



## DEPARTMENT OF NATURAL RESOURCES

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### Status of the Fisheries in Michigan Waters of Lake Erie and Lake St. Clair, 2014

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*Smallmouth bass in a Lake St. Clair trap net, patiently awaiting a jaw tag, May 2014*

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

## Highlights for 2014

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 Master Angler program, and commercial fishery records, as well as fisheries survey results. Some of the highlights described in detail include:

- The 2014 non-charter angler harvest rate for Lake Erie yellow perch was above the long-term average, while the walleye harvest rate was below the long-term average.
- Michigan non-charter anglers on Lake Erie caught 36,564 walleye and harvested 34,326 of those fish. Anglers reported releasing lower numbers of sub-legal size walleye in 2014 compared to 2013.
- Charter boat harvest rates for Lake Erie walleye were more than 5 times those estimated for non-charter anglers, while yellow perch charter boat harvest rates were 28% higher than those estimated for non-charter anglers.
- 2014 Lake Erie index gill net catch rates for Michigan waters were 63% higher than 2013 but remain below the 1978-2013 average.
- Long-term tagging studies on Lake Erie walleye stocks clearly illustrate the important contribution of Lake Erie walleye to the Great Lakes sport fishery of Southeast Michigan, from Port Huron to Toledo.
- 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 2014.
- Rock bass, channel catfish, and smallmouth bass and were the dominant species in the Lake St. Clair trap net survey in 2014. Over 18% of the channel catfish exceeded Master Angler minimum length.
- Tagging studies of lake sturgeon in the connecting waters since 1997 have demonstrated that these fish move throughout the region, although most recoveries have occurred in close proximity to the tagging site. Lake sturgeon residing year-around in the St. Clair River, or moving into Lake Huron, are more frequently caught by recreational and commercial fisheries than fish residing all year in Lake St. Clair.

## Fishery Forecast for 2015

Harvestable-size yellow perch abundance in the Michigan waters of Lake Erie is forecasted to increase in 2015, with the strongest contribution expected from the 2013 year-class. As a result, average size of perch is expected to be lower. Abundance of legal-size walleye is expected to decline about 20% in 2015. Michigan anglers will continue to find fewer walleye from the strong 2003 year-class, and the fishery will rely on contributions from the weaker 2012, 2011, and 2010 year-classes. This is not surprising, as annual variation in reproductive success of walleye and yellow perch can result in substantial year-to-year changes in their abundance. Muskellunge and smallmouth bass numbers tend to remain more stable from year to year and both species should continue to provide excellent fishing opportunities in 2015, particularly in Lake St. Clair and the Detroit River. Still, since weather conditions can affect sport fishing success as much as fish abundance it is difficult to predict fishing success. Water levels in Lake St. Clair, the connecting rivers, and Lake Erie are forecasted to rise to a point above or near their long term average in 2015. Thus, anglers may find easier access to some shallow water fishing areas.

## About the Lake St. Clair Fisheries Research Station

The Lake St. Clair Fisheries Research Station is a unit of the Research Section of the Michigan Department of Natural Resources (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 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. 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 (OMNR) 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 OMNR and MDNR to provide annual estimates of catch rates for the major sport fish species in the lake. 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*

An on-site creel survey conducted by the MDNR during 2014 produced a total harvest estimate of 222,835 fish (Table 1) for Michigan's Lake Erie sport fishery (non-charter). In combination, walleye and yellow perch accounted for 88% of the total harvest, reflecting their importance in the sport fishery. Non-charter anglers caught an estimated 36,564 walleye in Michigan waters of Lake Erie, and harvested 34,326 (94%) of those fish. The low percentage of small walleye released suggests that the 2012 and 2013 year-classes will make limited contributions to the

harvest in future years. Although few bass are harvested by Michigan's Lake Erie anglers, over 17,000 legal-size largemouth and smallmouth bass were reported caught and released. Estimated angler effort in 2014 declined 31% from 2013 (Figure 1). The walleye harvest rate in 2014 (0.14/angler hour) increased 8% from 2013, but remained below the long-term mean of 0.22 walleye per angler hour for the sixth consecutive year (Figure 2). The yellow perch harvest rate (0.68/angler hour) increased 7% in 2014, and remained well above the long-term mean of 0.55 yellow perch per angler hour. Trends in angler effort and harvest rates for walleye and yellow perch since the mid-1980's 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 2014 on-site creel survey. The age composition of harvested walleye was dominated by ages 3 and 4 (2011 and 2010 year-classes), which collectively accounted for 37% of the harvest (Figure 3). Age 10 and older walleye (including the 2003 year-class as 11 year-old fish) accounted for 26% of the harvest. The average length of walleye harvested in the sport fishery in 2014 was 533 mm (21.0 in.).

Yellow perch harvest was dominated by age 4 and age 5 fish (2010 and 2009 year-classes), which in combination, accounted for 68% of the total harvest (Figure 3). Average lengths of harvested age 4 and 5 yellow perch were 254 mm (10.0 in.) and 274 mm (10.8 in.). The overall average length of yellow perch harvested in the sport fishery in 2014 was 223 mm (10.2 in.). Observed mean length-at-age for yellow perch taken in the Michigan sport fishery was increased for age 3, 4, and 5 fish in 2014 (Figure 4).

### *Charter fishery*

In 2014, Michigan charter boat operators reported a harvest of 25,703 fish from Lake Erie (Table 2). In combination, walleye (40%) and yellow perch (52%) accounted for 92% of the total harvest. The walleye harvest rate in 2014 decreased 1% from 2013 and remained slightly below the long-term mean harvest rate of 0.73 walleye per hour (Figure 5). Yellow perch harvest rate increased



19% from 2013, exceeding the long-term mean of 0.61 yellow perch per hour for the 5th consecutive year. The charter boat walleye harvest rate (0.68) was nearly 5 times higher than those estimated for non-charter anglers (0.14) in 2014, while the yellow perch charter harvest rate (0.87) was about 28% higher than the rate for non-charter boat anglers (0.68).

Beginning in 2010, Michigan charter boat operators were also required to report catch-and-release fishing activity as well as harvest. For Lake Erie, charter operators reported releasing 5,732 fish in 2014. About 61% of the released fish were from the “other species” category, which is composed largely of white perch, white bass, freshwater drum, and channel catfish. Lake Erie charter boat operators reported catch and release of 4 muskellunge in 2014.

For the St. Clair-Detroit River system, charter boat anglers reported a harvest of 10,156 fish (Table 3). Walleye (39%), yellow perch (28%), and smallmouth bass (21%), made up the bulk of the harvest. In 2014, charter boat harvest rate for walleye decreased 21% from 2013, and was below the long-term mean walleye harvest rate of 0.20 walleye per hour (Figure 6). Yellow perch harvest rate decreased 30% in 2013 and remained well below the long-term yellow perch harvest rate of 0.51 yellow perch per hour.

Charter operators on the St. Clair-Detroit River system reported releasing 17,531 fish (Table 3). Smallmouth bass (79%) and muskellunge (7%) accounted for the majority of the fish caught-and-released. For smallmouth bass, charter operators released 86% of the 16,202 smallmouth bass caught in 2014. Of the 1,318 muskellunge reported caught, none were harvested, for a release rate of 100%.

The number of reported Michigan charter excursions on Lake Erie increased 1% in 2014, and remained well below the levels reported prior to 2004 (Figure 7). In 2014, charter boat excursions on the St. Clair-Detroit River system increased 8% from 2013. We suspect much of the increase in reported St. Clair system charter excursions since 2010 has been the result of the new reporting requirement for catch-and-release fishing activity. For many years, much of the charter fishing activity on the St. Clair-Detroit River system has been catch-and-release oriented, and was largely unreported.

### *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 2014, the catch rate decreased to the lowest level observed since the late 1980's (Figure 8). The decrease in muskie catch rates for 2014 continues a pattern of increased variability in catch rates over the past 13 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 2014, with 23 of the 34 total entries originating from the St. Clair system. However, the number of Lake St. Clair muskellunge Master Angler entries has generally declined since 2000 (Figure 9). We suspect this is largely a reflection of waning interest in submitting Master Angler entries for muskellunge less than 50" 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" minimum size limit (MSL) for Ontario waters and a 42" 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. Lake St. Clair accounted for 30% of all smallmouth bass entries statewide in 2014 (catch/keep and catch/release programs combined). Since the early 1990's, both catch/keep and catch/release Master Angler smallmouth bass entries from Lake St. Clair have exhibited an increasing trend (Figure 10). Catch/release entries have outnumbered



catch/keep entries for the last 14 years. The 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 2014, a total of two Michigan commercial fishing licenses were active on Lake Erie. The 2014 commercial harvest included 11 types of fish for a total of 1,050,153 pounds (Table 4). In combination, common carp (34%), white bass (16%), buffalo (13%), and channel catfish (11%) accounted for 74% of the total harvest by weight. The major species in the trap net harvest included white bass, freshwater drum, and quillback. The primary species in the seine harvest included common carp, buffalo, and channel catfish. The total value of the 2014 Lake Erie commercial harvest from Michigan waters was estimated at \$420,945 (Table 4). The 2014 harvests of white perch and white bass were the second highest reported since 1981 (Table 5). The harvest of channel catfish was the 3<sup>rd</sup> highest since 1981.

## Summary of Netting 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 conducted in the Michigan waters of Lake Erie 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.

### Lake Erie

A bottom trawl fish community survey was completed during 2014, which is the first time since the 1970's that this type of effort has been accomplished by the MDNR in Michigan waters of Lake Erie. Six sites previously sampled by the United States Geological Survey, including the two index gill net stations, were selected for sampling in 2014. A total of 3,878 fish representing 21 different species were captured during 6 trawl tows for an average CPE of 818 fish/10-minute tow. White perch (66%) dominated the catch of forage-size species, followed by yellow perch (11%), spottail shiner (5%), roundy goby (5%), and gizzard shad (5%). A combination of freshwater drum, trout-perch, mimic shiner, smallmouth bass, logperch, emerald shiner, walleye, white bass, white sucker, and rainbow smelt comprised the remaining 8% of the forage-size catch. The non-forage size (adult) catch was also dominated by white perch (40%) followed by freshwater drum (36%), yellow perch (10%), and channel catfish (10%). The remaining 4% of the non-forage size catch was composed of walleye, quillback, white bass, shorthead redhorse, carp, rock bass, white sucker, and pumpkinseed.

In 2014 a total of 989 fish representing 10 species were captured during four net lifts completed during the annual October gill net survey in Michigan waters of Lake Erie. White perch (34%), walleye (29%), and gizzard shad (18%) comprised over three-quarters of the catch by number, followed by channel catfish (8%), white bass (7%), yellow perch (3%), and freshwater drum (2%). The remaining three species (goldfish, quillback, and hybrid goldfish x carp) accounted for less than 1% of the total catch. The average CPE of white perch (85 fish/lift) in 2014 was nearly double the average white perch CPE observed since catch rates on species other than walleye were first recorded in 1992.

The average total walleye catch-per-effort (CPE) for the two index sites (71 fish/lift) increased by 63% from 2013 (Figure 11). The increase was due to a somewhat stronger cohort of yearling fish from the 2013 year-class, which accounted



for 27% of the total catch. The average CPE of yearling walleye (19 fish/lift) was similar to the CPE recorded for the 2010 and 2011 year-classes (Figure 12) but remains below the average of 36 fish/lift for the 1978-2013 time series. The 2011 year-class (age 3) was the most abundant cohort in the survey, accounting for 32% of the catch. Combined, the 2010-2013 year-classes will be the largest component of the Michigan Lake Erie walleye fishery in 2015.

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

Four trap nets were fished from April 24 to May 19, 2014 at index net sites in Anchor Bay. A total of 2,360 fish representing 25 species were captured during the survey. The catch also included a total of 6 mudpuppies. Rock bass were numerically dominant, accounting for 34% of the total (Figure 13). Other common species in the nets included channel catfish (18%), smallmouth bass (15%), and northern pike (8%).

Ages were estimated for walleye (N=150) and smallmouth bass (N=323) based on interpretation of dorsal spine samples. The dominant walleye cohort was the 2011 year-class (Age 3), accounting for 38% of the total catch (Figure 14). The 2010 year-class (Age 4) was also a major component of the walleye catch, accounting for 21% of the total. For smallmouth bass, the 2011 (25%), 2010 (19%), 2009 (10%), and 2008 (18%) year-classes accounted for 72% of the total trap net catch. A total of 282 smallmouth bass were tagged and released at the Anchor Bay trap net site in 2014.

The trap net survey documented an abundant population of channel catfish in Anchor Bay including many trophy size individuals. The average weight of channel catfish captured during the 2014 trap net survey was 5.3 pounds. Over 18% of the channel catfish exceeded the minimum size requirement (27 inch total length) for the MDNR Master Angler program. Lake St. Clair anglers are discouraged from keeping large channel catfish for food due to consumption advisories as a result of PCB contamination. However, catch-and-release trophy channel catfish angling opportunities are clearly available in Anchor Bay during the spring.

Over the 13 years of the trap net survey in Anchor Bay, rock bass have dominated the catch (Table 6). Smallmouth bass CPE has varied considerably, while walleye CPE has been fairly

steady. We suspect smallmouth bass catch rates in the trap nets are related to spawning movements during the survey period and are likely affected by annual variations in the warming of the waters of Anchor Bay. Sturgeon catch rates are low, but a few are captured in the trap nets each year.

The forage fish community of Lake St. Clair has been surveyed with bottom trawls each year since 1996 by the MDNR. A total of 9 trawl tows were conducted at the Anchor Bay index trawling site in 2014. The spring samples were dominated by yellow perch and spottail shiner (Table 7). The species with highest mean densities in the fall samples were sand shiner, trout-perch, round goby, and logperch (Table 8). Although spottail shiner was the second most abundant species in the spring trawl surveys, their catch rates in 2014 were among the lowest seen during the time series. Alewife catches have been low since 2003, likely a result of the alewife population crash in Lake Huron. Yellow perch age-specific catch rates from the trawl survey indicate highly variable recruitment in Lake St. Clair (Figure 15). Yellow perch recruitment in 1998, 2003, 2007, 2008, 2010, and 2013 was strong, with total CPE values for those year-classes all over 1,000 fish.

September trawling in Anchor Bay provides early indications of spawning success for yellow perch and smallmouth bass. Catch rates for young-of-year yellow perch from September trawls indicate spawning success in 2014 was much lower than in 2013 or 2010 (Figure 16). In combination, the strong 2010 and 2013 year-classes will result in continued strong contributions of yellow perch to the Lake St. Clair fishery over the next several years.

Smallmouth bass recruitment patterns are variable based on September trawl catch rates of young-of-year (Figure 17). The 2014 year-class densities were about the same as for 2013 and much less abundant than the record high densities recorded for the 2010 year-class. Population studies have suggested that mean length of young-of-year smallmouth bass in the fall can be more important than abundance in determining year-class strength. The mean length of young-of-year smallmouth bass caught in 2014 were below the long-term mean length recorded since 1996, suggesting the 2014 year-class is not likely to be a major contributor to the fishery in the future.



A total of 163 lake sturgeon were collected during assessment surveys on Lake St. Clair and the St. Clair River in 2014. Captured sturgeon averaged 49.9 inches (1,267 mm) in total length, with a range from 20.7 inches (526 mm) to 69.5 inches (1,765 mm). A total of 122 sturgeon were caught in the St. Clair River during the annual setline survey, while 39 fish were caught with trawls in Lake St. Clair during July – September. The length frequency for setline and trawl captured sturgeon in 2014 illustrates the higher proportion of large individuals in the trawl catch in the lake (Figure 18). We suspect this reflects a difference in the actual size structure of the 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 2003 to include small hooks, providing a less biased sample of the sturgeon population.

## 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.michigandnr.com/taggedfish/>.

### Lake Erie

Michigan placed walleye tagging in Lake Erie on indefinite hold in 2011. During 2014, seven tag returns were reported from fish previously tagged in the Huron River at Flat Rock. An additional 19 tag returns were reported from fish tagged near the Raisin River. 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 19). In contrast to the localized movements of smallmouth bass tagged in Lake St. Clair, 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 an average of 117.1 km (72.8 mi) from the tagging site. However, it is obvious from tag recovery patterns that some individuals from the Lake Erie spawning stocks migrate within that lake, never venturing into the Detroit River and Lake St. Clair.

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

In 2014, Michigan tagged a total of 282 smallmouth bass with non-reward jaw tags in Anchor Bay of Lake St. Clair. A total of 17 non-reward tags placed on smallmouth bass in 2014 were recovered by anglers for a single-season reporting rate of 6.0%. The 2014 reporting rate marked the first decrease in tag reports in five years and was half the 12.1% reporting rate observed in 2013. The 2014 tag reporting rate is closest to the 7.6% reporting rate observed in 2011 and nearly double the reporting rate of 3.1% observed in 2010. Walleye captured during the spring trap net survey were not tagged, although three walleyes that were tagged in Lake St. Clair during previous surveys were reported in 2014.

Since 2002, a total of 4,958 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 Detroit River near the Ambassador Bridge (Figure 19). On average, recaptured smallmouth bass tagged during 2002-2014 traveled 8.3 km (5.2 mi) from the Anchor Bay tagging site.

One smallmouth bass tagged in Anchor Bay was recovered from Whitmore Lake in Washtenaw County in 2011 (Figure 19). 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 large fish die-offs in the Great Lakes region during the early 2000s).



A total of 2,847 lake sturgeon have been tagged and released in the St. Clair River and Lake St. Clair since 1996. To date, 536 tagged lake sturgeon have been recaptured with survey gear or reported by fishermen. A total of 342 tagged sturgeon have been recovered with survey setlines in the North Channel. One was recovered in a survey trap net in Anchor Bay, while 12 have been recaptured in assessment trawls on Lake St. Clair. Sport anglers have reported 145 recoveries, nearly all from the St. Clair River North Channel, except for one reported from Lake Erie, near Huron, Ohio. Twenty-one 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. All other recaptures have occurred within 10 km (6.2 mi) of the tag sites. Trawling has accounted for the capture of 35% of the sturgeon tagged and released during this study, but only 37 recoveries (7%) have been fish originally caught in a trawl on Lake St. Clair. We view this as an indication that fish residing year-around in the St. Clair River, or moving into Lake Huron, are more frequently captured in recreational or commercial fisheries than fish residing all year in Lake St. Clair.

### Sport Fishing Regulations

Walleye in Lake Erie are managed cooperatively with other jurisdictions under a harvest quota system. Beginning in 2011, the walleye daily bag limit for anglers in Michigan waters of Lake Erie will be 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. The walleye daily bag limit regulation will be effective from May 1 through the end of April in the following year. For 2014, the LEC agreed upon a TAC of 4.03 million walleye, with a Michigan quota of 235,000 walleye. This quota sets the Michigan walleye daily possession limit at 6 fish from May 1, 2013 to April 30, 2014. The 2014 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 2014.

| MI 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               |

In 2006, Michigan bass fishing seasons were changed to include a statewide early catch-and-immediate-release (CIR) season. The CIR season opens statewide the last Saturday in April (April 25, 2014) and extends to the opening day for the harvest season. The harvest season for smallmouth and largemouth bass fishing in the Michigan portion of the connecting waters is the third Saturday in June (June 20, 2014) thru December 31. The harvest season for the Michigan waters of Lake Erie opens on the Saturday before Memorial Day (May 23 in 2014).

Effective April 1, 2013, the statewide daily possession limit for muskellunge in Michigan has been changed to 1 harvested fish per angler per year. This statewide regulation covers the Great Lakes and connecting waters of Southeast Michigan and has implications for catch-and-release format tournaments where fish are possessed. A non-transferable muskellunge harvest tag is required to harvest any muskellunge. The tag is free and is available at all license vendors. A muskellunge shall be immediately released or tagged with a validated muskellunge harvest tag.

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>.



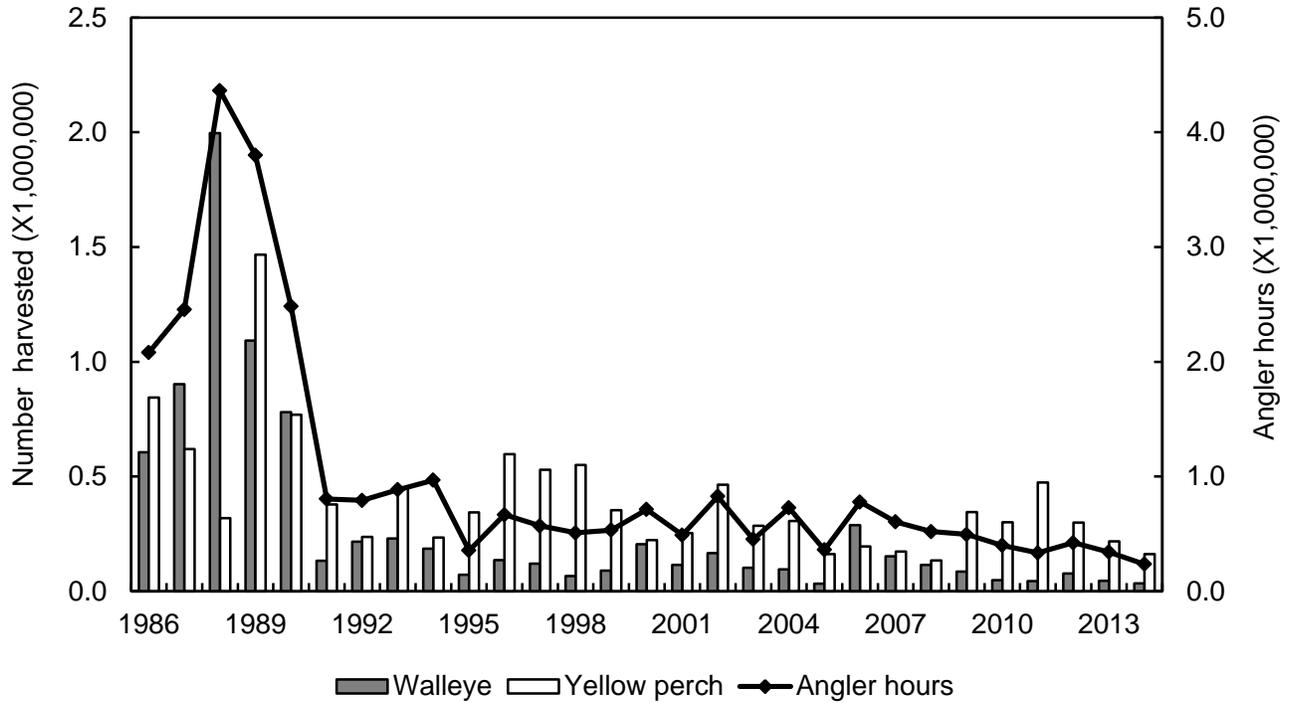


Figure 1.—Estimated harvest and effort for Michigan’s Lake Erie sport fishery, 1986-2014.

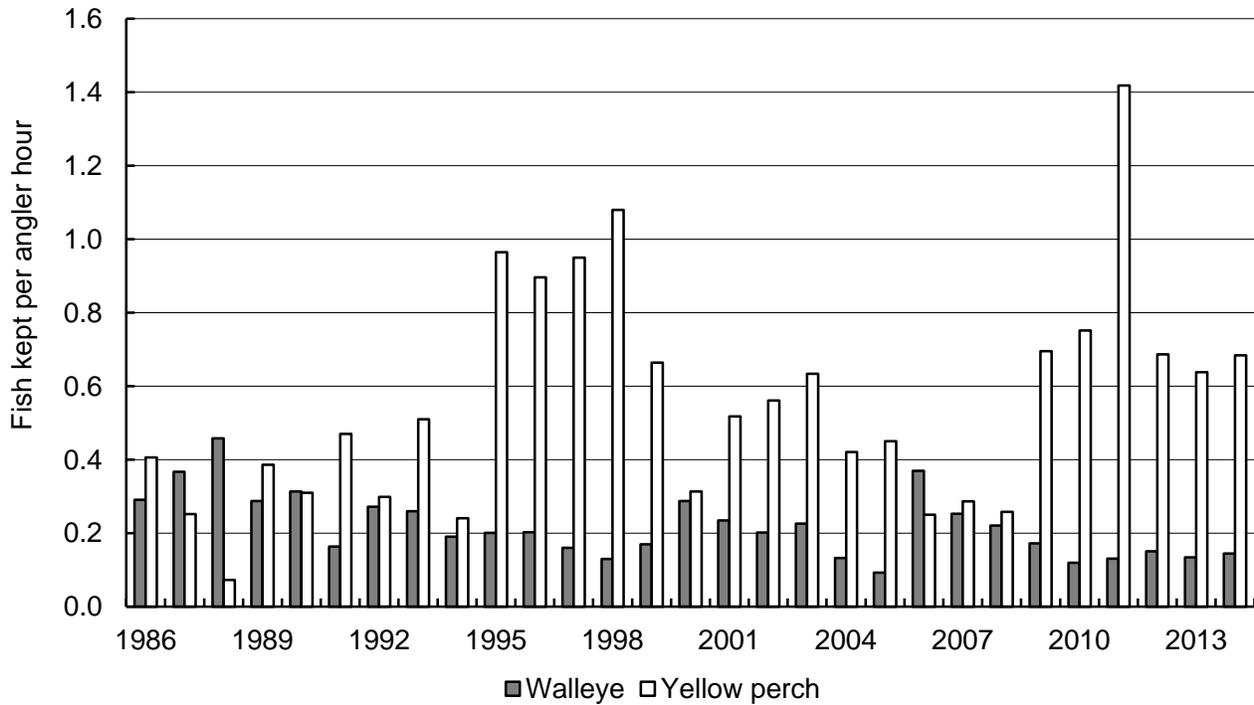


Figure 2.—Walleye and yellow perch harvest rates for Michigan’s Lake Erie sport fishery, 1986-2014.



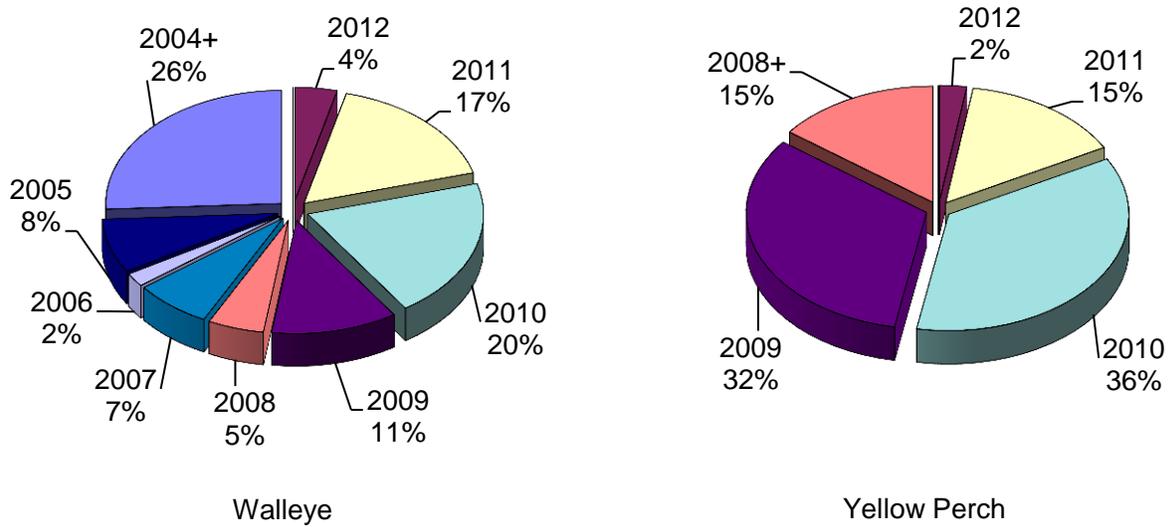


Figure 3.—Year-class contribution to Michigan sport harvest for walleye and yellow perch from Lake Erie in 2013.

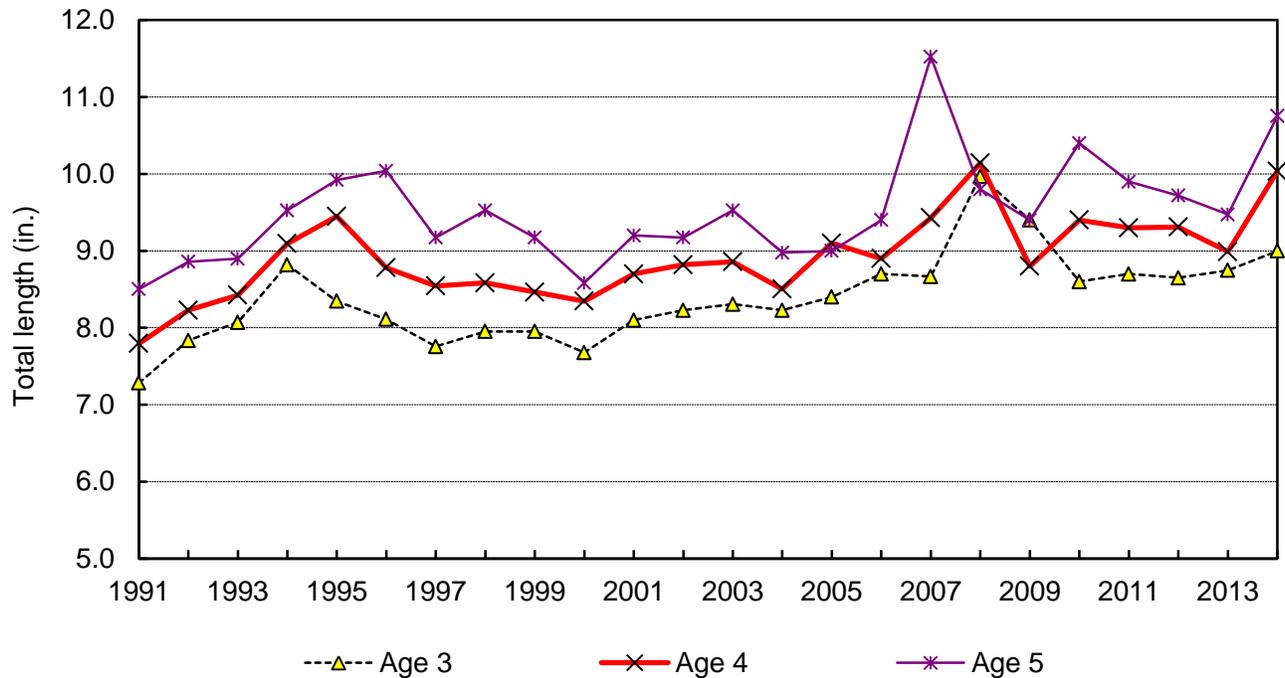


Figure 4.—Mean length at age for sport-harvested yellow perch from Michigan's waters of Lake Erie, 1991-2014.



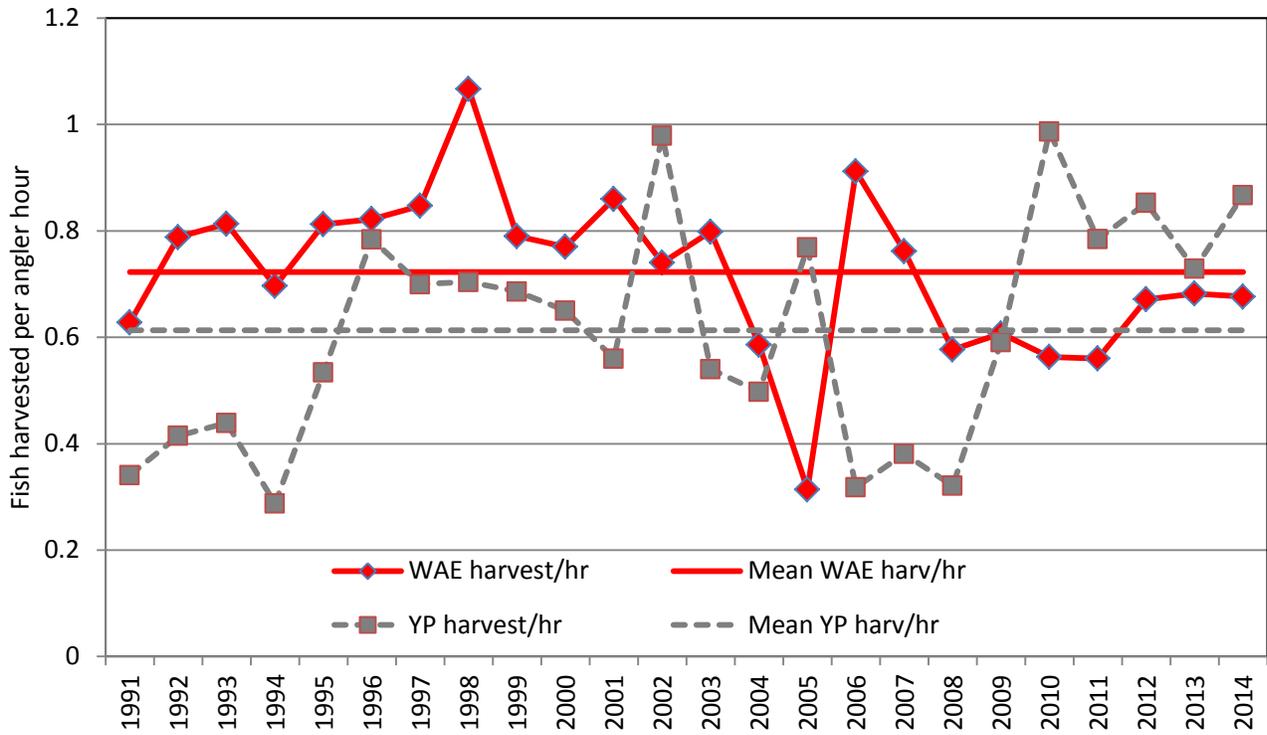


Figure 5.—Michigan Lake Erie charter boat harvest rates for walleye and yellow perch, 1991-2014.

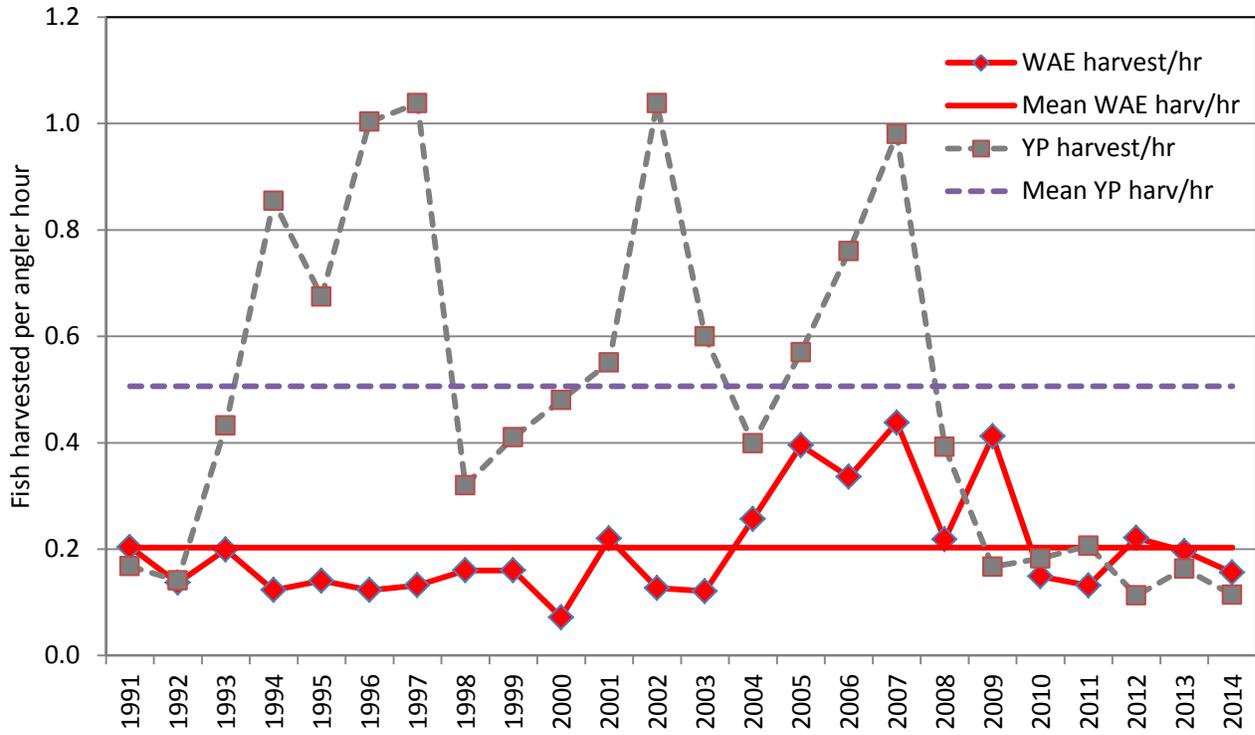


Figure 6.—Michigan St. Clair-Detroit River system charter boat harvest rates walleye and yellow perch, 1991-2014.



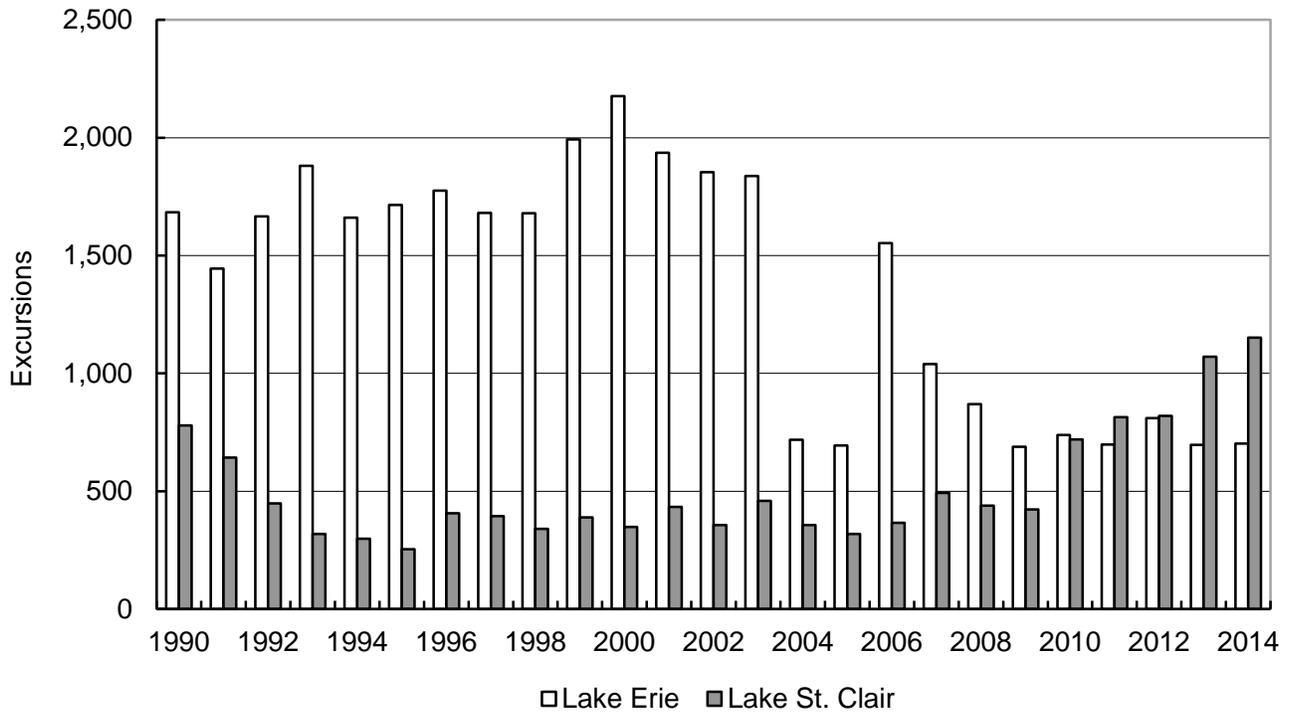


Figure 7.—Reported charter boat excursions on Lake Erie and the St. Clair-Detroit River system, 1990-2014.

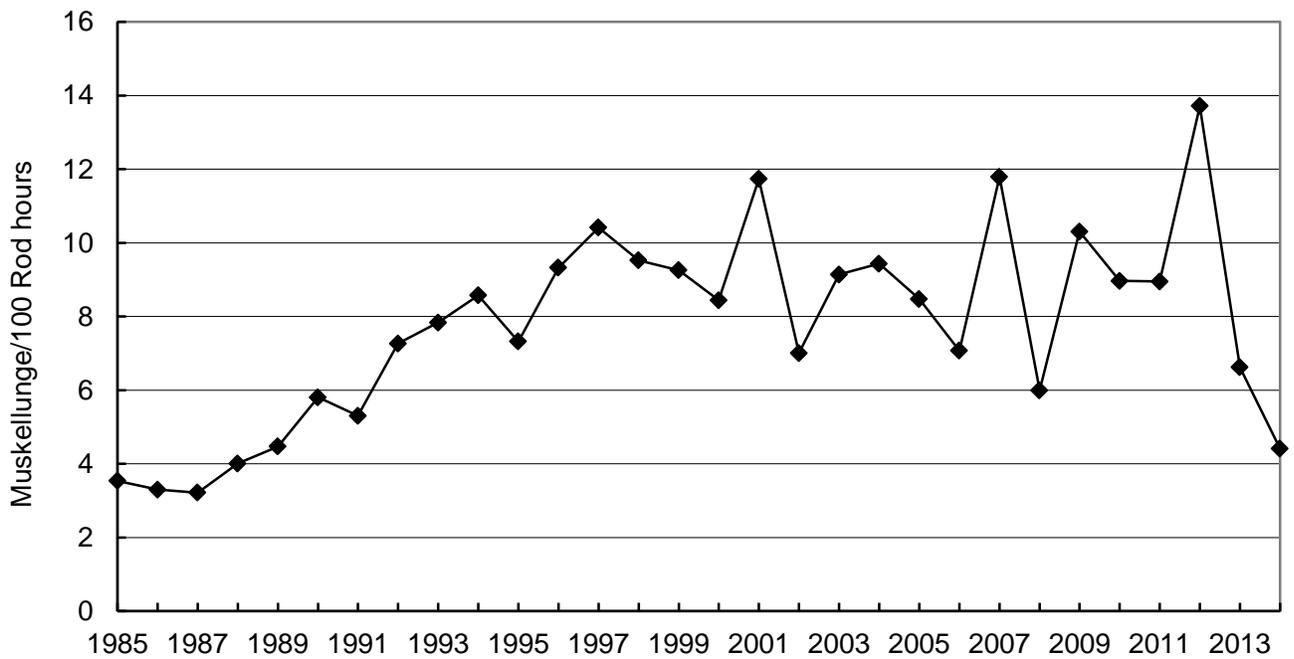


Figure 8.—Lake St. Clair muskellunge catch rate from Angler Diary Program, 1985-2014.



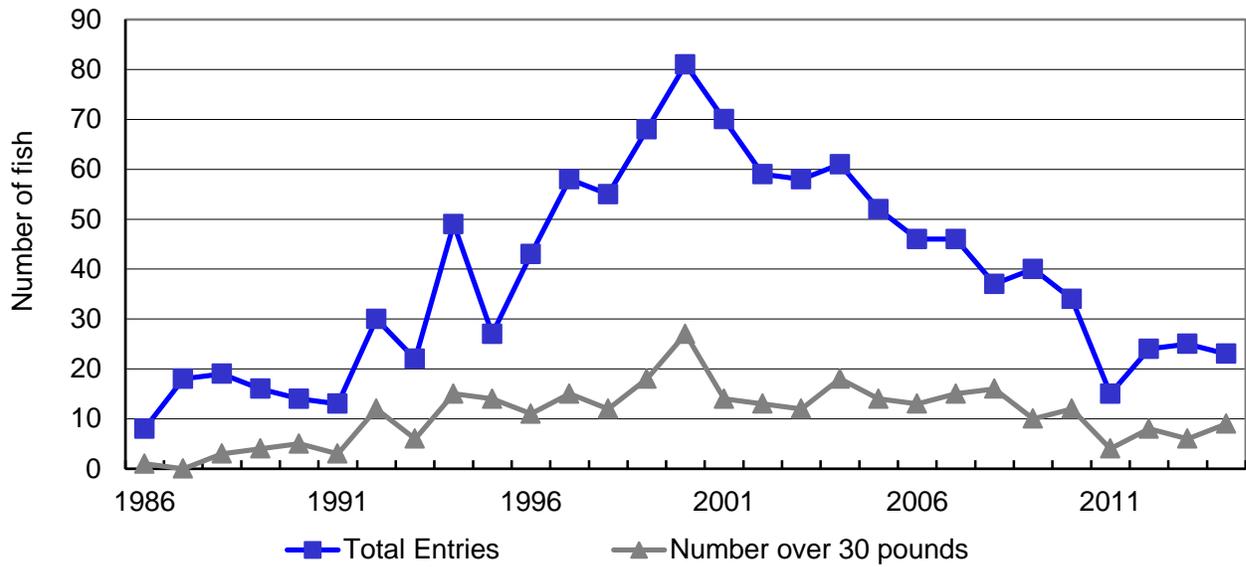


Figure 9.—Lake St. Clair muskellunge entered in the Michigan DNR Master Angler Program, 1986-2014. Values for 1992-2014 represent combined regular and catch-and-release Master Angler categories.

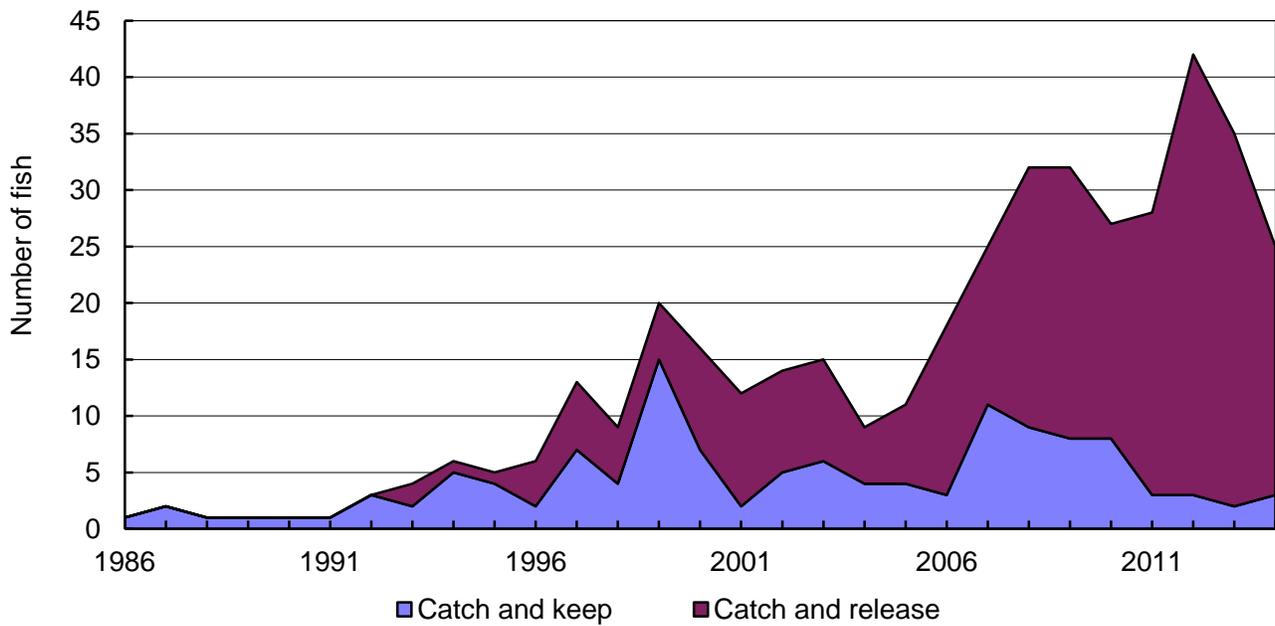


Figure 10.—Lake St. Clair smallmouth bass entered in the Michigan DNR Master Angler Program, 1986-2014.



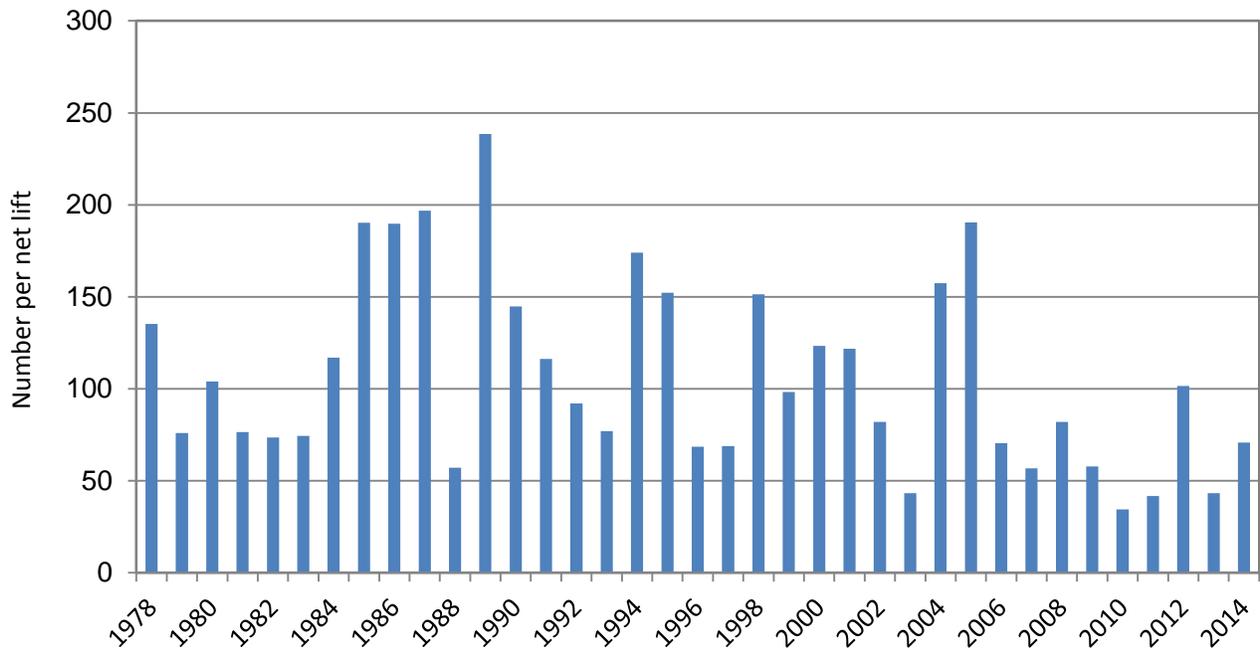


Figure 11.—Average total walleye catch per unit effort, by year, for Michigan Lake Erie index gill nets, 1978-2014.

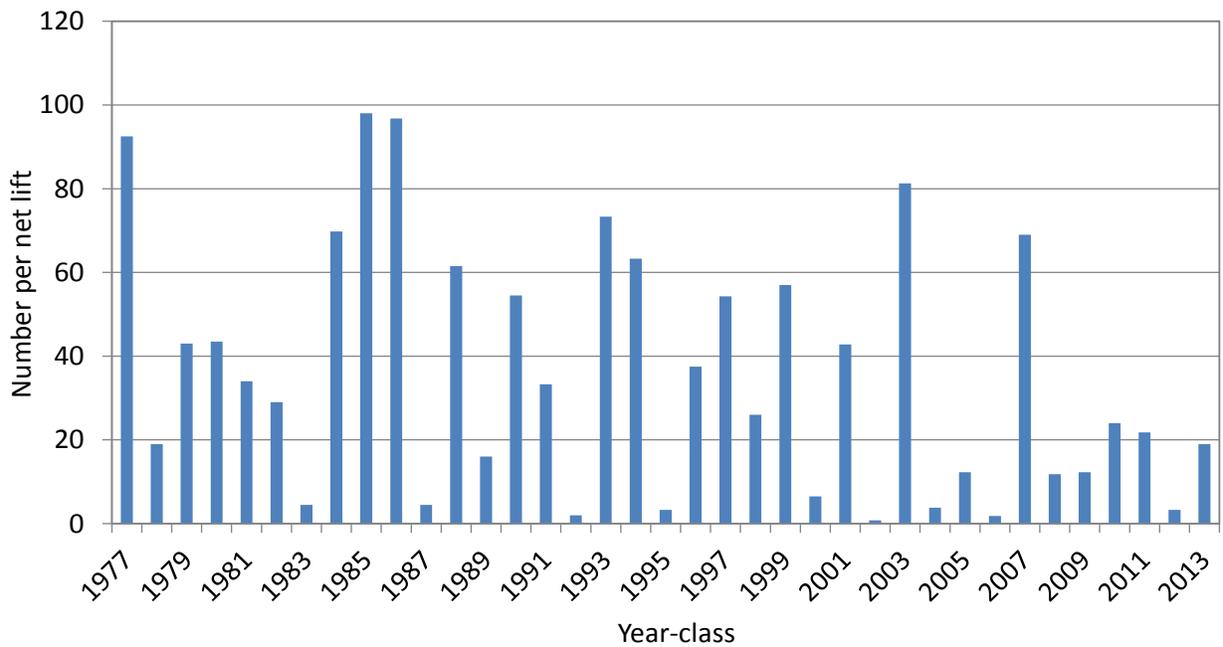


Figure 12.—Average yearling walleye catch per unit effort, by year-class, for Michigan Lake Erie index gill nets.



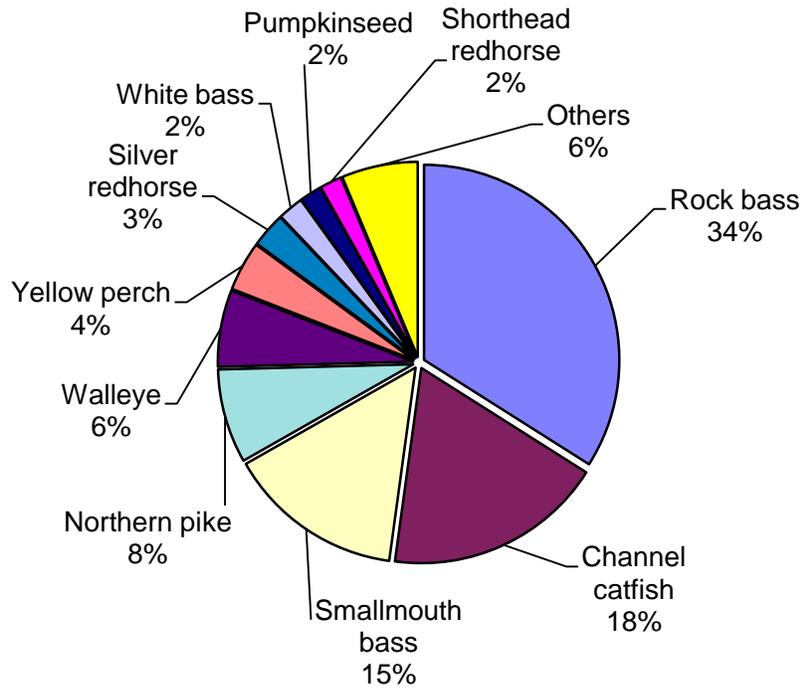


Figure 13.—Catch composition for trap nets fished in Lake St. Clair during April - May 2014.

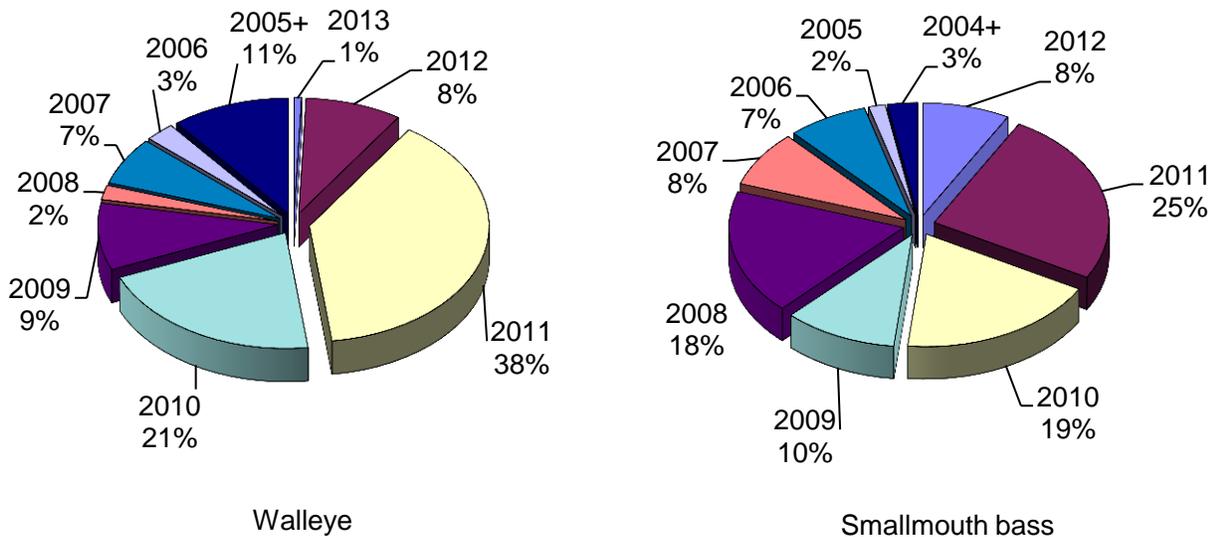


Figure 14.—Contribution by year-class to catch in survey trap nets in Lake St. Clair during April-May 2014.



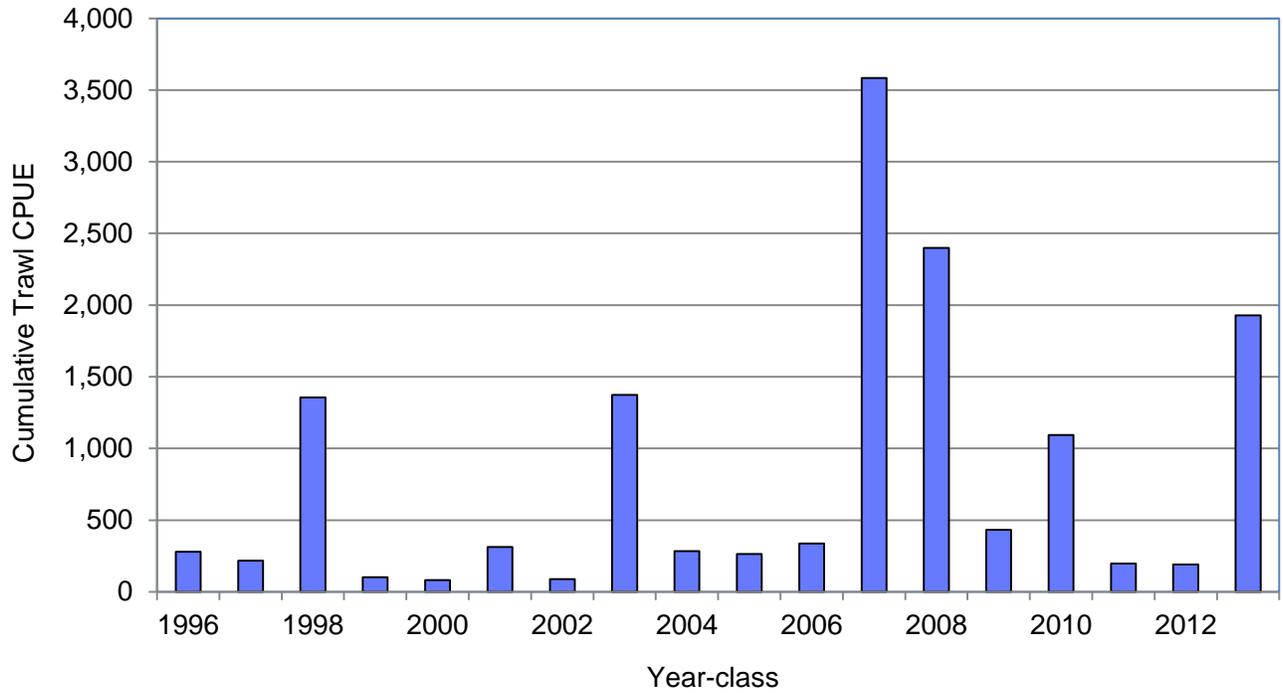


Figure 15.—Year-class strength for yellow perch in Lake St. Clair as indicated by June trawl catch rates summed across years (survey years 1996 to 2013).

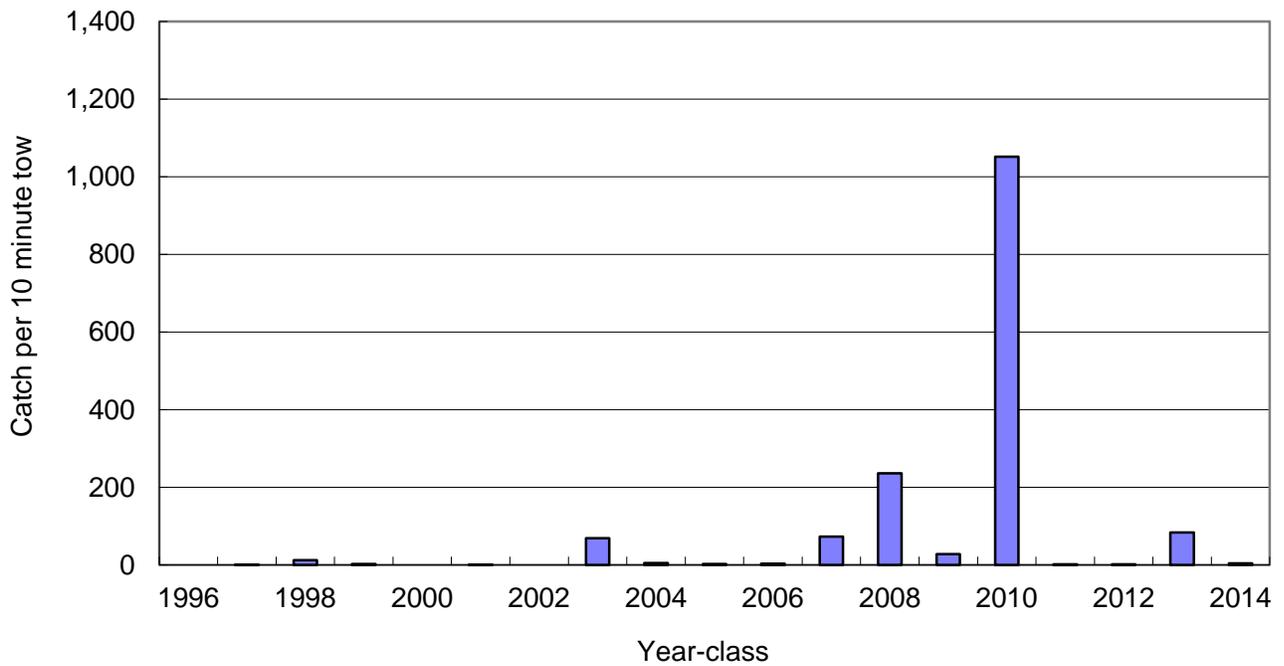


Figure 16.—Year-class strength for yellow perch in Lake St. Clair as indicated by September trawl age 0 catch rates, 1996 to 2014.



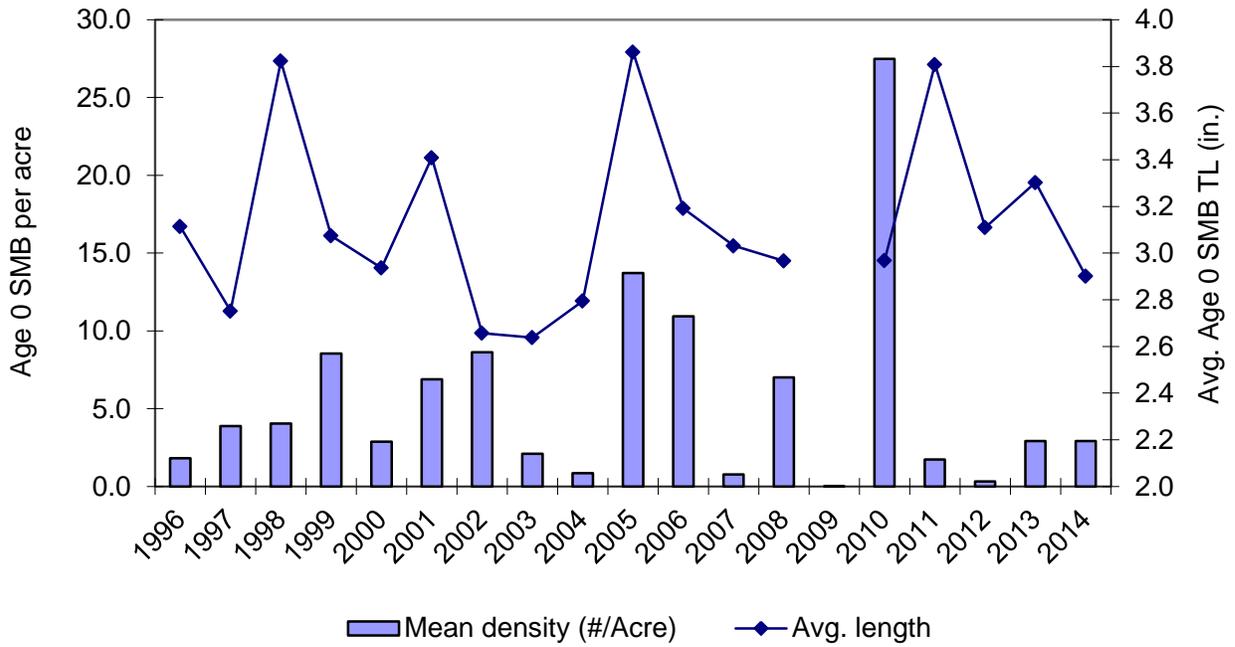


Figure 17.—Year-class strength for Lake St. Clair smallmouth bass as indicated by September trawl Age 0 catch rates and mean lengths, 1996 to 2014.

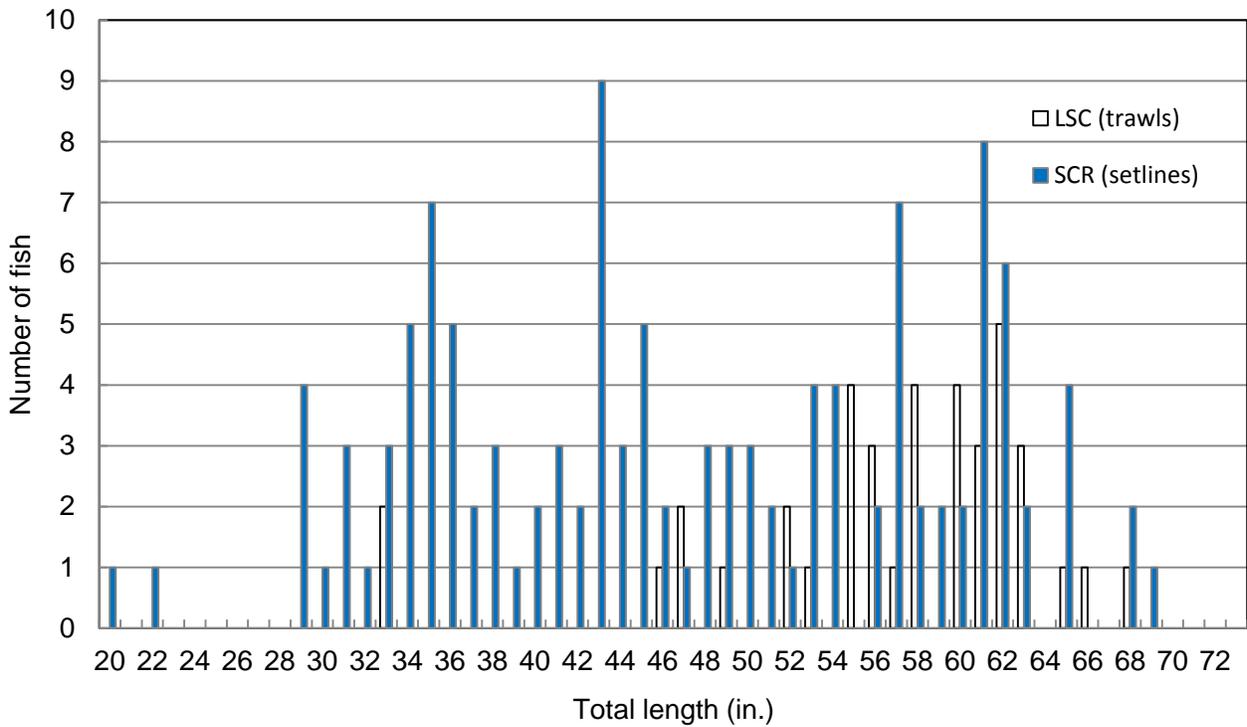


Figure 18.—Length frequency distribution for lake sturgeon caught in 2014 with survey setlines (n=122) in the St. Clair River and bottom trawls (n=39) in Lake St. Clair.



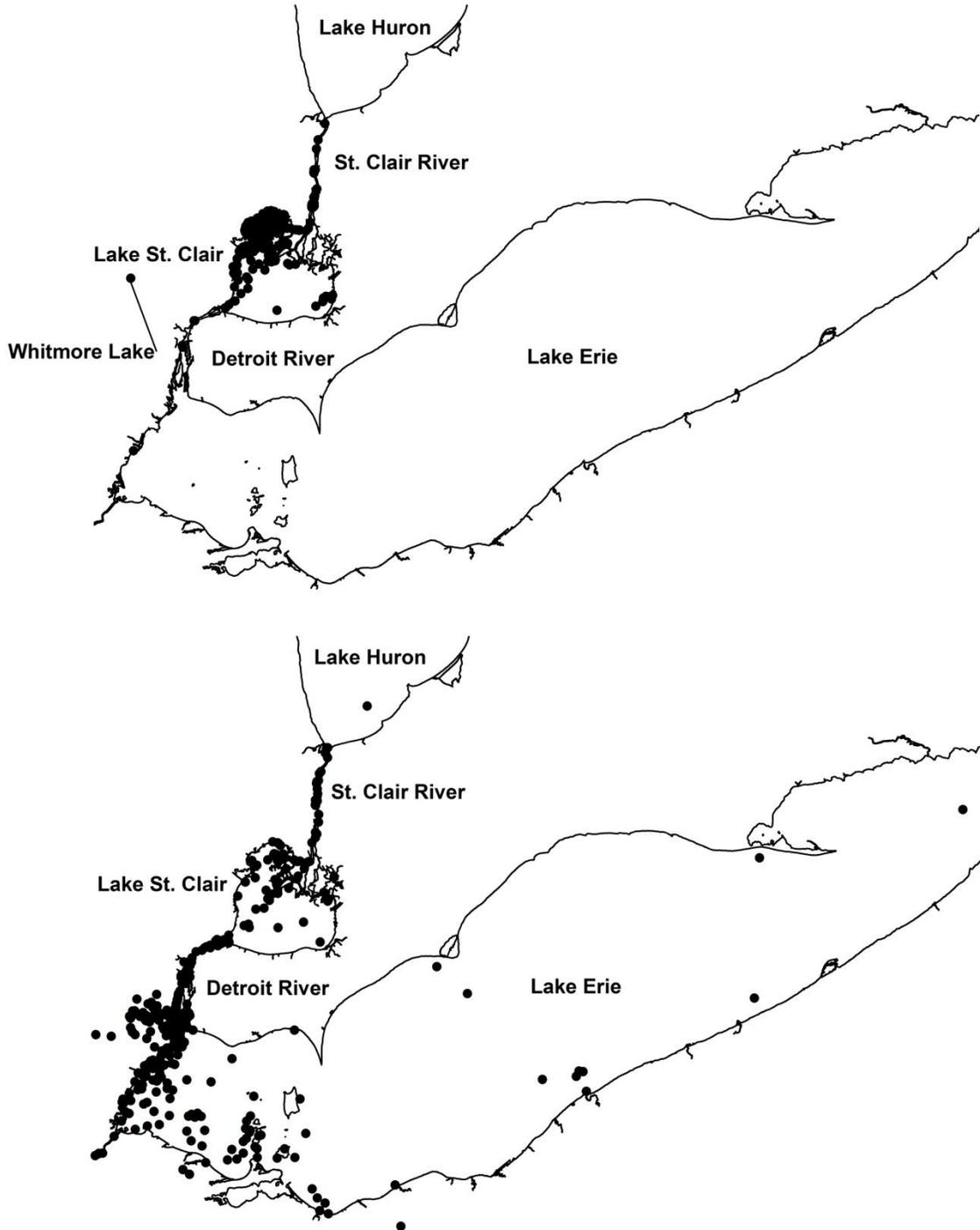


Figure 19.— Geographical distribution of smallmouth bass tag recoveries (N=573) for fish tagged during 2002-2014 at the Anchor Bay site in Lake St. Clair (top map) and for all tag recoveries since 2003 for walleye tagged during 1994-2010 in the Huron River (N=483, bottom map). Black dots represent the recovery location of individual fish.



Table 1.—Estimated harvest, harvest rate, effort, and released catch for Michigan's 2014 Lake Erie non-charter boat fishery. Two standard errors in parentheses.

| Species               | Harvest rate       | Month |        |        |        |        |        |        |                      |
|-----------------------|--------------------|-------|--------|--------|--------|--------|--------|--------|----------------------|
|                       |                    | Apr   | May    | Jun    | Jul    | Aug    | Sep    | Oct    | Season               |
| <b>HARVEST</b>        |                    |       |        |        |        |        |        |        |                      |
| Yellow perch          | 0.6839<br>(0.8475) | 0     | 3,790  | 15,110 | 24,172 | 36,959 | 56,410 | 25,554 | 161,995<br>(110,181) |
| Walleye               | 0.1449<br>(0.1592) | 1,759 | 15,458 | 12,575 | 4,258  | 227    | 0      | 50     | 34,326<br>(20,698)   |
| Channel catfish       | 0.0695<br>(0.1100) | 79    | 1,851  | 3,021  | 7,002  | 1,351  | 2,348  | 800    | 16,453<br>(14,302)   |
| White bass            | 0.0213<br>(0.0529) | 425   | 1,222  | 1,195  | 641    | 645    | 710    | 208    | 5,047<br>(6,879)     |
| White perch           | 0.0147<br>(0.0380) | 0     | 100    | 673    | 182    | 833    | 1,400  | 305    | 3,493<br>(4,941)     |
| Freshwater drum       | 0.0021<br>(0.0056) | 0     | 98     | 238    | 13     | 76     | 70     | 0      | 496<br>(724)         |
| Largemouth bass       | 0.0018<br>(0.0063) | 0     | 0      | 173    | 264    | 0      | 0      | 0      | 437<br>(819)         |
| Smallmouth bass       | 0.0008<br>(0.0020) | 0     | 0      | 22     | 93     | 5      | 74     | 0      | 193<br>(254)         |
| Other                 | 0.0001<br>(0.0004) | 0     | 0      | 0      | 27     | 0      | 0      | 0      | 27<br>(54)           |
| Total Harvest         | 0.9407<br>(0.2118) | 2,263 | 22,590 | 33,007 | 36,697 | 40,147 | 61,044 | 27,088 | 222,835<br>(37,963)  |
| <b>EFFORT</b>         |                    |       |        |        |        |        |        |        |                      |
| Angler hours          |                    | 8,124 | 56,222 | 57,147 | 44,609 | 28,296 | 29,687 | 12,786 | 236,871<br>(130,007) |
| Angler trips          |                    | 2,015 | 10,651 | 10,955 | 8,694  | 5,433  | 5,447  | 2,768  | 45,962<br>(25,940)   |
| <b>RELEASED</b>       |                    |       |        |        |        |        |        |        |                      |
| Walleye<br>Legal size | 0.0020<br>(0.0019) | 394   | 30     | 0      | 46     | 14     | 0      | 0      | 484<br>(444)         |
| Walleye<br>Sub-legal  | 0.0073<br>(0.0038) | 0     | 59     | 1,287  | 147    | 31     | 158    | 54     | 1,736<br>(864)       |
| Largemouth bass       | 0.0568<br>(0.1317) | 733   | 1,824  | 1,000  | 2,690  | 113    | 4,882  | 2,204  | 13,446<br>(17,127)   |
| Smallmouth bass       | 0.0163<br>(0.0375) | 566   | 800    | 645    | 618    | 177    | 852    | 210    | 3,868<br>(4,874)     |
| White bass            | 0.5630<br>(0.6095) | 303   | 64,123 | 23,012 | 17,672 | 18,744 | 7,227  | 2,275  | 133,356<br>(79,244)  |



Table 2.—Total harvest per hour, harvest per excursion, number harvested, and fishing effort (angler hours, trips, and charter excursions) for charter boats on Lake Erie, 2014.

| Species            | Total catch per hour | Catch per excursion | Month            |       |       |       |     |       |                  | Season |
|--------------------|----------------------|---------------------|------------------|-------|-------|-------|-----|-------|------------------|--------|
|                    |                      |                     | Apr <sup>1</sup> | May   | Jun   | Jul   | Aug | Sep   | Oct <sup>1</sup> |        |
| <b>Harvested</b>   |                      |                     |                  |       |       |       |     |       |                  |        |
| Rainbow trout      | 0.0001               | 0.0028              | 0                | 1     | 0     | 1     | 0   | 0     | 0                | 2      |
| Yellow perch       | 0.8672               | 19.0399             | 0                | 24    | 91    | 90    | 865 | 8,019 | 4,277            | 13,366 |
| Walleye            | 0.6766               | 14.8547             | 657              | 2,285 | 5,221 | 2,013 | 252 | 0     | 0                | 10,428 |
| Small. bass        | 0.0023               | 0.0499              | 21               | 2     | 3     | 3     | 6   | 0     | 0                | 35     |
| Other              | 0.1215               | 2.6667              | 13               | 230   | 1,440 | 36    | 29  | 124   | 0                | 1,872  |
| <b>Released</b>    |                      |                     |                  |       |       |       |     |       |                  |        |
| Yellow perch       | 0.0909               | 1.9957              | 0                | 0     | 5     | 0     | 180 | 748   | 468              | 1,401  |
| Walleye            | 0.0301               | 0.6610              | 32               | 48    | 317   | 53    | 11  | 2     | 1                | 464    |
| Small. bass        | 0.0227               | 0.4986              | 3                | 316   | 0     | 20    | 5   | 4     | 2                | 350    |
| Muskellunge        | 0.0003               | 0.0057              | 1                | 0     | 1     | 2     | 0   | 0     | 0                | 4      |
| Other              | 0.2279               | 5.0043              | 35               | 1,729 | 764   | 363   | 145 | 253   | 224              | 3,513  |
| Angler hours       |                      |                     | 702              | 3,118 | 6,370 | 2,372 | 640 | 1,445 | 765              | 15,412 |
| Angler trips       |                      |                     | 137              | 583   | 1,226 | 472   | 122 | 275   | 147              | 2,962  |
| Charter excursions |                      |                     | 43               | 148   | 274   | 112   | 30  | 63    | 32               | 702    |

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

Table 3.—Total harvest per hour, harvest per excursion, number harvested, and fishing effort (angler hours, trips, and charter excursions) for charter boats on the Detroit River, Lake St. Clair, and the St. Clair River, 2014.

| Species            | Total catch per hour | Catch per excursion | Month            |       |       |       |       |       |                  | Season |
|--------------------|----------------------|---------------------|------------------|-------|-------|-------|-------|-------|------------------|--------|
|                    |                      |                     | Apr <sup>1</sup> | May   | Jun   | Jul   | Aug   | Sep   | Oct <sup>1</sup> |        |
| <b>Harvested</b>   |                      |                     |                  |       |       |       |       |       |                  |        |
| Yellow perch       | 0.1140               | 2.5156              | 0                | 51    | 196   | 229   | 490   | 880   | 1,052            | 2,898  |
| Walleye            | 0.1559               | 3.4401              | 2,093            | 1,385 | 317   | 50    | 83    | 13    | 22               | 3,963  |
| Small. bass        | 0.0868               | 1.9149              | 0                | 0     | 229   | 705   | 921   | 319   | 32               | 2,206  |
| Muskellunge        | 0.0000               | 0.0000              | 0                | 0     | 0     | 0     | 0     | 0     | 0                | 0      |
| Other              | 0.0429               | 0.9453              | 147              | 475   | 415   | 31    | 20    | 0     | 1                | 1,089  |
| <b>Released</b>    |                      |                     |                  |       |       |       |       |       |                  |        |
| Yellow perch       | 0.0375               | 0.8273              | 0                | 0     | 173   | 174   | 275   | 322   | 0                | 953    |
| Walleye            | 0.0185               | 0.4080              | 438              | 19    | 1     | 2     | 5     | 4     | 1                | 470    |
| Small. bass        | 0.5507               | 12.1493             | 209              | 3,102 | 4,706 | 1,904 | 1,993 | 1,003 | 1,079            | 13,996 |
| Muskellunge        | 0.0519               | 1.1441              | 5                | 3     | 311   | 288   | 237   | 160   | 314              | 1,318  |
| Other              | 0.0312               | 0.6892              | 82               | 433   | 107   | 68    | 22    | 27    | 55               | 794    |
| Angler hours       |                      |                     | 3,456            | 3,530 | 4,644 | 3,725 | 3,989 | 2,692 | 3,378            | 25,414 |
| Angler trips       |                      |                     | 628              | 616   | 686   | 565   | 616   | 418   | 476              | 4,005  |
| Charter excursions |                      |                     | 164              | 172   | 210   | 159   | 174   | 113   | 160              | 1,152  |

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



Table 4.—Commercial harvest (pounds sold) from Michigan waters of Lake Erie in 2014.

| Species              | Harvest (lbs.) | % of total harvest | Reported market value |
|----------------------|----------------|--------------------|-----------------------|
| Carp                 | 353,979        | 34%                | \$95,574              |
| White bass           | 172,126        | 16%                | \$96,391              |
| Buffalo              | 136,743        | 13%                | \$72,474              |
| Channel catfish      | 117,835        | 11%                | \$54,204              |
| Freshwater drum      | 81,734         | 8%                 | \$22,068              |
| Quillback carpsucker | 70,180         | 7%                 | \$23,159              |
| White perch          | 42,646         | 4%                 | \$18,764              |
| Goldfish             | 34,054         | 3%                 | \$30,649              |
| Gizzard shad         | 31,800         | 3%                 | \$3,180               |
| Bullhead             | 7,556          | 1%                 | \$4,005               |
| Sucker               | 1,500          | 0%                 | \$405                 |
| Bowfin               | 180            | 0%                 | \$72                  |
| Grand Total          | 1,050,333      | 100%               | \$420,945             |



Table 5.—Commercial harvest (pounds caught) of selected species from Michigan waters of Lake Erie, 1983 to 2014.

| Year        | Buffalo   | Bullhead | Common carp | Channel catfish | Gizzard shad | Goldfish | Quillback | Freshwater drum | Sucker  | White bass | White perch | White-fish | Grand Total |
|-------------|-----------|----------|-------------|-----------------|--------------|----------|-----------|-----------------|---------|------------|-------------|------------|-------------|
| 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     |
| 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   |
| Grand Total | 1,768,704 | 304,864  | 10,997,029  | 1,198,118       | 3,727,693    | 689,048  | 938,979   | 1,122,099       | 101,168 | 872,312    | 281,405     | 40,486     | 20,991,752  |



Table 6.—Mean catch per trap net (24 hour lift) for species commonly taken during spring trap net surveys in Anchor Bay, Lake St. Clair.

| Species                   | Survey year |       |       |       |       |       |       |       |       |       |       |       |       | Mean  |
|---------------------------|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|                           | 2002        | 2003  | 2004  | 2005  | 2006  | 2007  | 2008  | 2009  | 2010  | 2011  | 2012  | 2013  | 2014  |       |
| Black bullhead            | 0.02        | 0.01  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.15  | 0.00  | 0.00  | 0.00  | 0.01  |
| Black crappie             | 0.00        | 0.01  | 0.12  | 0.00  | 0.00  | 0.00  | 0.00  | 0.02  | 0.01  | 0.06  | 0.08  | 0.04  | 0.01  | 0.03  |
| Bluegill                  | 0.06        | 0.00  | 0.05  | 0.01  | 0.02  | 0.00  | 0.05  | 0.00  | 0.01  | 0.23  | 0.03  | 0.07  | 0.01  | 0.04  |
| Brown bullhead            | 0.02        | 0.01  | 0.02  | 0.00  | 0.01  | 0.01  | 0.00  | 0.02  | 0.03  | 0.02  | 0.00  | 0.08  | 0.01  | 0.02  |
| Channel catfish           | 1.88        | 1.85  | 1.70  | 1.21  | 1.76  | 2.01  | 3.14  | 2.22  | 2.24  | 1.22  | 2.64  | 2.53  | 3.94  | 2.18  |
| Common carp               | 0.24        | 0.00  | 0.01  | 0.01  | 0.03  | 0.00  | 0.00  | 0.43  | 0.34  | 0.29  | 0.08  | 0.15  | 0.13  | 0.13  |
| Common white sucker       | 0.14        | 0.08  | 0.12  | 0.10  | 0.10  | 0.33  | 0.15  | 0.06  | 0.16  | 0.22  | 0.03  | 0.16  | 0.31  | 0.15  |
| Freshwater drum           | 1.30        | 4.01  | 1.68  | 0.36  | 2.27  | 0.47  | 0.36  | 0.59  | 0.66  | 0.52  | 0.35  | 0.38  | 0.25  | 1.02  |
| Gizzard shad              | 0.04        | 0.03  | 0.01  | 0.03  | 0.01  | 0.01  | 0.00  | 0.00  | 0.00  | 0.01  | 0.15  | 0.10  | 0.01  | 0.03  |
| Goldern redhorse          | 0.01        | 0.01  | 0.02  | 0.02  | 0.02  | 0.01  | 0.00  | 0.05  | 0.00  | 0.01  | 0.00  | 0.05  | 0.02  | 0.02  |
| Lake sturgeon             | 0.01        | 0.06  | 0.03  | 0.02  | 0.05  | 0.00  | 0.10  | 0.05  | 0.01  | 0.09  | 0.01  | 0.05  | 0.02  | 0.04  |
| Largemouth bass           | 0.22        | 0.04  | 0.11  | 0.03  | 0.03  | 0.10  | 0.10  | 0.11  | 0.06  | 0.21  | 0.03  | 0.18  | 0.10  | 0.10  |
| Muskellunge               | 0.56        | 0.52  | 0.63  | 0.71  | 0.48  | 0.49  | 0.13  | 0.83  | 0.18  | 0.12  | 0.00  | 0.13  | 0.08  | 0.37  |
| Northern pike             | 0.90        | 0.15  | 0.58  | 0.87  | 0.86  | 0.66  | 0.55  | 0.71  | 1.02  | 1.11  | 0.70  | 1.54  | 1.67  | 0.87  |
| Pumpkinseed               | 3.02        | 0.55  | 0.50  | 0.03  | 0.22  | 0.46  | 0.71  | 0.40  | 0.74  | 1.54  | 0.84  | 0.77  | 0.44  | 0.78  |
| 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  | 0.20  |
| 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  | 24.25 |
| Shorthead redhorse        | 1.14        | 1.90  | 0.69  | 0.77  | 1.62  | 0.51  | 1.00  | 0.76  | 1.16  | 1.30  | 0.74  | 0.52  | 0.37  | 0.96  |
| Silver redhorse           | 0.25        | 0.27  | 0.54  | 0.59  | 0.95  | 0.30  | 0.95  | 1.37  | 1.54  | 1.29  | 0.26  | 0.87  | 0.64  | 0.76  |
| Smallmouth bass           | 4.32        | 8.16  | 2.37  | 1.73  | 3.83  | 5.84  | 2.74  | 3.50  | 8.49  | 6.92  | 4.01  | 3.68  | 3.47  | 4.54  |
| Walleye                   | 2.17        | 1.55  | 1.15  | 2.43  | 2.40  | 1.72  | 1.25  | 1.98  | 1.03  | 2.14  | 1.02  | 1.91  | 1.51  | 1.71  |
| White bass                | 0.03        | 0.05  | 0.03  | 0.00  | 0.07  | 0.05  | 0.27  | 0.42  | 0.15  | 0.26  | 1.56  | 0.37  | 0.47  | 0.29  |
| White perch               | 0.11        | 0.05  | 0.35  | 0.05  | 1.11  | 0.10  | 0.96  | 0.44  | 0.79  | 0.83  | 0.67  | 0.85  | 0.12  | 0.49  |
| Yellow perch              | 3.08        | 0.74  | 2.04  | 0.51  | 0.58  | 2.22  | 1.59  | 0.50  | 0.39  | 1.31  | 1.19  | 0.96  | 0.86  | 1.23  |
| Total all species         | 50.08       | 34.14 | 27.67 | 15.72 | 32.19 | 37.08 | 36.48 | 43.97 | 73.15 | 63.40 | 50.80 | 34.90 | 23.59 | 40.24 |
| Number of net lifts       | 64          | 50    | 55    | 34    | 42    | 50    | 35    | 22    | 54    | 54    | 39    | 46    | 40    |       |
| Starting date             | 5/3         | 5/28  | 5/3   | 5/11  | 5/5   | 5/3   | 5/6   | 5/8   | 5/3   | 4/25  | 4/25  | 4/22  | 4/24  |       |
| Ending date               | 5/30        | 6/20  | 5/26  | 5/25  | 5/24  | 5/22  | 5/20  | 5/20  | 5/24  | 5/25  | 5/14  | 5/20  | 5/19  |       |
| Starting water temp. (°C) | 9           | 12    | 8     | 9     | 13    | 9     | 13    | 12    | 14    | 9     | 9     | 8     | 8     |       |
| Ending water temp. (°C)   | 15          | 16    | 15    | 13    | 13    | 13    | 11    | 14    | 17    | 13    | 14    | 15    | 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   |       |



Table 7.—Mean density (number of fish caught per hectare trawled) for all fish species caught during spring (June) with 10 m headrope index trawls in Anchor Bay, Lake St. Clair.

| Species            | Year  |       |      |       |       |      |      |       |       |       |       |       |      |       | Mean  |
|--------------------|-------|-------|------|-------|-------|------|------|-------|-------|-------|-------|-------|------|-------|-------|
|                    | 2001  | 2002  | 2003 | 2004  | 2005  | 2006 | 2007 | 2008  | 2009  | 2010  | 2011  | 2012  | 2013 | 2014  |       |
| Alewife            | 3     | 3     | 0    | 0     | 0     | 0    | 0    | 0     | 0     | 0     | 0     | 0     | 0    | 0     | 3     |
| Bluntnose minnow   | 10    | 7     | 1    | 6     | 118   | 1    | 13   | 0     | 3     | 2     | 4     | 3     | 1    | 4     | 10    |
| Common carp        | 0     | 0     | 0    | 1     | 0     | 0    | 0    | 0     | 0     | 0     | 0     | 0     | 0    | 0     | 0     |
| Emerald shiner     | 0     | 11    | 0    | 2     | 0     | 0    | 0    | 32    | 39    | 4     | 18    | 26    | 17   | 14    | 9     |
| Freshwater drum    | 5     | 1     | 4    | 3     | 6     | 4    | 3    | 0     | 0     | 0     | 2     | 0     | 0    | 0     | 3     |
| Johnny darter      | 0     | 0     | 0    | 3     | 2     | 0    | 7    | 2     | 17    | 3     | 4     | 17    | 61   | 105   | 13    |
| Lake sturgeon      | 0     | 1     | 1    | 0     | 0     | 2    | 1    | 0     | 0     | 0     | 0     | 1     | 0    | 2     | 0     |
| Largemouth bass    | 1     | 0     | 0    | 0     | 0     | 0    | 4    | 0     | 0     | 1     | 0     | 0     | 0    | 0     | 0     |
| Logperch           | 2     | 8     | 0    | 42    | 6     | 0    | 1    | 3     | 29    | 13    | 107   | 10    | 10   | 133   | 28    |
| Muskellunge        | 1     | 1     | 0    | 0     | 0     | 0    | 0    | 0     | 1     | 1     | 0     | 0     | 0    | 1     | 0     |
| Northern pike      | 1     | 0     | 1    | 0     | 1     | 1    | 0    | 0     | 0     | 0     | 1     | 2     | 0    | 0     | 0     |
| Shorthead redhorse | 4     | 7     | 4    | 2     | 6     | 9    | 1    | 0     | 0     | 4     | 1     | 0     | 0    | 0     | 3     |
| Pumpkinseed        | 2     | 0     | 0    | 0     | 0     | 1    | 1    | 0     | 0     | 0     | 0     | 6     | 0    | 0     | 1     |
| Quillback          | 0     | 0     | 0    | 0     | 0     | 0    | 0    | 0     | 0     | 0     | 0     | 0     | 0    | 0     | 0     |
| Rainbow smelt      | 61    | 0     | 14   | 53    | 11    | 6    | 1    | 68    | 110   | 122   | 18    | 284   | 56   | 148   | 116   |
| Rock bass          | 30    | 39    | 18   | 5     | 10    | 33   | 73   | 4     | 2     | 21    | 4     | 5     | 2    | 1     | 17    |
| Round goby         | 1     | 30    | 6    | 53    | 10    | 0    | 30   | 1     | 14    | 33    | 24    | 1     | 2    | 16    | 15    |
| Sand shiner        | 20    | 362   | 0    | 118   | 45    | 2    | 640  | 4     | 15    | 0     | 20    | 36    | 55   | 8     | 73    |
| Silver lamprey     | 0     | 0     | 1    | 1     | 0     | 5    | 2    | 0     | 0     | 1     | 0     | 0     | 0    | 0     | 1     |
| Silver redhorse    | 0     | 2     | 5    | 2     | 1     | 1    | 2    | 0     | 0     | 1     | 4     | 1     | 0    | 1     | 1     |
| Smallmouth bass    | 3     | 4     | 2    | 2     | 10    | 4    | 13   | 0     | 0     | 2     | 2     | 1     | 0    | 1     | 3     |
| Spottail shiner    | 7     | 5,730 | 211  | 1,777 | 524   | 769  | 53   | 90    | 2,705 | 495   | 5,093 | 1,988 | 109  | 226   | 1,110 |
| Trout-perch        | 11    | 265   | 13   | 108   | 65    | 248  | 7    | 2     | 3     | 23    | 13    | 42    | 41   | 84    | 94    |
| Walleye            | 1     | 1     | 1    | 0     | 2     | 12   | 2    | 0     | 1     | 0     | 0     | 2     | 0    | 0     | 2     |
| White perch        | 1     | 1     | 1    | 2     | 1     | 2    | 0    | 1     | 1     | 0     | 1     | 1     | 0    | 0     | 1     |
| White sucker       | 1     | 61    | 2    | 68    | 22    | 5    | 1    | 20    | 16    | 95    | 9     | 39    | 6    | 57    | 22    |
| Yellow perch       | 1,132 | 725   | 306  | 888   | 1,107 | 869  | 303  | 3,137 | 7,144 | 3,120 | 3,101 | 1,865 | 758  | 4,723 | 1,695 |



Table 8.—Mean density (number of fish caught per hectare trawled) for all fish species caught during fall (September or October) with 10 m headrope index trawls in Anchor Bay, Lake St. Clair.

| Species            | Year |       |       |       |       |       |      |       |       |       |       |       |      |      | Mean  |
|--------------------|------|-------|-------|-------|-------|-------|------|-------|-------|-------|-------|-------|------|------|-------|
|                    | 2001 | 2002  | 2003  | 2004  | 2005  | 2006  | 2007 | 2008  | 2009  | 2010  | 2011  | 2012  | 2013 | 2014 |       |
| Alewife            | 32   | 0     | 0     | 0     | 1     | 1     | 0    | 0     | 5     | 0     | 0     | 0     | 0    | 0    | 6     |
| Bluntnose minnow   | 54   | 33    | 13    | 43    | 238   | 61    | 36   | 65    | 198   | 821   | 189   | 7     | 4    | 1    | 96    |
| Common carp        | 1    | 2     | 0     | 0     | 1     | 0     | 0    | 0     | 0     | 0     | 1     | 0     | 0    | 0    | 0     |
| Emerald shiner     | 0    | 1     | 0     | 41    | 36    | 608   | 0    | 1     | 8     | 2     | 5     | 0     | 4    | 0    | 38    |
| Freshwater drum    | 2    | 0     | 1     | 5     | 2     | 3     | 2    | 0     | 2     | 2     | 0     | 1     | 0    | 1    | 1     |
| Johnny darter      | 0    | 0     | 7     | 0     | 0     | 0     | 1    | 1     | 0     | 0     | 1     | 12    | 0    | 1    | 2     |
| Lake sturgeon      | 0    | 0     | 0     | 0     | 0     | 0     | 0    | 1     | 0     | 0     | 1     | 1     | 0    | 0    | 0     |
| Largemouth bass    | 16   | 36    | 13    | 13    | 29    | 22    | 58   | 50    | 45    | 23    | 9     | 1     | 29   | 14   | 19    |
| Logperch           | 18   | 6     | 14    | 38    | 113   | 34    | 9    | 175   | 288   | 120   | 31    | 35    | 48   | 33   | 56    |
| Muskellunge        | 1    | 0     | 0     | 0     | 0     | 0     | 0    | 0     | 0     | 0     | 0     | 0     | 0    | 0    | 0     |
| Northern pike      | 1    | 1     | 1     | 0     | 0     | 0     | 0    | 0     | 0     | 0     | 1     | 0     | 0    | 1    | 0     |
| Shorthead redhorse | 2    | 0     | 0     | 0     | 1     | 2     | 1    | 0     | 0     | 0     | 1     | 0     | 0    | 0    | 0     |
| Pumpkinseed        | 5    | 5     | 3     | 1     | 0     | 5     | 8    | 24    | 0     | 0     | 5     | 0     | 1    | 0    | 3     |
| Quillback          | 0    | 2     | 1     | 1     | 0     | 0     | 0    | 5     | 0     | 0     | 0     | 0     | 0    | 1    | 1     |
| Rainbow smelt      | 0    | 0     | 4     | 26    | 0     | 1     | 0    | 1     | 139   | 0     | 1     | 2     | 0    | 0    | 10    |
| Rock bass          | 40   | 41    | 35    | 25    | 77    | 67    | 71   | 211   | 21    | 104   | 80    | 5     | 29   | 4    | 58    |
| Round goby         | 10   | 99    | 2     | 28    | 14    | 10    | 4    | 7     | 11    | 15    | 0     | 8     | 9    | 39   | 20    |
| Sand shiner        | 10   | 44    | 507   | 8,909 | 3,072 | 109   | 29   | 408   | 0     | 0     | 383   | 2,516 | 2    | 893  | 963   |
| Silver lamprey     | 0    | 0     | 0     | 0     | 0     | 1     | 1    | 1     | 0     | 0     | 1     | 3     | 0    | 1    | 0     |
| Silver redhorse    | 1    | 6     | 0     | 4     | 5     | 4     | 1    | 1     | 2     | 1     | 1     | 0     | 0    | 0    | 2     |
| Smallmouth bass    | 0    | 51    | 7     | 3     | 41    | 32    | 3    | 22    | 2     | 69    | 13    | 8     | 13   | 8    | 18    |
| Spottail shiner    | 879  | 2,407 | 1,068 | 545   | 2,410 | 2,668 | 983  | 2,191 | 981   | 2,492 | 1,867 | 28    | 168  | 0    | 1,026 |
| Trout-perch        | 0    | 10    | 6     | 59    | 3     | 79    | 1    | 0     | 3     | 105   | 7     | 14    | 12   | 96   | 68    |
| Walleye            | 0    | 11    | 0     | 2     | 9     | 3     | 1    | 0     | 2     | 0     | 2     | 0     | 0    | 0    | 2     |
| White perch        | 0    | 13    | 8     | 6     | 146   | 12    | 31   | 398   | 9     | 9     | 1     | 0     | 1    | 0    | 35    |
| White sucker       | 1    | 8     | 1     | 1     | 4     | 6     | 5    | 7     | 6     | 10    | 1     | 0     | 0    | 0    | 3     |
| Yellow perch       | 114  | 73    | 181   | 48    | 52    | 34    | 220  | 625   | 1,100 | 2,601 | 36    | 24    | 246  | 11   | 293   |

