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**A Survey of Sport Fishing in the Illinois Portion of Lake Michigan
March through September 2020**

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A SURVEY OF SPORT FISHING IN THE ILLINOIS PORTION OF LAKE MICHIGAN

March through September, 2020

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University of Illinois
Prairie Research Institute
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Submitted to
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Table 1. Common and scientific names of fishes appearing in this report of the survey of sport fishing in the Illinois portion of Lake Michigan. Only common names are used in the following text.

| Common Name | Scientific Name |
|---------------------|---------------------------------|
| Alewife | <i>Alosa pseudoharengus</i> |
| Bluegill | <i>Lepomis macrochirus</i> |
| Brown trout | <i>Salmo trutta</i> |
| Channel catfish | <i>Ictalurus punctatus</i> |
| Chinook salmon | <i>Oncorhynchus tshawytscha</i> |
| Coho salmon | <i>Oncorhynchus kisutch</i> |
| Common carp | <i>Cyprinus carpio</i> |
| Freshwater drum | <i>Aplodinotus grunniens</i> |
| Lake trout | <i>Salvelinus namaycush</i> |
| Largemouth bass | <i>Micropterus salmoides</i> |
| Northern pike | <i>Esox lucius</i> |
| Pumpkinseed sunfish | <i>Lepomis gibbosus</i> |
| Rainbow smelt | <i>Osmerus mordax</i> |
| Rainbow trout | <i>Oncorhynchus mykiss</i> |
| Rock bass | <i>Ambloplites rupestris</i> |
| Round goby | <i>Neogobius melanostomus</i> |
| Sea lamprey | <i>Petromyzon marinus</i> |
| Smallmouth bass | <i>Micropterus dolomieu</i> |
| Yellow perch | <i>Perca flavescens</i> |

EXECUTIVE SUMMARY

The purpose of this study was to estimate sport fishing effort and harvest by anglers fishing the Illinois portion of Lake Michigan (excluding charter fishing). Information provided by this annual study is important for management of sport fisheries in the Illinois waters of Lake Michigan. Due to the COVID-19 pandemic and related restrictions, data were collected via a contact creel survey on randomly-selected days over a truncated, four month period (6/1 - 9/30, as opposed to the typical six months; 4/1 - 9/30). Data were summarized and extrapolated over the four month period to obtain estimates for specific locations as well as for the entire Illinois portion of Lake Michigan. Sampling dates were randomly chosen for access sites within two strata: time period (segment = three week blocks) and type of day (weekday vs. weekend/holiday). A modified “social distancing” protocol was used for the survey process, including a shortened questionnaire; thus, some data were not collected. Mean length and weight of harvested fish was not estimated in 2020. An additional March survey was conducted at selected sites along the Lake Michigan shoreline. The March survey was stratified by weekend/ weekday, but the entire month of March was treated as one segment. An additional winter survey of sport fishing occurred during October 2019-February 2020. All data have been summarized by month for this report.

Conclusions:

1. Total angler effort in 2020 increased 10.3% from the same period (June-September) in 2019. Effort increased 21.9% for boat anglers and declined 9.8% for pedestrian anglers.
2. Yellow perch harvest decreased 64.7% from June-September 2019 estimates, to 3,374 fish.
3. Coho salmon comprised most of the salmonid harvest (64.2%); Coho salmon harvest increased 0.7% compared to June-September 2019, to 12,346 fish.
4. Chinook salmon harvest for June-September was estimated at 1,506 fish, a 9.1% increase from the same months in 2019.
5. Compared to June-September 2019, rainbow trout harvest decreased 10.8% to 1,825 fish
6. Lake trout harvest decreased to an estimated 3,483 fish, a 40.5% decrease from June-September 2019.
7. The estimated brown trout harvest decreased 7.7% from June-September 2019 to 72 fish.
8. Total angler expenditures for boats, motors, trailers and fishing gear were not estimated for April-September 2020.

9. In March 2020, angler effort decreased 4.0% compared to 2019, to 8,149 angler hours. Brown trout harvest decreased 68.6% to 70 fish, while Coho salmon increased 341.7% to 1,303 fish. Harvest of yellow perch was 1,401 fish (compared to an estimated yellow perch harvest of 0 fish in March 2019). No Chinook salmon, rainbow trout, or lake trout harvest was documented in March of 2020.

10. In the winter (October 2019-February 2020), 33,974 angler-hours were directed at yellow perch. Estimated harvest of yellow perch was 48,033, representing 63.4% of the March 2019-February 2020 yellow perch harvest.

ABSTRACT

A contact creel survey was planned from April 1 to September 30, 2020, covering all legal sport fishing during that period (both by pedestrians and anglers fishing from boats), excluding fishing from chartered boats and smelt fishing. The intent of the survey was to provide reliable estimates of sport fishing activity, sport fish harvest, expenditures for sport fishing, and the quality and distribution of sport fishing for the Illinois portion of Lake Michigan. Due to COVID-19-related restrictions, the survey was not conducted April 1 through May 31, and during June 1 through September 30, a modified protocol was used to collect data. The modified creel protocol resulted in a shortened questionnaire and reduced data collection. Total fishing effort for pedestrians and boaters for the survey period (6/1 – 9/30) was estimated at 179,575 angler-hours. Total harvest estimates for major species during the survey period include 3,374 yellow perch, 72 brown trout, 1,825 rainbow trout, 3,483 lake trout, 12,346 Coho salmon, and 1,506 Chinook salmon. Angler expenditures and travel were not estimated in 2020. The yield value of fish harvested by sport fishing was approximately \$747,812.

An additional early-season survey was conducted during March 1 to March 31 at Waukegan Harbor, Montrose Harbor, and Calumet Park for pedestrian anglers and Waukegan Harbor and Calumet Park for launched-boat anglers. In total, anglers harvested an estimated 1,401 yellow perch, 70 brown trout, and 1,303 Coho salmon in an estimated total of 8,149 hours of fishing during March. Total expenditures for fishing gear, boats, and motors during March were estimated at \$10,242.

Another additional survey of sport fishing was conducted during October 2019-February 2020 at a variety of sites in Chicago. Yellow perch anglers harvested an estimated 48,033 yellow perch in an estimated 33,974 hours of angling in this fall and winter period.

INTRODUCTION

This report summarizes results of a survey of sport fishing in the Illinois portion of Lake Michigan from June 1 to September 30, 2020. All types of legal hook and line sport fishing during that period, with the exceptions of charter-boat fishing, were covered by the survey. Two supplemental surveys were completed: 1) a survey of the early spring fishery was conducted from March 1 to March 31, and 2) a survey of “winter” angling was carried out during October 2019-February 2020 (see Appendix B). The intent of the project was to provide estimates of sport fishing effort, harvest, and quality, as well as estimated fishing-related expenditures for anglers fishing Illinois waters of Lake Michigan. Biological data concerning length, weight, sea lamprey wounding and scarring, and marks (fin clips and external tags) were also intended to be collected from angler-harvested fish, but were not collected due to the COVID-19 pandemic. Creel surveys for the Illinois portion of Lake Michigan have been conducted annually by the Illinois Natural History Survey since 1985; results from the first thirty-five years of these surveys have been reported in annual technical reports, most recently for the 2019 survey (Roswell and Czesny 2020). Prior to these

annual surveys, the most recent creel survey of this type in Illinois was conducted in 1979 by the Illinois Department of Conservation (Muench 1981).

Geographic setting

This survey occurred at access locations along the 63-mile Illinois shoreline of Lake Michigan (Figure 1), a highly-developed stretch of shoreline. Chicago covers roughly one-third of the Illinois shore, and a series of smaller cities cover most of the remainder. No significant tributary streams enter Lake Michigan in Illinois waters. The slope of the near-shore lake bottom is steeper in the northern part of Illinois waters than near Chicago, which forces boaters from Chicago to go considerably farther from shore to reach good salmon waters (deep and cold) during the summer than boaters departing from North Point Marina. Another geographic feature is the easy access to other states' waters for boaters (e.g., Wisconsin waters for anglers launching at North Point Marina and Indiana waters for anglers launching at Calumet Park). For this survey, data were assumed to represent anglers fishing in Illinois waters.

Figure 1. The Illinois shoreline of Lake Michigan.



METHODS

Non-charter angling activity was categorized into two groups that were evaluated separately: (1) Pedestrian and launched-boat anglers, for which data were generated via personal interviews and direct head counts, and (2) anglers using moored boats. The moored boat estimates presented here are based on extrapolating estimates for anglers using launched boats using data quantifying the distribution of moored-boat angling relative to launched-boat angling.

Pedestrians and launched-boat anglers

Effort and harvest were estimated for pedestrian and launched-boat anglers using selected primary fishing areas (i.e., selected shore access locations and boat ramps), and those estimates were extrapolated to other areas. For each primary fishing area, a modified stratified random sampling design similar to that suggested by Malvestuto (1996) was used. The primary sampling unit of the survey was the fishing day. Daily estimates (e.g., total harvest by species, expenditures by category, etc.) for each primary site were combined to estimate seasonal totals using the formula for stratified random samples given by Cochran (1977).

Use of primary fishing areas

The primary fishing areas for pedestrian anglers were North Point Marina (Winthrop Harbor), Waukegan Harbor (Waukegan), and four locations in Chicago: Montrose Harbor, Belmont Harbor, Jackson Park, and Calumet Park. The primary fishing areas for launched boats were boat ramps at North Point Marina (Winthrop Harbor), Waukegan Harbor (Waukegan), Diversey Harbor (Chicago), and Calumet Park (Chicago). For each day scheduled to be surveyed, a creel clerk was assigned to visit three areas, two pedestrian areas and one launch area, in a prescribed order. The three areas were always one of three groups: (1) Waukegan Harbor (pedestrians), North Point Marina (pedestrians), North Point Marina (launched boats); (2) Montrose Harbor (pedestrians), Belmont Harbor (pedestrians), Diversey Harbor (launched boats); and (3) Jackson Park (pedestrians), Calumet Park (pedestrians), Calumet Park (launched boats). Additional visits to the launch ramps at Waukegan Harbor were added to the design in 2006 and were surveyed in the same manner as the launch ramp sites in the three groups.

Estimates obtained for the primary fishing areas were extrapolated to all other areas of the Illinois shoreline based on the distribution of pedestrian anglers and boat trailers. Data describing these distributions were obtained via an annual series of aerial counts during helicopter flights (conducted on weekends during the spring and summer during 2006-2013, 2016, and 2019; no helicopter flights during 2014, 2015, 2017, 2018, or 2020). During each flight, pedestrian anglers were counted and recorded on a form divided by site and the type of pedestrian site: structure (piers and breakwalls), shore (shoreline) and harbor (inside enclosed harbors). Pedestrian anglers who were not at a recognized site were counted and listed in the vicinity of the closest recognized site; the sum of these became the total for "other areas" on the form. Boat trailers with a vehicle attached were counted in the parking lots of launch ramps and were listed on the form at the appropriate site. All of the data collected were combined for the period to

calculate an average percentage of total fishing effort occurring at each location (Table 2). Distribution data for the last 10 years with flights were included to increase confidence in extrapolating estimates from primary fishing areas.

Distribution of fishing

Pedestrians and launched boats

The aerial survey documented angler use of 24 fishing areas (in addition to “other” areas; Table 2). During 2005 – 2013, 2016, and 2019 these 24 areas accounted for 97.0% of the pedestrian anglers observed in the aerial surveys and 100% of the boat trailers parked near launch areas. Boats launched from the Calumet Yacht Club were not included in this survey (located in Illinois, but boats must leave the marina via Indiana waters). Interviews for the creel survey were conducted at six pedestrian fishing areas that accounted for 79.2% of the pedestrian anglers observed during the helicopter flights and four launch areas that accounted for 80.4% of the boat trailers observed near launch areas.

Table 2. Distribution of pedestrian anglers and boat trailers along the Illinois shoreline of Lake Michigan, determined by helicopter flights during 2005-2013, 2016 and 2019.

| Area | Pedestrian anglers (%) | Boat trailers (%) |
|---|------------------------|-------------------|
| 1. IL Beach State Park & North Point Marina | 1.3 | 38.4 |
| 2. Waukegan Harbor and breakwalls | 7.1 | 28.4 |
| 3. Great Lakes Naval Training Station | 0.1 | 0.3 |
| 4. Forest Park | 0.0 | 1.2 |
| 5. Central Park | 0.1 | 1.6 |
| 6. Winnetka (Lloyd and Tower Parks) | 0.3 | 3.9 |
| 7. Wilmette Harbor | 1.2 | NA |
| 8. Northwestern Univ. and Dawes Park | 0.3 | 5.4 |
| 9. Farwell Avenue pier | 0.8 | NA |
| 10. Hollywood Avenue pier | 0.7 | NA |
| 11. Foster Avenue pier | 0.6 | NA |
| 12. Montrose Harbor and breakwalls | 60.0 | NA |
| 13. Belmont Harbor | 5.7 | NA |
| 14. Diversey Harbor and breakwalls | 1.8 | 7.0 |
| 15. North Avenue pier | 0.0 | NA |
| 16. Navy Pier | 0.3 | NA |
| 17. Monroe Street breakwalls | 0.6 | NA |
| 18. Burnham Harbor and vicinity | 9.1 | 6.1 |
| 19. McCormick Place seawall | 0.8 | NA |
| 20. 31st Street Marina | 0.4 | 0.4 |
| 21. 50th Street access area | 0.2 | NA |
| 22. 59th Street Harbor | 0.6 | NA |
| 23. Jackson Park Harbor and breakwall | 4.3 | 0.5 |
| 24. Calumet Park | 0.8 | 6.7 |
| 25. other areas | 3.0 | 0 |

Moored boats

In the Illinois portion of Lake Michigan, boats are moored at several locations: North Point Marina, Waukegan Harbor, Great Lakes Naval Training Station, Wilmette Harbor, and the Chicago Park District harbors. The number

of power boats kept at moorings was used as an index of fishing activity from moored non-charter power boats (Table 3). Some fishing may occur from sail boats, but we assumed that it was a negligible portion of all fishing. Two private lift services (referred to as I/O service in Table 3) were included in the survey: Larsen Marine at Waukegan Harbor and Skipper Bud's at North Point Marina. Boats kept at moorings or on land (lift service) in the Calumet or Chicago River systems were assumed to represent a negligible portion of fishing activity and were not included.

Table 3. Mooring locations along the Illinois shoreline of Lake Michigan and numbers of non-charter power boats moored at each location, as determined by the marinas and port authorities. Total number of power boats per port in bold.

| Mooring area | Number of power boats |
|------------------------------------|-----------------------|
| North Point Marina | 440 |
| Public Moorings | 387 |
| Skipper Bud's I/O service | 53 |
| Waukegan Harbor | 353 |
| Public Moorings | 273 |
| Larsen Marine I/O service | 80 |
| Great Lakes Naval Training Station | 14 |
| Wilmette Harbor | 192 |
| Chicago Harbors | 2,391 |
| Diversey | 337 |
| other harbor moorings | 2,054 |

Early spring survey

Only two groups of sites were surveyed in the month of March. A group in Lake County consisted of Waukegan Harbor (pedestrians) and Waukegan Harbor (launched boats). A Chicago group consisted of Montrose Harbor (pedestrians), Calumet Park (pedestrians), and Calumet Park (launched boats). Virtually all the open boat ramps and the areas of heaviest concentrations of open water pedestrian anglers this early in the season were included in these groups (based on personal observations and previous surveys). Effort, harvest, and expenditures by moored-boat anglers were not estimated in the March survey because very few boats are at moorings at that time. Due to the COVID-19 pandemic, a modified “social-distancing” protocol (see below) was implemented beginning March 13th. Illinois instituted a “stay-at-home” order beginning March 22nd, and the creel survey was suspended beginning on this date.

Selection of dates in a stratified random sample

The creel survey season (intended to be 1 April through 30 September 2020, representing the major portion of fishing activity) was stratified by segment (three-week time periods) and type of day (weekends and holidays, or weekdays). The following 18 strata were formed:

- | | |
|---------------------------|------------------------------|
| 1. Week days 4/1 - 4/19 | 2. Weekend days 4/1 - 4/19 |
| 3. Week days 4/20 - 5/10 | 4. Weekend days 4/20 - 5/10 |
| 5. Week days 5/11 - 5/31 | 6. Weekend days 5/11 - 5/31 |
| 7. Week days 6/1 - 6/21 | 8. Weekend days 6/1 - 6/21 |
| 9. Week days 6/22 - 7/12 | 10. Weekend days 6/22 - 7/12 |
| 11. Week days 7/13 - 8/2 | 12. Weekend days 7/13 - 8/2 |
| 13. Week days 8/3 - 8/23 | 14. Weekend days 8/3 - 8/23 |
| 15. Week days 8/24 - 9/13 | 16. Weekend days 8/24 - 9/13 |
| 17. Week days 9/14 - 9/30 | 18. Weekend days 9/14 - 9/30 |

For each of the three groups of sites, four survey dates were selected at random within each stratum, with the restriction that all three groups were sampled at least one week day (Monday through Friday) and one weekend day each week. For strata 1 and 2, which were shorter than the others, fewer than four dates were selected for each group of sites. All three sites in each group were visited on the dates selected for that group. In addition to the surveys conducted at the three groups of sites, the launch ramps at Waukegan Harbor were surveyed three times per stratum, except during stratum 1, when only two visits were made.

Due to the COVID-19 pandemic and associated state orders, the creel survey was suspended through May 31st. Thus, no data were collected during strata 1, 2, 3, 4, 5, or 6. Data were collected via a modified “social-distancing” protocol (see below) during strata 7 – 18 (June 1st through September 30th).

The early spring survey was treated in a similar fashion to the core survey except that the segment duration was the entire month of March.

- | | |
|-------------------------|----------------------------|
| 1. Week days 3/1 - 3/31 | 2. Weekend days 3/1 - 3/31 |
|-------------------------|----------------------------|

Data collection

Data were collected via two methods at each site: interviews during a two-hour period, and counts at the beginning and end of the two-hour period. Additionally, at boat launch sites, the arrival times of returning boats were recorded for all boats (whether interviews were conducted or not). Each interview was designed for one angling party i.e., one or more anglers fishing together) to increase the number of angling parties that could be interviewed and to minimize redundant questions within angling parties. At the eight pedestrian sites, the two-hour interview period was either 0600 to 0800 or 0830 to 1030. At the boat launch sites, the two-hour period was always 1100 to 1300. For pedestrian sites, individual anglers were counted at the beginning and end of each two-hour period. For boat launch sites, trailers (with vehicles attached, excluding personal watercraft trailers) were counted.

In keeping with previous years' data collection, the creel survey was planned for creel clerks (who conducted the interviews) to gather information related to effort (number of angler-hours, number of angler-trips), expenditures for the present fishing trip (by category: major = boat, motor, or trailer; minor = fishing gear), zip code (to calculate distance driven to fishing locations, round-trip), harvest (by species), and species sought by angling parties. The species sought by anglers are typically grouped into four categories: Salmonids (including salmon and trout), yellow perch, other species (any species or group of species – e.g., “bass” – except salmonids and yellow perch), and unspecified (when the angling party is not targeting a specific species or group, i.e., “anything that bites”). Clerks also typically weigh and measure fish in possession of the anglers, note whether each fish had sea lamprey wounds and scars, and note any tags or marks (including clipped fins). The instructions to, and data form used by, creel clerks are in Brofka and Czesny (2008). However, due to the COVID-19 pandemic, data were collected under a modified “social-distancing” protocol: the questionnaire was reduced to collecting angler effort (trip length and anglers per party) and harvest data to reduce extended interpersonal contact.

Calculation of round trip miles

For March 2020, the distance traveled by automobile was estimated for each angling party using Google Earth (Google Inc., 2015) in April 2021 (zip code/ miles travelled data were not collected during the creel survey after March 12th). The “Get Directions” application was used to estimate distance from each party's zip code (using the location provided by Google Earth for that zip code) and the main parking area at the location where the angler was surveyed. As many drivers utilize Google for directions, these results likely closely match true distances driven, accounting for decisions to optimize both distance and travel time. The use of Google Earth instead of Google Maps resulted in directions not influenced by traffic; while traffic likely is a factor influencing the route taken by anglers to fishing sites, traffic is always changing, and optimal routes accounting for traffic would likely be different at the time distance was estimated (long after the interview). The distance given by Google Earth was doubled to produce a round trip estimate. When anglers provided other locations instead of zip codes (e.g., city, neighborhood, or intersection), we used the “Get Directions” application in the same way, replacing the zip code with the given location. When anglers in a party traveled from separate zip codes, we used the zip code provided by the party leader (i.e., the angler providing most answers for the survey).

Variables measured for each date

Data collected during interviews were used to estimate the following variables for each date at each site, when possible: (1) Harvest per angler-hour, determined for each species by dividing the number of fish harvested by all parties interviewed by the number of hours of fishing by individuals in those parties; (2) Expenditures per angler-trip, categorized into major and minor categories. For all expenditures, total expenditures by all anglers interviewed were divided by the number of anglers interviewed (expenditure data were not collected under the COVID-19 protocol); (3) Distance traveled (by automobile) per angler-trip. As for expenditures, the total, round-trip miles traveled by all anglers interviewed were divided by the number of anglers interviewed (distance data were not collected under the COVID-19 protocol); (4) Angler-hours (i.e., total time spent fishing by all anglers; see following paragraph); (5) angler-trips (i.e., total number of anglers who fished; see following paragraph); (6) total harvest was

calculated for each species as harvest per angler-hour multiplied by angler-hours; and (7) total expenditures were determined for each category as expenditures per angler-trip multiplied by angler-trips (expenditure data were not collected under the COVID-19 protocol).

Angler-hours and angler-trips were determined differently for pedestrians and boaters. For pedestrians, angler-hours was calculated by multiplying the average number of anglers (from counts at the beginning and end of each two-hour period) by the number of hours in the day (from 0.75 hour before sunrise to 0.75 hour after sunset), and angler-trips was calculated as angler-hours divided by the average duration of a pedestrian fishing trip (mean of 3.28 hours for all pedestrian interviews in 2020). The number of angler-trips for anglers using launched boats was estimated by multiplying the number of anglers returning on boats during the two-hour interview period by the ratio of the number of all boats returning in a day to the number returning between 1100 and 1300. By monitoring all boat traffic at North Point Marina on 13 days during 2015, 2016, and 2018, the number of boats returning all day was estimated to be 3.003 times the number returning during 1100 to 1300 interview period. Launched-boat angler-hours were estimated by multiplying the number of angler-trips by the monthly mean trip duration. To smooth unrealistic differences between months, estimates of angler-trips were multiplied by the ratio of the annual mean to monthly mean of estimated anglers per trip. Estimates of angler-hours were multiplied by both this ratio and the ratio of annual mean to monthly mean of hours per trip. In 2020, the annual mean number of anglers per boat was 2.42, and the annual mean trip duration for boat anglers was 5.77 hours.

Expansion of daily estimates

The formula given by Cochran (1977) for stratified random samples was used to expand daily estimates to seasonal site-specific estimates of effort, harvest, and expenditures. A different set of strata were used for expansion of estimates: we used month-long segments (e.g., June, July, August), each divided into weekend days and week days (instead of the three-week segments described above) and obtained monthly totals for each type of estimate.

Extrapolation to other areas

Extrapolations of seasonal estimates from primary fishing areas to other areas were based on the distributions of pedestrian anglers and boat trailers (assumed to reflect the distribution of launched-boat anglers; Table 2). Harvest, effort, and expenditures at areas not visited were estimated by extension of estimates for the nearest primary fishing areas. Thus, for pedestrian anglers, estimates for Waukegan Harbor were extended to all other areas north of and including Wilmette Harbor (except North Point Marina); estimates for Montrose Harbor were extended to all remaining areas north of Belmont Harbor; estimates for Belmont Harbor were extended to all remaining areas north of the Monroe Street breakwalls; estimates for Jackson Park were extended to all areas south of Monroe Street except for Calumet Park. For launched boats, estimates for Waukegan Harbor were extended to all launch ramps north of Wilmette (including the "other" areas listed in Table 2, but excluding North Point Marina); estimates for Diversey were extended to Dawes Park; and results for Calumet Park were extended to the ramps at Jackson Park, 31st Street Harbor, and Burnham Harbor.

Moored boats

Effort, harvest, and expenditure estimates for anglers using moored boats were extrapolated from calculations for launched boats. First, the ratios of moored fishing boats to launched fishing boats for North Point Marina and Diversey Harbor were estimated using surveys conducted during 2009-2017 and 2020. In these surveys, the numbers of fishing boats returning to moorings were counted while, simultaneously, the numbers of fishing boats returning to the launch ramp were also counted. Charter boats were excluded from these counts. The estimated ratios of moored to launched boats are 0.731 in North Point Marina and 2.000 in Diversey Harbor.

Using these figures, seasonal estimates of effort, harvest, and expenditures by anglers using launched boats at North Point, Waukegan (ratio assumed to be equal to North Point Marina), and Diversey harbors were extrapolated to moored boats. Thus, for example, the moored boat effort at North Point Marina for a given segment was estimated to be the launched boat effort for that segment multiplied by 0.731. Based on the distribution of moored power boats, estimates for Waukegan Harbor were extrapolated to boats moored in Wilmette Harbor and Great Lakes Naval Training Station, and the estimates for Diversey Harbor were extrapolated to all other boats moored in Chicago.

Other changes in creel survey methods

Creel survey methods have varied during the past thirty-five years of the creel survey, so comparisons should be made with caution. In particular, estimation of round-trip miles differs from years prior to 2015. The influences of changes in methods will continue to be evaluated.

Confidence intervals and bias

Estimates of harvest, effort, and expenditures are presented without confidence intervals, as we have not fully evaluated bias in our estimates. Although we have collected, and will continue to collect, data with which to partially assess biases, assessing potential impacts on precision of estimates is not possible at this time.

Yield values

The term “yield value” is used in this report to describe the hypothetical market price of fish harvested by anglers (if sold as fillets). To estimate the yield value, the estimated harvest for each species was multiplied by the estimated mean weight of that species to produce an estimated round weight. That round weight was then multiplied by 0.4 (assuming 60% loss in filleting process in keeping with previous years’ estimates; e.g., Roswell and Czesny 2020) to produce the harvested marketable weight for each species. The marketable weight for each species was then multiplied by species-specific prices (estimated using prices observed on the internet in March 2021 by C.R. Roswell) to produce the market value of the 2020 harvest for each species.

Missing data/ altered sites

Due to the COVID-19 pandemic, no surveys were conducted during April or May. Additionally, many sites on the Chicago lakefront were closed for much of June and sporadically throughout the summer (especially Montrose, Belmont, and Jackson). On a few occasions, pedestrian interviews were conducted at Diversey when Montrose or Belmont were not accessible; these data were supplementary and are not included in analyses or summaries in this report. Additionally, on some scheduled dates creel clerks were unable to complete their assigned interviews due to factors such as quarantining, illness, or civil unrest. In 2020, all or some surveys were not completed on approximately 19.1% of scheduled survey days during June-September. When possible, schedules were adjusted in response to cancelled shifts to maintain an even distribution of sampled dates across sites/ strata. When data were missing from some of the assigned dates in a stratum, estimates for the stratum were based only on data from the surveyed dates. Thus, the sample size was smaller in these cases than for strata in which all interview sets were completed, and the resulting estimates were not as precise as estimates derived from full data sets.

Environmental and other impacts on access

Unforeseen circumstances (e.g., construction) have caused one or more primary sites to be closed or less accessible during part or all of many past sampling seasons. Water levels were much higher than average in 2020, and on windy days, many areas were under water or difficult to use for angling; the shoreline at Montrose and Belmont and Johnson Pier at Waukegan were particularly impacted by high water levels. Other access limitations were restricted to scattered single-day disruptions.

Yellow perch year class contributions to the fishery

Anal spines of harvested yellow perch had been collected annually since 2005 to estimate age composition of yellow perch harvest (age is estimated via examination of sectioned spines; see Dub and Czesny 2016 for details), but were not collected in 2020 due to the COVID-19 creel protocol. An index of year class contributions to the yellow perch fishery was therefore not calculated for 2020.

Winter survey

See Appendix B for methods of the winter survey.

RESULTS

Overview

Estimates reported here are rounded; this may result in values for “totals” that differ slightly from the sum of individual values in tables. For simplicity, the words “approximately” or “estimated” are not repeated with each estimated value. Detailed results for 2020 are presented in Tables 4 - 10. Tables 4 and 5 list seasonal harvest and effort (angler hours) estimates for anglers. Tables 6 and 7 present effort and harvest for each segment. Table 8

provides yield values. Table 9 lists fin clip abbreviations; fin clips observed by our creel clerks are listed in Table 10, with the number of occurrences of each clip or clip combination listed by species. Table 10 can assist in determining the contributions of different stockings of fish to the sport fishery in the Illinois portion of Lake Michigan. Tables 11 and 12 report angler trips and expenditures among angler types and among years. Tables 13 and 14 compare angler hours and harvest by fish species between angler types and for each year. Table 15 compares minor fish species harvest for each year.

Several figures are included; these help visualize data in a manner consistent across recent years' reports. Figures 2 (a) and 2 (b) show decadal trends in harvest per unit effort of salmonids and yellow perch, respectively. Figures 3 (a) and 3 (b) show decadal trends in angler effort directed at salmonids and yellow perch, respectively. Figure 4 shows decadal trends in yellow perch harvest, figure 5 is a time series of harvested yellow perch lengths since 1986, and figure 6 shows seasonal patterns in yellow perch harvest. Figure 7 shows decadal trends in Coho salmon harvest, and figure 8 is a time series of harvested Coho salmon lengths since 1986. Figure 9 shows decadal trends in Chinook salmon harvest, and figure 10 is a time series of harvested Chinook salmon lengths since 1986. Figure 11 (a) and 11 (b) shows seasonal patterns of salmonid harvest for pedestrians and boaters, respectively.

Total June-September non-charter sport fishing effort in the Illinois portion of Lake Michigan was 179,575 angler-hours. Harvest for major species included 3,374 yellow perch, 12,346 Coho salmon, 1,506 Chinook salmon, 1,825 rainbow trout, 3,483 lake trout and 72 brown trout (Table 4). The Illinois sport fishing harvest was estimated to have a yield value of \$747,812 (Table 8).

Pedestrian fishing

From June 1 - September 30, 2020, pedestrian anglers spent 53,984 hours fishing in 16,441 trips to Lake Michigan (Table 4, Table 11). Yellow perch comprised the largest portion of the pedestrian harvest (3,374 fish; Table 4).

Boater fishing

Anglers using launched or moored boats made 21,619 trips to Lake Michigan (Table 11) and spent 125,591 hours fishing (Table 4) during June – September 2020. The most abundant components of boater harvest were Coho salmon (12,346) and lake trout (3,483; Table 4). North Point Marina accounted for 53.9% of the salmonines (lake trout, brown trout, rainbow trout, Chinook salmon, and Coho salmon) taken by all anglers who used boats, more than any other port (Table 4). See Appendix A for a comparison of the charter-boat fishery with non-charter boat angling. No yellow perch harvest by boat anglers was documented during June – September 2020 (Table 4).

Yield values

The estimated yield values of the three most valuable (in total yield) sport species were \$323,650 for Coho salmon, \$218,911 for Chinook salmon, and \$114,023 for lake trout (Table 8). Aside from yellow perch harvested from the Wisconsin portion of Green Bay, none of the species listed in Table 8 are currently commercially available from

Lake Michigan. Therefore, the values of all species are estimated from the retail prices for fish that are farm-raised or commercially-harvested in other waters. An estimated price for brown trout fillets was not available, so the price for lake trout fillets was used to estimate the yield value of brown trout.

Comparisons with preceding years

Because the creel survey was not conducted during April and May of 2020, comparisons for the entire regular creel survey period (April-September) are not possible. **Comparisons reported in this section are for the period of June-September.** Tables 11, 13, and 15 below show full-season estimates for prior years to maintain consistency with previous reports.

Compared to 2019, total angler fishing effort increased by 10.3%. Boater effort increased 21.9%, but pedestrian effort decreased 9.8% (Table 13). Directed effort (e.g., angler-hours targeting yellow perch, salmonines, etc.) was not estimated because “species sought” data were not collected under the modified questionnaire.

The yellow perch harvest of 3,373 was a decrease of 64.7% from the 2019 harvest. Pedestrian harvest of yellow perch peaked in June (63.8% of pedestrian harvest). In contrast to recent years, when Montrose accounted for the largest portion of the yellow perch harvest, no yellow perch harvest was observed at Montrose in 2020 (Table 6). June and July accounted for 100% of harvest in 2020 (Figure 6).

The 2020 harvest of Coho salmon increased by 0.7% compared to 2019. The majority (93.3%) of observed harvest occurred in June and July (Tables 6 and 7).

The Chinook salmon harvest was 1,505 fish for 2020, an increase of 9.1% from the same period in 2019. Chinook salmon harvest peaked in June (41.8% of harvest) and September (32.8% of harvest; Tables 6 and 7).

The 2020 harvest of lake trout was 3,482, a 40.5% decrease from harvest in June-September 2019. Lake trout harvest was highest in June (35.1% of harvest) and August (41.1% of harvest; Tables 6 and 7).

The 2020 estimated brown trout harvest (72) decreased by 7.7% from the same period in 2019. The majority (56.9%) of the harvest occurred in June and July (Tables 6 and 7).

The 2020 rainbow trout harvest (1,826) decreased from 2019 by 10.8%. Most of the rainbow trout harvest occurred in June and July (76.3%; Tables 6 and 7).

The 2020 early spring (March) survey saw a decrease of 4.0% in angling effort compared to March of 2019. Total salmonine harvest was 148.3% higher than for March of 2020: Coho salmon harvest increased 341.7% to 1,303 fish, but brown trout harvest decreased 68.6% to 70 fish and no harvest of rainbow trout or lake trout was observed (after

harvest of 10 and 25 fish, respectively, during march 2019). No Chinook salmon were harvested in the month of March in 2020, typical for March. March harvest of yellow perch was 1,401 fish, after no yellow perch were harvested in March of 2019 (Table 14).

Seasonal patterns in salmonid harvest and effort

The majority of salmon and trout were harvested during the survey period were harvested in June (65.3%; Figure 11a, b). The majority of brown trout harvest occurred in June or August (56.9%), while Coho salmon harvest peaked in June (82.2%). June and July accounted for most rainbow trout harvest (76.3%), and most lake trout were harvested in June or August (76.3%). Most (74.6%) of Chinook salmon harvest occurred during June or August.

Minor species

In addition to the species for which results are presented in detail in Tables 4 - 14 (commonly-encountered salmonids and yellow perch), creel clerks reported the catch and/ or harvest of several other species by anglers (referred to here as “minor species”; Table 15). For some species, the total number of fish harvested (and total numbers caught) were estimated. For other species, very few fish were observed, so only the actual number observed in anglers’ possession by creel clerks during interviews is reported. Most of these “minor” species were harvested in or near the harbors. Minor species harvested (data on numbers released were not collected from most parties interviewed in 2020) include: **round goby**, 3,872; **freshwater drum**, 542; **common carp**, 31; **rock bass**, 424; **smallmouth bass**, 826; **bluegill**, 119; **alewife**, 4 harvested fish observed; **channel catfish**, 1 harvested fish observed; and **northern pike**, 2 harvested fish observed.

Winter survey

See Appendix B for results of the winter survey.

DISCUSSION

Changes in the fishery and the creel survey in 2020

The primary purpose of this report is to report data summaries and other information from this long-term monitoring project to fisheries scientists and managers. As such, much of the data collection, analyses, and reporting were intended to be very similar to previous years. This typically provides a better comparison with previous years’ data, enabling a more complete understanding of inter-annual trends in the fishery. However, the COVID-19 pandemic dramatically altered the timing and types of creel survey data collected in 2020. Thus, only total effort and harvest estimates are comparable with previous years’ estimates, and only for June-September.

Reports for survey years prior to 2012 included estimates of vehicle fuel costs based on an estimated fuel cost of \$0.10 per mile. Another approach used in recent years estimated fuel costs based average costs per mile reported

annually by AAA – similar to the approach used by Melstrom and Lupi (2013). Because no round trip travel distance data were collected under the COVID-19 protocol, estimates of fuel costs were not possible for this report.

An important change in the fishery occurred in 2015 (and continues to be present): the establishment of a closed season for yellow perch fishing from May 1 – June 15. Previously (2001 – 2013), fishing for yellow perch was not permitted during the month of July (except for children under 16, 2007 – 2013), and in 2014 there was no closed season. In 2020, June accounted for 63.8% of yellow perch harvest, and July accounted for 36.2% of the estimated total harvest of 3,373 yellow perch; June and July were similarly important during 2015-2019 as well. During 2004-2013 (the last ten years with a July closure), July accounted for 3.7% of yellow perch harvest, on average. Thus, the opening of July to yellow perch angling has allowed increased yellow perch harvest during that month; however, total harvest in 2020 remained very low. This is significant because 2015-2020 have been the six worst years for yellow perch harvest recorded in this survey (since 1986). These low spring and summer harvest totals may be driven by a seasonal shift in angling effort and success, with fall and winter months increasingly important to the perch fishery in recent years (see Appendix B).

Angler effort

Total angler fishing effort (indexed by angler-hours) for June-September, 2020 increased 21.9% for boats and decreased 9.8% for pedestrians compared to the same period in 2019. Effort has generally been declining since this survey began in 1986, and total angler effort in 2018 was the lowest on record (1986-2019). The trend of decreasing angler effort was reversed slightly in 2019, but effort remained near an all-time low. Because April and May were not surveyed, effort estimates for 2020 are not comparable to previous years' April-September estimates. However, it is clear that the COVID-19 pandemic impacted effort, especially for pedestrians. Notably, the Montrose harbor area (along with much of the Chicago lakefront) was closed to vehicular traffic on many visits to Montrose harbor by creel staff, severely restricting angler access to the most popular pedestrian access site.

Yellow perch

Annual yellow perch harvests by anglers in Illinois have varied substantially over time. Estimated angler harvest was well over one million fish each year from 1986 through 1993 (except 1989). However, harvest fell to fewer than 600,000 in 1994, and by 1997 fell to well under 60,000 (driven in part by regulation changes and reduced effort; Brofka and Dettmers, 1999). Harvest increased somewhat in 2001 (to 169,967) in response to increased effort and new regulation changes (repeal of an unprotected slot limit and moving the month closure from June to July). Yellow perch harvest generally increased from 2002 through 2008 to around 300,000, but then declined. Total yellow perch harvest has now been less than 100,000 fish for the last ten years (2011-2020) and under 20,000 fish for the last six years (2015-2020). The mean April-September yellow perch harvest during 2010-2019 was 51,500; however, the mean harvest during 2015-2019 was 10,973, less than one-fourth of the ten-year mean. Harvest in 2020 was estimated at only 3,373 yellow perch, the lowest estimate on record. Some yellow perch harvest may have occurred during April or May when the creel survey was suspended, but it was likely insignificant, since the

Chicago lakefront was closed for much of the time, and recent years have seen very little harvest during April and May. Because the modified survey questionnaire did not include collecting data about which species angling parties sought, directed effort and harvest-per-effort (HPE) were not estimated for the perch fishery in 2020.

Coho salmon

Coho salmon consistently comprise the largest part of both the boat and pedestrian salmonid fishery. Coho salmon typically make up about 66% of the total salmonid harvest, and in 2019 accounted for 64.2% of salmonids harvested by the surveyed component of the non-charter angling fishery (including pedestrians). However, April and May typically represent important components of harvest for Coho salmon, and since these months were not surveyed in 2020, comparisons with previous years are of limited utility.

Other salmonids

Harvest end effort in 2020 is difficult to compare with previous years due to impacts of the COVID-19 pandemic and modified creel survey protocol.

Yellow perch year class contributions to the fishery

Because biological data collection, including spine collection, did not occur in 2020, we are unable to estimate year-class contributions to the yellow perch fishery in 2020.

Minor species

Some species provide a smaller, yet consistent component of the fishery. In 2020, harvest was observed for many of the “minor” species that have been important in previous years, such as smallmouth bass, rock bass, bluegill, common carp, and freshwater drum. However, due to the pandemic and related protocol changes, harvest numbers are not comparable to previous years. Furthermore, data for directed effort and released fish were not collected in 2020.

Expenditures

Expenditure data were not collected in the regular April-September creel survey under the modified protocol in 2020.

Early spring (March) survey

Fishing effort and success during March is heavily influenced by the weather and the severity of the winter preceding March. For example, March of 2012 was one of the warmest on record for this region, resulting in the highest March angling effort of the last ten years, and above-average harvest of yellow perch, Coho salmon, and brown trout. In contrast, ice limited angling at Waukegan Harbor during 2014 and 2015, resulting in reduced effort, and subsequently low yellow perch and brown trout harvests. Effort in March of 2020, at 8,150 angler hours, was slightly below the mean of the last 10 years and a slight decrease from March 2019. Harvest estimates for yellow

perch (1,401) and Coho salmon (1,303) were slightly higher than the ten-year mean for the month of March. For all other species, March harvest in 2020 was lower than the ten-year mean.

Winter survey

See Appendix B for discussion of winter survey results.

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Table 4. Effort (anglers-hours) and harvest (by species) by non-charter anglers in the Illinois portion of Lake Michigan during June-September, 2020. Wau. = Waukegan, Peds = Pedestrian.

| Type of angler | Area | Effort | | Harvest | | | | | | |
|----------------|-------------|-------------|--------------|---------------|--------------|-------------|---------------|------------|-------------|----------------|
| | | Total hours | Target perch | Target salmon | Yellow perch | Brown trout | Rainbow trout | Lake trout | Coho salmon | Chinook salmon |
| Peds | North Point | 2,269 | NA | NA | 15 | 0 | 0 | 0 | 0 | 0 |
| | Wau. Harbor | 11,595 | NA | NA | 141 | 8 | 28 | 0 | 0 | 56 |
| | Montrose | 11,020 | NA | NA | 0 | 0 | 0 | 0 | 0 | 0 |
| | Belmont | 4,171 | NA | NA | 681 | 0 | 65 | 0 | 0 | 0 |
| | Jackson | 3,924 | NA | NA | 516 | 0 | 0 | 0 | 0 | 80 |
| | Calumet | 891 | NA | NA | 0 | 0 | 0 | 0 | 0 | 0 |
| | others | 20,114 | NA | NA | 2,021 | 3 | 38 | 0 | 0 | 284 |
| | TOTALS | 53,984 | NA | NA | 3,374 | 11 | 131 | 0 | 0 | 420 |
| Boat | North Point | 38,095 | NA | NA | 0 | 28 | 1,253 | 1,813 | 6,118 | 851 |
| | Wau. Harbor | 26,450 | NA | NA | 0 | 24 | 317 | 1,201 | 4,479 | 169 |
| | Diversey | 8,530 | NA | NA | 0 | 0 | 0 | 0 | 0 | 0 |
| | Calumet | 2,593 | NA | NA | 0 | 0 | 0 | 0 | 0 | 0 |
| | others | 49,923 | NA | NA | 0 | 9 | 124 | 469 | 1,749 | 66 |
| | TOTALS | 125,591 | NA | NA | 0 | 61 | 1,694 | 3,483 | 12,346 | 1,086 |
| | Combined | TOTALS | 179,575 | NA | NA | 3,374 | 72 | 1,825 | 3,483 | 12,346 |

Table 5. Effort (anglers-hours) and harvest (by species) by non-charter anglers at selected sites along the Illinois portion of Lake Michigan during March, 2020. Wau. = Waukegan, Cal. = Calumet, Peds = Pedestrian.

| Location | Effort | | Harvest | | | | | | |
|----------------|-------------|--------------|---------------|--------------|-------------|---------------|------------|-------------|----------------|
| | Total hours | Target perch | Target salmon | Yellow perch | Brown trout | Rainbow trout | Lake trout | Coho salmon | Chinook salmon |
| Wau. Harbor | 222 | 0 | 58 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wau. Ramp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Montrose | 4,693 | 0 | 4,659 | 0 | 33 | 0 | 0 | 98 | 0 |
| Cal. Park Peds | 1,562 | 0 | 1,562 | 0 | 0 | 0 | 0 | 155 | 0 |
| Cal. Park Ramp | 1,673 | 706 | 966 | 1,401 | 37 | 0 | 0 | 1,051 | 0 |
| Total | 8,149 | 706 | 7,245 | 1,401 | 70 | 0 | 0 | 1,303 | 0 |

Table 6. Effort and harvest for each month by pedestrian anglers of the Illinois portion of Lake Michigan during June-September, 2020. Wau. = Waukegan.

| Time Period | Area | Effort | | Harvest | | | | | | |
|-------------|-------------|-------------|--------------|---------------|--------------|-------------|---------------|------------|-------------|----------------|
| | | Total hours | Target perch | Target salmon | Yellow perch | Brown trout | Rainbow trout | Lake trout | Coho salmon | Chinook salmon |
| April | North Point | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Wau. Harbor | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Montrose | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Belmont | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Jackson | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Calumet | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | others | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| May | North Point | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Wau. Harbor | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Montrose | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Belmont | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Jackson | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Calumet | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | others | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| June | North Point | 610 | NA | NA | 0 | 0 | 0 | 0 | 0 | 0 |
| | Wau. Harbor | 1,915 | NA | NA | 43 | 0 | 0 | 0 | 0 | 0 |
| | Montrose | 663 | NA | NA | 0 | 0 | 0 | 0 | 0 | 0 |
| | Belmont | 1,208 | NA | NA | 0 | 0 | 0 | 0 | 0 | 0 |
| | Jackson | 1,057 | NA | NA | 490 | 0 | 0 | 0 | 0 | 0 |
| | Calumet | 408 | NA | NA | 0 | 0 | 0 | 0 | 0 | 0 |
| | others | 4,884 | NA | NA | 1,620 | 0 | 0 | 0 | 0 | 0 |
| July | North Point | 885 | NA | NA | 15 | 0 | 0 | 0 | 0 | 0 |
| | Wau. Harbor | 1,259 | NA | NA | 98 | 0 | 0 | 0 | 0 | 0 |
| | Montrose | 3,671 | NA | NA | 0 | 0 | 0 | 0 | 0 | 0 |
| | Belmont | 1,186 | NA | NA | 681 | 0 | 0 | 0 | 0 | 0 |
| | Jackson | 610 | NA | NA | 26 | 0 | 0 | 0 | 0 | 0 |
| | Calumet | 268 | NA | NA | 0 | 0 | 0 | 0 | 0 | 0 |
| | others | 3,227 | NA | NA | 401 | 0 | 0 | 0 | 0 | 0 |
| August | North Point | 450 | NA | NA | 0 | 0 | 0 | 0 | 0 | 0 |
| | Wau. Harbor | 1,530 | NA | NA | 0 | 0 | 0 | 0 | 0 | 0 |
| | Montrose | 2,725 | NA | NA | 0 | 0 | 0 | 0 | 0 | 0 |
| | Belmont | 697 | NA | NA | 0 | 0 | 20 | 0 | 0 | 0 |
| | Jackson | 519 | NA | NA | 0 | 0 | 0 | 0 | 0 | 0 |
| | Calumet | 215 | NA | NA | 0 | 0 | 0 | 0 | 0 | 0 |
| | others | 2,795 | NA | NA | 0 | 0 | 8 | 0 | 0 | 0 |
| September | North Point | 324 | NA | NA | 0 | 0 | 0 | 0 | 0 | 0 |
| | Wau. Harbor | 6,892 | NA | NA | 0 | 8 | 28 | 0 | 0 | 56 |
| | Montrose | 3,961 | NA | NA | 0 | 0 | 0 | 0 | 0 | 0 |
| | Belmont | 1,080 | NA | NA | 0 | 0 | 45 | 0 | 0 | 0 |
| | Jackson | 1,738 | NA | NA | 0 | 0 | 0 | 0 | 0 | 80 |
| | Calumet | 0 | NA | NA | 0 | 0 | 0 | 0 | 0 | 0 |
| | others | 9,208 | NA | NA | 0 | 3 | 30 | 0 | 0 | 284 |

Table 7. Effort and harvest by anglers using boats of the Illinois portion of Lake Michigan during June-September, 2020. Wau. = Waukegan.

| Time period | Area | Effort | | Harvest | | | | | | |
|-------------|-------------|-------------|--------------|---------------|--------------|-------------|---------------|------------|-------------|----------------|
| | | Total hours | Target perch | Target salmon | Yellow perch | Brown trout | Rainbow trout | Lake trout | Coho salmon | Chinook salmon |
| April | North Point | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Wau. Harbor | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Diversey | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Calumet | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | others | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| May | North Point | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Wau. Harbor | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Diversey | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Calumet | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | others | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| June | North Point | 18,298 | NA | NA | 0 | 28 | 916 | 806 | 4,830 | 598 |
| | Wau. Harbor | 7,286 | NA | NA | 0 | 0 | 27 | 299 | 3,827 | 22 |
| | Diversey | 2,007 | NA | NA | 0 | 0 | 0 | 0 | 0 | 0 |
| | Calumet | 0 | NA | NA | 0 | 0 | 0 | 0 | 0 | 0 |
| | others | 11,519 | NA | NA | 0 | 0 | 10 | 117 | 1,494 | 9 |
| July | North Point | 8,744 | NA | NA | 0 | 0 | 192 | 261 | 685 | 31 |
| | Wau. Harbor | 8,233 | NA | NA | 0 | 10 | 179 | 364 | 493 | 68 |
| | Diversey | 3,889 | NA | NA | 0 | 0 | 0 | 0 | 0 | 0 |
| | Calumet | 502 | NA | NA | 0 | 0 | 0 | 0 | 0 | 0 |
| | others | 20,549 | NA | NA | 0 | 4 | 70 | 142 | 192 | 27 |
| August | North Point | 8,360 | NA | NA | 0 | 0 | 61 | 681 | 525 | 166 |
| | Wau. Harbor | 7,672 | NA | NA | 0 | 14 | 112 | 538 | 159 | 65 |
| | Diversey | 0 | NA | NA | 0 | 0 | 0 | 0 | 0 | 0 |
| | Calumet | 836 | NA | NA | 0 | 0 | 0 | 0 | 0 | 0 |
| | others | 3,877 | NA | NA | 0 | 6 | 44 | 210 | 62 | 25 |
| September | North Point | 2,693 | NA | NA | 0 | 0 | 84 | 64 | 77 | 55 |
| | Wau. Harbor | 3,257 | NA | NA | 0 | 0 | 0 | 0 | 0 | 13 |
| | Diversey | 2,634 | NA | NA | 0 | 0 | 0 | 0 | 0 | 0 |
| | Calumet | 1,254 | NA | NA | 0 | 0 | 0 | 0 | 0 | 0 |
| | others | 13,978 | NA | NA | 0 | 0 | 0 | 0 | 0 | 5 |

Table 8. Yield values of fish harvested by non-charter sport anglers in the Illinois waters of Lake Michigan during June - September 2020, calculated with 2019 mean weights. All fish are assumed to be prepared as fillets with 60% waste. Prices for all except brown trout (used lake trout value) are those current in national markets in March, 2021.

| Species | Total harvest | Av. wt. (lbs.) | Round wt. (lbs.) | Market wt. (lbs.) | Price per pound | Yield value |
|----------------|---------------|----------------|------------------|-------------------|-----------------|-------------|
| Yellow perch | 3,374 | 0.51 | 1,725 | 690 | \$31.40 | \$21,669 |
| Brown trout | 72 | 5.42 | 390 | 156 | \$10.91 | \$1,704 |
| Rainbow trout | 1,825 | 5.81 | 10,602 | 4,241 | \$16.00 | \$67,856 |
| Lake trout | 3,483 | 7.50 | 26,130 | 10,452 | \$10.91 | \$114,023 |
| Coho salmon | 12,346 | 2.99 | 36,862 | 14,745 | \$21.95 | \$323,650 |
| Chinook salmon | 1,506 | 12.37 | 18,631 | 7,452 | \$29.38 | \$218,911 |

Combined yield value of all species: \$747,812

Table 9. Fin clip abbreviations.

| Name of fin or bone | Abbreviation |
|----------------------|--------------|
| Adipose fin | ad |
| Dorsal fin | do |
| Left maxillary bone | lm |
| Right maxillary bone | rm |
| Left pectoral fin | lp |
| Right pectoral fin | rp |
| Left ventral fin | lv |
| Right ventral fin | rv |

Table 10. Fin clip summary for salmonids harvested by non-charter anglers in the Illinois waters of Lake Michigan during 2020 (March and June-September). Fish were not examined under the COVID-19 protocol, except a few fish that were visually checked for fin clips from a distance.

| Clip | Species | | | | |
|---------|-------------|---------------|------------|-------------|----------------|
| | Brown trout | Rainbow trout | Lake trout | Coho salmon | Chinook salmon |
| ad | 0 | 1 | 0 | 0 | 0 |
| no clip | 0 | 0 | 0 | 6 | 0 |

Table 11. Estimated number of angler trips and expenditures by non-charter anglers in the Illinois portion of Lake Michigan, during 2011 – 2020. In previous years, expenditure estimates were rounded to the nearest \$1,000 (or 10,000 miles); 2013 - 2020 estimates were rounded to the nearest whole-dollar amount (or mile). NA = not applicable.

* Estimates for 2011 – 2019 are for April-September; 2020 estimates are for June - September.

| Type of angler | Year | Effort | Expenditures | | |
|----------------|-------|----------------|--------------|--------------|----------------|
| | | (angler-trips) | Major (boat) | Minor (gear) | Miles (travel) |
| Pedestrians | 2011 | 40,781 | NA | \$163,000 | 730,000 |
| | 2012 | 52,758 | NA | \$266,000 | 910,000 |
| | 2013 | 44,709 | NA | \$300,173 | 891,196 |
| | 2014 | 45,078 | NA | \$374,365 | 888,160 |
| | 2015 | 34,111 | NA | \$302,143 | 1,142,899 |
| | 2016 | 33,755 | NA | \$392,304 | 1,094,062 |
| | 2017 | 27,070 | NA | \$444,502 | 794,390 |
| | 2018 | 24,199 | NA | \$496,448 | 717,969 |
| | 2019 | 23,555 | NA | \$166,293 | 565,001 |
| | 2020* | 16,441* | NA | NA | NA |
| Boats | 2011 | 37,061 | \$2,320,000 | \$532,000 | 1,230,000 |
| | 2012 | 44,863 | \$1,668,000 | \$912,000 | 1,510,000 |
| | 2013 | 36,575 | \$750,284 | \$424,726 | 1,285,864 |
| | 2014 | 32,471 | \$6,124,859 | \$765,368 | 1,107,217 |
| | 2015 | 32,484 | \$3,377,158 | \$576,078 | 1,303,955 |
| | 2016 | 30,500 | \$128,238 | \$445,616 | 1,486,934 |
| | 2017 | 28,445 | \$2,696,374 | \$645,545 | 1,423,337 |
| | 2018 | 25,215 | \$4,861,307 | \$2,831,105 | 1,142,288 |
| | 2019 | 30,214 | \$17,360,298 | \$275,290 | 1,359,943 |
| | 2020* | 21,619* | NA | NA | NA |
| Season Totals | 2011 | 77,842 | \$2,320,000 | \$695,000 | 1,960,000 |
| | 2012 | 97,621 | \$1,668,000 | \$1,178,000 | 2,420,000 |
| | 2013 | 81,284 | \$750,284 | \$724,899 | 2,177,060 |
| | 2014 | 77,549 | \$6,124,859 | \$1,139,733 | 1,995,377 |
| | 2015 | 66,595 | \$3,377,158 | \$878,221 | 2,446,854 |
| | 2016 | 64,255 | \$128,238 | \$837,920 | 2,580,996 |
| | 2017 | 55,515 | \$2,696,374 | \$1,090,047 | 2,217,727 |
| | 2018 | 49,414 | \$4,861,307 | \$3,327,553 | 1,860,257 |
| | 2019 | 53,769 | \$17,360,298 | \$441,583 | 1,924,944 |
| | 2020* | 38,060* | NA | NA | NA |

Table 12. March fishing effort and expenditures by non-charter anglers at selected sites in the Illinois portion of Lake Michigan, during 2011 – 2020. In previous years, expenditure estimates were rounded to the nearest \$1,000 (or 1,000 miles); 2013 - 2019 estimates were rounded to the nearest whole-dollar amount (or mile). NA = not applicable.

| Type of angler | Year | Effort | Expenditures | | |
|----------------|------|----------------|--------------|--------------|----------------|
| | | (angler-trips) | Major (boat) | Minor (gear) | Miles (travel) |
| Pedestrians | 2011 | 1,667 | NA | \$5,300 | 27,000 |
| | 2012 | 4,517 | NA | \$47,400 | 85,000 |
| | 2013 | 611 | NA | \$3,846 | 15,081 |
| | 2014 | 1,309 | NA | \$10,469 | 25,284 |
| | 2015 | 1,517 | NA | \$12,197 | 35,052 |
| | 2016 | 3,313 | NA | \$30,779 | 112,738 |
| | 2017 | 1,897 | NA | \$8,607 | 65,384 |
| | 2018 | 2,603 | NA | \$148,723 | 58,036 |
| | 2019 | 1,654 | NA | \$11,735 | 41,756 |
| | 2020 | 1,973 | NA | \$9,805 | 10,434 |
| Launched Boats | 2011 | 215 | \$1,599,000 | \$400 | 3,000 |
| | 2012 | 1,417 | \$0 | \$16,400 | 31,000 |
| | 2013 | 259 | \$0 | \$502 | 2,145 |
| | 2014 | 207 | \$276,616 | \$13,255 | 2,063 |
| | 2015 | 300 | \$0 | \$5,020 | 6,388 |
| | 2016 | 160 | \$280,510 | \$19,155 | 4,474 |
| | 2017 | 107 | \$0 | \$800 | 1,261 |
| | 2018 | 286 | \$0 | \$8,275 | 24,615 |
| | 2019 | 329 | \$0 | \$869 | 7,641 |
| | 2020 | 288 | \$0 | \$437 | 78,810 |
| March Totals | 2011 | 1,882 | \$1,599,000 | \$5,700 | 30,000 |
| | 2012 | 5,934 | \$0 | \$63,800 | 116,000 |
| | 2013 | 870 | \$0 | \$4,348 | 17,226 |
| | 2014 | 1,516 | \$276,616 | \$23,724 | 27,347 |
| | 2015 | 1,817 | \$0 | \$17,217 | 41,440 |
| | 2016 | 3,473 | \$280,510 | \$49,934 | 117,212 |
| | 2017 | 2,004 | \$0 | \$9,407 | 66,645 |
| | 2018 | 2,889 | \$0 | \$156,998 | 82,651 |
| | 2019 | 1,983 | \$0 | \$12,604 | 49,397 |
| | 2020 | 2,261 | \$0 | \$10,242 | 89,244 |

Table 13. Fishing effort and harvest by non-charter anglers in the Illinois portion of Lake Michigan, during 2011 – 2020. Estimates were rounded to the nearest whole number. Peds = Pedestrian anglers, Boat = Boat anglers.

* Estimates for 2011 – 2019 are for April-September; 2020 estimates are for June - September.

| Angler type | Year | Effort | Harvest | | | | | |
|-------------|-------|----------------|--------------|-------------|---------------|------------|-------------|----------------|
| | | (angler-hours) | Yellow perch | Brown trout | Rainbow trout | Lake trout | Coho Salmon | Chinook salmon |
| Peds | 2011 | 169,723 | 33,071 | 664 | 312 | 0 | 4,759 | 1,155 |
| | 2012 | 207,171 | 74,406 | 878 | 22 | 12 | 67 | 1,464 |
| | 2013 | 172,865 | 43,314 | 659 | 83 | 0 | 3,118 | 1,291 |
| | 2014 | 180,470 | 51,731 | 849 | 555 | 118 | 6,017 | 806 |
| | 2015 | 133,885 | 8,289 | 793 | 303 | 0 | 9,663 | 463 |
| | 2016 | 131,329 | 11,110 | 2,018 | 122 | 193 | 3,470 | 1,011 |
| | 2017 | 105,905 | 9,516 | 1,030 | 218 | 13 | 1,368 | 1,230 |
| | 2018 | 95,798 | 14,649 | 678 | 168 | 0 | 5,820 | 277 |
| | 2019 | 94,855 | 9,402 | 581 | 317 | 0 | 4,416 | 312 |
| | 2020* | 53,984* | 3,373* | 11* | 132* | 0* | 0* | 420* |
| Boat | 2011 | 196,848 | 23,725 | 434 | 2,800 | 3,008 | 24,859 | 4,747 |
| | 2012 | 257,762 | 19,443 | 317 | 4,659 | 3,624 | 48,777 | 12,192 |
| | 2013 | 209,530 | 9,793 | 4,356 | 3,071 | 2,962 | 33,121 | 5,132 |
| | 2014 | 182,583 | 2,744 | 5,237 | 6,277 | 4,175 | 24,297 | 4,206 |
| | 2015 | 187,078 | 0 | 655 | 3,039 | 2,418 | 25,193 | 7,093 |
| | 2016 | 174,154 | 121 | 1,212 | 6,972 | 7,220 | 22,025 | 5,095 |
| | 2017 | 160,658 | 52 | 3,348 | 2,029 | 2,771 | 30,711 | 2,127 |
| | 2018 | 144,127 | 1,580 | 191 | 1,968 | 4,539 | 26,182 | 3,423 |
| | 2019 | 168,418 | 145 | 86 | 3,574 | 6,999 | 23,320 | 1,577 |
| | 2020* | 125,590* | 0* | 61* | 1,694* | 3,482* | 12,345* | 1,085* |
| Season | 2011 | 366,571 | 56,796 | 1,098 | 3,112 | 3,008 | 29,618 | 5,902 |
| | 2012 | 464,933 | 93,849 | 1,195 | 4,681 | 3,636 | 48,844 | 13,656 |
| | 2013 | 382,395 | 53,107 | 5,015 | 3,154 | 2,962 | 36,239 | 6,423 |
| | 2014 | 363,053 | 54,475 | 6,086 | 6,832 | 4,293 | 30,314 | 5,012 |
| | 2015 | 320,963 | 8,289 | 1,448 | 3,342 | 2,418 | 34,856 | 7,556 |
| | 2016 | 305,483 | 11,231 | 3,230 | 7,094 | 7,413 | 25,495 | 6,106 |
| | 2017 | 266,563 | 9,568 | 4,378 | 2,247 | 2,784 | 32,079 | 3,357 |
| | 2018 | 239,925 | 16,229 | 869 | 2,136 | 4,539 | 32,002 | 3,700 |
| | 2019 | 263,273 | 9,547 | 667 | 3,891 | 6,999 | 27,736 | 1,889 |
| | 2020* | 179,575* | 3,374* | 72* | 1,825* | 3,483* | 12,346* | 1,506* |

Table 14. March fishing effort and harvest by non-charter anglers at selected sites in the Illinois portion of Lake Michigan, in 2011- 2020. Estimates were rounded to the nearest whole number. Peds = Pedestrian, Lau'd = Launched boat anglers.

| Angler type | Year | Effort | Harvest | | | | | |
|--------------|------|----------------|--------------|-------------|---------------|------------|-------------|----------------|
| | | (angler-hours) | Yellow perch | Brown trout | Rainbow trout | Lake trout | Coho salmon | Chinook salmon |
| Peds | 2011 | 6,937 | 28 | 15 | 75 | 0 | 292 | 0 |
| | 2012 | 17,941 | 4,103 | 915 | 0 | 0 | 1,941 | 0 |
| | 2013 | 2,363 | 0 | 67 | 0 | 0 | 28 | 0 |
| | 2014 | 5,241 | 0 | 0 | 0 | 0 | 988 | 0 |
| | 2015 | 5,954 | 0 | 199 | 0 | 0 | 754 | 0 |
| | 2016 | 12,891 | 0 | 567 | 41 | 0 | 1,921 | 0 |
| | 2017 | 7,420 | 0 | 125 | 0 | 124 | 372 | 0 |
| | 2018 | 10,305 | 0 | 74 | 17 | 0 | 237 | 0 |
| | 2019 | 6,661 | 0 | 18 | 10 | 0 | 276 | 0 |
| | 2020 | 6,477 | 0 | 33 | 0 | 0 | 252 | 0 |
| Lau'd | 2011 | 1,144 | 0 | 72 | 0 | 0 | 909 | 0 |
| | 2012 | 8,059 | 4,780 | 912 | 41 | 21 | 1,283 | 0 |
| | 2013 | 1,486 | 1,135 | 0 | 0 | 0 | 19 | 0 |
| | 2014 | 1,167 | 0 | 73 | 15 | 0 | 381 | 0 |
| | 2015 | 1,730 | 0 | 654 | 0 | 0 | 541 | 0 |
| | 2016 | 915 | 0 | 19 | 0 | 0 | 18 | 0 |
| | 2017 | 603 | 0 | 0 | 0 | 0 | 19 | 0 |
| | 2018 | 1,635 | 695 | 0 | 13 | 139 | 530 | 0 |
| | 2019 | 1,833 | 0 | 205 | 0 | 25 | 19 | 0 |
| | 2020 | 1,673 | 1,401 | 37 | 0 | 0 | 1,051 | 0 |
| March Totals | 2011 | 8,081 | 28 | 87 | 75 | 0 | 1,201 | 0 |
| | 2012 | 26,000 | 8,883 | 1,827 | 41 | 21 | 3,224 | 0 |
| | 2013 | 3,849 | 1,135 | 67 | 0 | 0 | 47 | 0 |
| | 2014 | 6,408 | 0 | 73 | 15 | 0 | 1,369 | 0 |
| | 2015 | 7,684 | 0 | 853 | 0 | 0 | 1,295 | 0 |
| | 2016 | 13,806 | 0 | 586 | 41 | 0 | 1,939 | 0 |
| | 2017 | 8,023 | 0 | 125 | 0 | 124 | 391 | 0 |
| | 2018 | 11,940 | 695 | 74 | 30 | 139 | 767 | 0 |
| | 2019 | 8,494 | 0 | 223 | 10 | 25 | 295 | 0 |
| | 2020 | 8,149 | 1,401 | 70 | 0 | 0 | 1,303 | 0 |

Table 15. Minor species harvest by non-charter anglers in the Illinois portion of Lake Michigan, during 2011 – 2020. Estimates were rounded to the nearest whole number. Round goby harvest was not estimated until 2014.

* Estimates for 2011 – 2019 are for April-September; 2020 estimates are for June - September.

| Year | Smallmouth bass | Largemouth bass | Rock bass | Bluegill Sunfish | Pumpkinseed sunfish | Common carp | Freshwater drum | Round goby |
|-------|--------------------|--------------------|--------------|---------------------|------------------------|----------------|--------------------|---------------|
| 2011 | 0 | 4 | 575 | 309 | 0 | 238 | 2,946 | - |
| 2012 | 38 | 0 | 2,001 | 406 | 42 | 216 | 3,540 | - |
| 2013 | 68 | 20 | 804 | 546 | 0 | 208 | 6,205 | - |
| 2014 | 154 | 0 | 274 | 0 | 0 | 104 | 688 | 33,484 |
| 2015 | 0 | 0 | 284 | 76 | 0 | 121 | 2,786 | 18,803 |
| 2016 | 0 | 27 | 159 | 93 | 0 | 154 | 1,223 | 6,506 |
| 2017 | 337 | 54 | 0 | 0 | 0 | 30 | 534 | 1,695 |
| 2018 | 110 | 53 | 20 | 0 | 0 | 0 | 541 | 3,319 |
| 2019 | 80 | 0 | 181 | 24 | 0 | 200 | 3,509 | 4,190 |
| 2020* | 826* | 0* | 424* | 119* | 0* | 31* | 542* | 3,872* |

Figure 2 (a). Salmonid harvest per unit effort, derived from the Illinois sport fishing surveys of Lake Michigan, 2011-2020

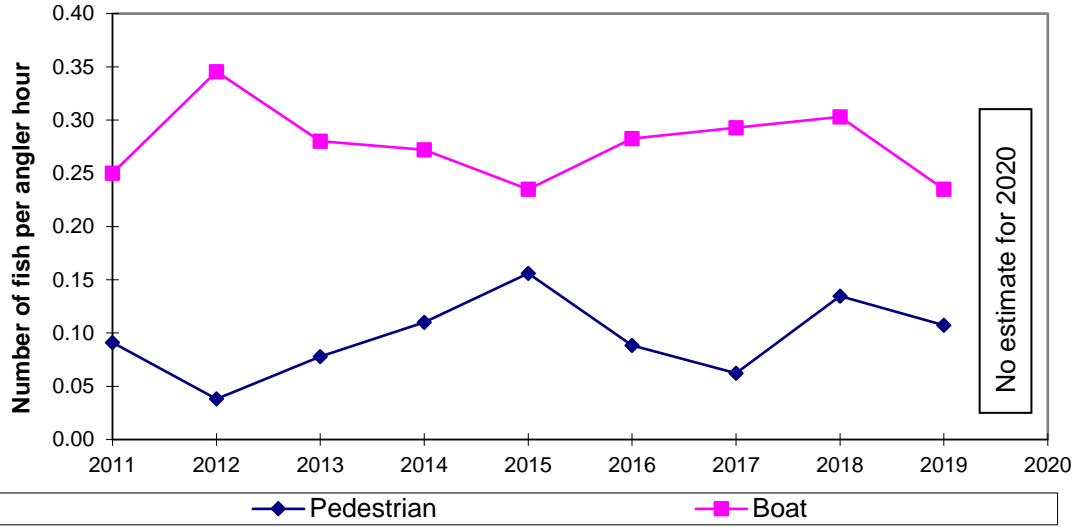


Figure 2 (b). Yellow perch harvest per unit effort, derived from Illinois sport fishing surveys of Lake Michigan, 2011-2020

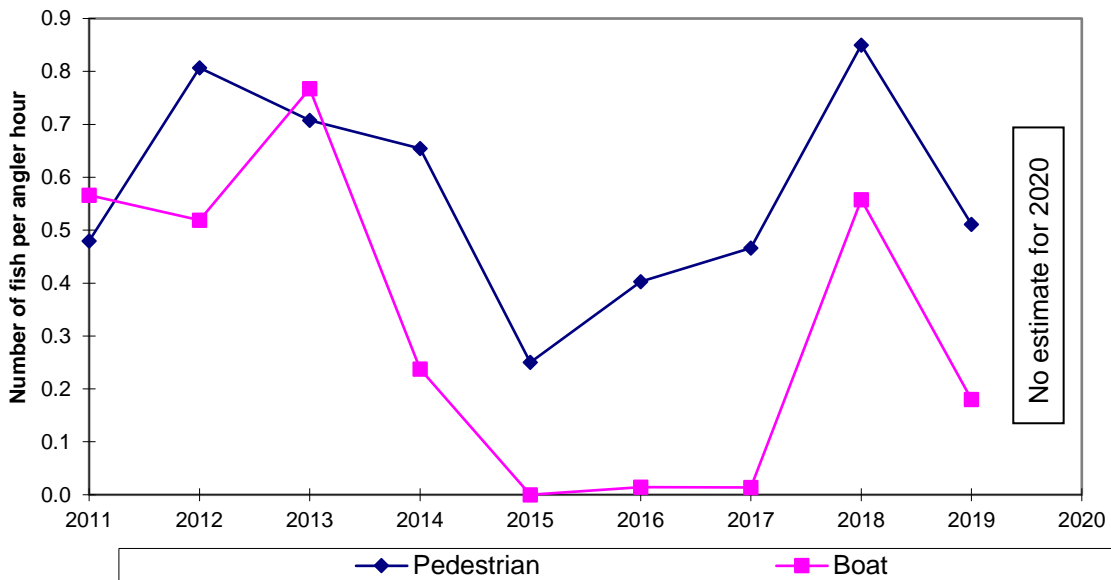


Figure 3 (a). Directed angler effort for salmonids in the Illinois portion of Lake Michigan, 2011-2020

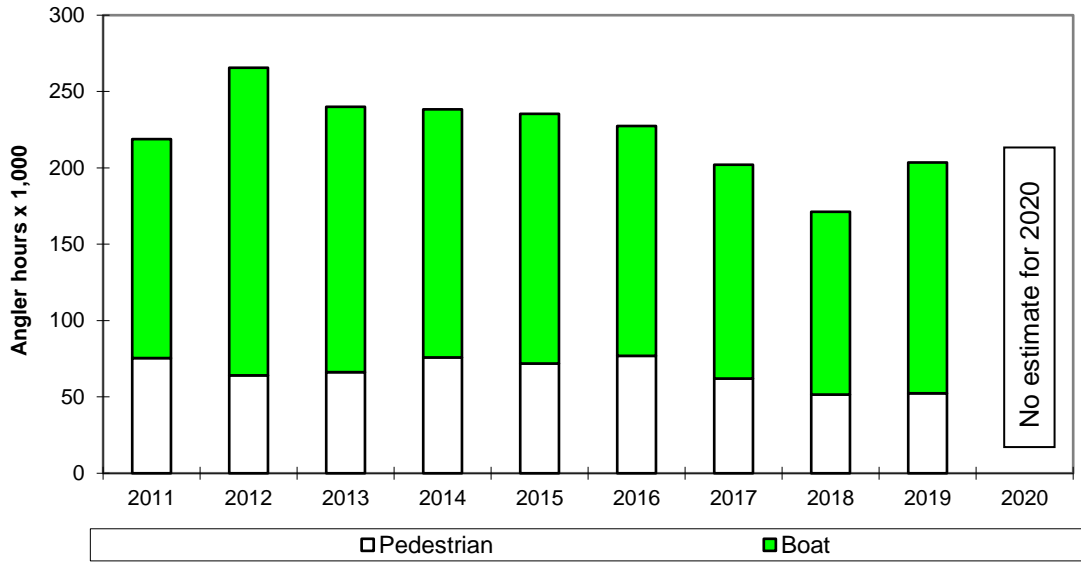


Figure 3 (b). Directed angler effort for yellow perch in the Illinois portion of Lake Michigan, 2011-2020

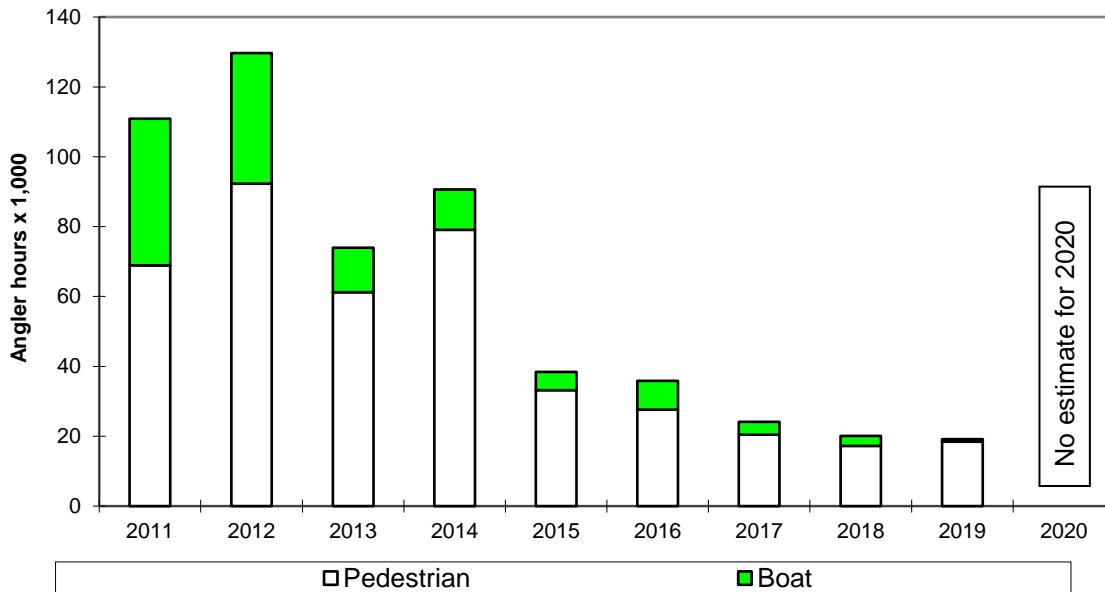


Figure 4. Total yellow perch non-charter sport harvest in the Illinois waters of Lake Michigan, 2011-2020

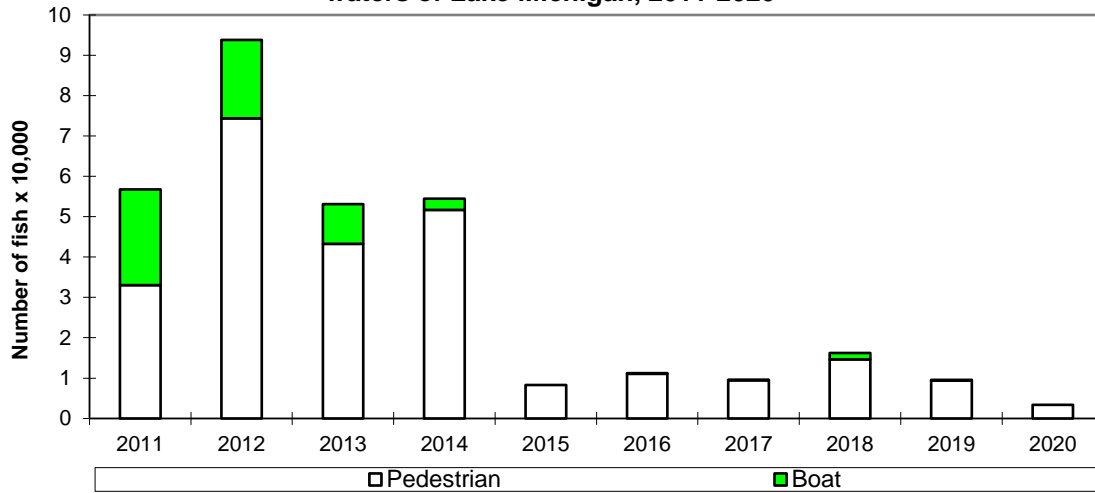


Figure 5. Average lengths of creel yellow perch from the Illinois waters of Lake Michigan, 1986 - 2020

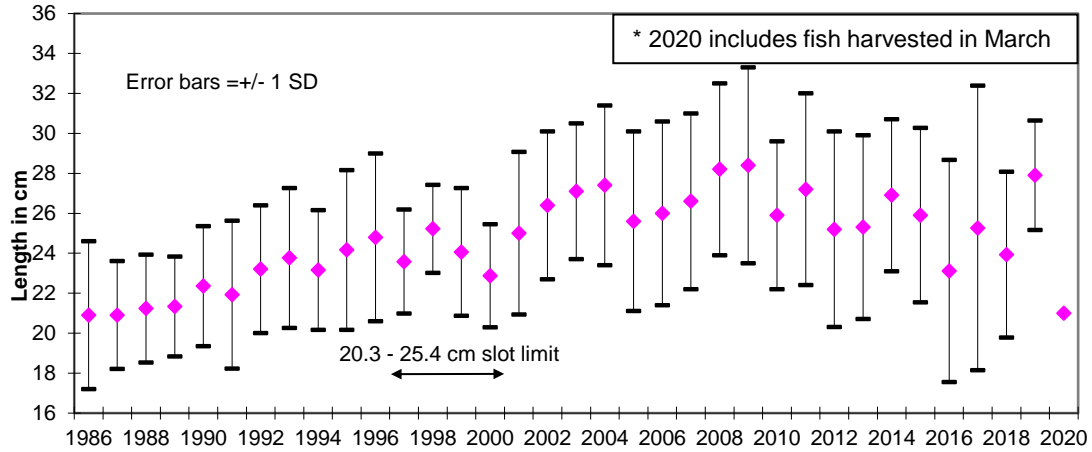


Figure 6. 2020 yellow perch sport harvest from the Illinois waters of Lake Michigan, per month

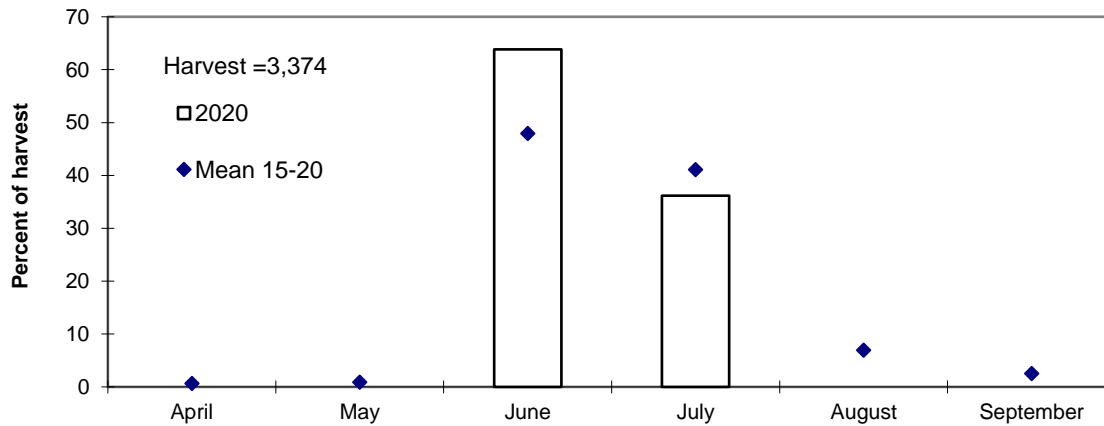


Figure 7. Total non-charter coho salmon sport harvest in the Illinois waters of Lake Michigan, 2011- 2020

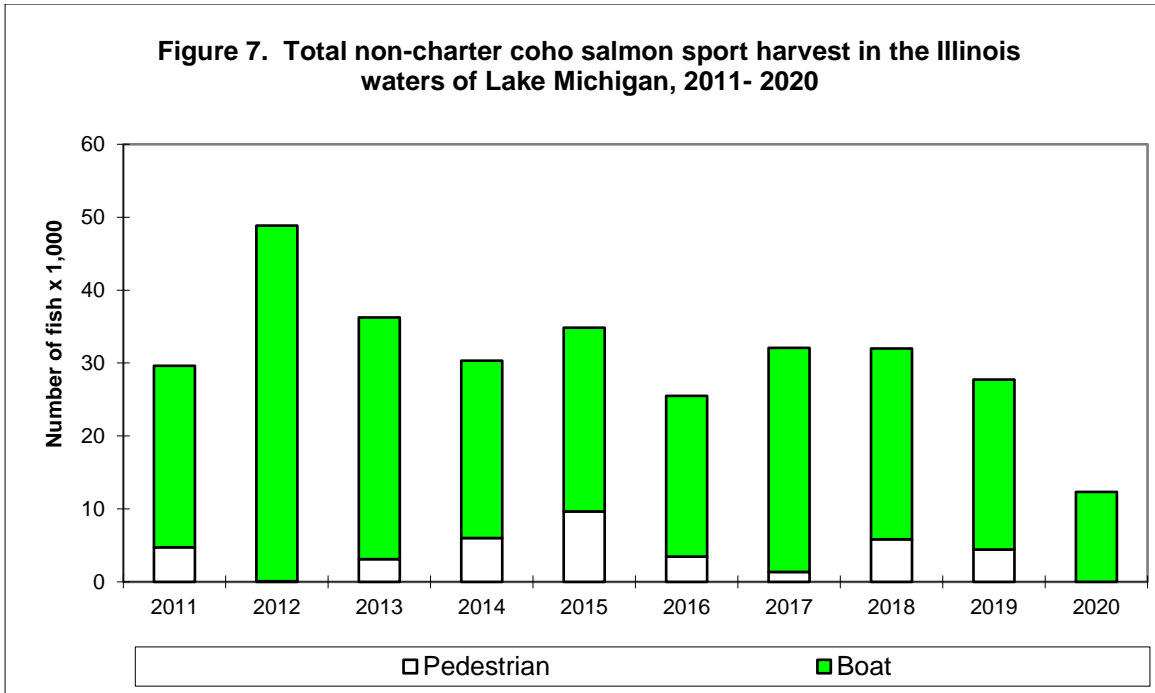


Figure 8. Average lengths of creel coho salmon from the Illinois waters of Lake Michigan, 1986 - 2020

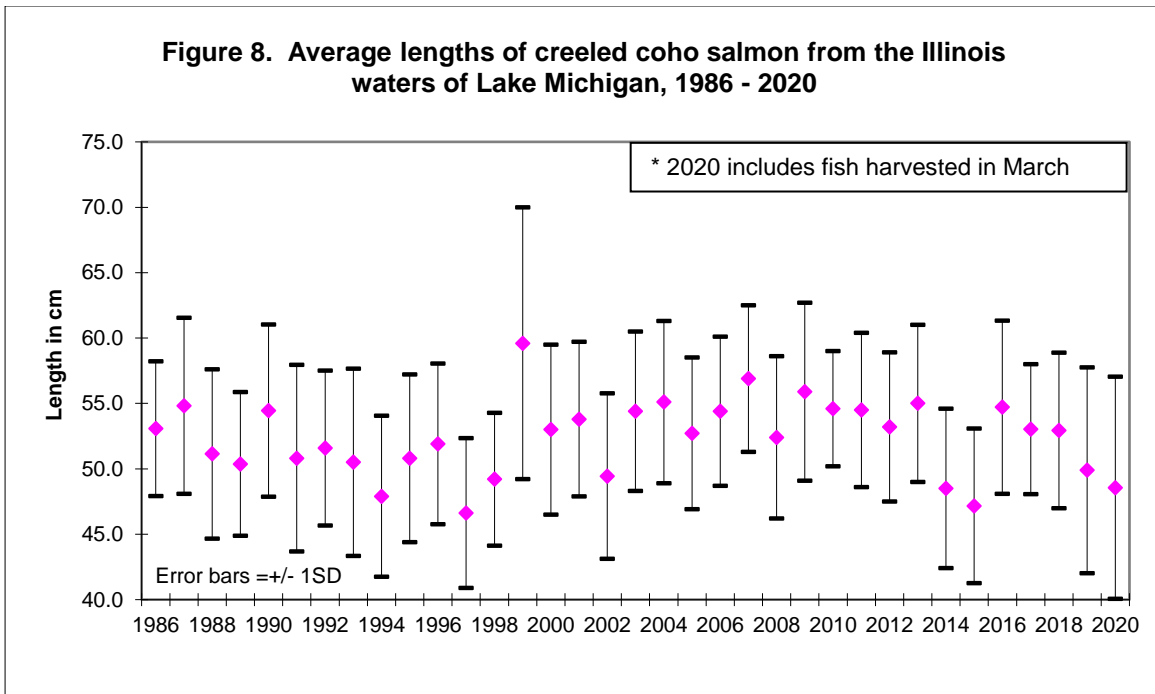


Figure 9. Total non-charter chinook salmon sport harvest in the Illinois waters of Lake Michigan, 2011-2020

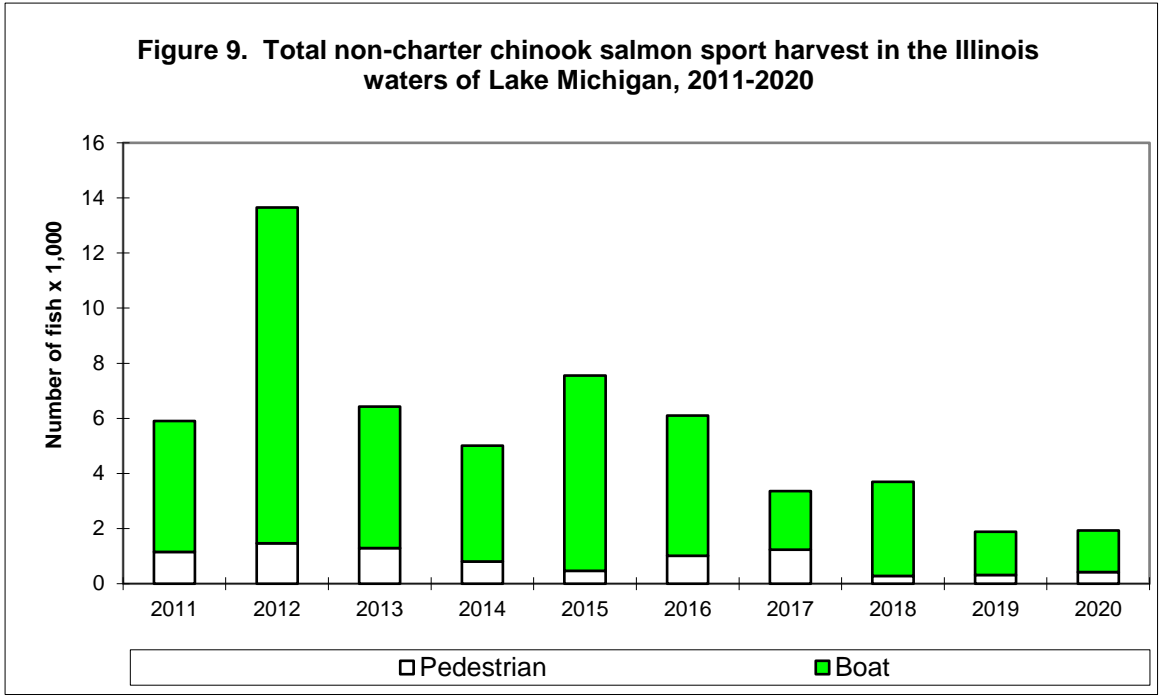


Figure 10. Average lengths of creel chinook salmon from the Illinois waters of Lake Michigan, 1986 - 2020

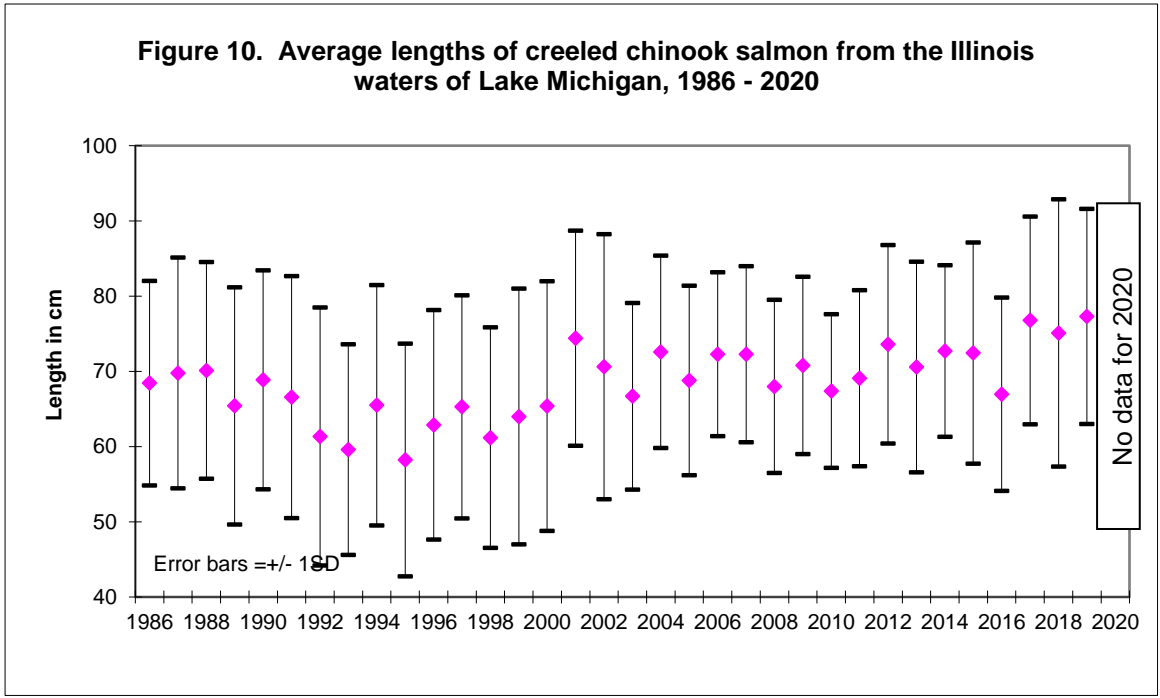


Figure 11 (a). 2020 Salmonid non-charter harvest by pedestrians, per month

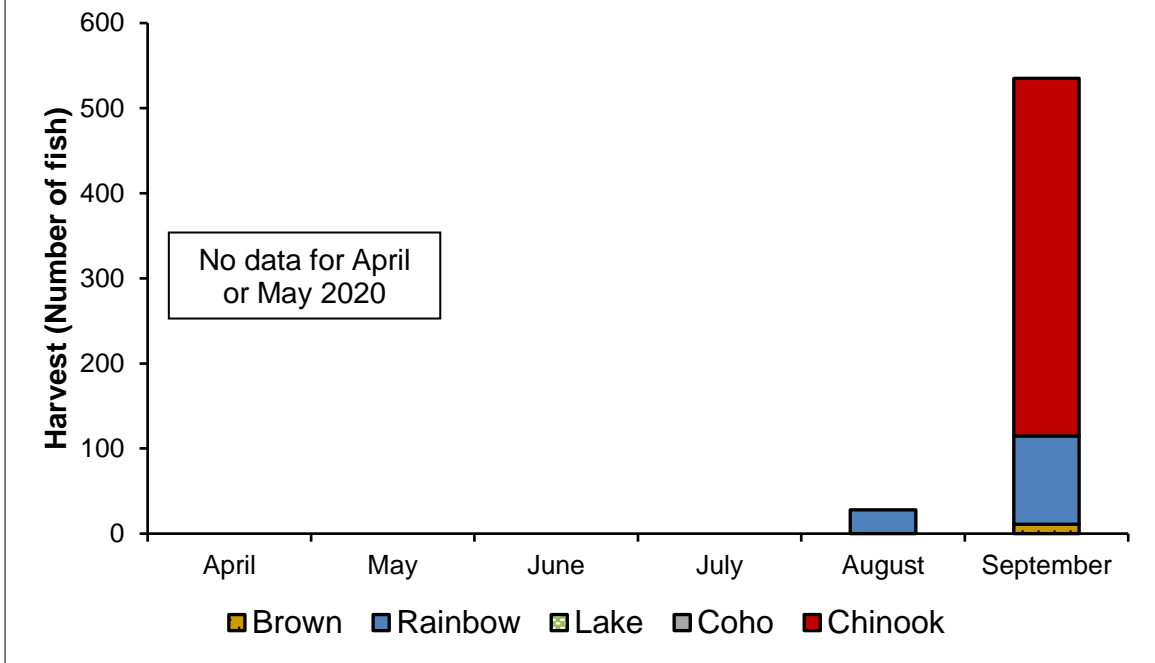
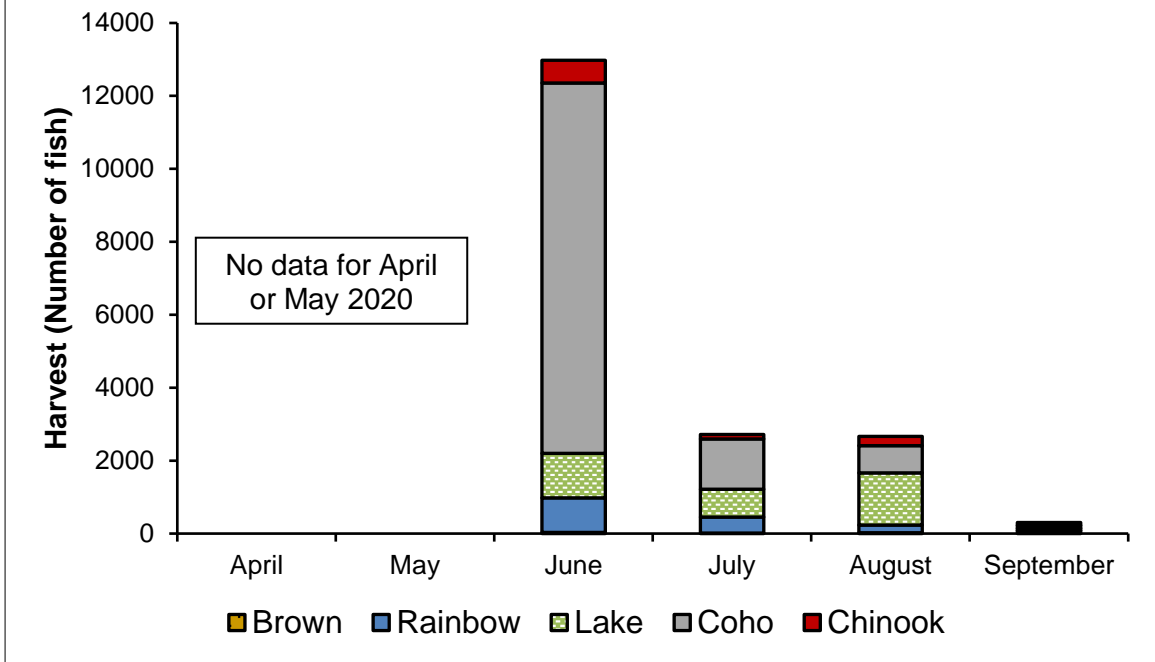


Figure 11 (b). 2020 Salmonid non-charter harvest by boaters, per month



APPENDIX A - COMPARISON OF THE CHARTER AND NON - CHARTER SALMONID BOAT FISHERY

The charter and non -charter boat salmonid fisheries were compared to evaluate whether the two groups target the same salmonid species (Tables A1 and A2). Composition of total harvest for both groups has been mostly similar for the last ten years, but lake trout harvest has become more important to charter boat harvest than non-charter harvest. Harvest-per-unit-effort (HPE) for both groups is presented in Figure A1; the charter fishery has generally exhibited higher success than the non - charter boat fishery (charter HPE approximately 70% higher than non-charter HPE). The combined harvest of both charter and non - charter anglers (boats and pedestrians) for 2011 - 2020 is presented in Figure A2. The non-charter data for 2020 represent harvest and effort from June-September (early spring and winter surveys are not included).

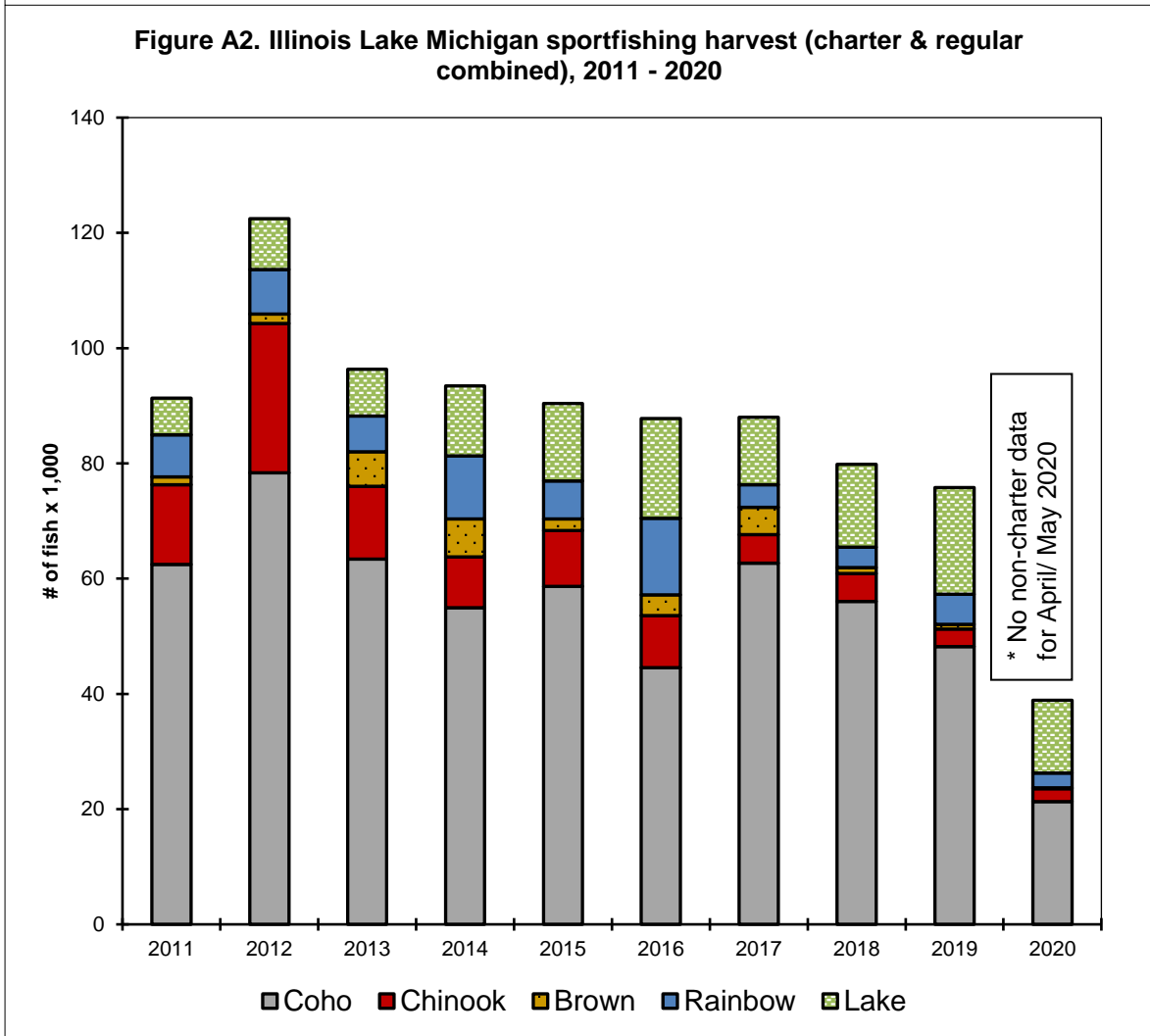
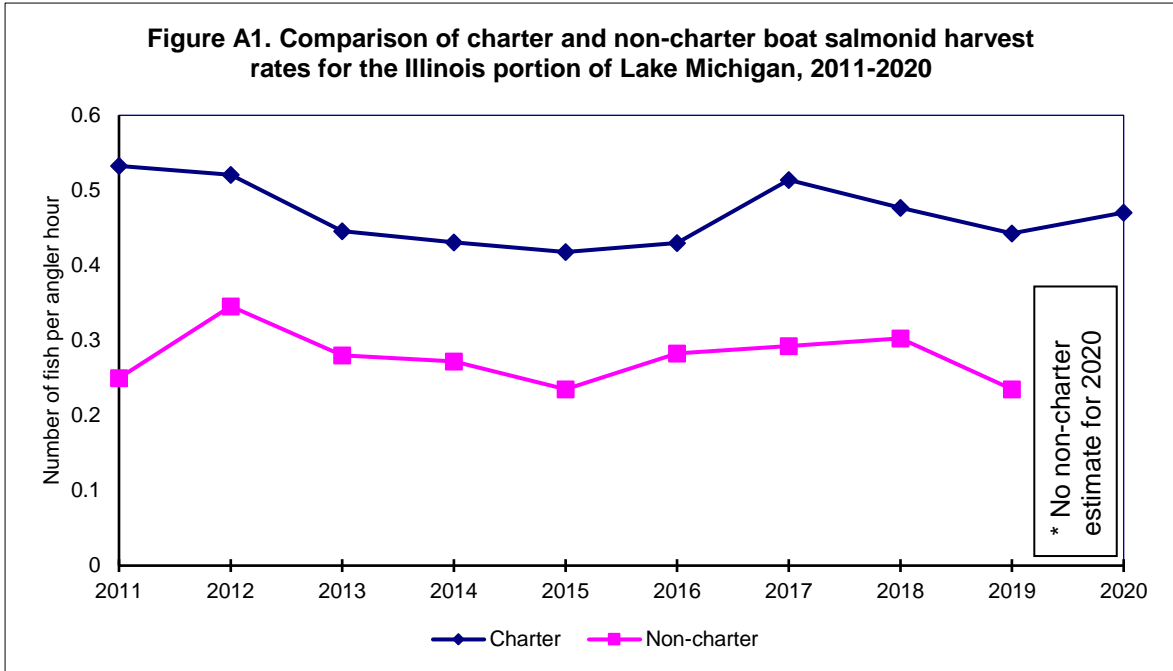
Table A1. Non-charter boat harvest composition (boats only) 2011 - 2020.

* Data for 2011-2019 are for April-September, while data for 2020 are for June-September. Directed effort estimates are not available for 2020.

| Year | Effort | Percent of total harvest | | | | | |
|-------|----------------|--------------------------|---------------|------------|-------------|----------------|-----------------|
| | (angler-hours) | Brown trout | Rainbow trout | Lake trout | Coho salmon | Chinook salmon | Total salmonids |
| 2011 | 143,331 | 1.2 | 7.8 | 8.4 | 69.3 | 13.2 | 35,848 |
| 2012 | 201,326 | 0.5 | 6.7 | 5.2 | 70.1 | 17.5 | 69,569 |
| 2013 | 173,695 | 9.0 | 6.3 | 6.1 | 68.1 | 10.6 | 48,642 |
| 2014 | 162,453 | 11.9 | 14.2 | 9.4 | 55.0 | 9.5 | 44,192 |
| 2015 | 163,424 | 1.7 | 7.9 | 6.3 | 65.6 | 18.5 | 38,398 |
| 2016 | 150,456 | 2.9 | 16.4 | 17.0 | 51.8 | 12.0 | 42,524 |
| 2017 | 140,028 | 8.2 | 5.0 | 6.8 | 74.9 | 5.2 | 40,986 |
| 2018 | 119,817 | 0.5 | 5.4 | 12.5 | 72.1 | 9.4 | 36,303 |
| 2019 | 151,216 | 0.2 | 10.1 | 19.7 | 65.6 | 4.4 | 35,556 |
| 2020* | NA* | 0.3* | 9.1* | 18.7* | 66.1* | 5.8* | 18,670* |

Table A2. Charter boat harvest composition April – September 2011 - 2020.

| Year | Effort | Percent of total harvest | | | | | |
|------|----------------|--------------------------|---------------|------------|-------------|----------------|-----------------|
| | (angler-hours) | Brown trout | Rainbow trout | Lake trout | Coho salmon | Chinook salmon | Total salmonids |
| 2011 | 91,235 | 0.5 | 8.6 | 7.0 | 67.6 | 16.3 | 48,585 |
| 2012 | 96,818 | 1.0 | 6.0 | 10.8 | 58.1 | 24.2 | 50,425 |
| 2013 | 95,530 | 2.2 | 7.1 | 12.2 | 63.8 | 14.6 | 42,556 |
| 2014 | 94,976 | 1.2 | 10.0 | 19.2 | 60.2 | 9.4 | 40,902 |
| 2015 | 97,893 | 1.4 | 7.9 | 27.1 | 58.4 | 5.2 | 40,902 |
| 2016 | 89,409 | 0.9 | 16.1 | 25.8 | 49.5 | 7.6 | 38,439 |
| 2017 | 83,960 | 0.8 | 3.9 | 20.7 | 70.9 | 3.7 | 43,157 |
| 2018 | 76,684 | 0.6 | 3.7 | 26.9 | 65.8 | 3.1 | 36,563 |
| 2019 | 78,240 | 0.4 | 3.9 | 33.2 | 59.1 | 3.4 | 34,641 |
| 2020 | 41,793 | 0.3 | 3.9 | 46.5 | 45.7 | 3.6 | 19,656 |



APPENDIX B – WINTER YELLOW PERCH ANGLING EFFORT AND CATCH IN CHICAGO**INTRODUCTION**

Previous surveys of recreational angling have shown a significant, but relatively small amount of angling effort in Chicago during fall and winter months, primarily targeting yellow perch. Creel surveys during the October-February period (hereafter referred to as winter surveys) were conducted during the winters of 1986-'87, 1987-'88, 1988-'89, and 2006-'07. In these surveys, yellow perch harvest estimates ranged from 2,886 fish to 91,314 fish, and represented between 0.2% and 8.4% of the total annual yellow perch harvest estimates (INHS data).

Since the 2006-'07 winter survey, important changes have occurred in the Lake Michigan ecosystem, and harvest estimates for yellow perch during the typical survey months (March-September) have declined substantially. In addition, access to some lakefront locations in the south side of Chicago has improved since 2007; creel clerk observations and online fishing reports suggest angler use has dramatically increased in the winter months at some of these sites (most notably at the 85th Street slip, which adjoins newly-opened Steelworkers Park). Furthermore, previous winter surveys indicated fishing effort varied substantially based on weather (i.e., ice cover in the harbors). Thus, surveys of winter angling were needed to assess the impact of the ecosystem and access changes on the Lake Michigan fishery in Chicago, and to further evaluate the impact of meteorological variables on fishing effort. We conducted winter surveys in the winters of 2014-2015, 2015-2016, and 2018-2019; the results of these surveys indicated the winter season had become much more important for the yellow perch fishery (Roswell and Czesny, 2020).

Our objective was to obtain additional data for the winter of 2019-2020; we intended to produce results comparable to those from previous winter surveys and used similar methodology.

METHODS

We used methods similar to the standard Lake Michigan shoreline creel survey (Roswell and Czesny 2020). In this case, however, clerks moved along on a route, with no set time to spend at each site. All angling parties encountered were surveyed, until the threshold of ten parties targeting one of three categories of fish (perch, salmonids, or other species) was reached, or all anglers at the site were interviewed, or more than 40 minutes had elapsed at that site. After one of these conditions was met, the clerk would move to the next site. If no anglers were fishing at a site, the clerk would wait five minutes and, if no anglers arrived, record a count of zero anglers and proceed to the next site.

The clerk would always start at Navy Pier at 7:00 AM (because of the parking situation: anglers were able to use the parking structure at a reduced cost as long as they left by 10:00 AM). The clerk would then go to the next site (either north or south depending on the schedule) and continue until all of the sites were visited. The clerk would always end at the launch ramp at Calumet Park (and stay there for an hour if there were boat trailers in the lot). A complete list of sites can be found in Table B1; note that some sites were added or dropped compared with previous winters due to observations of fishing effort (or lack thereof).

All sites were visited on scheduled dates. Dates were selected based on a stratified random sample, in which weekends vs. weekdays represented the two strata. One random date was selected from each weekend (Saturday or Sunday), and one random weekday (Monday-Friday) was selected every other week. Data were summarized using strata means for each month and site.

Table B1. Sites visited in Chicago for the winter survey.

| Site | Order visited (North schedule) | Order Visited (South schedule) | Angler Type |
|-----------------------------|-----------------------------------|-----------------------------------|---------------|
| Navy Pier | 1 | 1 | Pedestrian |
| Diversey Harbor | 2 | 4 | Pedestrian |
| Montrose Harbor | 3 | 5 | Pedestrian |
| DuSable Harbor | 4 | 2 | Pedestrian |
| Burnham Harbor | 5 | 3 | Pedestrian |
| Jackson Harbor | 6 | 6 | Pedestrian |
| 85th Street Slip | 7 | 7 | Pedestrian |
| 95 th St. Bridge | 8 | 8 | Pedestrian |
| Calumet Ramp | 9 | 9 | Launched Boat |

RESULTS

On 32 dates during October 2019 – February 2020, creel clerks conducted 374 interviews of pedestrian anglers and 56 interviews of boat anglers. Clerks measured 114 fish harvested by anglers (including 104 yellow perch). To facilitate consistent comparisons with previous winter surveys, the results in this report focus on yellow perch-directed effort and harvest, which constitutes the dominant fishery component during the fall and winter months.

An estimated 33,974 angler-hours were directed at yellow perch angling, resulting in an estimated harvest of 48,033 yellow perch. An estimated 41,263 additional yellow perch were released by anglers. November accounted for 95.2% of pedestrian yellow perch harvest, and most perch were harvested at 85th Street (88.0%; Table B2). Boaters using the Calumet Park boat ramp harvested most perch during November (46.2% of boater harvest) and December (31.2%). Yellow perch harvested in the winter of 2019-'20 were generally smaller than perch harvested in spring and summer of 2019 (Figure B1). The mean length of yellow perch harvested in winter was 24.3 cm, and the mean weight was 142 grams, compared to means of 27.9 cm and 252 grams for perch harvested during spring and summer of 2019.

Table B2. Estimated monthly total angler effort directed at yellow perch, yellow perch harvest, and number of yellow perch released for each site visited in the winter creel survey 2019-2020.

| Month | Location | Yellow Perch Effort (angler hours) | Yellow Perch Harvested | Yellow Perch Released |
|--------------|-----------------|---------------------------------------|---------------------------|--------------------------|
| October | 85th Street | 43 | 0 | 0 |
| | 95th St. Bridge | 0 | 0 | 0 |
| | Burnham Harbor | 0 | 0 | 0 |
| | Diversey Harbor | 0 | 0 | 0 |
| | DuSable Harbor | 59 | 0 | 0 |
| | Jackson Harbor | 34 | 0 | 0 |
| | Montrose Harbor | 253 | 0 | 0 |
| | Navy Pier | 326 | 0 | 32 |
| Calumet Ramp | 781 | 87 | 0 | |
| November | 85th Street | 5,600 | 6,710 | 4,325 |
| | 95th St. Bridge | 60 | 0 | 0 |
| | Burnham Harbor | 0 | 0 | 0 |
| | Diversey Harbor | 236 | 0 | 0 |
| | DuSable Harbor | 23 | 0 | 0 |
| | Jackson Harbor | 0 | 0 | 0 |
| | Montrose Harbor | 195 | 0 | 0 |
| | Navy Pier | 7,265 | 632 | 262 |
| Calumet Ramp | 6,712 | 18,614 | 14,508 | |
| December | 85th Street | 1,703 | 71 | 0 |
| | 95th St. Bridge | 324 | 261 | 610 |
| | Burnham Harbor | 0 | 0 | 0 |
| | Diversey Harbor | 378 | 0 | 0 |
| | DuSable Harbor | 0 | 0 | 0 |
| | Jackson Harbor | 0 | 0 | 0 |
| | Montrose Harbor | 117 | 0 | 0 |
| | Navy Pier | 1,635 | 34 | 6 |
| Calumet Ramp | 5,859 | 12,593 | 11,973 | |
| January | 85th Street | 20 | 0 | 0 |
| | 95th St. Bridge | 70 | 0 | 0 |
| | Burnham Harbor | 0 | 0 | 0 |
| | Diversey Harbor | 0 | 0 | 0 |
| | DuSable Harbor | 0 | 0 | 0 |
| | Jackson Harbor | 0 | 0 | 0 |
| | Montrose Harbor | 20 | 0 | 0 |
| | Navy Pier | 0 | 0 | 0 |
| Calumet Ramp | 476 | 2,104 | 601 | |
| February | 85th Street | 85 | 0 | 0 |
| | 95th St. Bridge | 0 | 0 | 0 |
| | Burnham Harbor | 0 | 0 | 0 |
| | Diversey Harbor | 0 | 0 | 0 |
| | DuSable Harbor | 0 | 0 | 0 |
| | Jackson Harbor | 0 | 0 | 0 |
| | Montrose Harbor | 51 | 0 | 0 |
| | Navy Pier | 150 | 0 | 0 |
| Calumet Ramp | 1,500 | 6,928 | 8,947 | |

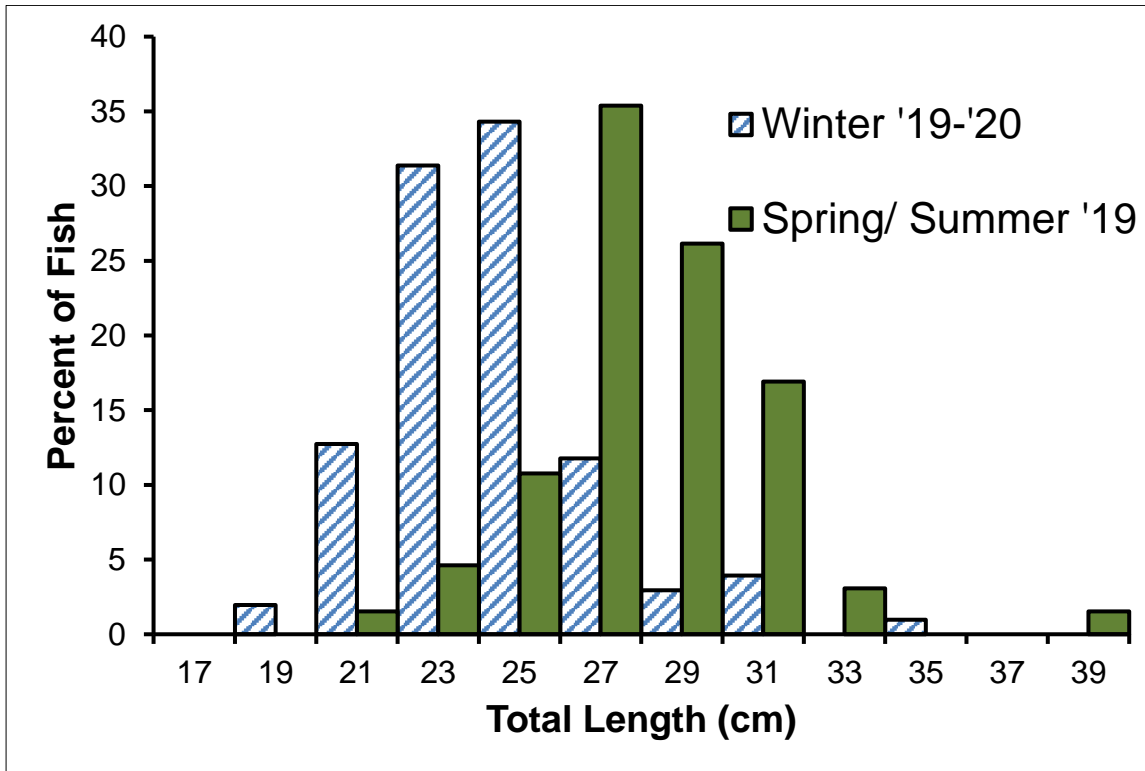


Figure B1. Length frequency distribution of yellow perch harvested in winter (October 2019-February 2020, blue/ white striped bars) and spring/ summer (April-September 2019, solid green bars). Lengths are grouped into 2 cm bins (labeled by bin midpoint).

DISCUSSION

During the winter of 2019-'20, yellow perch fishing constituted an important component of the Lake Michigan recreational fishery in Illinois. The 33,974 angler-hours spent by winter perch anglers represents 12.9% of total combined (pedestrian and boater) angler-hours fished in Illinois waters during April-September 2019. The estimated harvest of 48,033 yellow perch during winter represents 503.1% of the April-September 2019 harvest estimate, and 83.4% of the total annual harvest for the period of March 2019-February 2020.

In keeping with most previous winter surveys, yellow perch harvested in the winter of 2019-'20 were smaller, on average, than perch harvested the previous summer (April-September, 2019). The mean length of yellow perch harvested October, 2019-February, 2020 was substantially lower than the mean length for April-September 2019 (27.9 cm), but slightly higher than for the last winter survey (2018-'19 mean was 23.9 cm).

An important difference between the typical (March – September) survey periods and most winter surveys is the spatial distribution of anglers, and this continued in the winter of 2019-'20. During spring and summer, Montrose Harbor (and

vicinity) usually accounts for the majority of pedestrian yellow perch fishing effort. However, results from this winter survey suggest Montrose harbor represented only 3.4% of total perch-directed fishing effort by pedestrians. Instead, the primary areas utilized by yellow perch anglers in winter were the 85th street slip and Navy Pier, together accounting for 90.2% of perch-directed angler-hours for pedestrians fishing in the winter of 2019-'20. Combined, these areas account for less than 10% of pedestrian anglers observed during helicopter flights conducted in the spring and summer (Table 2 in the main body of this report), a pattern corroborated by frequent observations by creel clerks. In addition to seasonal movement of yellow perch, the shift in spatial distribution of anglers may be attributable to several factors such as access changes, amenities (e.g., bathrooms), and weather-related factors (e.g., ice).

Weather is a major factor that likely has a large influence not only on locations anglers use for fishing, but also on the time spent fishing and fishing success of anglers. For example, the presence and thickness of ice (driven by cold temperatures) in harbor areas can play a large role in the ease of fishing. The presence of ice forces anglers at some locations to break holes in the ice to fish, which may make sites with open water more appealing. However, very thick ice may allow anglers to walk on the ice and drill holes to find fish, which may attract anglers interested in ice fishing at locations that freeze early (e.g., areas lacking wave action or current) following a long period of cold temperatures. High winds may drive anglers to seek sheltered areas, and prolonged periods of high winds can increase turbidity (anglers often attribute poor catch rates to turbidity, C. Roswell personal observations) through wave action. Large snow events can restrict access to some sites. All winters in Chicago have periods of cold temperatures, high winds, and snow; however, there can be considerable variation in the frequency, magnitude, and duration of these events from one winter to the next. The winter of 2019-'20 was characterized by above-average temperatures overall, but was cold at times, including snow and record low temperatures November 10-12. Boaters accounted for a large portion of the yellow perch harvest, and this is likely driven in part by the relative lack of ice, keeping the boat ramp open and productive waters accessible through much of the winter. Pedestrian perch angling success was primarily confined to southern access points, especially 85th street. The unusually-low harvest at Navy Pier, despite high levels of angler effort, suggests unknown environmental conditions limited perch abundance in the Navy Pier area in the winter of 2019-'20.

Comparison with previous years and the importance of the winter season

The winter harvest of 2019-'20, at 48,033 fish, was 31.6% lower than that of the most recent winter survey during 2018-'19. The winter harvest comprised 83.4% of the total annual harvest (March 2019 – February 2020), similar to the previous winter season (80.6% for 2018-'19), higher than 65.9% for the winter of 2015-'16, and much higher than 10.6% for the winter of 2014-'15. Winter harvest of yellow perch never exceeded 5% of the annual total during the three completely surveyed years in the 1980s and was 8.4% for 2006-'07.

Similarly, angling effort directed at yellow perch during the winter of 2019-'20 was a large component of total annual perch-directed effort, at 63.4% (similar to the previous year's 68.1%). The winter survey in 2015-'16 estimated winter represented 39.8% of the total annual perch-directed effort, and the winter of 2014-'15 accounted for 11.4% of the annual total for that year. Directed effort estimates are not available for the winter surveys of the 1980s.

Yellow perch harvested in the winter of 2018- '19 were slightly larger (mean TL: 24.3 cm) than during the winter of 2018- '19 (mean TL: 23.9 cm). Typically, yellow perch harvested during the fall and winter period tend to be smaller, on average, than those harvested in the preceding spring and summer periods. This was again the case for the winter of 2019- '20; perch harvested in the spring and summer of 2019 averaged 27.9 cm in length. A lower percentage of yellow perch were released during the winter of 2019-'20 (release rate of 46.2%) than in the previous winter, when (75.3% of caught perch were released during October 2018 – February 2019). Because angler harvest of yellow perch tends to be size-selective (i.e., smaller fish are more likely to be released than large fish), this suggests fewer smaller fish were present during the winter of 2019-'20 than the previous year.

This survey, in which yellow perch harvest during October-February was estimated at 83.4% of the annual total, demonstrates the current importance of fall and winter to the yellow perch fishery in Illinois waters of Lake Michigan. Four previous winter surveys since 2006 showed harvest in these months comprised larger portions of total annual harvest (8.4% - 80.6%) than the three winters surveyed in the late 1980s (0.2% - 5.0%), suggesting the winter component is becoming increasingly important relative to the spring/ summer period. It is important to point out that the spring and summer harvest rates have been at or near record lows in recent years, attributable in part to low abundance of adult yellow perch. Whether future increases in yellow perch effort, harvest, and harvest rates during spring and summer (if perch were to become more abundant) would be matched by similar increases in the winter fishery is unclear.

The viability of the winter yellow perch fishery is likely dependent on access. Unlike the spring and summer periods, when pedestrian anglers typically utilize shore access in parks, winter perch anglers rely on locations that are less accessible. The area around the former US Steel South Works was particularly important during the winter of 2019-'20. A large portion of the angler effort at 85th street occurred on private land. Furthermore, much of the winter angling occurs from docks in the harbors, which are off limits during the boating season, and only accessible through the purchase of a pass for the winter season (and only a select few piers are open to fishing). Additionally, Navy Pier requires anglers to leave by 10:00 am to receive the early “fisherman’s” parking rate (which represents a significant discount from the normal rate). Thus, small changes in policies that currently allow anglers to use these locations would have a drastic impact on the importance of the winter period for yellow perch angling in Chicago.

Other types of fishing

Yellow perch angling constituted the majority of recreational angling during the October – February period as a whole, and 55.8% of angler parties contacted during the months of October – February were targeting perch. The majority of angling activity not directed at yellow perch was comprised of anglers targeting salmonines, especially in October, when 66.1% of angler parties interviewed were targeting salmon and/ or trout. Only 12.3% of encountered angler parties in the October-February period were targeting other species or “anything that bites.” Our estimates reported here only used interviews with angling parties targeting perch (i.e., perch-directed effort). However, all data from other types of angling are stored in an INHS database for future analyses.

Limitations

Some uncertainty surrounds our estimates, especially due to a low level of survey effort. It is possible that some fishing activity was missed due to low temporal resolution of our survey; however, this would likely represent only a small portion of the overall fishery. Furthermore, with fewer survey dates, there is a higher likelihood of one date (with a very high catch rate, for example) being highly influential in our estimates of monthly means. Another important limitation is the lack of survey effort at locations inaccessible to creel clerks, especially on private land in and around the U.S. Steel property; based on our observations, the areas between 89th and 91st streets appeared to be popular with anglers, despite being located on private land. A complete discussion of winter creel survey limitations can be found in Appendix B of Roswell and Czesny (2016).

Conclusions

Our survey produced meaningful estimates of catch of yellow perch and perch-directed angler effort during the winter of 2019-'20. The majority of angler effort in Chicago during winter months was directed at yellow perch. Winter perch harvest was a significant portion of the fishery, representing over four-fifths of the total annual perch harvest (March 2019- February 2020). Yellow perch harvested in the winter were generally smaller than perch harvested during April – September. The perch harvest in this winter represented a larger proportion of total annual perch harvest than in any of the seven previous winter surveys conducted since 1985.