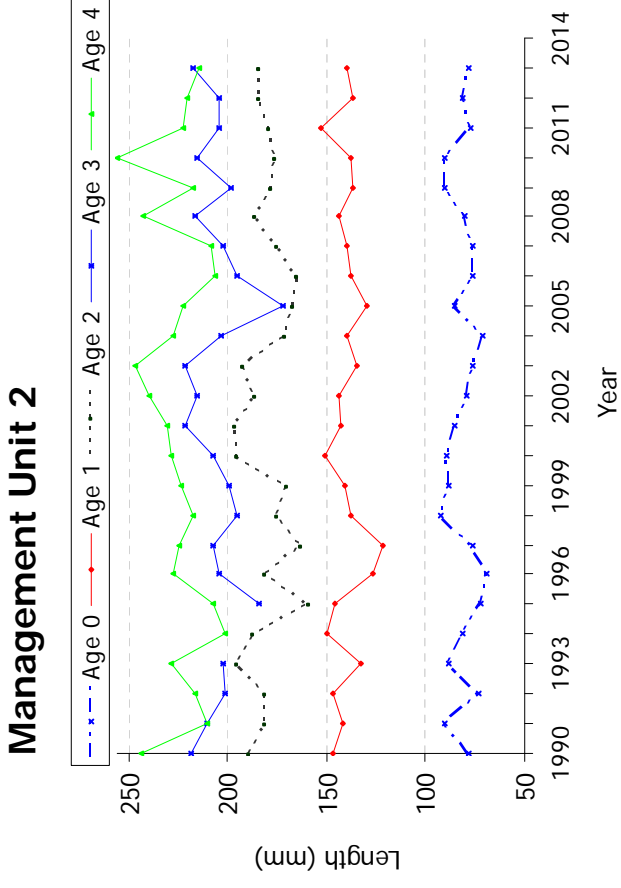
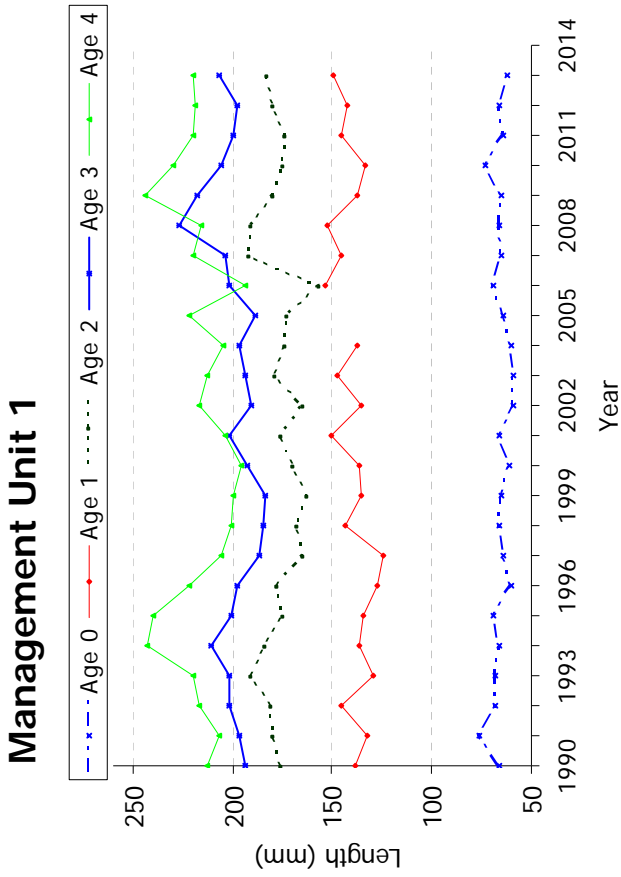
**Figure 1.6.** Spatial distribution of Yellow Perch small mesh gill net effort (km) in 2013 by 10-minute grid.



**Figure 1.7.** Spatial distribution of Yellow Perch sport effort (angler hours) in 2013 by 10-minute grid.

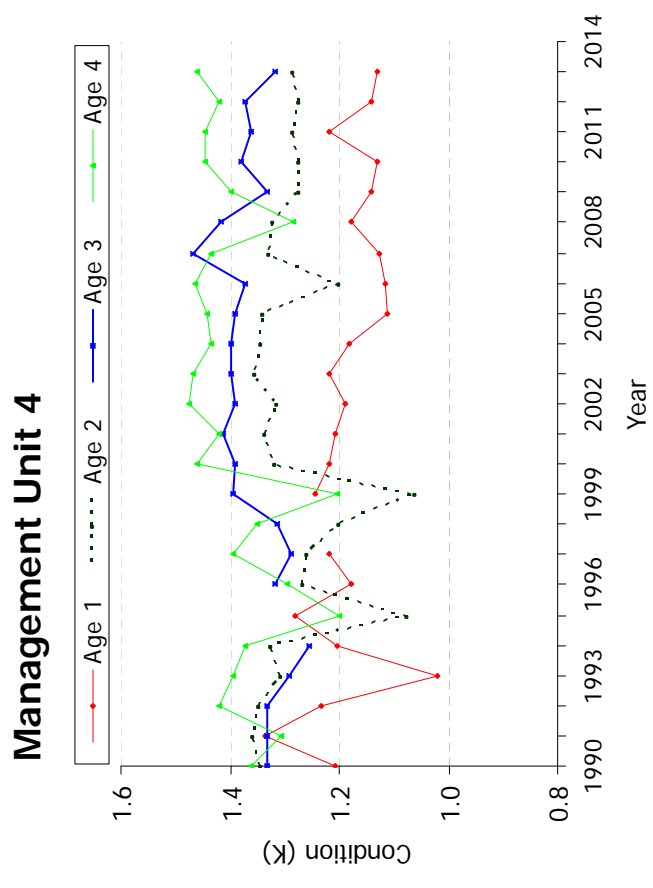
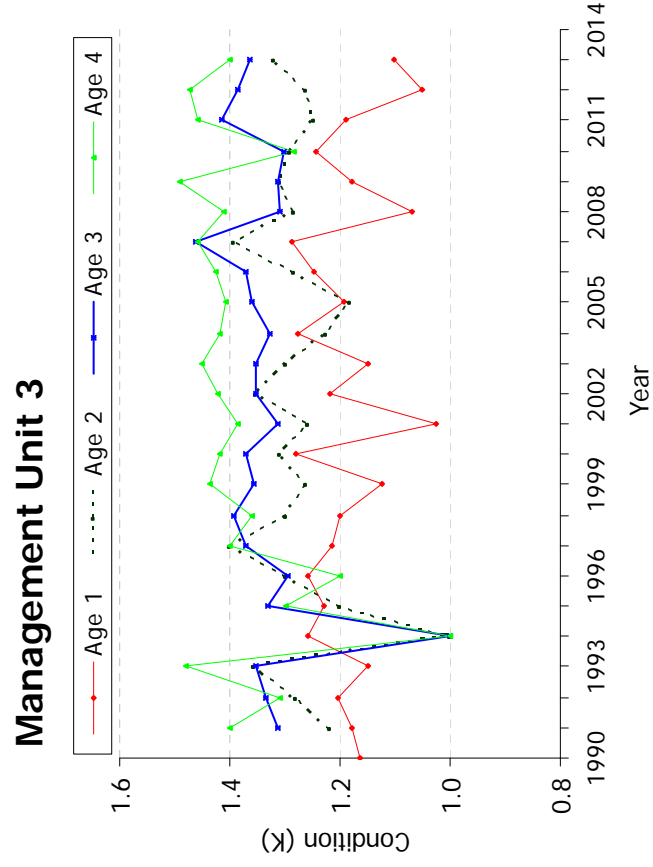
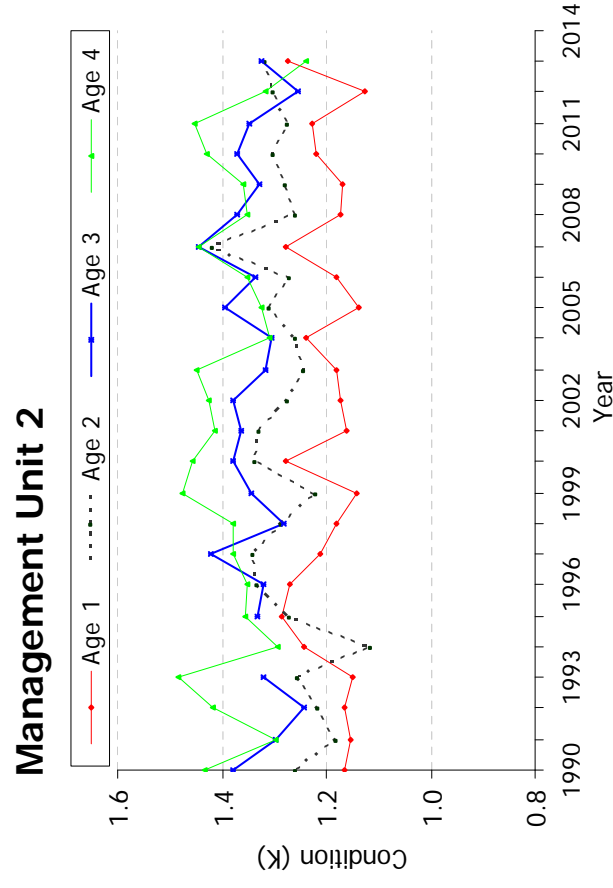
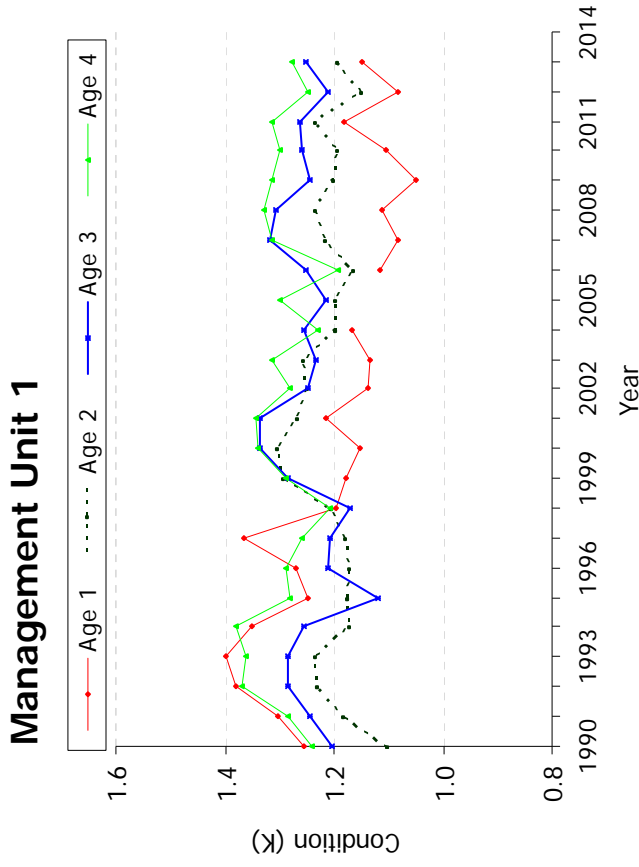


**Figure 1.8.** Spatial distribution of Yellow Perch trap net effort (lifts) in 2013 by 10-minute grid.

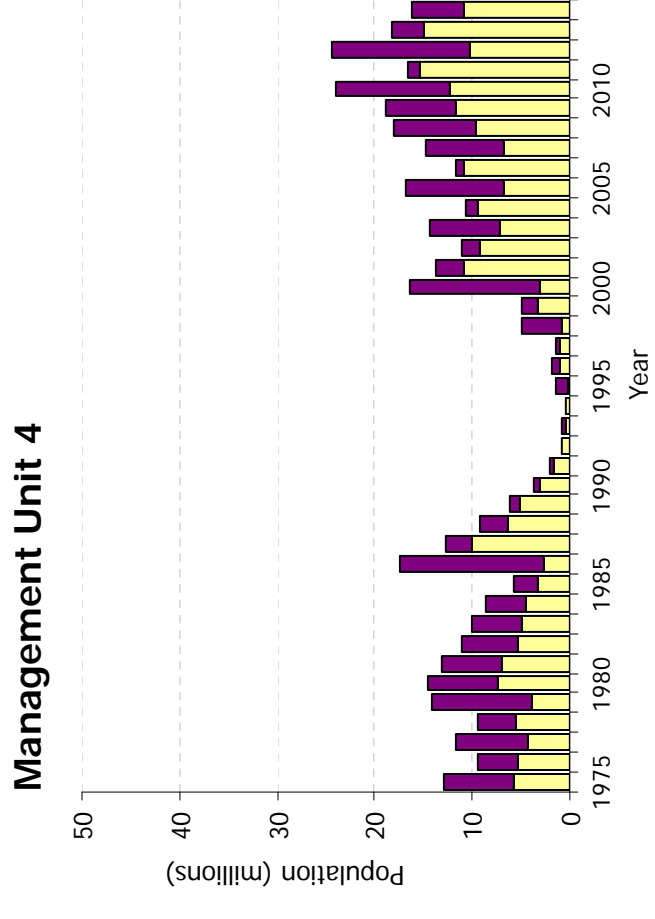
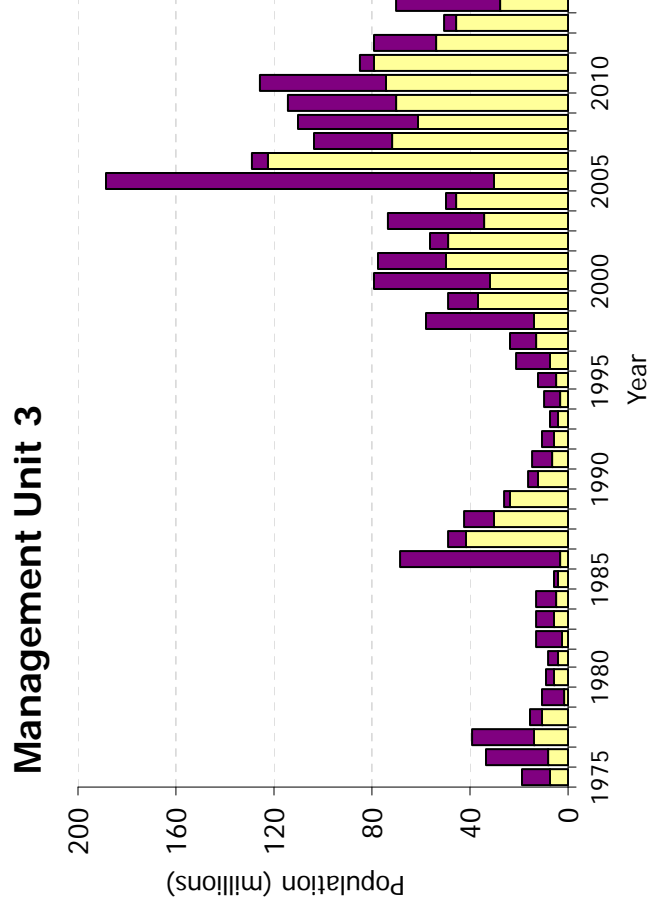
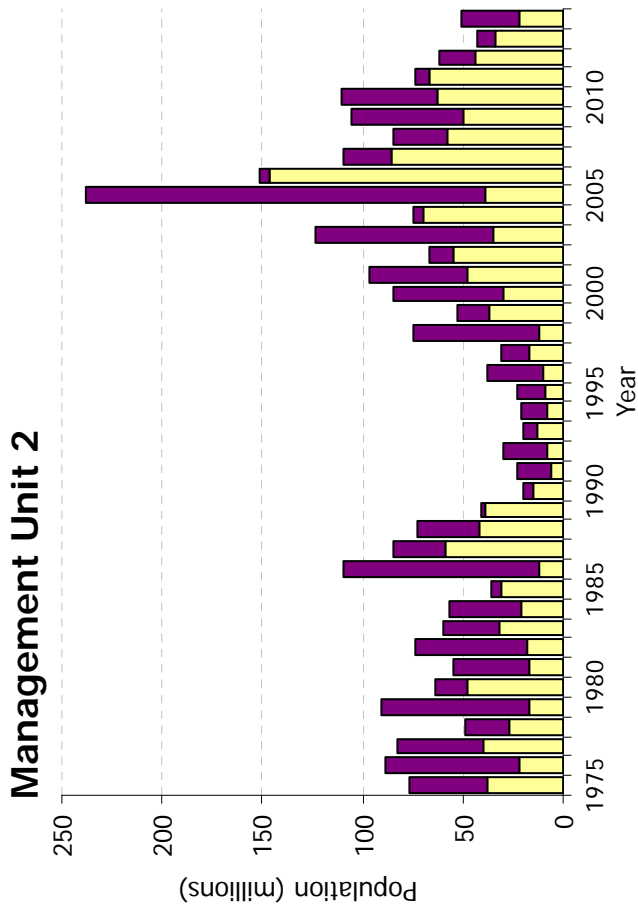
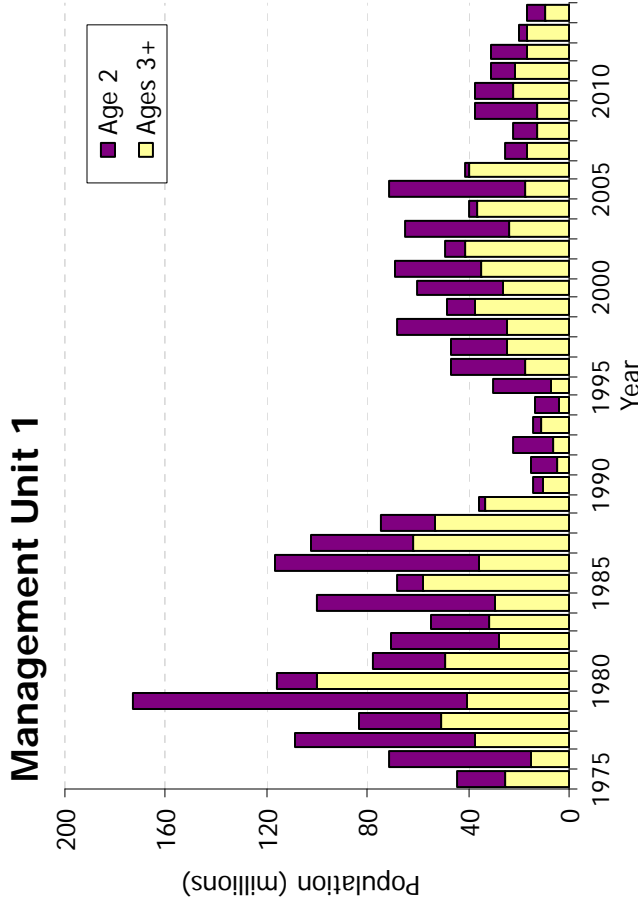


**Figure 1.9.** Yellow Perch total length-at-age from 1990-2013 fall interagency experimental samples for ages 0-4 by management unit (MU).

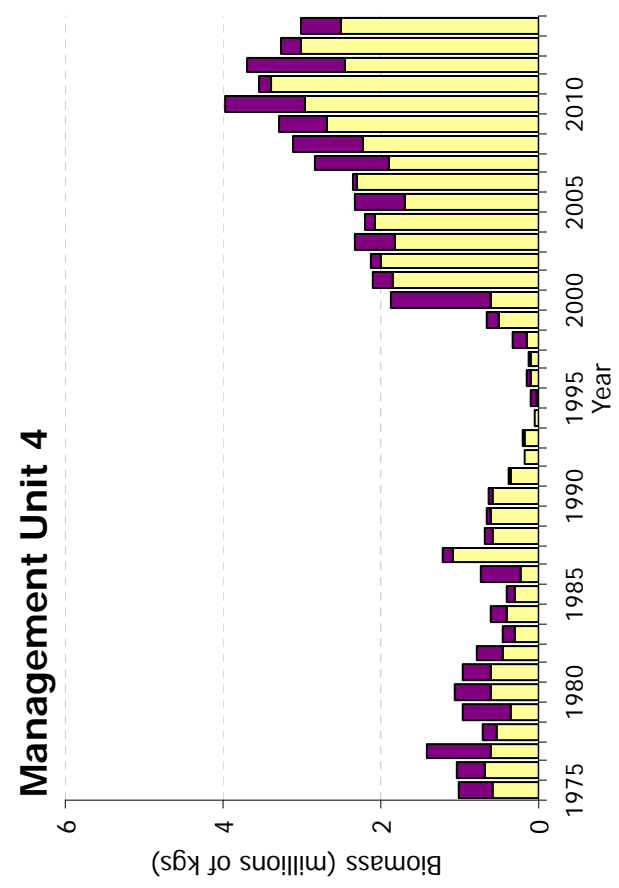
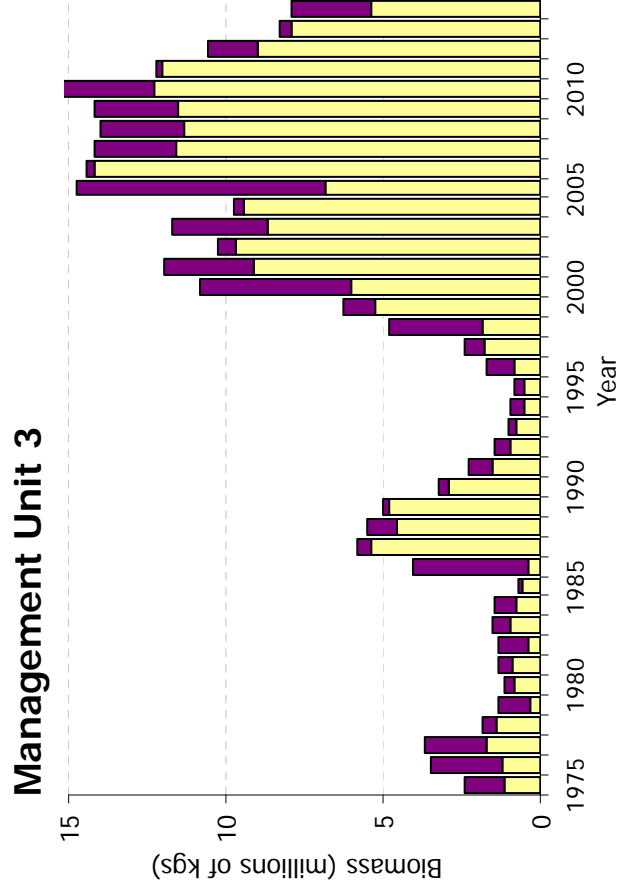
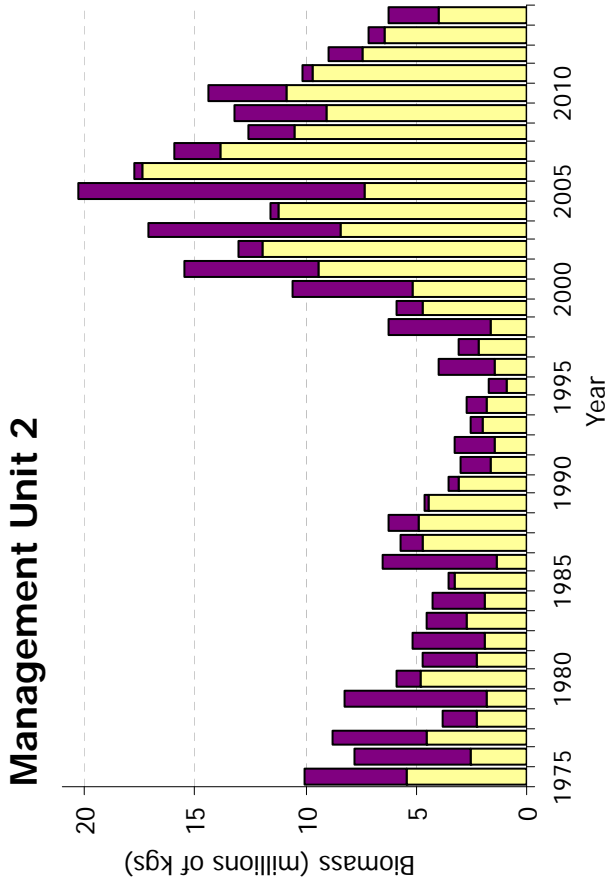
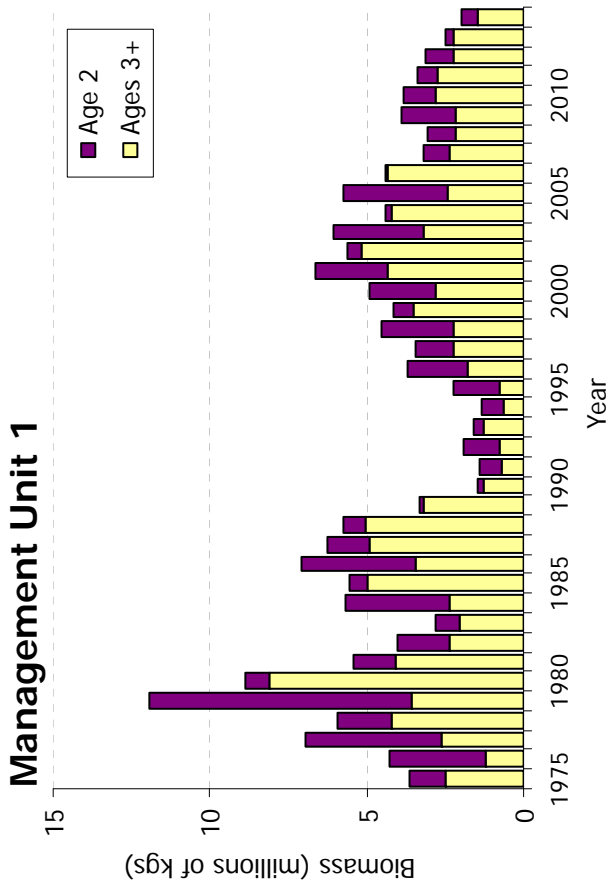




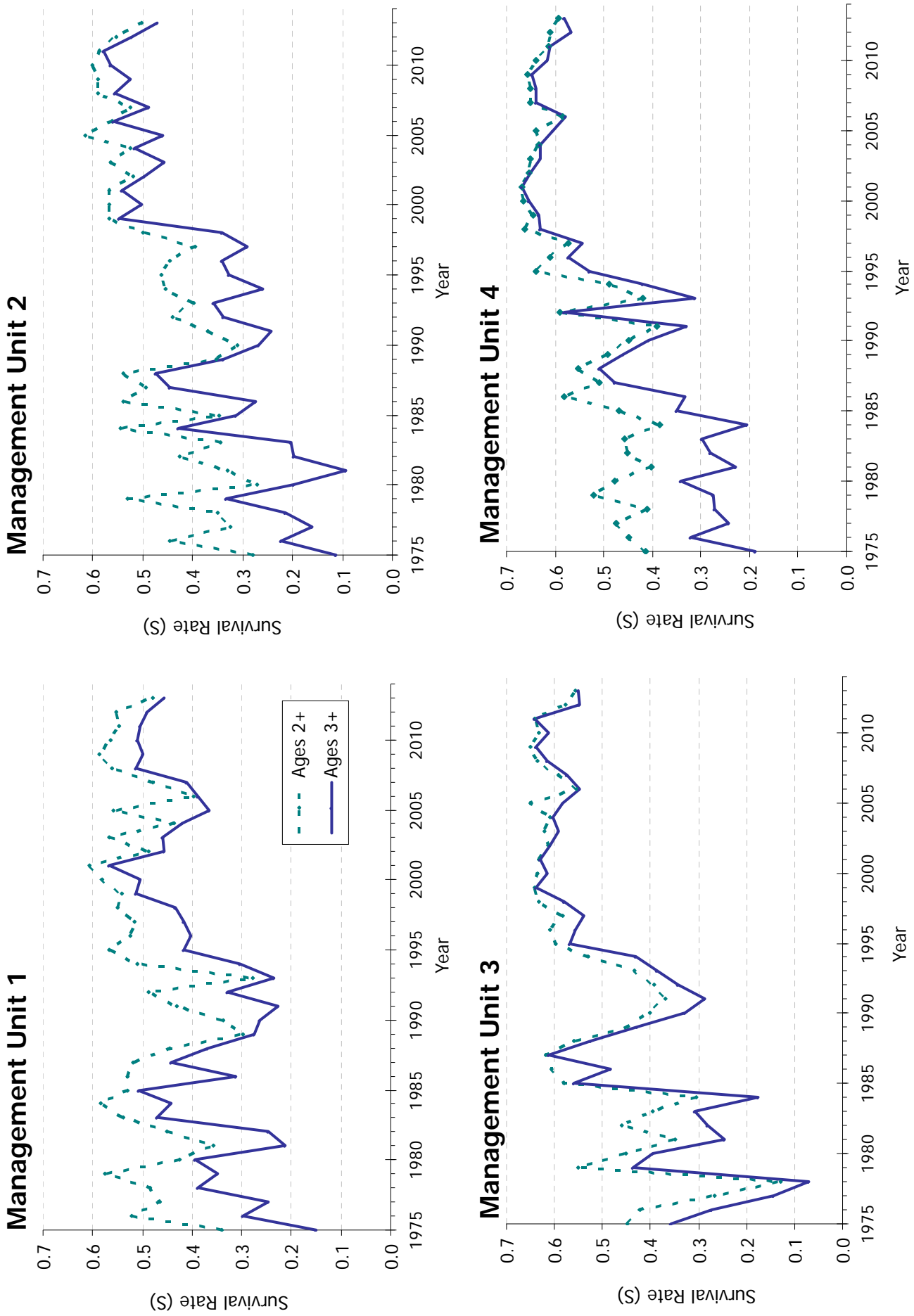
**Figure 1.10.** Yellow Perch condition (K) at age from 1990-2013 fall interagency experimental samples for ages 1-4 by management unit (MU).



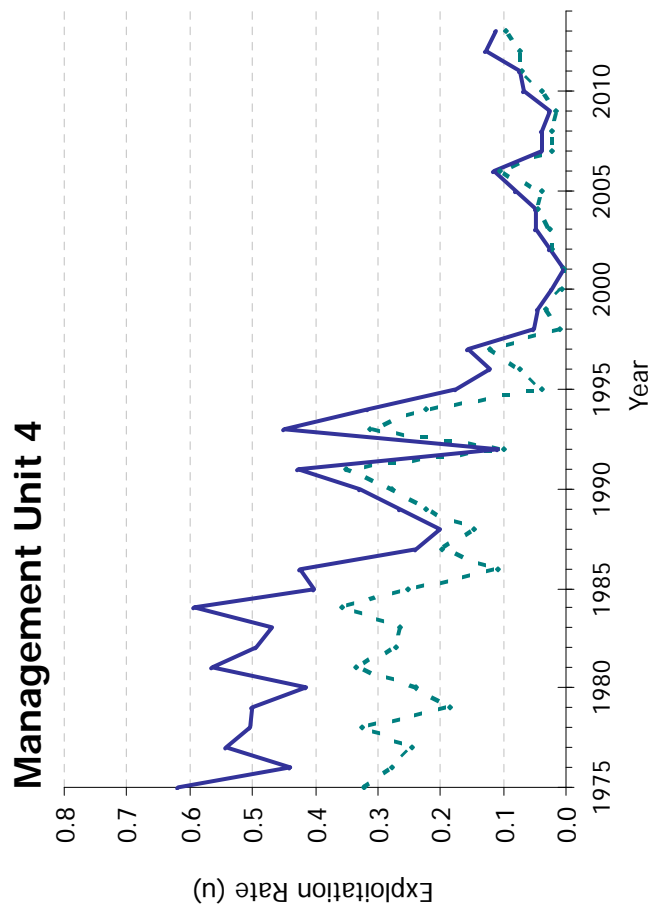
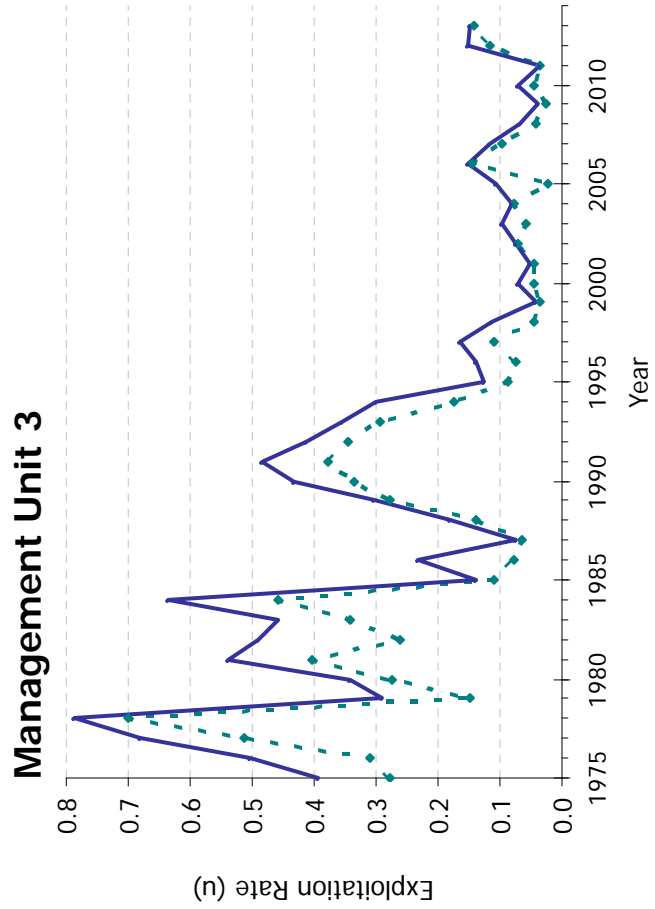
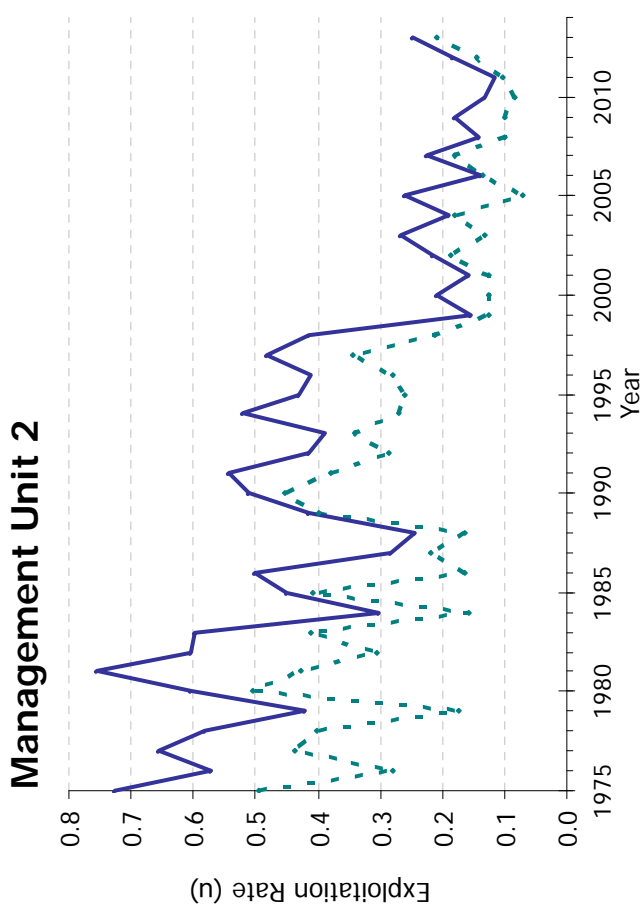
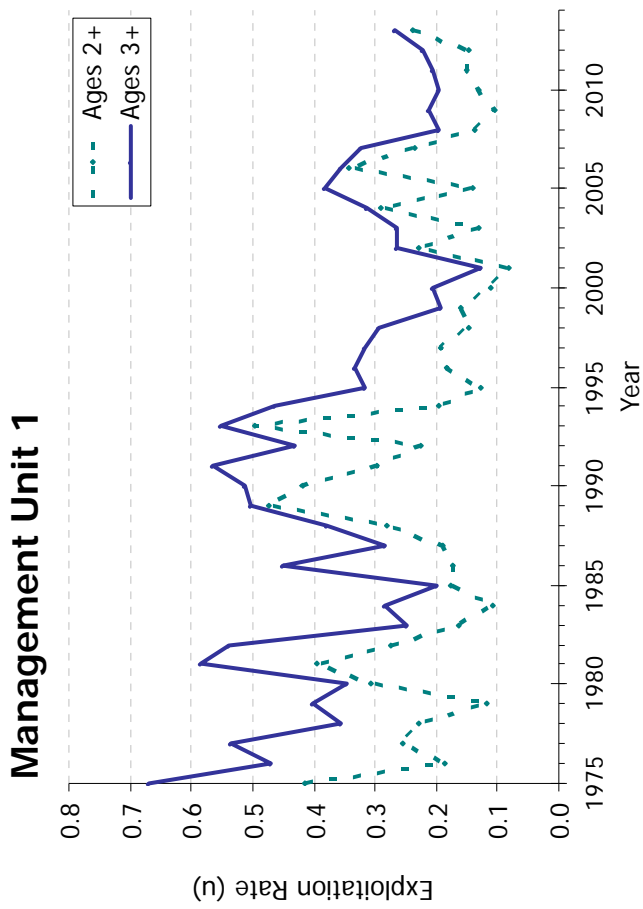
**Figure 1.11.** Lake Erie Yellow Perch population estimates by management unit for age 2 (dark bars) and ages 3+ (light bars). Estimates for 2014 are from ADMB and regressions for age 2 from survey gears.



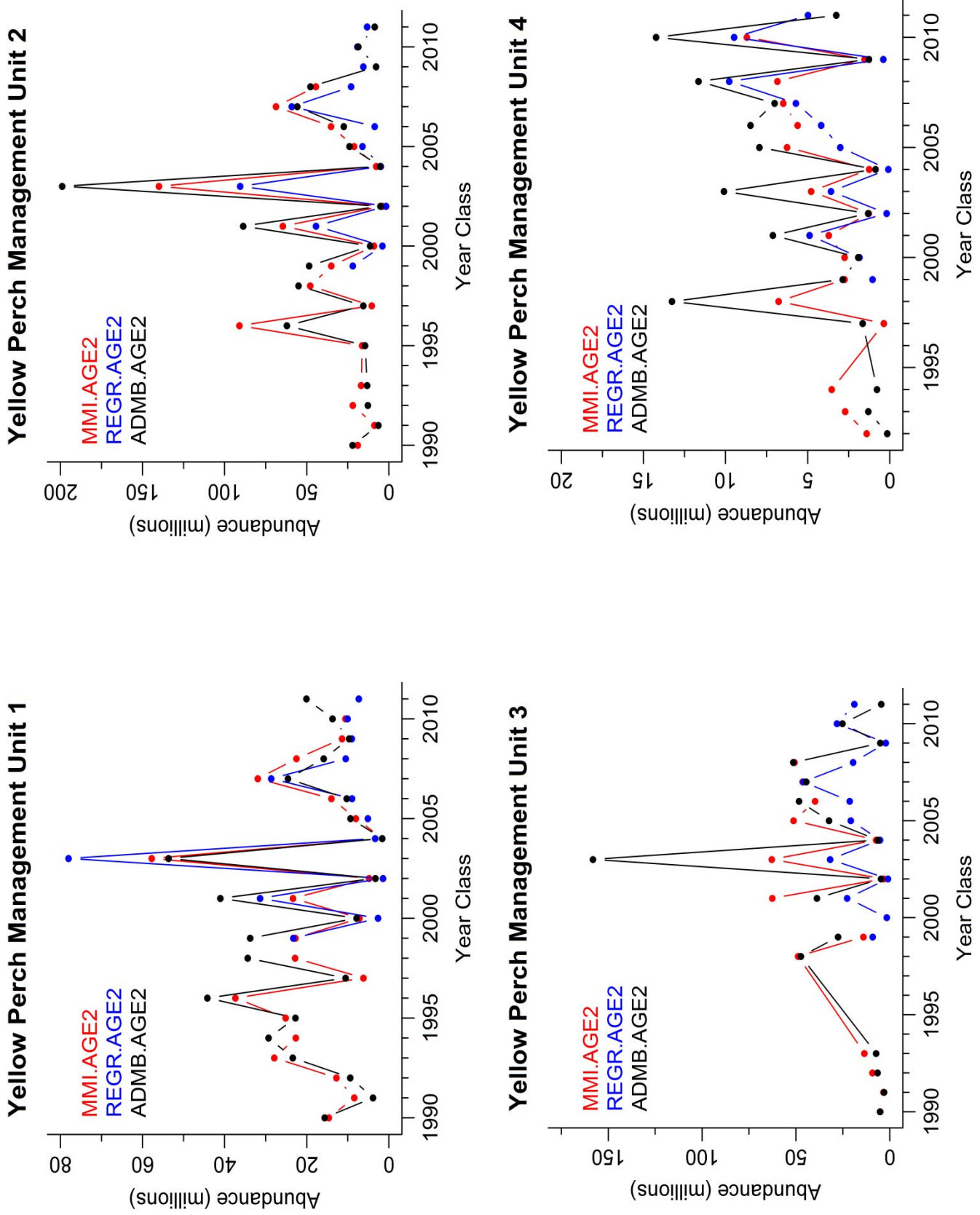
**Figure 1.12.** Lake Erie Yellow Perch biomass estimates by management unit for age 2 (dark bars) and ages 3+ (light bars). Estimates for 2014 are from ADMI and regressions for age 2 from survey gears.



**Figure 1.13.** Lake Erie Yellow Perch survival rates by management unit for ages 2+ (dashed line) and ages 3+ (solid line). Estimates are derived from ADMB.



**Figure 1.14.** Lake Erie Yellow Perch exploitation rates by management unit for ages 2+ (dashed line) and ages 3+ (solid line). Estimates are derived from ADMB.



**Figure 1.15.** Yellow Perch age-2 abundance estimates (in millions of fish) from multi-model inference recruitment models run for each management unit.

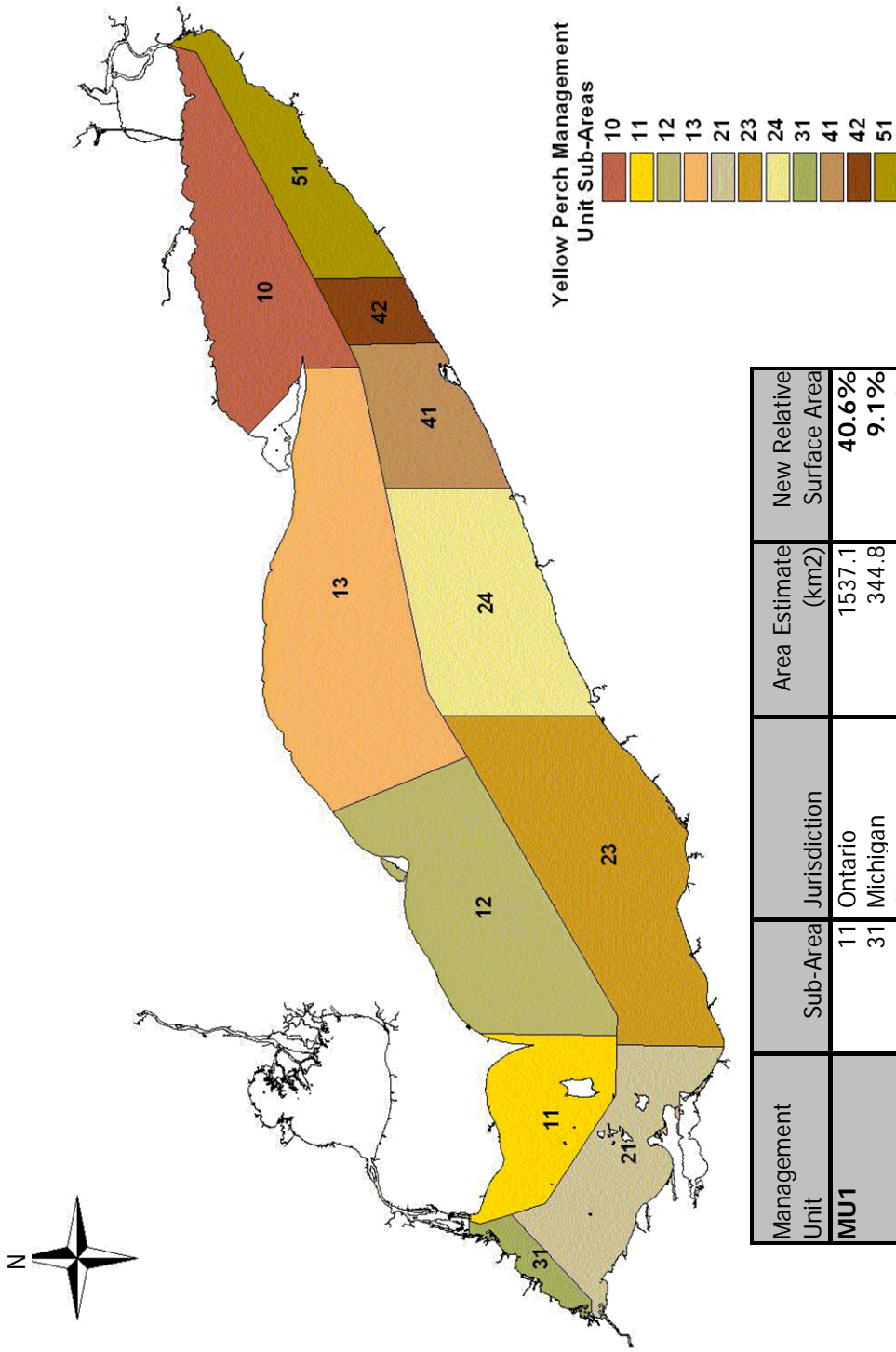


Figure 2.1. Calculations for subunit areas in the Yellow Perch Task Group Management Units.

**Appendix A Table 1.** Expert Opinion (EO) Lambda ( $\lambda$ ) values and relative number of terms associated with catch-at-age analysis data sources by management unit (Unit).

Unit	Data Source	$\lambda$	Relative Number of Terms
1	Commercial Gill Net Effort	0.8	1
	Sport Effort	0.7	1
	Commercial Trap Net Effort	0.5	1
	Commercial Gill Net Harvest	1.0	5
	Sport Harvest	0.9	5
	Commercial Trap Net Harvest	0.7	5
	Trawl Survey Catch Rates	1.0	3
	Partnership Gill Net Index Catch Rates	1.0	5
2	Commercial Gill Net Effort	0.8	1
	Sport Effort	0.8	1
	Commercial Trap Net Effort	0.6	1
	Commercial Gill Net Harvest	1.0	5
	Sport Harvest	0.9	5
	Commercial Trap Net Harvest	0.7	5
	Trawl Survey Catch Rates	0.9	4
	Partnership Gill Net Index Catch Rates	1.0	5
3	Commercial Gill Net Effort	0.8	1
	Sport Effort	0.8	1
	Commercial Trap Net Effort	0.6	1
	Commercial Gill Net Harvest	1.0	5
	Sport Harvest	0.8	5
	Commercial Trap Net Harvest	0.6	5
	Trawl Survey Catch Rates	1.0	4
	Partnership Gill Net Index Catch Rates	1.0	5
4	Commercial Gill Net Effort	0.8	1
	Sport Effort	0.7	1
	Commercial Trap Net Effort	0.6	1
	Commercial Gill Net Harvest	1.0	5
	Sport Harvest	0.7	5
	Commercial Trap Net Harvest	0.6	5
	NY Gill Net Survey Catch Rates	1.0	5
	Partnership Gill Net Index Catch Rates	0.9	5



**Appendix A Table 2a.** Projected Yellow Perch age-2 estimates (in millions of fish) from multi-model inference recruitment models run for each management unit.

**2014 Age-2 Projections**

Management Unit	Age-2 Recruitment Estimates			Number of years in model	Number of models averaged
	2014				
	Min.	Mean	Max.		
1	6.865	8.238	9.885	21	9
2	27.892	30.396	33.124	18	2
3	35.119	42.295	50.938	14	1
4	2.737	3.911	5.588	17	2

**Appendix A Table 2b** Parameters from multi-model inference recruitment models run for each management unit.

**2014 Age-2 Projections**

**MU1**

$$\text{Age}_2 \sim \text{Intercept} + \text{OPSF11} + \text{OOS11A} + \text{OHF11A} + \text{OOS10A} + \text{OHF10A}$$

Survey	Estimate	Uncond. variance	Number of models	Importance	+/- (alpha = 0.05)
OHF10A	0.116	0.026	4	0.382	0.339
OOS10A	0.156	0.038	3	0.425	0.412
OHF11A	0.043	0.003	5	0.472	0.117
OOS11A	0.240	0.051	6	0.638	0.478
OPSF11	0.100	0.003	8	0.876	0.123
(Intercept)	-0.129	0.238	9	1	1.029

**MU2**

$$\text{Age}_2 \sim \text{Intercept} + \text{BOHS20A} + \text{OPSF21} + \text{BOHJ21A}$$

Survey	Estimate	Uncond. variance	Number of models	Importance	+/- (alpha = 0.05)
BOHJ21A	0.093	0.008	1	0.640	0.190
BOHS20A	0.131	0.002	2	1	0.094
OPSF21	0.356	0.004	2	1	0.143
(Intercept)	0.933	0.087	2	1	0.632

**MU3**

$$\text{Age}_2 \sim \text{Intercept} + \text{BOHS30A} + \text{BOHJ31A}$$

Survey	Estimate
BOHS30A	0.335
BOHJ31A	0.283
(Intercept)	0.708

**MU4**

$$\text{Age}_2 \sim \text{Intercept} + \text{NYF41A} + \text{LPC41A}$$

Survey	Estimate	Uncond. variance	Number of models	Importance	+/- (alpha = 0.05)
LPC41A	0.064	0.012	1	0.311	0.236
NYF41A	0.538	0.027	2	1	0.350
(Intercept)	-0.328	0.194	2	1	0.940

**Appendix A Table 3.** Interagency trawl surveys indices. All trawl series are reported in arithmetic mean catch per hectare, all gill net series are in numbers of fish per lift.

Series in grey are excluded from recruitment estimates in Appendix Table 2

Year	OHS10	OHF10	OHS11	OHF11	OOS10	OOS11	OHS20	OHF20	OHS21	OHF21	OHS30	OHF30	OHF20B	OHF21B	OHF30B	OHF31B	OHS20B	OHS21B	OHS30B	OHS31B	OHJ21B	OHJ31B	OHJ21	OHJ31	
1984																									
1985																									
1986																									
1987				74.9		212.6																			
1988				11.2		265.4																			
1989				11.8		12.5																			
1990				144.4		35.2																			
1991				146.9		42.1																			
1992				58.1		27.6																			
1993				60.7		9.5																			
1994				1164.2		3.7																			
1995				508.5		287.1																			
1996				348.9		82.4																			
1997				3290.8		579.3																			
1998				52.2		33.7																			
1999				174.5		250.9																			
2000				155.3		68.5																			
2001				186.4		41.5																			
2002				322.1		246.3																			
2003				1509.9		1111.6																			
2004				40.9		9.3																			
2005				124.2		62.3																			
2006				180.2		121.9																			
2007				592.9		631.5																			
2008				267.0		74.7																			
2009				186.0		69.4																			
2010				58.2		26.9																			
2011				12.0		15.5																			
2012				74.5		35.0																			
2013				398.7		337.0																			
1984	283.9	9.7	761.7	44.5						119.1	5.9	7.3	0.0												
1985	2.4	32.6	20.8	125.5						3.8	30.5	1.6	17.1												
1986	102.0	0.2	1859.5	61.7						7.6	212.7	6.9	0.0	0.3											
1987	3.4	284.1	3.8	39.7						5.5	0.8	36.7	0.0	2.1											
1988	667.7	0.8	305.0	2.9						1.1	105.8	0.4	0.4	0.0											
1989	296.9	53.2	457.7	84.6						6.3	82.1	16.4	0.4	1.9								6.8	76.6		
1990	13.4	43.3	12.0	202.6	21.0					0.0	26.7	5.6	0.0	2.6								41.3	68.9	29.7	0.6
1991	19.6	15.5	1.0	144.0	24.5					1.7	17.8	3.2	0.7	0.6								63.3	56.6	3.8	1.6
1992	4.4	3.1	54.3	9.0	594.0	32.8				5.6	70.3	4.6	0.0	0.1								47.5	8.0	5.7	6.3
1993	16.0	12.0	21.6	4.5	239.8	17.9				3.0	30.6	2.6	2.9	0.2								146.9	112.0	93.2	0.1
1994	4.0	159.8	15.3	84.0	29.8	17.9				2.7	34.7	6.2	10.6	1.7								317.8	22.5	39.7	7.4
1995	22.4	32.7	6.0	33.7	5.3	54.3				15.2	4.3	10.9	4.0	1.7								362.5	81.3	55.2	9.6
1996	3.2	3.7	199.1	2.6	53.6	6.1				106.3	0.3	0.4	33.6	1.1	7.9							198.4	70.8		
1997	47.5	18.9	59.8	21.5	5.4	0.2				4.4	4.4	7.1	0.0	0.1								139.3	350.5	177.9	
1998	3.7	4.0	114.9	1.2	1005.9	14.9				8.4	127.8	1.7	8.1	0.0								17.5	6.7	6.2	0.0
1999	63.5	40.6	2.5	69.5	34.0	155.7				23.0	16.1	110.0	15.5	109.3								440.6	107.6	67.9	119.9
2000	84.8	19.9	10.2	2.1	1.2	4.8				6.6	0.7	3.6	11.3	3.0								106.1	162.4	55.5	36.9
2001	10.2	0.4	76.7	2.0	463.8	2.7				11.5	4.8	69.4	2.0	13.8								1.9	12.9	9.6	1.9
2002	749.6	49.5	0.6	13.9	8.3	42.6				6.8	1.0	6.6	0.0	0.7								198.7	245.2	186.6	19.7
2003	2.3	1.1	93.3	0.8	224.0	1.5				1.3	222.8	2.3	240.6	2.6	2.7							2.7	2.6	7.2	3.2
2004	61.7	44.4	0.5	4.3	0.1	21.4				6.5	0.1	12.4	0.1	12.2								97.65	1188.5	332.5	7.7
2005	82.3	131.6	10.3	0.1	8.8	0.2				5.4	0.4	124.4	0.0	156.2								0.0	2.2	2.5	0.2
2006	10.8	13.6	2.8	1.4	0.3	4.8				283.2	39.9	19.5	30.1	38.0								15.7	28.5	94.8	129.7
2007	40.9	34.5	6.3	0.9	73.9	3.0				9.1	63.5	7.9	70.0	9.6								184.4	203.9	202.5	43.4
2008	150.2	26.4	4.9	6.6	0.3	4.1				1088.3	44.3	20.8	356.0	25.1								333.1	310.6	150.6	87.0
2009	104.3	137.2	1.5	4.2	0.0	0.0				62.5	0.7	0.4	10.7	0.3								265.2	121.4	190.0	30.6
2010	12.4	13.2	0.6	5.7	0.6	5.7				4.0	1.7	51.8	0.2	63.5								0.0	49.5	18.1	36.2
2011	41.3	55.5	3.9	1.9	3.9	12.8				138.2	5.0	176.7	2.6	224.6								1.3	158.7	101.8	218.6
2012	22.3	23.3	11.3	1.1	1.6	1.7				13.7	27.4	2.0	33.2	2.2								53.1	21.9	48.7	117.8
2013	262.6	109.5	1.8	0.5	2.1	5.6				23.8	2.2	0.5	0.8	0.1								64.1	71.4	152.1	30.4

Appendix A Table 4. Legend. Lakewide trawl index codes and series names used in Appendix A Tables 2 and 3. All series are reported in arithmetic mean catch per hectare, except LPS41 and OPSF11-41, gill net indices which are reported in mean catch per lift. Abbreviations in Appendix T3 ending with a 'B' represent survey indices blocked by depth strata.

Abbreviation	Series
OHS10	Ohio Management Unit 1 summer age 0
OHS11	Ohio Management Unit 1 summer age 1
OHF10	Ohio Management Unit 1 fall age 0
OHF11	Ohio Management Unit 1 fall age 1
OOS10	Ontario/Ohio Management Unit 1 summer age 0
OOS11	Ontario/Ohio Management Unit 1 summer age 1
OHS20	Ohio Management Unit 2 summer age 0
OHF20	Ohio Management Unit 2 fall age 0
OHS21	Ohio Management Unit 2 summer age 1
OHF21	Ohio Management Unit 2 fall age 1
OHS30	Ohio Management Unit 3 summer age 0
OHF30	Ohio Management Unit 3 fall age 0
OHS31	Ohio Management Unit 3 summer age 1
OHF31	Ohio Management Unit 3 fall age 1
OHJ21	Ohio Management Unit 2 June age 1
OHJ31	Ohio Management Unit 3 June age 1
OLPN40	Outer Long Point Bay Nearshore Management Unit 4 age 0
OLPN41	Outer Long Point Bay Nearshore Management Unit 4 age 1
OLPO40	Outer Long Point Bay Offshore Management Unit 4 age 0
OLPO41	Outer Long Point Bay Offshore Management Unit 4 age 1
ILPF40	Inner Long Point Bay Management Unit 4 age 0
ILPF41	Inner Long Point Bay Management Unit 4 age 1
LPC40	Long Point Composite Management Unit 4 age 0
LPC41	Long Point Composite Unit 4 age 1
LPS41	Long Point Bay Management Unit 4 summer Gill Net age 1
NYF40	New York Management Unit 4 fall age 0
NYF41	New York Management Unit 4 fall age 1
OPSF11	Ontario Partnership Gill Net Management Unit 1 fall age 1
OPSF21	Ontario Partnership Gill Net Management Unit 2 fall age 1
OPSF31	Ontario Partnership Gill Net Management Unit 3 fall age 1
OPSF41	Ontario Partnership Gill Net Management Unit 4 fall age 1