



## DEPARTMENT OF NATURAL RESOURCES

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### Status of the Fisheries in Michigan Waters of Lake Erie and Lake St. Clair, 2017

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*A Lake St. Clair Master Angler Bluegill, captured electrofishing in November 2017*

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Lake St. Clair Fisheries Research Station  
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**FISHERIES DIVISION**

## Highlights for 2017

The purpose of this report is to provide an update on the status of the fisheries in the Great Lakes and connecting waters of Southeast Michigan. Sources of information used in compiling this report include creel surveys, charter boat reports, an angler diary program, the Michigan Department of Natural Resources (MDNR) Master Angler program, commercial fishery records, and fisheries survey results. Some of the highlights described in detail include:

- Michigan non-charter anglers captured over 1 million Lake Erie Yellow Perch and harvested over 870 thousand of these fish. Catch rates were the second highest observed since 1986, second only to 2016.
- The 2017 non-charter angler harvest rate for Lake Erie yellow perch was the second highest recorded since 1986, while the walleye harvest rate was below the long-term average.
- Michigan non-charter anglers on Lake Erie caught 60,039 legal-sized Walleye and harvested 56,938 of those fish. The high release rate was due to the abundance of sub-legal fish from the large 2015 year class.
- Lake St. Clair continues to be the premier Michigan water for trophy Muskellunge and Smallmouth Bass based on the number of entries recorded in the Master Angler program in 2017.
- Non-charter recreational Lake St. Clair anglers harvested more than 42 thousand Walleye in 2017, a 71% increase from 2016.
- Trap netting and trawling in Lake St. Clair resumed in 2017 after a hiatus in 2016.
- The Lake St. Clair trawl survey revealed better than average recruitment of Yellow Perch and Smallmouth Bass in 2017.
- The 2017 catch of two-year old Walleye in the MDNR's Lake Erie assessment gill nets reflects the strong 2015 year class, which will fully recruit to the fishery during 2018 and result in impressive catch rates of Walleye in Michigan waters of Lake Erie and the St. Clair-Detroit River System for years to come.
- Brook Silversides and Emerald Shiners were the numerically dominant species in the 2017 nearshore electrofishing survey.

### About the Lake St. Clair Fisheries Research Station

The Lake St. Clair Fisheries Research Station is a unit of the Research Section of the MDNR Fisheries Division. The station conducts research and stock assessment on fish populations of Lake Erie, the St. Clair-Detroit River System, and Saginaw Bay. Results of this work are instrumental in fisheries management decisions affecting these waters. The station works closely with fisheries managers in the MDNR's Lake Erie Management Unit and routinely collaborates in joint projects with other state and federal partner agencies, local units of government, non-government organizations, academic institutions, and stakeholder groups. Federal Sport Fish Restoration (SFR) Program dollars provide support for the majority of the station's assessment activities. The SFR Program provides grant funds to restore and better manage America's fishery resources through excise taxes on the purchase of fishing equipment, motorboat and small engine fuels, import duties, and interest. More information on the SFR Program can be found at: <http://wsfrprograms.fws.gov/Subpages/GrantPrograms/SFR/SFR.htm>.

### Sport Fishery Summary

Information on angler catch rates, effort, and opinion of Michigan's sport fisheries is collected with angler surveys. An angler survey can be conducted on-site where anglers are interviewed or counted while on the water, or off-site when anglers are interviewed by mail or telephone. On-site methods, also known as creel surveys, have been used extensively by the MDNR on various Michigan waters to estimate angler effort, harvest, and catch. In Southeast Michigan, on-site creel survey data are collected each year from the non-charter recreational fishery of Lake Erie. An on-site creel survey was also conducted on Lake St. Clair during 2017. Charter boat harvest, release, and angling effort are also recorded by Lake Erie and St. Clair-Detroit River System charter operators, who are required to report this information to the MDNR on a monthly basis.

Another example of an off-site angler survey is an angler diary program, where anglers keep their own records of angling activity and success. A



voluntary Sport Fishery Diary Program is used to collect catch and effort data for recreational fishing on Lake St. Clair. The program was initiated by the Ontario Ministry of Natural Resources and Forestry (OMNRF) in 1985 to monitor trends in the Muskellunge catch rate for Lake St. Clair. Five years later the program was expanded to include other species. The MDNR became involved in the program in 1993. Since that time, the program has been a cooperative effort between the OMNRF and MDNR to provide annual estimates of catch rates for the major sport fish species in Lake St. Clair. The MDNR Master Angler program, established in 1973 to recognize anglers who catch unusually large fish, also provides information on trends in voluntary reports of “trophy” catches throughout the Great Lakes waters of Southeast Michigan.

#### *Lake Erie non-charter recreational fishery*

The annual creel survey conducted by the MDNR during 2017 produced a total harvest estimate of 948,062 fish (Table 1) for Michigan's Lake Erie non-charter sport fishery, representing a modest decline when compared to harvest in 2016 (1,297,684), but is still substantially higher than 2015 (461,826). Yellow Perch alone accounted for 93% of the total harvest, reflecting their continued dominance of the recreational sport fishery. Non-charter anglers harvested an estimated 56,938 Walleye in Michigan waters of Lake Erie, which declined when compared to the harvest in 2016 (65,816), though catch rates improved slightly (2017 total catch rate: 0.14 Walleye/hr; 2016: 0.13). Angler effort in 2017 declined 19% from 2016 (Figure 1). The Walleye harvest rate in 2017 (0.14 fish/angler hour) remained below the long term mean of 0.21 fish/angler hour (Figure 2). The Yellow Perch total harvest rate (2.17 fish/angler hour) decreased 11% compared to 2016, but still represented the second highest catch rate in the time-series (Figure 2). Trends in angler effort and harvest rates for Walleye and Yellow Perch since the mid-1980s suggest that the level of angler effort on Lake Erie is affected by many factors in addition to harvest rates. Other factors, including weather, prey fish abundance, fishing success on other Great Lakes waters, fuel expenses, and regional economic conditions have likely contributed to the comparatively low level of fishing effort since 1991.

Biological data were collected from Walleye and Yellow Perch during the 2017 on-site creel survey. The age composition of harvested Walleye was

dominated by ages 2 through 4 (2013 to 2015 year-classes), collectively representing 68% of the harvest; though the 2014 year class (age 3) single-handedly made up 43% of the catch. Similar to last year, age 11 and older Walleye accounted for only 7% of the harvest (Figure 3). The average length of Walleye harvested in the sport fishery in 2017 was 18.8 inches.

Yellow Perch harvest was dominated by age 3 fish (2014 year-class), which accounted for 69% of the total harvest (Figure 3). The overall average length of Yellow Perch harvested in the sport fishery in 2017 was 8.6 inches. The mean length-at-age for Yellow Perch taken in the Michigan sport fishery decreased for ages 3, 4 5 fish in 2017 relative to 2016 (Figure 4).

#### *Lake St. Clair non-charter recreational fishery*

In 2017 the MDNR conducted a creel survey of the American waters of Lake St. Clair. Recreational anglers spent 540,779 hours (down from 553,457 hours in 2016) fishing the American waters of Lake St. Clair. Anglers harvested a total of 137,511 fish up from 117,658 fish in 2016 (Table 2). Yellow Perch were the most commonly harvested species in the American waters of Lake St. Clair during 2017, representing 49% of the total harvest. A total of 66,946 Yellow Perch were harvested, yielding a total harvest rate of 0.12 fish/angler hour, both down slightly from 2016. Non-charter anglers harvested a total of 42,620 Walleye, up 71% from 2016 (13,396 Walleye harvested in 2016), representing a total harvest rate of 0.08 fish/angler hour. Over 155,000 legal sized black bass (Largemouth and Smallmouth combined) were captured in the American waters of Lake St. Clair, and 96% were released. Additionally in 2017, 1,339 legal-sized Muskellunge were captured and 39 were estimated harvested. Anglers are reminded that beginning with the 2018 license year any harvested Muskellunge must be reported within 24 hours at [www.michigan.gov/registerfish](http://www.michigan.gov/registerfish) or by calling 1-844-345-3474.

Similar to Lake Erie, biological data were collected from Walleye and Yellow Perch during the 2017 on-site Lake St. Clair creel survey. The age composition of harvested Walleye was dominated by age 2 and age 3 (2014 and 2015 year-class), which together accounted for 72% of the harvest (Figure 5). Age 10 and older Walleye accounted for only 4% of the harvest. The average length of



Walleye harvested in the sport fishery in 2017 was 17.1 inches.

Yellow Perch harvest was dominated by age 4 fish (2013 year-class), which accounted for 51% of the total harvest (Figure 5). This year-class was the most numerically dominant in last year's (2016) harvest as well. The average length of yellow perch harvested in the sport fishery in 2017 was 8.7 inches.

#### *Charter fishery*

In 2017, Michigan charter boat operators reported a total harvest of 53,383 fish of all species from Lake Erie. In combination, Yellow Perch and Walleye accounted for over 99% of the total harvest. The Walleye targeted harvest rate in 2017 (0.83 fish hour, Table 3) was down from 2016. The total Walleye harvest rate (0.56) remained slightly below the long-term mean total harvest rate of 0.71 fish/angler hour (Figure 6). The Yellow Perch targeted harvest rate increased substantially from 2016, exceeding the long-term mean of 0.70 fish/angler hour for the 8<sup>th</sup> consecutive year (Figure 6).

Beginning in 2010, Michigan charter boat operators were required to report catch-and-release fishing activity as well as harvest. For Lake Erie, charter operators reported releasing 18,630 fish of all species in 2017. About 72% of the released fish were Walleyes, suggesting a high abundance of sub-legal sized fish associated with the strong 2015 and 2016 year-classes. Lake Erie charter boat operators reported the catch and release of 15 Muskellunge in 2017, all non-targeted catch.

For the St. Clair-Detroit River System, charter boat anglers reported a harvest of 22,014 fish of all species. Walleye (74%) and Yellow Perch (15%) made up the bulk of the harvest. In 2017, the charter boat targeted harvest rate for Walleye increased substantially when compared to 2016 and was well above long-term mean Walleye harvest rate of 0.21 fish/angler hour (Figure 7). The Yellow Perch harvest rate decreased slightly from 2016, and remained well below the long-term mean harvest rate of 0.43 fish/angler hour (Figure 7).

Charter operators on the St. Clair-Detroit River System reported releasing 30,780 fish. Smallmouth Bass (49%) and Walleye (24%) accounted for the majority of the fish that were

captured and released. For charters targeting Smallmouth Bass, charter operators released 96% of the 15,853 fish caught in 2017. Of the 857 Muskellunge reported caught, seven were harvested for an overall release rate of 99.2% (Table 4).

The number of reported Michigan charter excursions on Lake Erie decreased slightly in 2017 but was the second highest amount since 2007 (Figure 8). In 2017, charter boat excursions on the St. Clair-Detroit River System increased 9% from 2016, continuing a trend of increased charter activity since 2012. The reporting requirement of catch and release fishing implemented in 2010 may explain some of the increased activity that was reported; however, it is likely that the continuing upward trend in charter excursions since 2012 represents a true increase in charter activity. The charter fishing activity on the St. Clair-Detroit River System is primarily catch-and-release oriented, and was largely unreported prior to 2010 making long-term trends in charter effort difficult to assess in the St. Clair system.

#### *Sport Fishery Diary and Master Angler programs*

Muskellunge catch rates derived from the Sport Fishery Diary Program on Lake St. Clair improved through the late 1980's and early 1990's, but were more variable in the 2000's. In 2017, the catch rate increased slightly from the previous year (Figure 9). The increase in Muskellunge catch rates for 2017 continues a pattern of increased variability in catch rates over the past 17 years. We suspect this increased variability may be more reflective of the lower number of Muskellunge anglers involved in the diary program, than of actual changes in the Muskellunge population.

For years, the quality of the Lake St. Clair Muskellunge fishery was reflected in the MDNR's Master Angler program. Lake St. Clair continued to dominate the statewide Master Angler entries for Muskellunge in 2017 with 32 of the 55 total entries. The previous three years have shown an increasing trend in the number of Master Angler entries from Lake St. Clair (Figure 10). There has been a general decline in entries since the peak in 2001. We suspect this is largely a reflection of waning interest in submitting Master Angler entries for Muskellunge less than 50 inches in length, which has become a local benchmark for "trophy" status for Muskellunge from the St. Clair-Detroit River System. By all accounts, the Muskellunge population continues to provide excellent fishing



opportunities. We expect that the following factors will continue to contribute to a strong Muskellunge population and fishery in Lake St. Clair and the connecting waters: 1) a 44 inch minimum size limit (MSL) for Ontario waters and a 42 inch MSL for Michigan waters of the St. Clair system; 2) physical and biological changes in the lake such as clearer water and increased aquatic plant growth resulting in improved habitat for Muskellunge; and, 3) extensive voluntary practice of catch-and-release fishing for Muskellunge in Lake St. Clair by both charter and non-charter anglers.

Statistics from the Master Angler program indicate that Lake St. Clair is one of the premier waterbodies in the state for trophy Smallmouth Bass. With 27 entries in the Master Angler program in 2017, Lake St Clair represented 21% of the total entries statewide. The next highest waterbody had 5 total entries. This represents a substantial increase from the general decline that had been observed from 2013 – 2016 on Lake St. Clair (Figure 11). The continued strong representation of Lake St. Clair Smallmouth Bass in the statewide Master Angler program is likely a reflection of an abundance of trophy-size Smallmouth Bass in the lake, a high degree of angler effort targeting the species, and widespread practice of catch-and-release among Smallmouth Bass anglers.

## Commercial Fishery Summary

Since 1979 the commercial fishery in Michigan waters of Lake Erie has primarily harvested rough fish species using seines in the shallow embayments along the shoreline, although a small-mesh trap net license has been active since 2006. In 2017, a total of three Michigan commercial fishing licenses were active on Lake Erie. The 2017 commercial harvest included 11 types of fish for a total of 348,115 pounds (Table 5). In combination, Channel Catfish (23%), White Bass (18%), Common Carp (13%) and Gizzard Shad (12%) accounted for 67% of the total harvest by weight. The total value of the 2017 Lake Erie commercial harvest from Michigan waters was estimated at \$194,936 (Table 5). The 2017 total harvest was the lowest since 2004 with harvest declining for all species besides Gizzard Shad (Table 6). The harvest of Common Carp was the lowest since 1981.

## Summary of Fisheries Surveys

The MDNR conducts a number of annual assessments using a variety of gear types to target the diverse fish communities present in Lake Erie and the St. Clair-Detroit River System. Since 1978, the Lake St. Clair Fisheries Research Station has fished variable mesh multi-filament gill nets at two fixed (index) locations in western Lake Erie each fall, as part of the interagency walleye assessment program. In 2014, a bottom trawl survey was added to our standard assessments of the Michigan waters of Lake Erie in order to measure recruitment of important fish species. Trap nets have been deployed in Anchor Bay of Lake St. Clair each spring since 2002 to sample adult fish populations, while juvenile and forage fish populations in the lake have been assessed with bottom trawls each spring and fall since 1996. A setline survey has been used to monitor the Lake Sturgeon population in the North Channel of the St. Clair River since 1997; beginning in 2013 the MDNR modified its bottom trawl to increase its success in capturing Lake Sturgeon in Lake St. Clair. After a hiatus in 2016 associated with the repower of our primary work platform, the R/V *Channel Cat*, the annual trap net and trawl surveys resumed in 2017. In 2017 we also continued our fall nearshore electrofishing survey for a second year utilizing our electrofishing boat, the R/V *Mooneye*.

### Lake Erie

Eight sites, including the two index gill net stations, were sampled during the 2017 Lake Erie bottom trawl fish community survey. A total of 11,492 fish representing 22 different species were captured during 8 trawl tows for an average catch-per-effort (CPE) of 1,444 fish/10-minute tow. Age 0 White Perch had the highest average CPE (759 fish/10-minute tow) for forage-sized fish, followed by age 0 Gizzard Shad (292 fish/10-minute tow), Yellow Perch (133 fish/10-minute tow), Mimic Shiner (50 fish/10-minute tow), and White Bass (41 fish/ 10-minute tow). Trout Perch, Round Goby, Age 0 Walleye, Logperch, Silver Chub, Rainbow Smelt, Spottail Shiner, and Tubenose Goby were also captured. The non-forage size (adult) catch was dominated by Yellow Perch (50 fish/10-minute tow), followed by Freshwater Drum (44 fish/10-minute tow), White Perch (20 fish/10-minute tow), White Bass (14 fish/10-minute tow), and Walleye (7 fish/10-minute tow). Also captured were Channel Catfish, Common Carp, Rock Bass, Shorthead Redhorse, Pumpkinseed, Quillback, White Sucker, and Smallmouth Bass (all less than 2 fish/10-minute tow). While 2017 brought the



highest overall CPE observed since Michigan's modern-day bottom trawl survey began in 2014, this was only the fourth trawl survey in recent memory, making it difficult to put the catch rates that we observed into a broader context for Michigan waters of Lake Erie.

In 2017 a total of 1,110 fish representing 10 species were captured during four net lifts at two index sites completed during the annual October gill net survey in Michigan waters of Lake Erie. White Perch (36%), Walleye (29%), and Gizzard Shad (20%), comprised over three-quarters of the catch by number, followed by White Bass (9%), Channel Catfish (3%), Freshwater Drum (1%), White Sucker (1%), and Yellow Perch (1%). The remaining two species (Goldfish and Shorthead Redhorse) accounted for less than 1% of the total catch. The average Walleye catch rate for the two index sites (80 fish/lift) in 2017 was two-thirds that observed during 2016 (Figure 12). Two year-old fish from the robust 2015 year class accounted for 71% of the total catch, followed by age 1 (2016 year class; 17%) and age 3 (2014 year-class; 10%) Walleye. The average catch rate of yearling Walleye (13 fish/lift) decreased 84% from 2016, and was well below the average of 37 fish/lift for the 1978-2016 time series (Figure 13), which reflects the smaller size of the 2016 year class compared to the strong 2015 year class. The 2015 Walleye year class, which will be fully recruited to the fishery in 2018, is expected to be a strong contributor to the Lake Erie fishery in upcoming years.

#### *Lake St. Clair and St. Clair River*

The 2017 trap net survey ran between April 24<sup>th</sup> and May 18<sup>th</sup> culminating in 36 net lifts. Total catch per lift was 49.06 fish which was higher than the average over the time series (39.9 fish/lift), and the highest observed since 2012 (50.8 fish/lift). Rock Bass and Walleye were the two most commonly observed species making up 56 and 15% of the catch, respectively (Figure 14). Age was estimated for 203 Smallmouth Bass and 99 Northern Pike (Figure 15). Year-class contribution to Smallmouth Bass catch was relatively uniform (Figure 15), with the 2011 year class being most abundant (21% of the catch). For Northern Pike, the 2013 (33%) and 2014 (34%) year-classes made up the majority of the catch (Figure 15). Smallmouth Bass averaged 17.2 inches in length and Northern Pike averaged 27.9 inches in length. Additionally four Muskellunge were captured, averaging 43.1 inches in total length, and ranged

between 8 and 15 years old. In addition to the trap net survey we continued Smallmouth Bass sampling by electrofishing along the "Mile Roads" area east of St. Clair Shores. A total of 146 individuals were sampled with an average length of 16.9 inches and an age range of 3 to 12. Together these surveys indicate strong populations of sportfish in Lake St. Clair, with an abundance of large, and relatively old individuals.

A total of 167 Lake Sturgeon were collected during assessment surveys on Lake St. Clair and the St. Clair River in 2017. Captured Lake Sturgeon averaged 41.4 inches in total length, with a range from 20.2 inches to 72.6 inches. A total of 146 Lake Sturgeon were caught in the St. Clair River during the annual setline survey, while 21 fish were caught with trawls in Lake St. Clair during July and August. The length frequency for setline and trawl-captured Lake Sturgeon in 2017 illustrates the higher proportion of large individuals in the trawl catch in the lake (Figure 15). We suspect this reflects a difference in the actual size structure of the Lake Sturgeon present in the lake during the summer, rather than a product of differences in size bias between the two survey gear types. Survey setlines were modified in 2002 to include small hooks, providing a less biased sample of the Lake Sturgeon population. In addition to sampling Lake Sturgeon, each setline is also set with two minnow traps, one attached to each end. These traps target Northern Madtom, a small catfish species endangered in the State of Michigan and Province of Ontario. Each trap is baited with earthworms, which experimentation in past years has suggested as being the preferred bait. A total of 172 Northern Madtoms were sampled in 2017. Northern Madtoms have very specific habitat and water quality requirements, making them a sensitive indicator of environmental quality. The high catch rate suggests high quality habitat conditions exist in the St. Clair River at this time.

The forage fish community bottom trawl of Lake St. Clair has occurred annually since 1996, with the exception of 2016 when technical issues prevented the completion of the survey. A total of three trawls were conducted at the index station in both the spring and late summer. Yellow Perch dominated that total catch during the spring trawls (Table 8). Yellow Perch and Log Perch were the most abundant species in the fall trawls (Table 9). Recent declines in Shiner species continued for both spring and late summer trawls (Tables 8 & 9). This recent trend may be, in part, associated with our ability to trawl in areas of dense vegetation



which have increased in recent years. Trawl catch rates of Yellow Perch by year-class when summed across years indicates highly variable recruitment of Yellow Perch across seasons (Figure 16). However, please note that since catch across years are added to determine the strength of an individual year class, a lack of 2016 trawling will handicap this estimate over the next few seasons. Length-at-age for Yellow Perch in Anchor Bay continued a declining trend in 2017 (Figure 17), and are well below state average. While the cause of this decline is still unknown, it is an active area of investigation for our staff.

The late summer trawls provide a first glance at recruitment patterns for important sport fishes such as Yellow Perch and Smallmouth Bass. Age 0 Yellow Perch abundance was the third highest observed in the time series (Figure 18), but still well below the record 2010 year class. Smallmouth Bass age 0 density was above the long term mean (Figure 19), however, the size of age 0 Smallmouth Bass is often considered a more important indicator of recruitment success than abundance. Smallmouth Bass average size was essentially unchanged from 2015 (Figure 19), and slightly above the long term average. The combination of above average abundance of age 0 fish and above average size has not occurred since 2006, and strongly suggest that the 2017 year class will be an important contributor to Smallmouth Bass populations in the future.

The second annual nearshore electrofishing survey was conducted at the end of October and beginning of November, 2017. The purpose of this survey is to provide insight into the population size structure and abundance of fish species such as panfish, largemouth bass, and forage fishes that are associated with nearshore areas and may not be adequately captured by our other survey methods. Thirteen sampling stations located around the lake and deemed representative of lake-wide nearshore habitat conditions were sampled for three ten minute transects each. During the first and third ten minute transect all observed fish were netted, identified, and measured to the nearest centimeter. During the middle ten minute transect only age 0 Muskellunge were netted as part of a Muskellunge recruitment index initiated in 2015.

A total 3,193 individual fish representing 29 unique species were measured. Brook Silversides and Yellow Perch were numerically dominant, each making up roughly 20% of the total catch by

number. Yellow Perch, and Brook Silversides were the most widely distributed species as each was encountered at all 13 sampling locations. A total of 12 age 0 Muskellunge was captured for a catch rate of 0.31 fish/10-min shocking, up from 2016 (0.03 fish/10-min shocking), but below the 2015 catch rate (1.11 fish/10-min shocking; the 2015 survey targeted age 0 Muskellunge only). Panfish catches were generally lower than in 2015. Size structures for select panfish species (Figure 20) and Largemouth Bass revealed an abundance of small, likely age 0 individuals, indicating strong recruitment. Size structure of Largemouth Bass (Figure 20) indicated many large catchable size individuals. Moving forward the nearshore survey will provide a strong basis for evaluating change in size structure and recruitment of these important fish species.

## Fish Tagging Studies

The MDNR uses a number of different tagging methods that are dependent upon the type of fish being tagged and the purpose for tagging, which can include estimating fish abundance, growth, mortality, exploitation, and movement. The tags most commonly used by the MDNR in the St. Clair-Detroit River System and Lake Erie are metal tags located on the jaw of Walleye and Smallmouth Bass or on the dorsal fin of Lake Sturgeon. Angler cooperation is an essential component of fish tagging programs, and all anglers are encouraged to report tagged fish by filling out the on-line form available at <http://www.michigan.gov/eyesinthefield>.

### Lake Erie

Michigan placed Walleye tagging in Lake Erie on indefinite hold in 2011 as the need to continue the existing lake-wide tagging program was being investigated in cooperation with our partner agencies. Accordingly, there has been a continual decline in the number of tagged Walleyes reported each year as the remaining tagged fish are susceptible to natural and fishing mortality and no new fish are being tagged. Therefore, we will no longer report on tag returns from Lake Erie Walleye beginning with our 2018 annual report. During 2017, only one tag return was reported from fish previously tagged in the Huron River at Flat Rock. The Lake Erie Walleye Task Group, which represents natural resource management agencies from Michigan, Ontario, New York, Pennsylvania, and Ohio, continues to explore options for future lake-wide tagging strategies.



The long-term distribution of tag recoveries from Walleye tagged in the Huron River at Flat Rock show that these fish tend to be captured along the south and western shores of Lake Erie, in the Detroit and St. Clair rivers, and on Michigan's side of Lake St. Clair (Figure 22). In contrast to the localized movements of Smallmouth Bass tagged in Lake St. Clair (see below), recoveries of tagged Lake Erie Walleye continue to provide evidence of substantial movement from spawning locations in Lake Erie through the connecting waters of the St. Clair-Detroit River System. For example, recoveries of Walleye tagged at the Huron River in Flat Rock show they have travelled to the Detroit River, Lake St. Clair, the St. Clair River, and even southern Lake Huron. However, it is obvious from tag recovery patterns that other individuals from the Lake Erie spawning stocks migrate within that lake, travelling as far as the Central and Eastern basins.

#### *Lake St. Clair and St. Clair River*

In 2017, Michigan tagged a total of 203 Smallmouth Bass with non-reward jaw tags in Anchor Bay of Lake St. Clair. A total of 12 non-reward tags placed on Smallmouth Bass in 2017 were recovered by anglers for a single-season reporting rate of 5.9%. This is higher than the 3.9% single-season reporting rate observed during 2015 (Smallmouth Bass were not tagged in Anchor Bay during 2016). Walleye captured during the spring trap net survey were not tagged.

Since 2002, a total of 5,161 Smallmouth Bass captured in survey trap nets in Anchor Bay have been tagged and released. Smallmouth Bass movements are rather localized, with nearly all the Smallmouth Bass tag recoveries reported to date coming from the Michigan waters of Lake St. Clair. The northernmost Smallmouth Bass tag recovery has been from the Port Huron area of the St. Clair River, and the southernmost recovery came from the Oak Harbor area in Ohio waters of Lake Erie (Figure 22). On average, recaptured Smallmouth Bass tagged during 2002-2017 traveled 5.2 mi (8.4 km) from the Anchor Bay tagging site.

During 2016 a total of 438 Smallmouth Bass were sampled by electrofishing and jaw-tagged in the "Mile Roads" area of Lake St. Clair, east of St. Clair Shores (the first Smallmouth Bass tagging effort for this location); an additional 144 Smallmouth Bass were collected and jaw-tagged here in 2017. A total of 11 non-reward tags placed on

Smallmouth Bass in the Mile Roads area during 2017 were recovered by anglers for a single-season reporting rate of 7.6%, which is just over a percent lower than the 8.7% single-season reporting rate observed during 2016 and nearly 2% higher than that observed from Smallmouth Bass tagged in nearby Anchor Bay during 2017. The higher reporting rate for fish tagged near the Mile Roads could be explained by a number of factors, including the fact that the tagging program is new, and anglers are unaccustomed to seeing tagged Smallmouth Bass in this area (and are therefore more likely to report them); that tagged fish in this area are more concentrated and available for anglers to capture; or, all else being equal, that the intensity of the Smallmouth Bass fishery in the Mile Roads area is greater than in Anchor Bay. Similar to tagged Anchor Bay fish, recaptured Smallmouth Bass that were jaw-tagged during 2016-2017 did not travel far, ranging an average of 5.0 mi (8.0 km) from the Mile Roads tagging site.

One Smallmouth Bass tagged in Anchor Bay was recovered from Whitmore Lake in Washtenaw County in 2011 (Figure 22). As there is no connection between the two water bodies this fish was illegally transported from Lake St. Clair to Whitmore Lake and released, where it was subsequently recaptured and reported. Anglers are reminded that the unauthorized transfer of fish from one water body to another poses significant risks, particularly for introduction of diseases such as viral hemorrhagic septicemia (VHS; the illness responsible for fish kills in the Great Lakes region as recently as spring 2018).

A total of 3,219 Lake Sturgeon have been tagged and released in the St. Clair River and Lake St. Clair since 1996. To date, 727 tagged Lake Sturgeon have been recaptured with survey gear or reported by fishermen. A total of 474 tagged sturgeon have been recovered with survey setlines in the North Channel. One was recovered in a survey trap net in Anchor Bay, one in a survey gill net, while 13 have been recaptured in assessment trawls on Lake St. Clair. Sport anglers have reported 206 recoveries, nearly all from the North Channel of the St. Clair River, except for one reported from Lake Erie, near Huron, Ohio. Twenty-five recoveries have been reported from the Ontario commercial trap net fishery in southern Lake Huron, approximately 70 km (43.5 mi) from the tag site. Seven recoveries have been made on Lake Sturgeon that were found dead from boat strikes or unknown causes.





## Sport Fishing Regulations

Walleye in Lake Erie are managed cooperatively with other jurisdictions under a harvest quota system. Since 2011, the Walleye daily bag limit for anglers in Michigan waters of Lake Erie is directly related to the Total Allowable Catch (TAC) for Walleye determined by the Great Lakes Fishery Commission Lake Erie Committee (LEC) in late March. The table below provides the quota thresholds used to determine the daily bag limit under this new regulation.

Michigan Walleye quota	Daily bag limit
More than 108,364 fish	6
96,958 to 108,364 fish	5
85,551 to 96,957 fish	4
74,144 to 85,550 fish	3
62,737 to 74,143 fish	2
less than 62,737 fish	1

The Walleye daily bag limit regulation will be effective from May 1 through the end of April in the following year. For 2017, the LEC agreed upon a TAC of 5.924 million Walleye, with a Michigan quota of 345,000 Walleye. This quota set the Michigan Walleye daily possession limit at 6 fish from May 1, 2017 to April 30, 2018. The 2018 daily possession limit for Walleye fishing in Michigan waters of Lake Erie will be announced in April. The Michigan Walleye minimum size limit (15 inches) and season (open all year) for Lake Erie waters remain unchanged for 2018.

In 2015, Michigan's black bass fishing seasons were changed to provide year-round black bass fishing opportunities. Catch-and-immediate release black bass fishing is now legal all year. The possession season for Smallmouth and Largemouth bass fishing in the Michigan portion of the St. Clair River, Lake St. Clair, and the Detroit River is the third Saturday in June (June 17, 2017) thru December 31. The black bass possession season for the Michigan waters of Lake Erie opens on the Saturday before Memorial Day (May 26 in 2018).

The Lake Sturgeon and Muskellunge harvest tags have been eliminated for the 2018 license year. However, it is now mandatory to report the

harvest of a Lake Sturgeon or Muskellunge within 24 hours of the time of catch at either [www.michigan.gov/registerfish](http://www.michigan.gov/registerfish) or by calling 844-345-3474. Additionally, Muskellunge are now open to catch and immediate release fishing all year in all waters open to fishing.

The latest information on all of Michigan's fishing regulations, including those of the Great Lakes and its connecting waters in Southeast Michigan, can be found on-line at <https://www.michigan.gov/fishingguide>.

## Station News - 2017

In August 2017 new Fisheries Research Biologist Andrew Briggs joined our staff. Andrew filled the vacancy left by Mike Thomas' retirement. Andrew grew up in Scottville, MI, earned his Bachelor's Degree from Lake Superior State University, and his Master's Degree from Central Michigan University. Andrew comes to us from the U.S. Fish and Wildlife Service bringing a wealth of knowledge and experience. Andrew's research interests include Lake Sturgeon, Great Lakes fish communities, and fish passage issues. Andrew is also an avid angler.



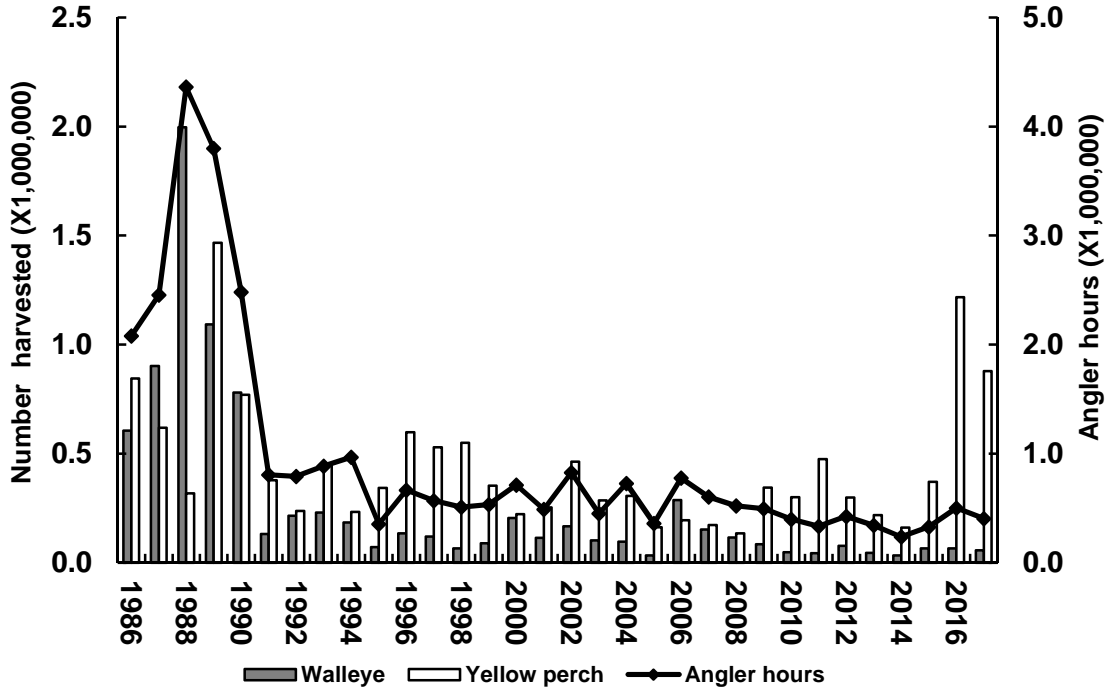


Figure 1.—Estimated harvest and total effort for Michigan’s Lake Erie sport fishery, 1986-2017.

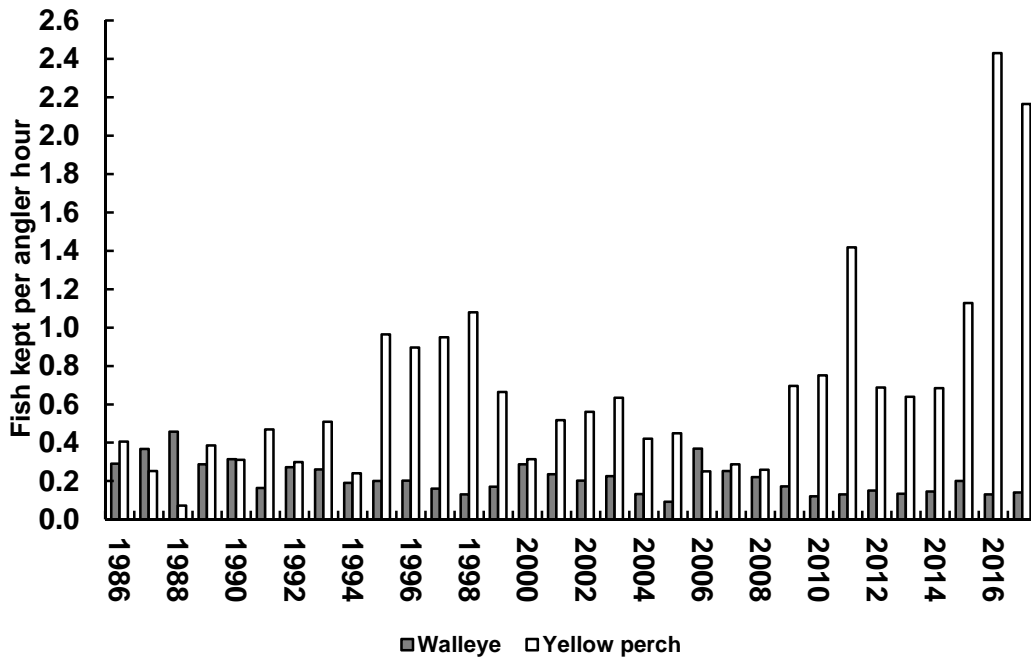


Figure 2.—Walleye and Yellow Perch harvest rates (based on total effort) for Michigan’s Lake Erie sport fishery, 1986-2017.



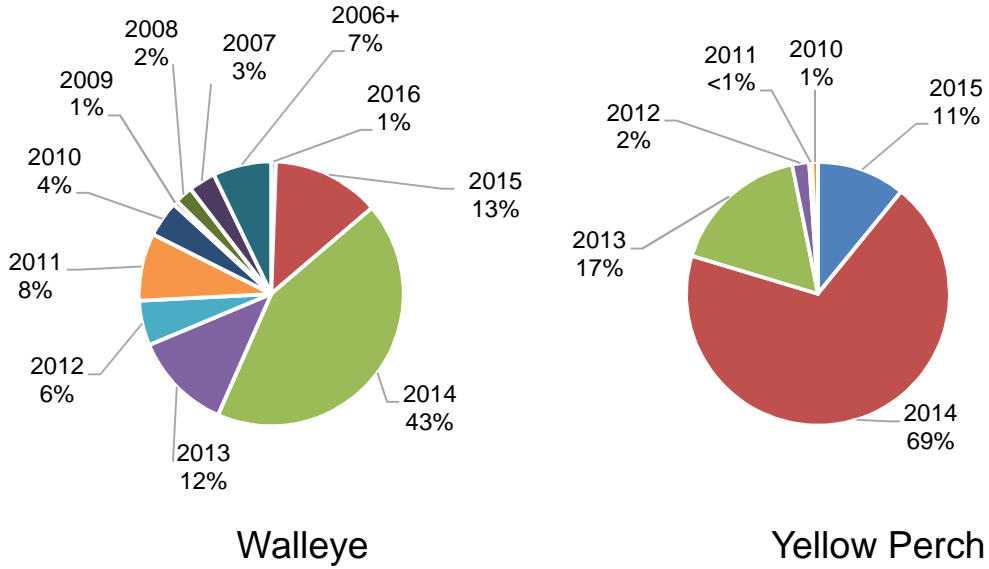


Figure 3.—Year-class contribution to Michigan sport harvest for Walleye and Yellow Perch from Lake Erie in 2017.

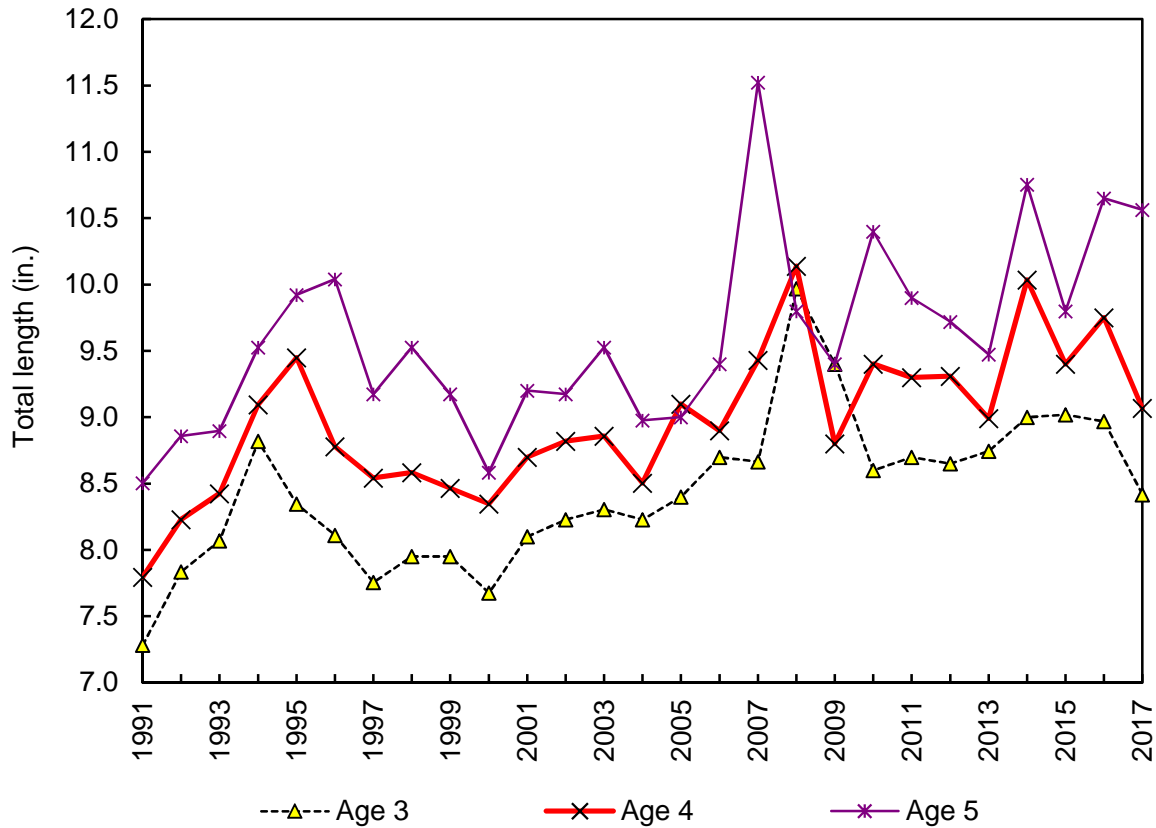


Figure 4.—Mean length at age for sport-harvested Yellow Perch from Michigan's waters of Lake Erie, 1991-2017.



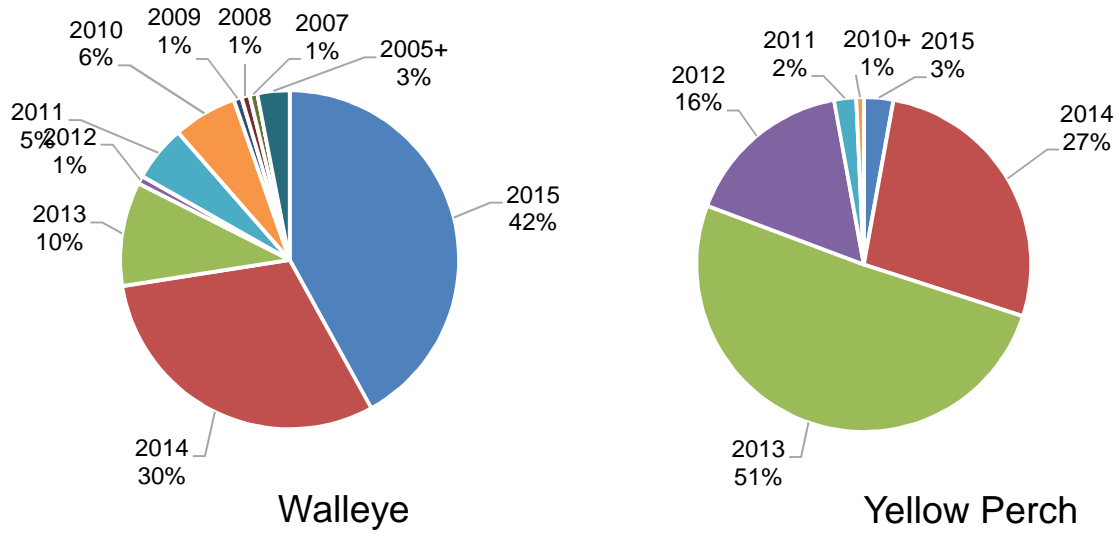


Figure 5.— Year-class contribution to Michigan sport harvest for Walleye and Yellow Perch from Lake St. Clair in 2017.

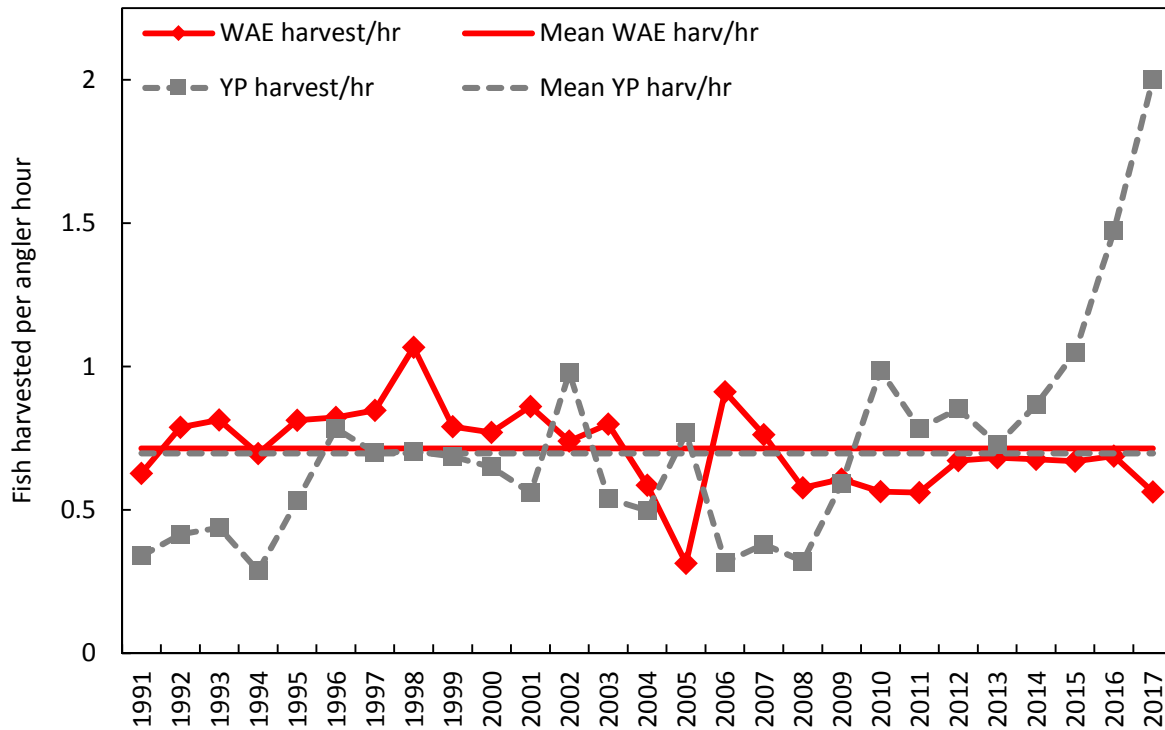


Figure 6.—Michigan Lake Erie charter boat harvest rates for walleye and yellow perch, 1991-2017.



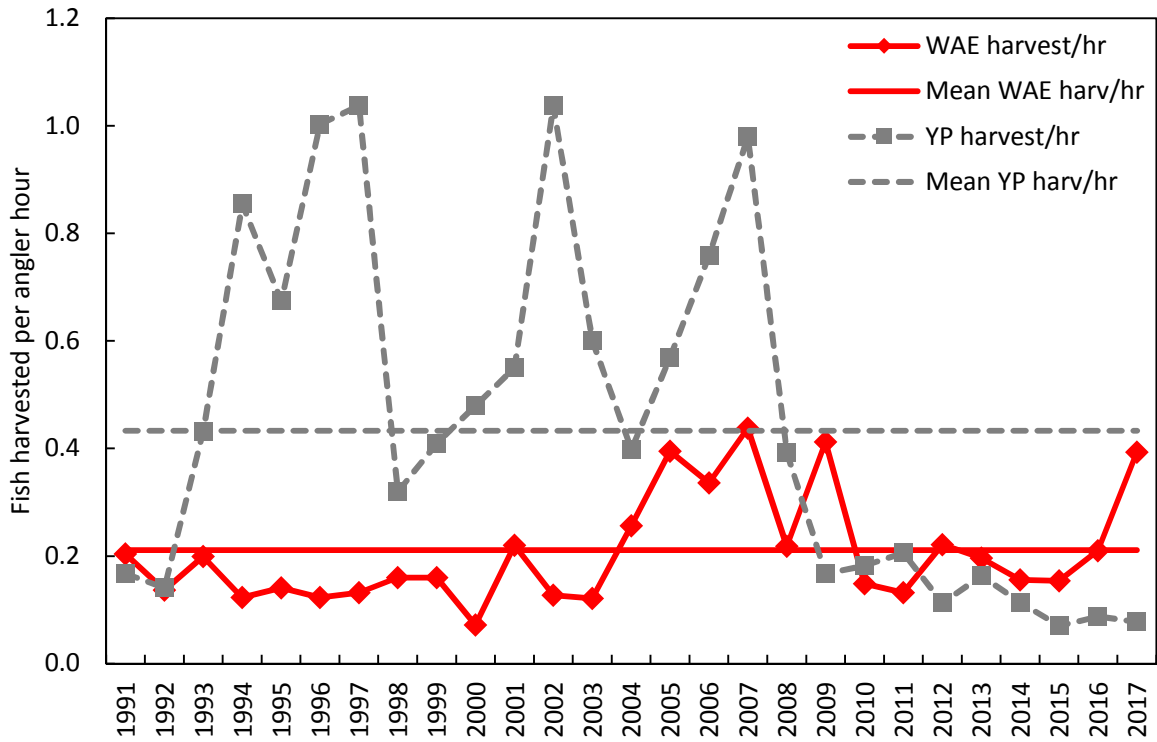


Figure 7.—Michigan St. Clair-Detroit River system charter boat harvest rates walleye and yellow perch, 1991-2017.

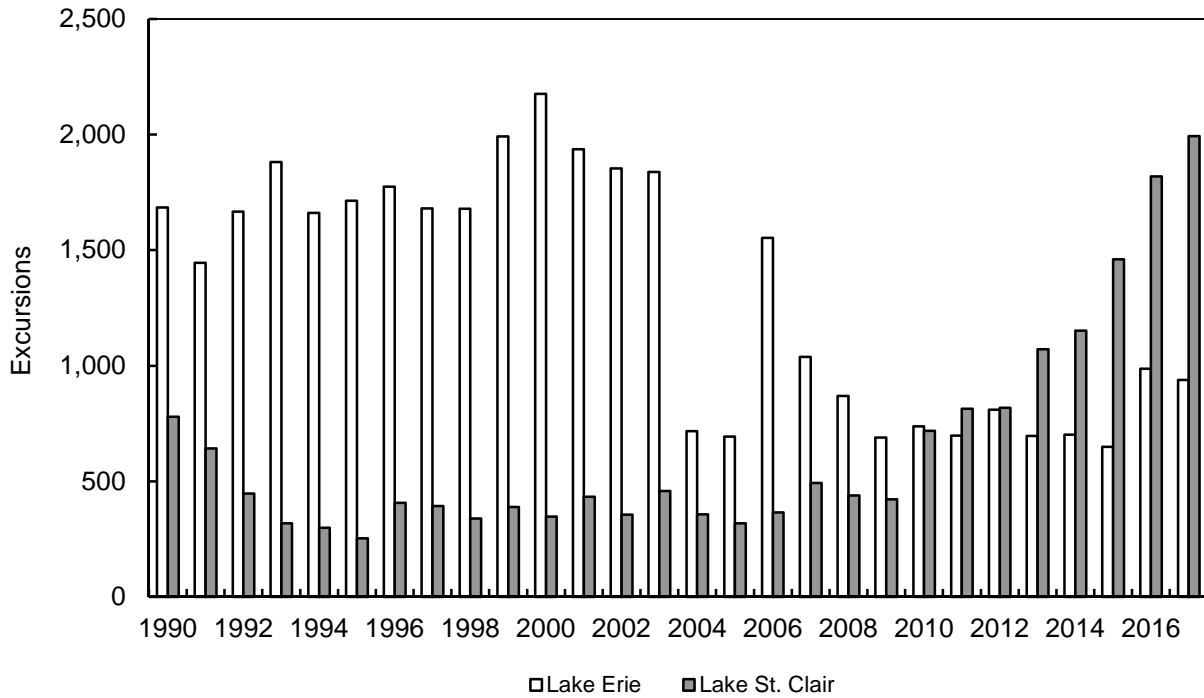


Figure 8.—Reported charter boat excursions on Lake Erie and the St. Clair-Detroit River system, 1990-2017.



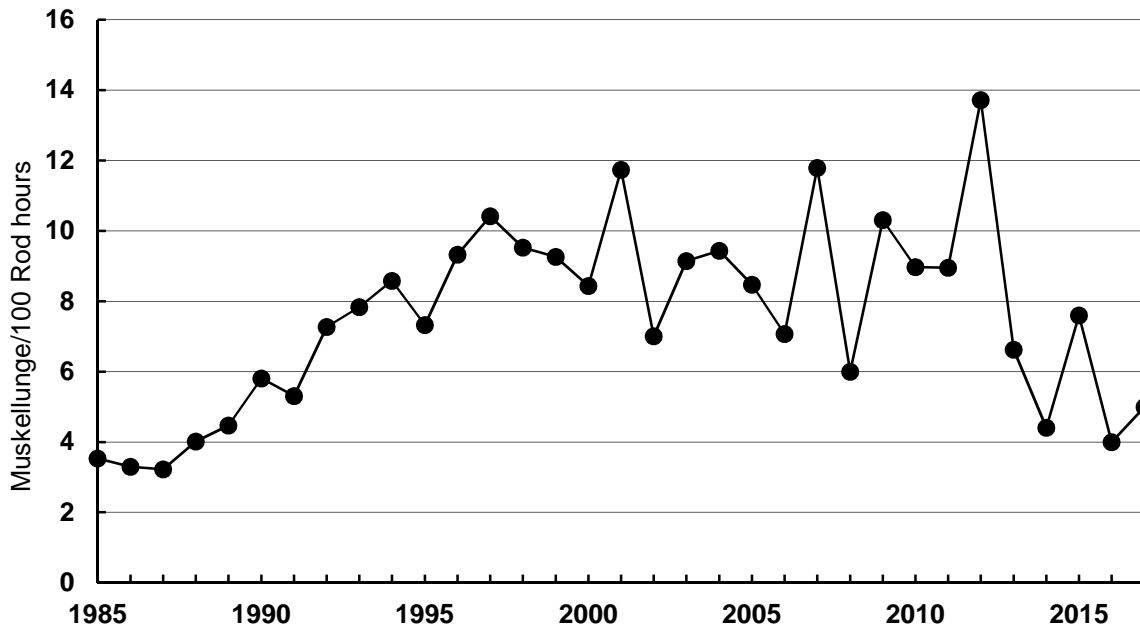


Figure 9.—Lake St. Clair muskellunge catch rate from Angler Diary Program, 1985-2017.

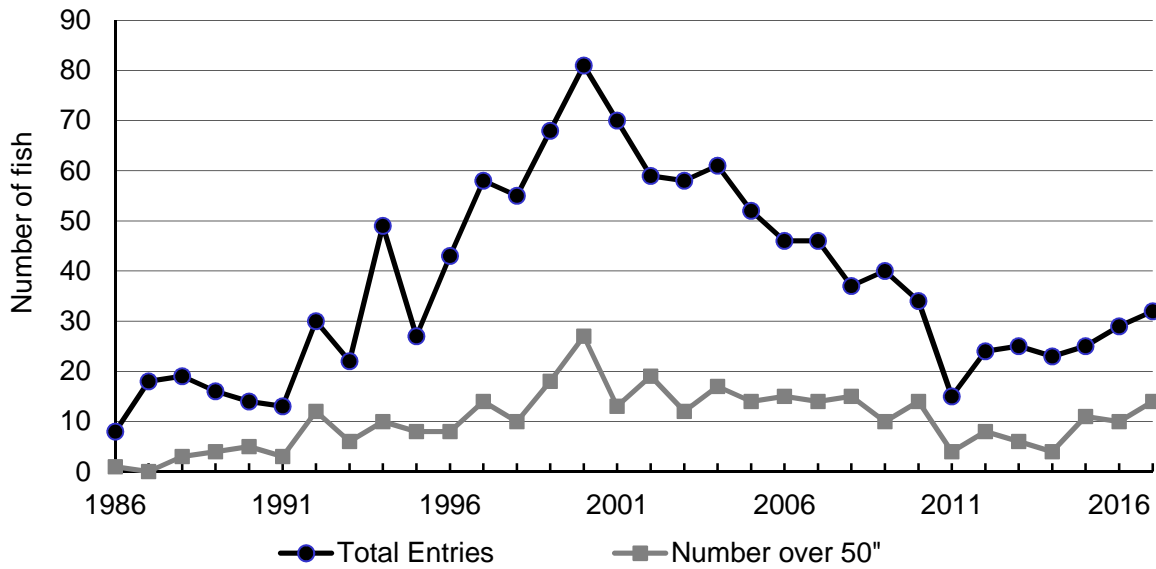


Figure 10.—Lake St. Clair muskellunge entered in the Michigan DNR Master Angler Program, 1986-2017.



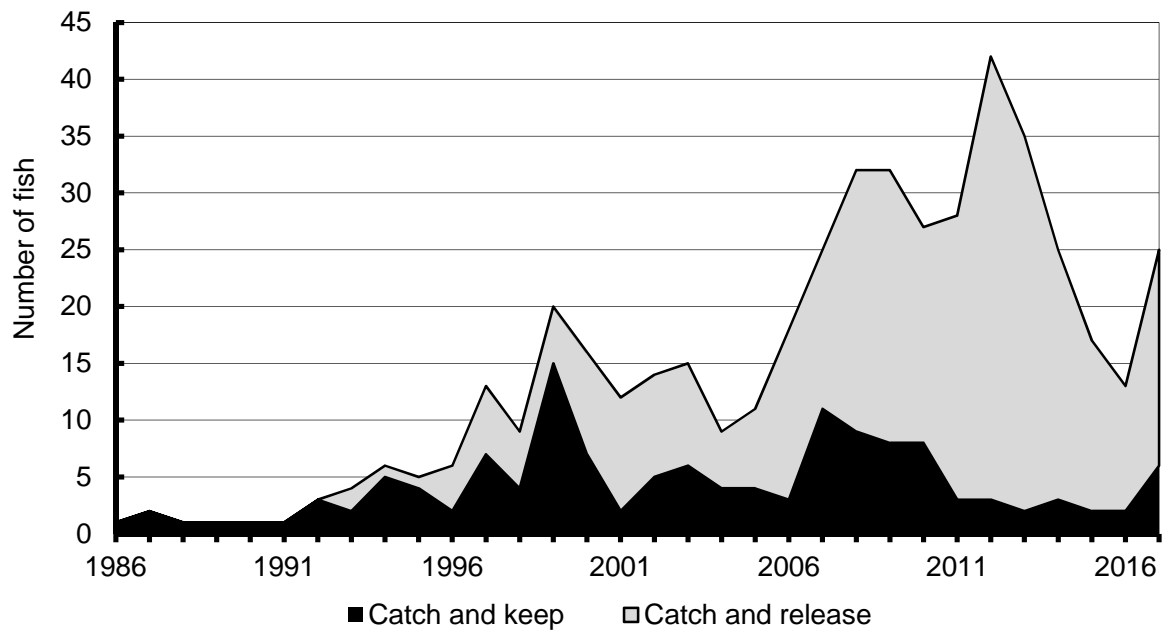


Figure 11.—Lake St. Clair smallmouth bass entered in the Michigan DNR Master Angler Program, 1986-2017.



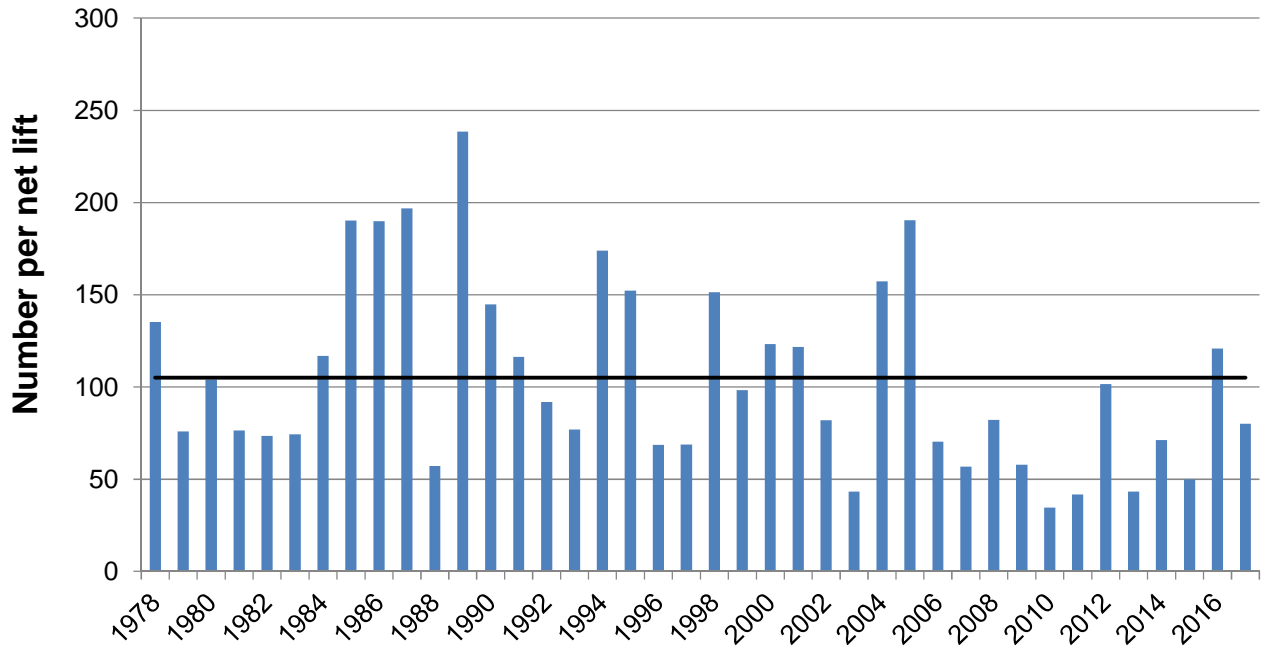


Figure 12.—Average total walleye catch per unit effort, by year, for Michigan Lake Erie index gill nets, 1978-2017.





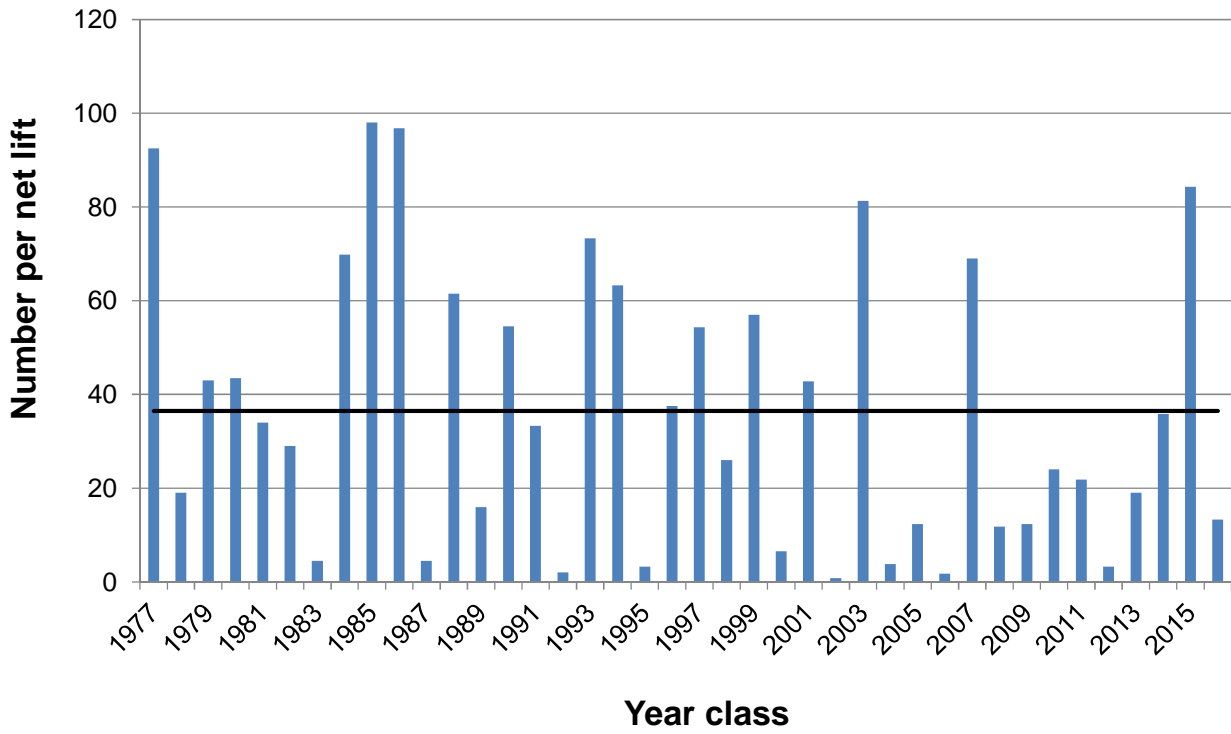


Figure 13.—Average yearling walleye catch per unit effort, by year-class, for Michigan Lake Erie index gill nets.

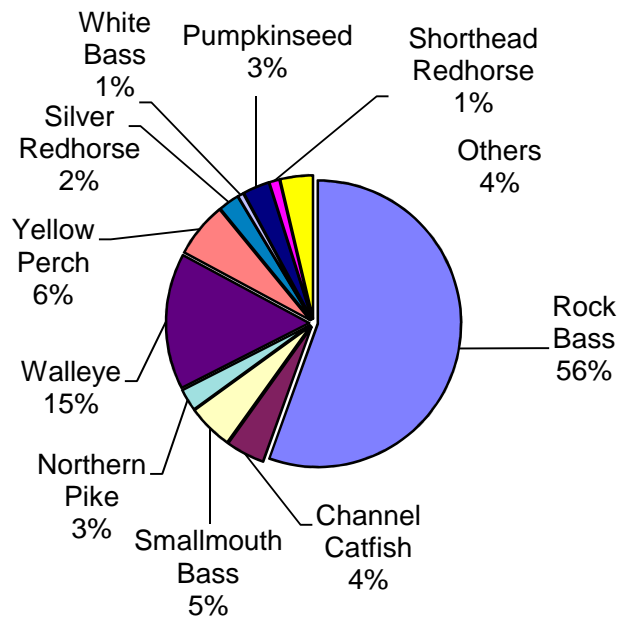


Figure 14.—Catch composition for trap nets fishing in Lake St. Clair during April – May 2017.



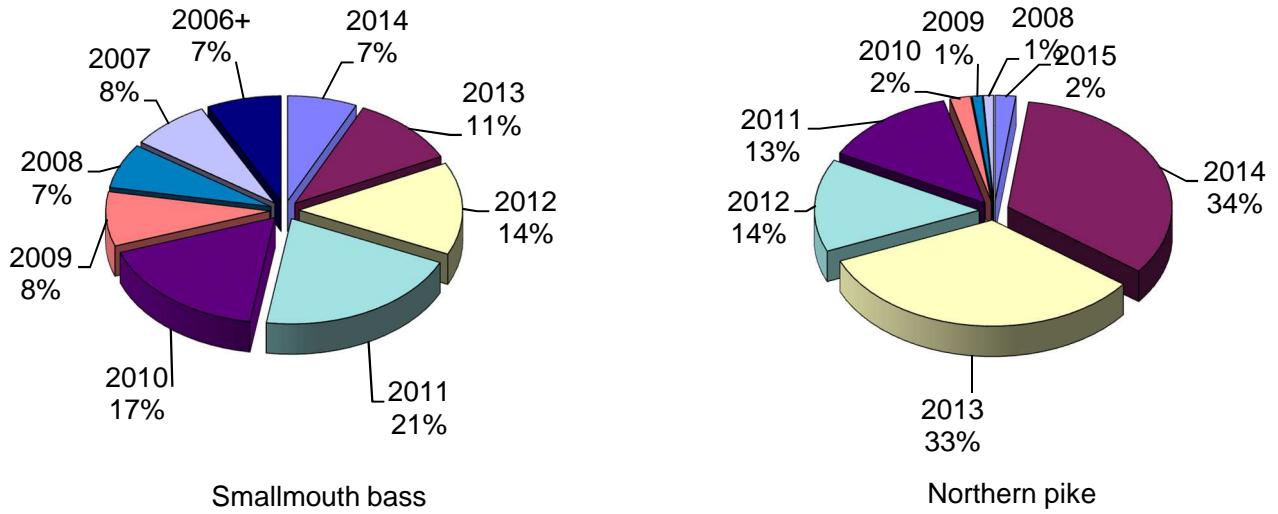


Figure 15.—Contribution by year-class to catch in Lake St. Clair survey trap nets during April – May 2017.

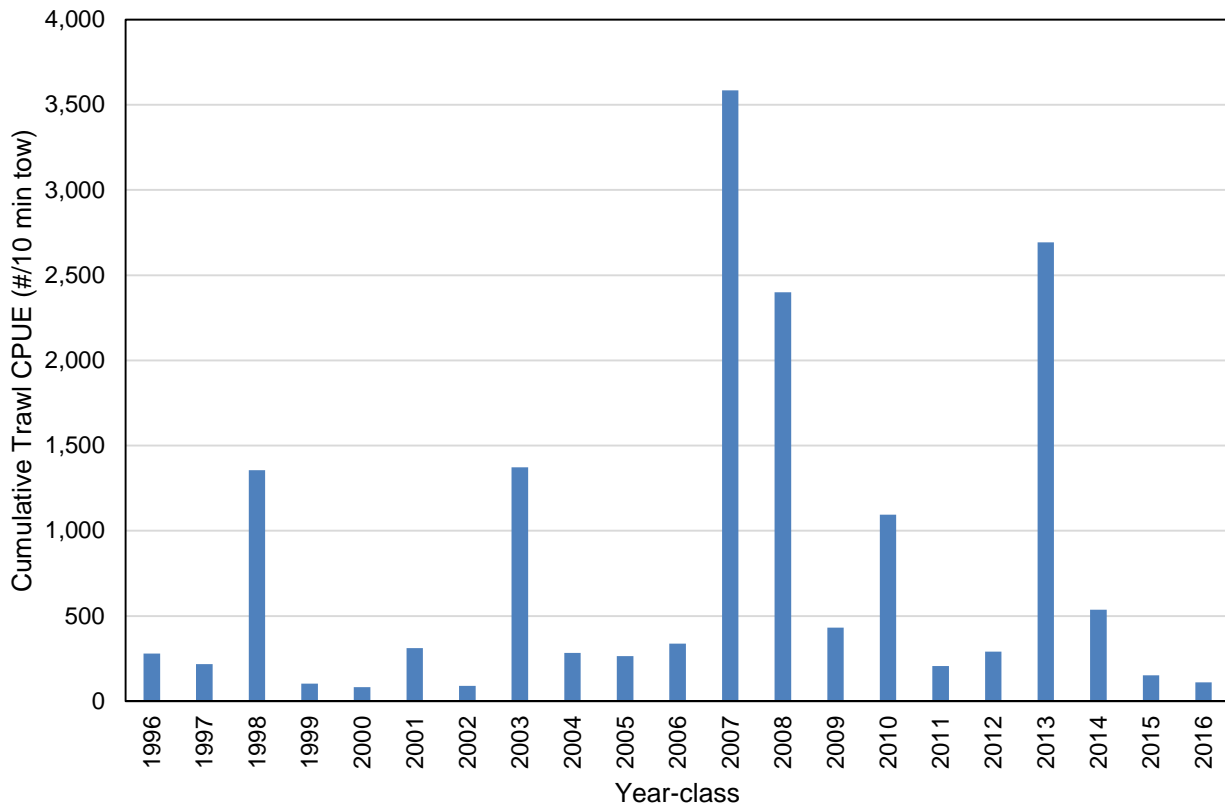


Figure 16.—Year-class strength for Yellow Perch in Lake St. Clair as indicated by June trawl catch rates summed across years (survey years 1997-2017). Note: no trawling occurred in 2016.



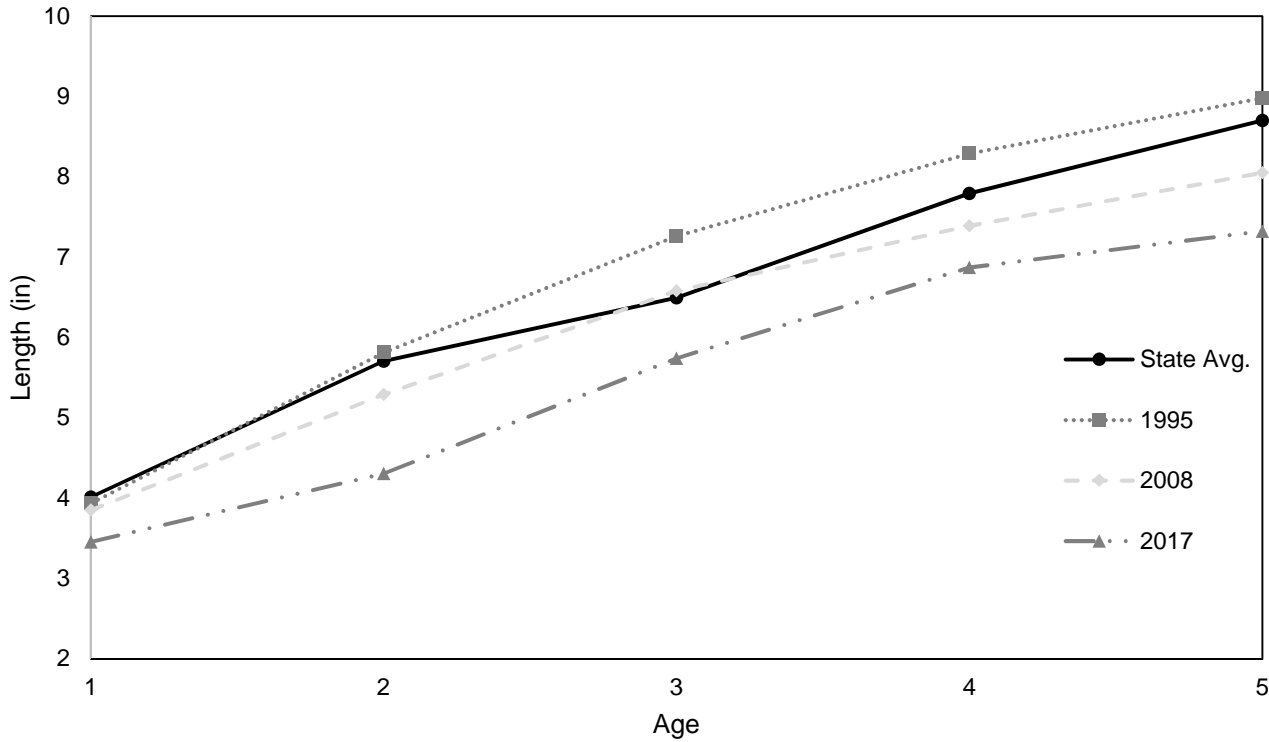


Figure 17.—Average length-at-age for Yellow Perch caught in June trawls on Lake St. Clair over three sampling years and compared to the state average.

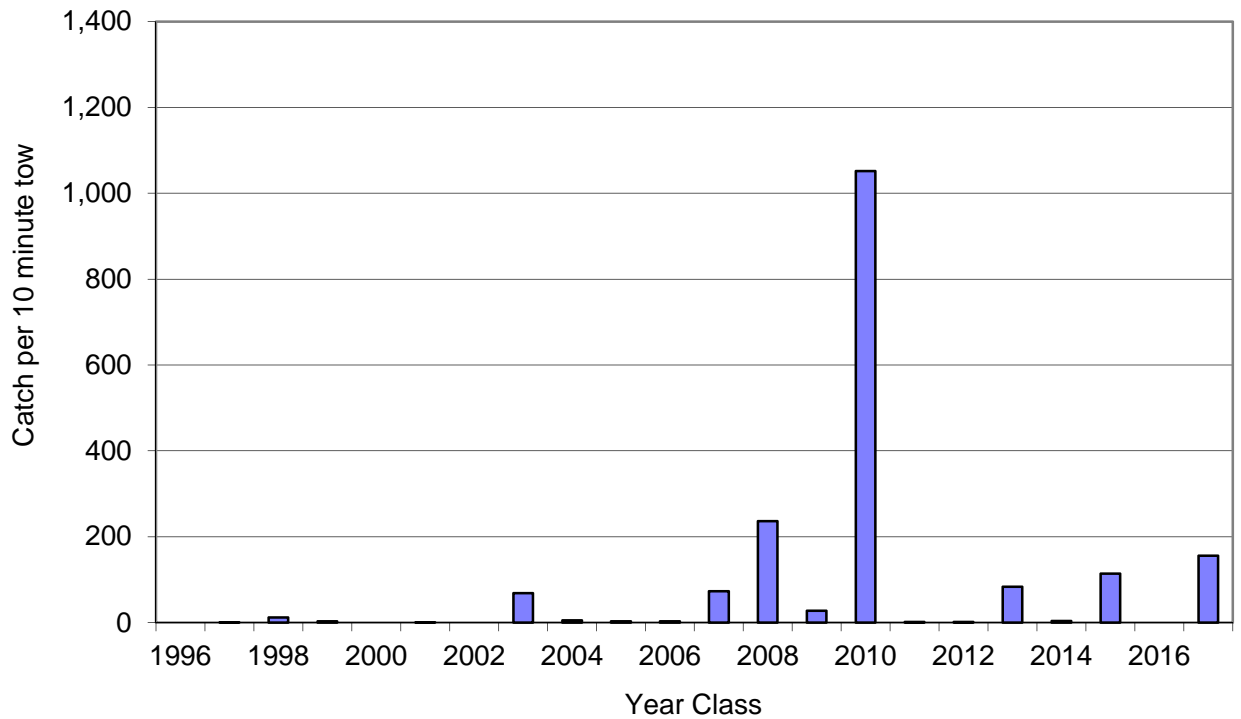


Figure 18.—Year-class strength for Yellow Perch in Lake St. Clair as indicated by September trawl age-0 catch rates 1996-2017. Note: No trawling occurred in 2016.



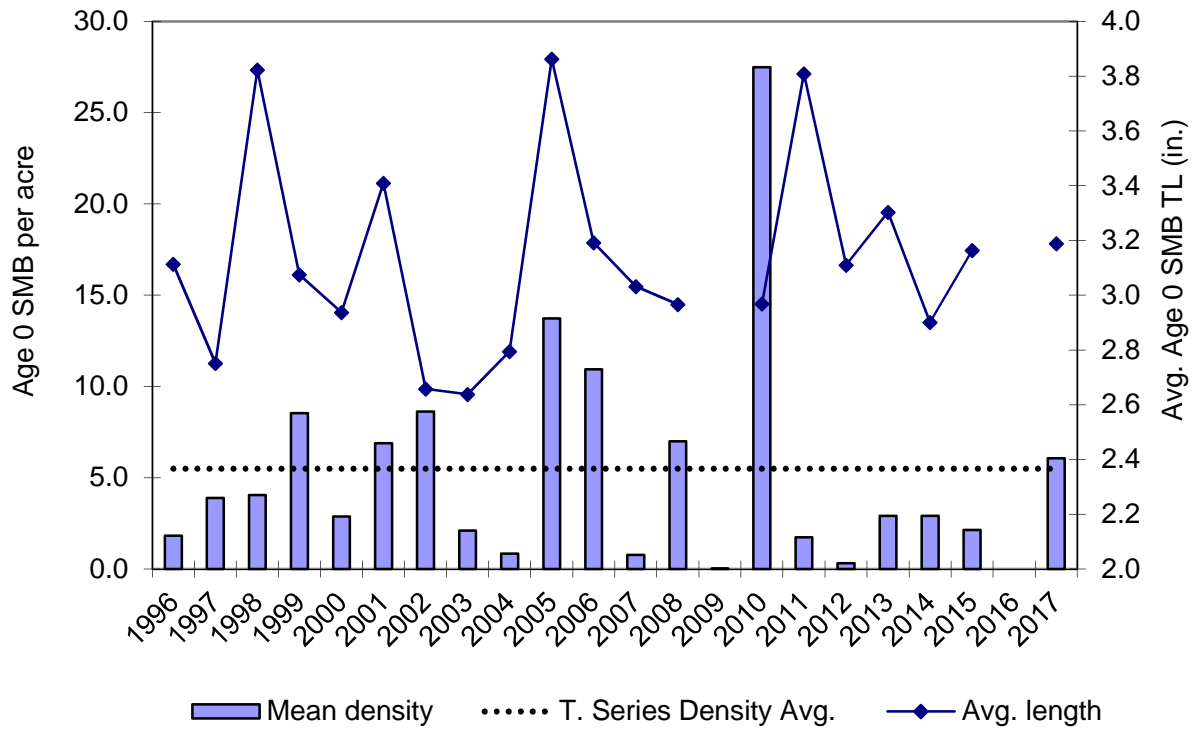


Figure 19.—Year-class strength for Lake St. Clair Smallmouth Bass as indicated by September trawl age-0 catch rates (bars) and average length (solid line), 1996-2017. The average year-class strength for the time series is illustrated by the dotted line. Note: No trawling occurred in 2016.



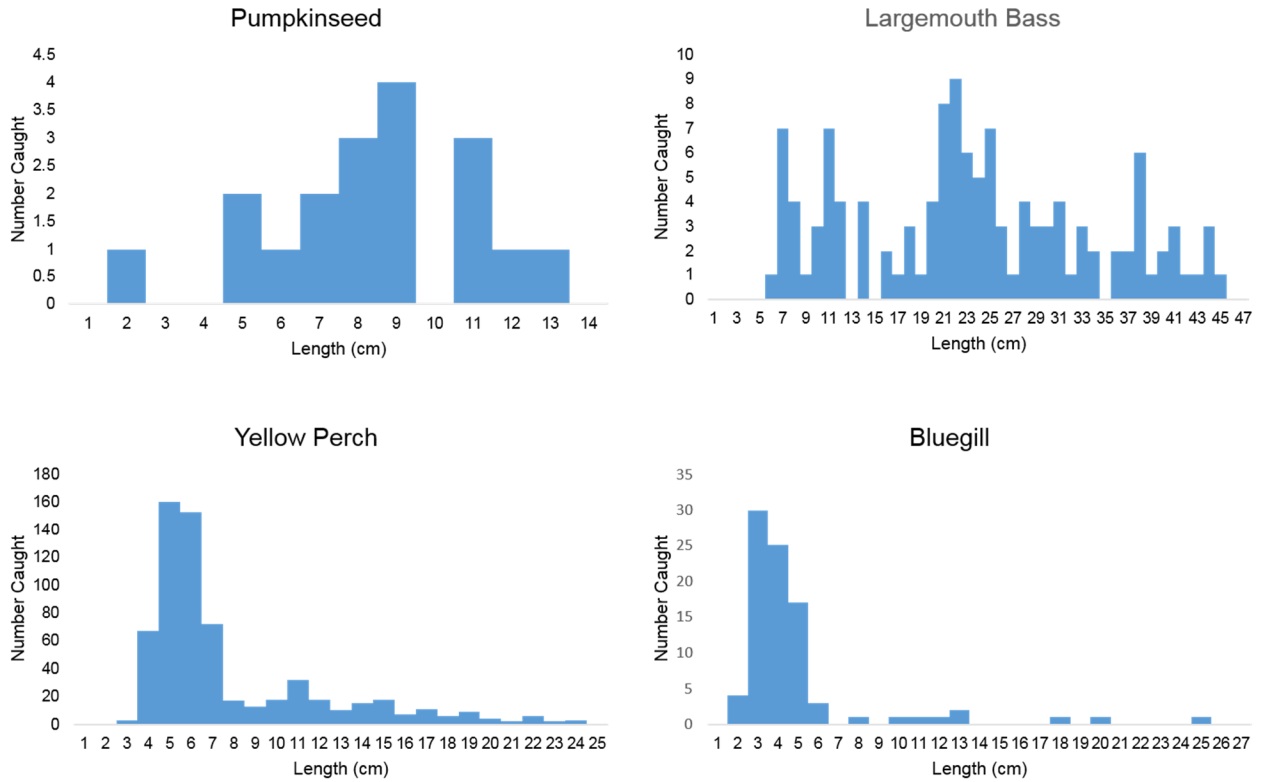


Figure 20.-Length frequency distribution of select Lake St. Clair species collected during the 2017 nearshore survey. Note: X-axis units are cm, 2.5 cm = 1 inch.



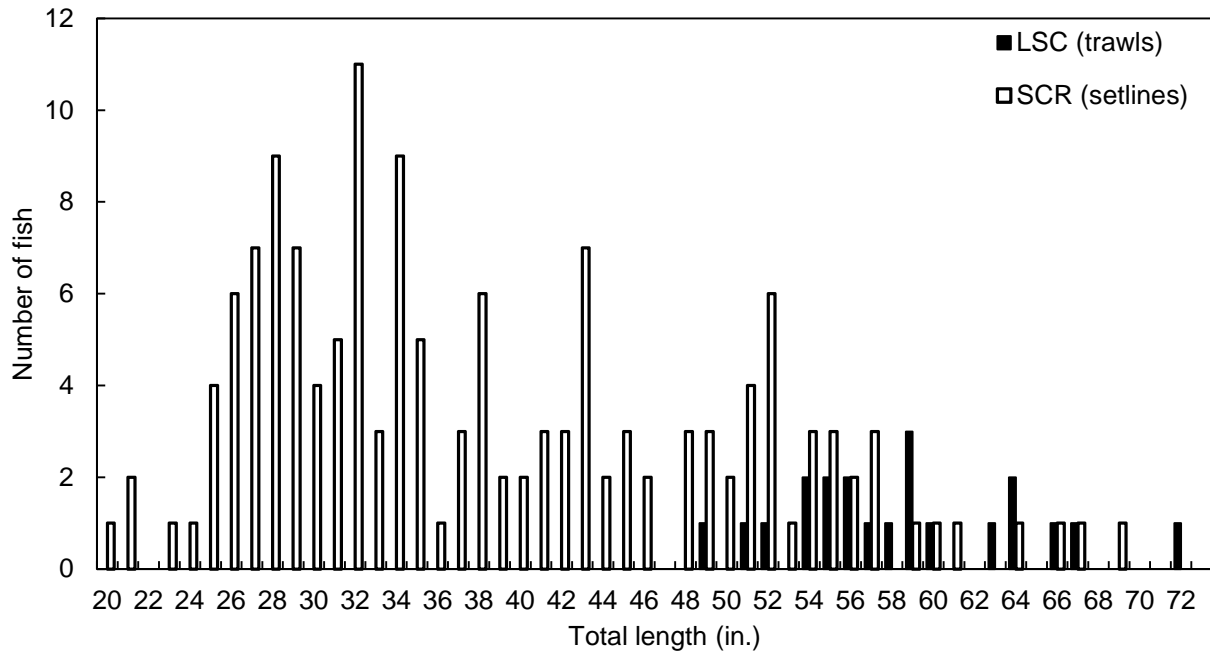


Figure 21.—Length frequency distribution for Lake Sturgeon caught in 2017 with survey setlines (n=146, white bars) in the St. Clair River and bottom trawls (n=21, black bars) in Lake St. Clair.



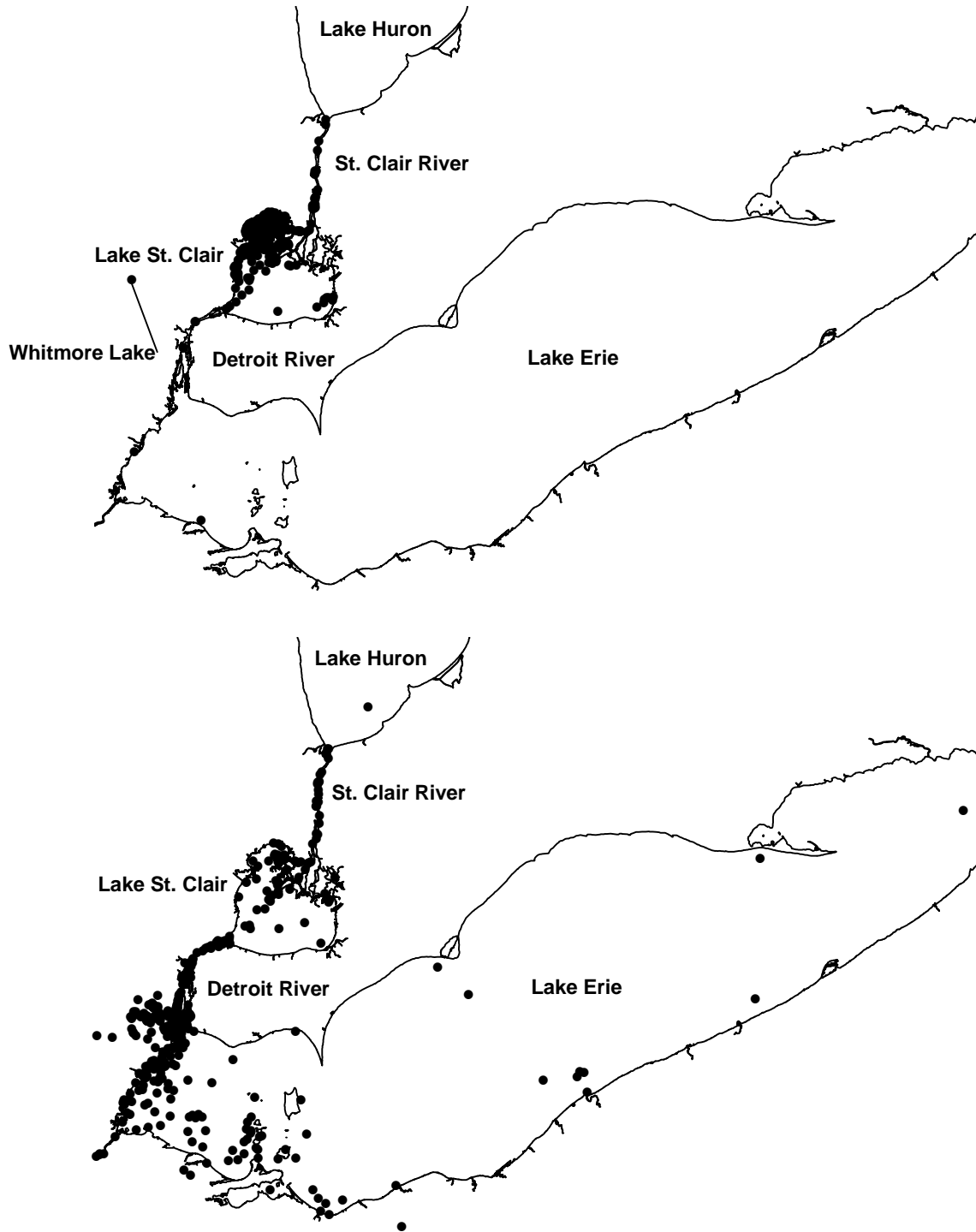


Figure 22.— Geographical distribution of smallmouth bass tag recoveries (N=651) for fish tagged during 2002-2017 at the Anchor Bay site in Lake St. Clair (top map) and for all tag recoveries since 2003 for walleye tagged during 1994-2010 in the Huron River (N=490, bottom map). Black dots represent the recovery location of individual fish.



Table 1.—Estimated harvest, total harvest rate, effort, and released catch for Michigan's 2017 Lake Erie non-charter boat fishery. Released numbers represent legal sized fish where applicable.

Species	Harvest rate (fish/hr)	Month							
		Apr	May	Jun	Jul	Aug	Sep	Oct	Season
<b>HARVEST</b>									
Yellow Perch	2.17	95	4,227	16,754	6,287	102,698	666,400	82,234	878,695
Walleye	0.14	4,039	18,647	23,455	6,321	2,198	2,221	57	56,938
Channel Catfish	0.008	0	164	674	484	532	1,595	0	3,449
White bass	0.01	1,190	2,477	242	326	121	0	7	4,363
White Perch	0.003	0	206	213	97	147	436	0	1,099
Freshwater Drum	0.002	0	20	71	40	0	545	0	676
Largemouth Bass	0.006	0	1,237	1,040	104	167	0	0	2,548
Total Harvest	2.34	5,324	26,968	42,653	13,687	105,935	671,197	82,298	948,062
<b>EFFORT</b>									
Angler hours		12,791	43,814	71,134	76,458	44,768	134,557	22,333	405,855
Angler trips		2,407	8,08	12,717	17,452	6,945	26,270	4,970	78,779
<b>RELEASED</b>									
Walleye	0.008	24	1,210	1,528	212	72	55	0	3,101
Largemouth Bass	0.012	0	924	1,626	971	12	0	246	3,779
Smallmouth Bass	0.007	466	245	256	975	256	485	0	2,683
Yellow Perch	0.33	47	2,374	4,807	32,620	5,645	73,599	15,734	134,826
White bass	0.22	8,706	16,553	9,581	14,867	12,935	23,793	2,922	89,357





Table 2.—Estimated harvest, total harvest rate, effort, and released catch for the 2017 Lake St. Clair non-charter boat fishery. Released numbers represent legal sized fish where applicable.

Species	Harvest rate (fish/hr)	Month							
		Apr	May	Jun	Jul	Aug	Sep	Oct	Season
<b>HARVEST</b>									
Yellow Perch	0.12	311	1744	4,069	25,884	9,453	11,994	13,491	66,946
Walleye	0.08	231	6,870	6,077	21,696	4,057	1,926	1,763	42,620
Bluegill	0.01	43	693	256	573	204	1,081	311	3,160
Pumpkinseed	0.01	9	183	556	2,189	0	23	58	3,017
Smallmouth Bass	0.01	0	79	752	3,285	841	642	119	5,717
Rock Bass	0.01	0	2,235	3,755	910	580	0	0	7,481
Largemouth Bass	0.002	0	0	298	1,043	0	57	21	1,419
<b>Total Harvest</b>	<b>0.25</b>	<b>781</b>	<b>17,096</b>	<b>16,451</b>	<b>55,773</b>	<b>15,372</b>	<b>16,058</b>	<b>15,980</b>	<b>137,511</b>
<b>EFFORT</b>									
Angler hours		8,823	73,544	90,678	216,064	56,191	63,818	31,661	540,779
Angler trips		2,047	13,000	14,256	38,019	9,792	12,063	6,068	95,245
<b>RELEASED</b>									
Walleye	0.02	140	3,652	3,073	4,800	806	661	181	13,314
Largemouth Bass	0.05	695	5,286	3,975	11,310	1,630	2,084	1,046	26,025
Smallmouth Bass	0.23	586	16,769	28,297	54,321	11,947	7,518	3,068	122,506
Yellow Perch	0.30	382	3,609	6,628	85,450	21,197	22,386	20,372	160,025
Muskellunge	0.002	0	107	179	500	303	90	121	1,300



Table 3.—Total targeted harvest per hour, targeted harvest per excursion, number harvested, and targeted fishing effort (angler hours, trips, and charter excursions) for charter boats on Lake Erie, 2017.

Species	Catch per hour	Catch per excursion	Month							Season
			Apr	May	Jun	Jul	Aug	Sep	Oct	
<b>Harvested</b>										
Yellow perch	6.279	149.16	0	0	224	2,298	7,950	20,958	8,844	40,274
Walleye	0.825	17.701	1,122	2,310	6,075	1,961	162	5	30	11,668
Small. bass	0	0	0	0	0	0	0	0	0	0
Muskellunge	-	-	-	-	-	-	-	-	-	-
<b>Released</b>										
Yellow perch	0.226	157.54	0	0	15	97	322	582	435	1,451
Walleye	0.910	37.243	1,138	2,819	6,745	2,096	79	0	1	12,878
Small. bass	1.857	40.857	0	0	267	0	0	19	0	286
Muskellunge	-	-	-	-	-	-	-	-	-	-
Angler hours			1,582	2,893	7,114	2,917	1,846	3,233	1,182	20,767
Angler trips			273	518	1,381	555	340	602	225	3,894
Charter excursions			82	132	324	138	74	139	50	939

<sup>1</sup>March and April values combined; October, November, and December values combined.

Table 4.—Total targeted harvest per hour, targeted harvest per excursion, number harvested, and targeted fishing effort (angler hours, trips, and charter excursions) for charter boats on the Detroit River, Lake St. Clair, and the St. Clair River, 2017.

Species	Catch per hour	Catch per excursion	Month							Season
			Apr	May	Jun	Jul	Aug	Sep	Oct	
<b>Harvested</b>										
Yellow perch	2.203	49.315	0	114	0	134	267	1,183	965	2,663
Walleye	0.766	15.883	7,344	4,765	2,125	756	534	221	249	15,994
Small. bass	0.027	0.549	0	26	5	109	122	48	0	310
Muskellunge	0.001	0.024	0	0	0	0	7	0	0	7
<b>Released</b>										
Yellow perch	1.294	28.981	0	0	0	98	111	620	736	1,565
Walleye	0.350	7.237	2,790	2,936	914	480	124	23	21	7,288
Small. bass	1.281	25.380	275	2,915	3,793	2,905	2,168	1,166	1,118	14,340
Muskellunge	0.115	2.629	0	0	150	165	160	119	171	765
Angler hours			10,697	8,081	6,620	4,706	4,560	3,357	3,350	41,371
Angler trips			1,914	1,455	1,070	734	655	522	496	6,846
Charter excursions			479	417	333	235	202	166	161	1,993

<sup>1</sup>March and April values combined; October, November, and December values combined.



Table 5.—Commercial harvest (pounds sold) from Michigan waters of Lake Erie in 2017.

Species	Harvest (lbs.)	% of total harvest	Reported market value
Channel Catfish	81,639	23%	\$36,738
White Bass	63,270	18%	\$54,412
Common Carp	46,707	13%	\$13,078
Gizzard Shad	40,200	12%	\$0
Goldfish	28,082	8%	\$28,082
Quillback	25,281	7%	\$10,871
Buffalo	21,547	6%	\$21,547
Bullhead	16,820	5%	\$11,101
White Perch	14,672	4%	\$16,726
Freshwater Drum	9,777	3%	\$2,346
Sucker	120	0%	\$35
<b>Grand Total</b>	<b>348,115</b>	<b>100%</b>	<b>\$194,936</b>



Table 6.—Commercial harvest (pounds caught) of selected species from Michigan waters of Lake Erie, 1982 to 2017.

Year	Buffalo	Bullhead	Common Carp	Channel Catfish	Gizzard Shad	Goldfish	Quillback	Freshwater Drum	Sucker	White Bass	White Perch	Whitefish	Grand Total
1982	22,474	58	676,896	20,354	76,000	0	1,430	608	178	1,742	0	0	799,740
1983	7,837	997	622,604	28,990	665,000	0	1,510	3,555	185	12,042	0	0	1,342,720
1984	789	152	422,571	9,208	1,265,200	0	56,061	116	44	2,041	0	0	1,756,182
1985	7,885	7,340	738,857	9,253	878,000	0	80,018	905	1,378	4,764	0	0	1,728,400
1986	14,732	7,687	367,310	11,183	0	0	2,217	2,032	123	1,397	0	0	406,681
1987	17,814	4,462	685,395	39,603	0	551	1,062	1,825	88	4,142	0	0	754,942
1988	9,471	5,421	417,365	15,208	0	188	1,380	1,180	0	1,049	0	0	451,262
1989	19,549	3,572	194,320	11,481	0	2,951	568	0	0	991	0	0	233,432
1990	40,064	488	158,151	2,025	0	877	0	0	0	0	0	0	201,605
1991	0	704	206,244	1,941	0	466	6,894	0	0	19	8	0	216,276
1992	0	444	251,365	2,929	2,845	1,025	30,204	290	0	357	10	0	289,469
1993	0	844	238,805	9,152	395	501	28,175	4,206	0	1,180	0	0	283,258
1994	0	659	94,662	5,760	2,103	111	8,930	111	0	1,819	0	0	114,155
1995	0	827	329,262	16,168	23	517	66,013	39,673	436	1,850	64	0	454,833
1996	104	828	387,671	24,969	36,996	7,138	73,662	48,218	4,286	2,923	45	0	586,840
1997	91,877	744	325,433	17,936	24,494	10,497	33,937	8,823	72	7,306	4	0	521,123
1998	15,721	2,139	620,015	16,573	4,988	6,862	22,990	24,507	6,180	1,326	0	0	721,301
1999	25,894	7,050	211,055	7,561	6,200	0	0	265	1,945	23	0	0	259,993
2000	27,843	1,742	313,200	14,400	4,595	3,025	0	0	0	1,776	0	0	366,581
2001	24,393	1,197	185,495	16,328	55	8,281	310	2,935	0	492	0	0	239,486
2002	45,367	6,500	336,820	39,778	6,655	4,660	1,300	4,035	0	3,810	0	0	448,925
2003	9,350	900	65,020	7,890	0	0	2,150	0	0	0	0	0	85,310
2004	18,883	1,650	97,380	23,600	5,120	0	3,400	0	550	1,973	0	0	152,556
2005	96,621	5,495	319,700	15,657	14,910	78,333	1,600	331	2,390	1,338	0	0	536,375



Table 6.- (continued)—Commercial harvest (pounds caught) of selected species from Michigan waters of Lake Erie, 1982 to 2017.

Year	Buffalo	Bullhead	Common Carp	Channel Catfish	Gizzard Shad	Goldfish	Quillback	Freshwater Drum	Sucker	White Bass	White Perch	Whitefish	Grand Total
2006	85,269	7,277	378,123	42,931	52,382	67,171	5,030	7,876	1,410	5,237	796	10,693	664,195
2007	215,282	12,536	241,356	98,979	242,695	39,140	9,900	67,072	9,712	77,249	35,946	8,800	1,058,667
2008	142,726	31,969	204,881	71,385	134,008	84,361	2,257	137,304	11,244	98,041	56,867	0	975,043
2009	130,295	45,294	196,888	63,725	122,379	90,771	3,900	116,312	11,339	96,456	34,522	9,439	921,320
2010	68,511	47,612	191,321	64,913	0	77,550	107,037	130,533	7,919	37,021	19,524	963	752,904
2011	107,610	57,670	401,034	138,540	0	84,857	84,727	227,873	17,435	47,058	31,949	4,155	1,202,908
2012	221,255	24,450	507,305	129,666	110,800	57,015	93,296	136,679	12,520	96,916	26,070	6,436	1,422,408
2013	164,345	8,600	256,546	102,197	40,050	28,146	138,841	73,101	10,234	187,848	32,954	0	1,042,862
2014	136,743	7,556	353,979	117,835	31,800	34,054	70,180	81,734	1,500	172,126	42,646	0	1,050,153
2015	100,135	26,396	227,946	144,500	50	88,791	76,203	128,510	332	179,246	53,245	267	1,025,621
2016	73,119	29,493	187,838	155,315	0	86,818	69,213	17,282	705	166,613	35,708	0	822,104
2017	21,547	16,820	46,707	81,639	40,200	28,082	25,281	9,777	120	63,270	14,672	0	348,115
G. Total	1,963,505	377,573	11,459,520	1,579,572	3,767,943	892,739	1,109,676	1,277,668	102,325	1,281,441	385,030	40,753	24,237,745



Table 7.- Mean catch per trap net lift for species during spring trap net surveys in Anchor Bay. Note: survey did not occur in 2016.

Species	Survey year																Mean
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	
Black Bullhead	0.02	0.01	0	0	0	0	0	0	0	0.15	0	0	0	0		0	0.01
Black Crappie	0	0.01	0.12	0	0	0	0	0.02	0.01	0.06	0.08	0.04	0.01	0		0	0.02
Bluegill	0.06	0	0.05	0.01	0.02	0	0.05	0	0.01	0.23	0.03	0.07	0.01	0.04		0.02	0.04
Brown Bullhead	0.02	0.01	0.02	0	0.01	0.01	0	0.02	0.03	0.02	0	0.08	0.01	0		0.03	0.02
Channel Catfish	1.88	1.85	1.7	1.21	1.76	2.01	3.14	2.22	2.24	1.22	2.64	2.53	3.94	1.61		2.05	2.13
Common Carp	0.24	0	0.01	0.01	0.03	0	0	0.43	0.34	0.29	0.08	0.15	0.13	0.12		0.20	0.14
Common White Sucker	0.14	0.08	0.12	0.1	0.1	0.33	0.15	0.06	0.16	0.22	0.03	0.16	0.31	0.12		0.07	0.14
Freshwater Drum	1.3	4.01	1.68	0.36	2.27	0.47	0.36	0.59	0.66	0.52	0.35	0.38	0.25	0.21		0.44	0.92
Gizzard Shad	0.04	0.03	0.01	0.03	0.01	0.01	0	0	0	0.01	0.15	0.1	0.01	0.03		0.32	0.05
Goldern Redhorse	0.01	0.01	0.02	0.02	0.02	0.01	0	0.05	0	0.01	0	0.05	0.02	0.04		0	0.02
Lake Sturgeon	0.01	0.06	0.03	0.02	0.05	0	0.1	0.05	0.01	0.09	0.01	0.05	0.02	0.08		0.03	0.04
Largemouth Bass	0.22	0.04	0.11	0.03	0.03	0.1	0.1	0.11	0.06	0.21	0.03	0.18	0.1	0.1		0.04	0.10
Muskellunge	0.56	0.52	0.63	0.71	0.48	0.49	0.13	0.83	0.18	0.12	0	0.13	0.08	0.07		0.03	0.33
Northern Pike	0.9	0.15	0.58	0.87	0.86	0.66	0.55	0.71	1.02	1.11	0.7	1.54	1.67	1.51		1.30	0.94
Pumpkinseed	3.02	0.55	0.5	0.03	0.22	0.46	0.71	0.4	0.74	1.54	0.84	0.77	0.44	0.19		1.57	0.80
Quillback Carpsucker	0.22	0.13	0.25	0.07	0.28	0.06	0.27	0.34	0.32	0.25	0.06	0.15	0.23	0.02		0.15	0.19
Rock Bass	30.34	13.95	14.65	6.16	15.44	21.73	22.12	29.09	53.81	43.31	36.35	19.33	8.92	15.49		27.59	23.89
Shorthead Redhorse	1.14	1.9	0.69	0.77	1.62	0.51	1	0.76	1.16	1.3	0.74	0.52	0.37	0.41		0.59	0.90
Silver Redhorse	0.25	0.27	0.54	0.59	0.95	0.3	0.95	1.37	1.54	1.29	0.26	0.87	0.64	0.44		1.11	0.76
Smallmouth Bass	4.32	8.16	2.37	1.73	3.83	5.84	2.74	3.5	8.49	6.92	4.01	3.68	3.47	2.29		2.61	4.26
Walleye	2.17	1.55	1.15	2.43	2.4	1.72	1.25	1.98	1.03	2.14	1.02	1.91	1.51	1.32		7.18	2.05
White Bass	0.03	0.05	0.03	0	0.07	0.05	0.27	0.42	0.15	0.26	1.56	0.37	0.47	0		0.33	0.27
White Perch	0.11	0.05	0.35	0.05	1.11	0.1	0.96	0.44	0.79	0.83	0.67	0.85	0.12	0.08		0.20	0.45
Yellow Perch	3.08	0.74	2.04	0.51	0.58	2.22	1.59	0.5	0.39	1.31	1.19	0.96	0.86	1.43		3.20	1.37
Total all species	50.08	34.14	27.67	15.72	32.19	37.08	36.48	43.97	73.15	63.4	50.8	34.9	23.59	25.6		49.06	39.86
Number of net lifts	64	50	55	34	42	50	35	22	54	54	39	46	40	36		36	
Starting date	03- May	28- May	03- May	11- May	05- May	03- May	06- May	08- May	03- May	25-Apr	25- Apr	22- Apr	24- Apr	27- Apr		24- Apr	
Ending date	30- May	20- Jun	26- May	25- May	24- May	22- May	20- May	20- May	24- May	25- May	14- May	20- May	19- May	18- May		18- May	
Starting water temp. (°C)	9	12	8	9	13	9	13	12	14	9	9	8	8	8		11	
Ending water temp. (°C)	15	16	15	13	13	13	11	14	17	13	14	15	13	14		13	
Average secchi depth (m)	1.8	2.2	1.2	2.2	1.7	2.6	2.1	1.5	1.7	1.3	1.9	1.93	2.1	3		1.86	



Table 8.- Average density (number of fish per hectare trawled) for all fish species caught during spring trawls in Anchor Bay. Note: Survey did not occur in 2016.

Species	Year															Mean	
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016		2017
Alewife	3	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0
Bluntnose Minnow	7	1	6	118	1	13	0	3	2	4	3	1	4	0		0	11
Common Carp	0	0	1	0	0	0	0	0	0	0	0	0	0	0		0	0
Emerald Shiner	11	0	2	0	0	0	32	39	4	18	26	17	14	24		0	12
Freshwater Drum	1	4	3	6	4	3	0	0	0	2	0	0	0	1		1	2
Johnny Darter	0	0	3	2	0	7	2	17	3	4	17	61	105	18		1	16
Lake Sturgeon	1	1	0	0	2	1	0	0	0	0	1	0	2	0		0	1
Largemouth Bass	0	0	0	0	0	4	0	0	1	0	0	0	0	0		0	0
Logperch	8	0	42	6	0	1	3	29	13	107	10	10	133	3		8	25
Muskellunge	1	0	0	0	0	0	0	1	1	0	0	0	1	0		0	0
Northern Pike	0	1	0	1	1	0	0	0	0	1	2	0	0	0		0	0
Shorthead Redhorse	7	4	2	6	9	1	0	0	4	1	0	0	0	0		0	2
Pumpkinseed	0	0	0	0	1	1	0	0	0	0	6	0	0	0		0	1
Quillback	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0
Rainbow Smelt	0	14	53	11	6	1	68	110	122	18	284	56	148	37		5	62
Rock Bass	39	18	5	10	33	73	4	2	21	4	5	2	1	0		2	15
Round Goby	30	6	53	10	0	30	1	14	33	24	1	2	16	17		3	16
Sand Shiner	362	0	118	45	2	640	4	15	0	20	36	55	8	2		1	87
Silver Lamprey	0	1	1	0	5	2	0	0	1	0	0	0	0	0		0	1
Silver Redhorse	2	5	2	1	1	2	0	0	1	4	1	0	1	0		1	1
Smallmouth Bass	4	2	2	10	4	13	0	0	2	2	1	0	1	0		0	3
Spottail Shiner	5,730	211	1,777	524	769	53	90	2,705	495	5,093	1,988	109	226	22		55	1,323
Trout-Perch	265	13	108	65	248	7	2	3	23	13	42	41	84	27		14	64
Walleye	1	1	0	2	12	2	0	1	0	0	2	0	0	0		4	2
White Perch	1	1	2	1	2	0	1	1	0	1	1	0	0	0		0	1
White Sucker	61	2	68	22	5	1	20	16	95	9	39	6	57	1		1	27
Yellow Perch	725	306	888	1,107	869	303	3,137	7,144	3,120	3,101	1,865	758	4,723	2,875		1,552	2,165



Table 9.- Average density (number of fish per hectare trawled) for all fish species caught during late summer trawls in Anchor Bay. Note: Survey did not occur in 2016.

Species	Year																Mean
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	
Alewife	0	0	0	1	1	0	0	5	0	0	0	0	0	0	0	0	0
Bluntnose Minnow	33	13	43	238	61	36	65	198	821	189	7	4	1	0	0	0	114
Channel Darter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.8	0
Common Carp	2	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0
Emerald Shiner	1	0	41	36	608	0	1	8	2	5	0	4	0	0	0	0	47
Freshwater Drum	0	1	5	2	3	2	0	2	2	0	1	0	1	1	1	1	1
Johnny Darter	0	7	0	0	0	1	1	0	0	1	12	0	1	1	0	0	2
Lake Sturgeon	0	0	0	0	0	0	1	0	0	1	1	0	0	8	0	0	1
Largemouth Bass	36	13	13	29	22	58	50	45	23	9	1	29	14	5	0	0	23
Logperch	6	14	38	113	34	9	175	288	120	31	35	48	33	53	296	86	
Muskellunge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Northern Pike	1	1	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0
Pumpkinseed	5	3	1	0	5	8	24	0	0	5	0	1	0	0	0	0	3
Quillback	2	1	1	0	0	0	5	0	0	0	0	0	1	0	0	0	1
Rainbow Smelt	0	4	26	0	1	0	1	139	0	1	2	0	0	0	0	1	12
Rock Bass	41	35	25	77	67	71	211	21	104	80	5	29	4	3	1	1	52
Round Goby	99	2	28	14	10	4	7	11	15	0	8	9	39	54	36	22	
Sand Shiner	44	507	8,909	3,072	109	29	408	0	0	383	2,516	2	893	1	0	1,125	
Shorthead Redhorse	0	0	0	1	2	1	0	0	0	1	0	0	0	0	0	0	0
Silver Lamprey	0	0	0	0	1	1	1	0	0	1	3	0	1	0	0	0	1
Silver Redhorse	6	0	4	5	4	1	1	2	1	1	0	0	0	0	2	2	
Smallmouth Bass	51	7	3	41	32	3	22	2	69	13	8	13	8	5	12	19	
Spottail Shiner	2,407	1,068	545	2,410	2,668	983	2,191	981	2,492	1,867	28	168	0	0	0	1,187	
Trout-Perch	10	6	59	3	79	1	0	3	105	7	14	12	96	25	84	34	
Walleye	11	0	2	9	3	1	0	2	0	2	0	0	0	1	0	2	
White Perch	13	8	6	146	12	31	398	9	9	1	0	1	0	0	1	42	
White Sucker	8	1	1	4	6	5	7	6	10	1	0	0	0	0	0	3	
Yellow Perch	73	181	48	52	34	220	625	1,100	2,601	36	24	246	11	218	298	384	

