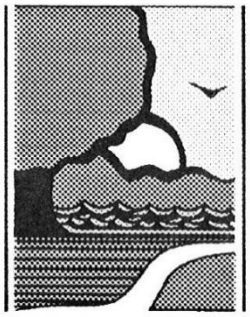

Illinois Department of Natural Resources

Division of Fisheries

Nearshore Fish Community of Lake Michigan: 2020 Summer Harbor Assessment

Rebecca A. Redman
Illinois Department of Natural Resources
Lake Michigan Program
January 13, 2021

This work was funded by Federal Aid in Sport Fish Restoration Funds (F-65-R)

Table of Contents

Executive Summary……1

Introduction……2

Methods……3

Results and Discussion……4

Recommendations……7

Acknowledgements……7

Literature Cited……7

Tables……8-12

Figures……13-16

List of Tables

Table 1. Amount of electrofishing effort (hrs:min) and water temperatures at three Illinois harbors and along the shoreline in Calumet Harbor during 2020.

Table 2. Proposed minimum lengths (mm) for Smallmouth Bass, Largemouth Bass and Rock Bass of various length categories (taken from Gabelhouse 1984).

Table 3. Fish species sampled during summer 2020 by electrofishing in three Illinois harbors and along the shoreline in Calumet Harbor. Catch-per-unit-effort (No. fish / hr electrofishing) is shown for targeted species and the presence of incidental species is denoted with the letter P.

Table 4. Catch-per-unit-effort (CPUE; No. fish / hr electrofishing) of Stock size (≥ 180 mm) Smallmouth Bass in three Illinois harbors and along the shoreline in Calumet Harbor, 2000-2020. *Caution should be used comparing 2020 CPUE among years due to reduced sampling effort as a result of Covid-19 restrictions.

Table 5. Catch-per-unit-effort (CPUE; No. fish / hr electrofishing) of Stock size (≥ 200 mm) Largemouth Bass in three Illinois harbors and along the shoreline in Calumet Harbor, 2000-2020. *Caution should be used comparing 2020 CPUE among years due to reduced sampling effort as a result of Covid-19 restrictions.

Table 6. Catch-per-unit-effort (CPUE; No. fish / hr electrofishing) of Stock size (≥ 100 mm) Rock Bass in three Illinois harbors and along the shoreline in Calumet Harbor, 2000-2020. *Caution should be used comparing 2020 CPUE among years due to reduced sampling effort as a result of Covid-19 restrictions.

List of Figures

Figure 1. Location of Lake Michigan harbors sampled in 2020.

Figure 2. Length distribution of Stock size (≥ 180 mm) Smallmouth Bass sampled at three Illinois harbors and along the shoreline in Calumet Harbor during 2020.

Figure 3. Observed weight-length relationship (white diamonds) and standard weight equation (*Ws*; black line) of Stock size (≥ 180 mm) Smallmouth Bass sampled at three Illinois harbors and along the shoreline in Calumet Harbor during 2020.

Figure 4. Length distribution of Stock size (≥ 200 mm) Largemouth Bass sampled at three Illinois harbors during 2020. No Largemouth Bass were sampled at Calumet Harbor.

Figure 5. Observed weight-length relationship (white diamonds) and standard weight equation (*Ws*; black line) of Stock size (≥ 200 mm) Largemouth Bass sampled at three Illinois harbors and during 2020.

Figure 6. Length distribution of Stock size (≥ 100 mm) Rock Bass sampled at three Illinois harbors during 2020. No Rock Bass were sampled at Calumet Harbor.

Figure 7. Observed weight-length relationship (white circles) and standard weight equation (*Ws*; black line) of Stock size (≥ 100 mm) Rock Bass sampled at three Illinois harbors during 2020.

Executive Summary

Pulsed DC electrofishing was used to assess the nearshore fish community in three Illinois harbors and the shoreline inside Calumet Harbor from mid-June to late August 2020. Sampling effort declined 63% from that in 2019 due to the Covid-19 pandemic and associated restrictions. The inability to sample during the productive spring period (May-early June) greatly reduced the number of sportfish encountered, particularly Largemouth Bass and Smallmouth Bass. Species richness was highest in North Point Marina with a total of 18 fish species detected, followed by Waukegan South Harbor (12 species). We detected 11 species in Jackson Inner Harbor and only three species along the shoreline in Calumet Harbor. Rock Bass, Pumpkinseed, Largemouth Bass, Smallmouth Bass, Bluegill, and Black Bullhead were the most abundant targeted, sportfish encountered. In 2020, a total of 40 Smallmouth Bass were collected; of these 31 were Stock size (≥ 180 mm), 19 were Quality size (≥ 280 mm), 7 were Preferred size (≥ 350 mm), and 2 were Memorable size (≥ 430 mm). No Trophy size (≥ 510 mm) Smallmouth Bass were sampled. Fifty-seven Largemouth Bass were sampled in 2020 and 18 of these were Stock size (≥ 200 mm). A total of 7 Largemouth Bass were Quality size (≥ 300 mm) and 1 Preferred size (≥ 380 mm). No Memorable (≥ 510 mm) or Trophy size (≥ 630 mm) Largemouth Bass were sampled. Overall, relative weight of Stock size Smallmouth Bass was equivalent to standard weight, but slightly higher than standard weight (*Ws*) for Stock size Largemouth Bass. A total of 135 Rock Bass were collected in 2020 and 120 of these were Stock size (≥ 100 mm). A total of 36 were Quality size (≥ 180 mm), and 4 were Preferred size (≥ 230 mm). No Memorable size (≥280 mm) or Trophy size (≥ 330 mm) Rock Bass were sampled. The relative weight of most Stock size Rock Bass was similar to or higher than standard weight.

Introduction

Several sport and non-sport fish species inhabit Illinois harbors and nearshore areas of Lake Michigan during summer. Common sport fish found in these areas include: Smallmouth Bass (*Micropterus dolomieu*), Largemouth Bass (*Micropterus salmoides*), Yellow Perch (*Perca flavescens*), Northern Pike (*Esox lucius*), Black Bullhead (*Ameiurus melas*), Rock Bass (*Ambloplites rupestris*), and several other Centrarchids (sunfish family). There has been an increasing demand for sport fishing opportunities in nearshore areas and an increased interest in the nearshore sport fishery since 1998, especially for Largemouth and Smallmouth Bass. Increases in the abundances of these warm- and cool-water fish species and angler effort for non-perch and non-salmonid fish species in the Illinois waters of Lake Michigan are evident from sport angler creel data. Prior to 1996 no estimate of Smallmouth Bass harvest could be calculated from creel data because few were found in the possession of anglers. However, by 2000 anglers reported catching an estimated 4,892 Smallmouth Bass (Brofka and Dettmers 2006) and within the last five years annual catch ranged from approximately 3,840 to a peak of 12,951 Smallmouth Bass in 2018 (pers. comm. C. Roswell, INHS).

Historical stocking of juvenile Smallmouth Bass in Illinois harbors may or may not have contributed to the establishment of sustainable populations. For example, no stocking records exist for Largemouth Bass and yet they are also observed in the nearshore fish community. Regardless, stocking events for Smallmouth Bass were small scale, sporadic and last occurred in 1985. Since that time, young-of-year (YOY) Smallmouth Bass have been captured at multiple sites that were never stocked and have been collected in areas where no Smallmouth Bass were collected in the past (e.g., Farwell Avenue Pier since 2000). Both these observations suggest that natural reproduction and immigration have allowed Smallmouth Bass to expand its range along the Illinois shoreline. In regards to Largemouth Bass, there are several potential sources for brood fish to have entered Lake Michigan in the past, such as the Lake Calumet complex, Wolf Lake, the Japanese Gardens ponds at 59th Street Harbor, Lincoln Park Zoo ponds, the diversion structure at the North Branch of the Chicago River (Wilmette), and Prairie Cove Harbor on the Illinois/Wisconsin state line. Remnant populations of brood fish may have existed in these locations until recent changes in the lake favored their dispersal. Over the past 10 years, monitoring data suggest stable abundance of Smallmouth Bass, a downward trend in the abundance of Largemouth Bass, but quality sizes of both species within Illinois waters of Lake Michigan. In fact, during 2019 a pedestrian angler landed the new Illinois state record Smallmouth Bass (22.5 inch, 7lb 3oz) along the shoreline at Monroe Harbor.

Although management of fish species inhabiting nearshore areas has been incorporated into the Illinois Strategic Plan for Lake Michigan fisheries since the early 1980s, personnel and funding deficiencies did not allow their investigation until 1995. This assessment program was developed to monitor the relative abundance and

distribution of nearshore sport fish species and to determine whether those species were susceptible to overexploitation by tracking changes in relative abundances over time. Species composition, abundance, and length distribution data were previously obtained through incidental catches of non-salmonid fish species during fall electrofishing for returning salmonids and through a sport angler creel survey. During creel surveys sport anglers were interviewed, fish in their possession were measured and weighed, and estimated sport harvest was used as an index of the relative abundance of these fish species. Abundance and species composition data obtained through a creel survey, however, may be biased because anglers target specific species, effort is not equivalent at all locations, and harvest (rather than total catch) is usually reported. In addition to biological information (e.g., length and weight), an understanding of seasonal dispersal patterns of the sport fish associated with the nearshore fish community is required to effectively manage these species. If sport fish dispersal patterns for Lake Michigan are like the patterns observed in Lake Ontario, then some of these fish species will inhabit protected areas early in the year and later move into open lake areas once water temperatures reach 15° C (Danehy 1984).

The objectives of this ongoing study are to: 1) determine the fish species composition of select Illinois harbors and nearshore areas of Lake Michigan; 2) monitor changes in the relative abundances of Smallmouth and Largemouth Bass and other sport fish through time; 3) evaluate intra- and inter-annual fidelity of Smallmouth and Largemouth Bass to harbors; 4) monitor size structure and growth indices for sport fish inhabiting these harbors; and 5) collect age-composition data during select years which may eventually be used to determine recruitment rates of the most abundant fish species.

Methods

Fish were sampled using a boat electrofishing pulsed-DC control box (Smith-Root Inc.) capable of delivering 5kw from the GPP 5.0 generator to the electrodes. Pulse frequency was set to 60 Hz and duty-cycle was internally controlled. Total sampling time was based on harbor size, weather conditions, and the amount and type of fish collected. Selection of sampling sites (Figure 1) was based on harbor configurations that were conducive to electrofishing (i.e., availability of shallow water areas <3 m in depth), availability of a launch ramp, and sport-angler creel survey data. Three Illinois harbors and the shoreline inside Calumet Harbor were sampled in 2020 (Table 1). Sampling at North Point Marina was limited to the inner entrance of the north harbor, the channel connecting the north and south harbors, and the south harbor. At Waukegan, the south harbor was sampled, and the inner harbor was sampled at Jackson Harbor. The Calumet Harbor site consisted of the rip-rap shoreline between the Calumet River and the north slip within Calumet Harbor. In addition, the north face of the confined disposal facility and the south face of the Calumet breakwall were sampled when weather and waves permitted. Due to the Covid-19 pandemic and associated restrictions, sampling was delayed until 15 June

2020. As a result, sampling effort declined 63% from that in 2019 and the inability to sample during the productive spring period (May-early June) greatly reduced the number of Largemouth and Smallmouth Bass encountered.

Sport fish species were the target of electrofishing sampling effort. We attempted to capture all Largemouth and Smallmouth Bass that were encountered except for bass fry whose presence was only noted. Other targeted species (e.g., Rock Bass, Crappie, Yellow Perch) were subsampled to obtain a representative distribution of sizes. The presence of non-target, incidental species (e.g., Alewife, Gizzard Shad, White Sucker, and Common Carp) was usually only noted, but when possible established aquatic nuisance species (e.g., Goldfish, Koi) were captured and removed from the water. All other sampled fish were dip-netted and held onboard in a 100-gallon tank filled with a 0.5% solution of NaCl and lake water. An oxygen cylinder with an air stone was used to increase retention time and keep the fish alive while biological data were obtained. Fish were measured to the nearest 5 mm (maximum total length) and weighed to the nearest 10 grams. No pit-tagged Smallmouth or Largemouth Bass were collected during 2020. In a collaborative effort with Shedd Aquarium staff, we collected a small amount of caudal fin tissue from Smallmouth and Largemouth Bass ≥ 150 mm for stable isotope analysis. This quick and minimally invasive technique can provide a glimpse into longer-term dietary habits compared to what can be gleaned from stomach content analysis at the time of capture, and can be done without having to sacrifice the fish. Results from this effort will be shared upon completion of the sample analysis.

Catch-per-unit-effort (CPUE) for targeted species was calculated as the number of fish per hour of electrofishing effort. Relative Stock Density (RSD) for Quality, Preferred, and Memorable length fish were calculated for Smallmouth and Largemouth Bass (Table 2; Gabelhouse 1984 as reported in Anderson and Neumann 1996). Relative Weight (*Wr*; a measure of a fish's body condition or plumpness) of Smallmouth Bass, Largemouth Bass, and Rock Bass was compared to species-specific Standard Weight (*Ws*) equations taken from Anderson and Neumann (1996). Only fish collected after 24 June were included in this analysis because pre-spawn fish tend to have inflated *Wr* values.

Results and Discussion

Species Composition

Overall, we sampled 10 targeted, sportfish species and 15 non-targeted (incidental) species by electrofishing during 15 June – 24 August 2020. The highest number of species was detected in North Point Marina (18 species), followed by Waukegan South Harbor (12 species), Jackson Inner Harbor (11 species), and then Calumet Harbor (3 species). Rock Bass, Pumpkinseed, Largemouth Bass, Smallmouth Bass, Bluegill, and

Black Bullhead were the most abundant targeted, sportfish encountered. The presence and abundance of sportfish differed among harbors. For example, abundance of Rock Bass and Pumpkinseed was much higher in North Point Marina than at any other sampling location (Table 3). The highest CPUE (No. fish/hr) of Largemouth Bass and Black Bullhead occurred at Jackson Harbor and a large diversity of Centrarchids was also collected at this site. Smallmouth Bass was the only species collected at Calumet during 2020. This is likely a result of the Calumet site being an open-lake area more exposed to wave action, slower warm up during the spring, and rapid changes in water temperatures during the summer. All of these factors may reduce the establishment of aquatic vegetation and Centrarchids.

The types of sport fish species we encountered in the three protected harbors (North Point Marina, Waukegan Harbor and Jackson Harbor) were similar to those typically found in warm-water inland lakes with similar habitats. It is likely that increased water clarity and aquatic vegetation in the protected areas of these harbors have produced favorable conditions for a number of these cool- and warm-water fish species (Jude et al. 2002). One major difference between these harbors and inland lakes is the abbreviated growing season in the harbors caused by influxes of cool water from the main lake, which suppresses water temperatures in the spring and can intermittently decrease temperatures during summer upwellings. A second difference is the relatively restricted fishing access; much of the area within these harbors is dedicated to moored vessels and closed to fishing. Thus, Illinois harbors likely act as refuges on Lake Michigan where populations of warm-water fish may grow in a near natural state with limited fishing mortality.

Smallmouth Bass

A total of 40 Smallmouth Bass were measured and weighed in 2020; a large decline from that reported in 2019 largely due to reduced effort, particularly during the spring. Thirty-one fish were Stock size (≥ 180 mm). Most Stock size Smallmouth Bass were collected at Calumet Harbor (N=13) and Waukegan South Harbor (N=12), followed by North Point Marina (N=4), and then Jackson Inner Harbor (N=2). Catch-per-unit-effort (CPUE) of Stock size Smallmouth Bass was similar to that reported in 2019 at North Point Marina, increased at Waukegan South Harbor, and decreased at Jackson and Calumet harbors (Table 4). The nearly 60% decline in annual CPUE at Calumet Harbor can in large part be attributed to the lack of sampling during spring (May thru early June) when most of these fish are typically caught at this location.

Most Smallmouth Bass sampled in 2020 were of Quality size (N=19), fewer of Preferred size (N=7), and still fewer of Memorable size (N=2). No trophy size Smallmouth Bass (≥ 510 mm) were collected in 2020. Stock size Smallmouth Bass ranged in length from 185-460 mm and multiple size classes were represented in 2020

(Figure 2). The average relative weight (*Wr*) of Smallmouth Bass sampled in 2020 was 102 and the measured weights of these fish were similar to standard weights (*Ws*; Figure 3).

Largemouth Bass

We sampled 57 Largemouth Bass in 2020 and 18 of these fish were Stock size (≥ 200 mm), which is a large decline from that reported in 2019 likely due to reduced effort, particularly during spring. Most Largemouth Bass were collected at Jackson Harbor (N=29), followed by North Point Marina (N=23), and then Waukegan Harbor (N=5). No Largemouth Bass were collected along the shoreline in Calumet Harbor. CPUE of Stock size Largemouth Bass increased at North Point Marina, but declined at Waukegan and Jackson Inner Harbor compared to 2019 (Table 5). The 77% decline in annual CPUE at Jackson Harbor can in large part be attributed to lack of sampling during spring (May thru early June) when most of these fish are typically caught at this location.

Seven Largemouth Bass sampled in 2020 were Quality size and 1 fish was Preferred size. No memorable (≥ 510 mm) or trophy size (≥ 630 mm) Largemouth Bass were sampled. Stock size Largemouth Bass ranged in length from 285-390 mm and multiple size classes were represented in 2020 (Figure 4). The average relative weight (*Wr*) of Stock size Largemouth Bass was 107 in 2020 and the measured weights of these fish were slightly higher than standard weights (Ws; Figure 5).

Rock Bass

Rock Bass were more abundant than Smallmouth or Largemouth Bass in our sample efforts during 2020 and our highest catches occurred in North Point Marina. CPUE of Stock size Rock Bass increased at North Point Marina, but declined at the three other harbors compared to 2019 (Table 6). We sampled a total of 135 Rock Bass in 2020 of which 120 were Stock size (≥ 100 mm). Several Rock Bass were Quality size (N = 36) and fewer were Preferred size (N = 4). No memorable (≥ 280 mm) or trophy size (≥ 330 mm) Rock Bass were collected. Stock size Rock Bass ranged in length from 285-390 mm and multiple size classes were well represented in 2020 (Figure 6). The average relative weight (*Wr)* of Rock Bass was 98 in 2020. Measured weights were similar to standard weights for smaller Rock Bass (< 175 mm) and higher than standard weights for larger fish (*Ws*; Figure 7).

Recommendations

1. Monitor angler effort directed at Smallmouth and Largemouth Bass and potential population expansions using shoreline creel surveys.
2. Collect a representative sample of abundant sport fish species during select years to determine ages.

Acknowledgements

This study was conducted using Federal Aid in Sport Fish Restoration funds (grant number F-65-R).

Literature Cited

Anderson, R. O., and R. M. Neumann. 1996. Length, weight, and associated structural indices. Pages 447–482 *in* Murphy, B. R., and D. W. Willis (eds.) *Fisheries Techniques* (2nd ed.). American Fisheries Society, Bethesda, Maryland.

Brofka, W. A., and J. M. Dettmers. 2006. A survey of sport fishing in the Illinois portion of Lake Michigan. Aquatic Ecology Technical Report 06/04. Illinois Natural History Survey. 66 pp.

Danehy, R. J. 1984. Comparative ecology of fishes associated with natural cobble shoals and sand substrates in Mexico Bay, Lake Ontario. MS Thesis. State University of New York, Syracuse. 84 pp.

Gabelhouse, D.W. 1984. A length categorization system to assess fish stocks. North American Journal of Fisheries Management 4:273-285.

Jude, D., Stoermer, E., Johengen, T., and A. N. Perakis. 2002. Non-indigenous species in the Great Lakes: ecology, interactions, impacts, and future research directions. White paper prepared for the University of Michigan's Great Lakes Initiative. 39 pp.

Table 1. Amount of electrofishing effort (hrs:min) and water temperatures at three Illinois harbors and along the shoreline in Calumet Harbor during 2020.

Sampling Date	*Location*			
	North Point Marina	*Waukegan South Harbor*	*Jackson Inner Harbor*	*Calumet Harbor*
15, 16, 17, 25 June	*0:56 / 62F*	*0:31 / 64F*	*0:19 / 77F*	*0:39 / 66F*
15, 20, 21 July	*1:00 / 68F*	*0:32 / 68F*	*0:37 / 81F*	*0:25 / 78F*
5, 6, 10 August	*0:58 / 76F*	*0:30 / 72F*	*0:37 / 70F*	*0:43 / 73F*
24 August	-	*0:26 / 77F*	-	-

Table 2. Proposed minimum lengths (mm) for Smallmouth Bass, Largemouth Bass and Rock Bass of various length categories (taken from Gabelhouse 1984).

Species	Size designation				
	Stock	Quality	Preferred	Memorable	Trophy
Smallmouth Bass	180	280	350	430	510
Largemouth Bass	200	300	380	510	630
Rock Bass	100	180	230	280	330

Table 3. Fish species sampled during summer 2020 by electrofishing in three Illinois harbors and along the shoreline in Calumet Harbor. Catch-per-unit-effort (No. fish / hr electrofishing) is shown for targeted species and the presence of incidental species is denoted with the letter P.

	Location			
Target Species	North Point Marina	Waukegan South Harbor	Jackson Inner Harbor	Calumet Harbor
Black Bullhead	0.51		16.03	
Bluegill	8.59	2.07	8.97	
Green Sunfish	2.53	1.03		
Largemouth Bass	11.62	1.72	18.59	
Northern Pike		0.35		
Pumpkinseed	34.34	6.21	10.26	
Rock Bass	58.08	6.21	1.28	
Smallmouth Bass	5.56	4.83	1.28	6.15
Warmouth	0.51			
Yellow Perch	2.53	1.03		
Incidental Species				
Alewife	P	P	P	
Banded Killifish	P		P	
Blackstripe Topminnow	P			
Bluntnose Minnow			P	
Bowfin	P			
Brown Trout				P
Buffalo spp.	P		P	P
Common Carp	P	P	P	
Fathead Minnow	P			
Gizzard Shad	P	P	P	
Golden Shiner	P			
Rainbow Trout				P
Round Goby	P	P	P	P
Spottail Shiner		P		
White Sucker	P	P		

Table 4. Catch-per-unit-effort (CPUE; No. fish / hr electrofishing) of Stock size (≥180 mm) Smallmouth Bass in three Illinois harbors and along the shoreline in Calumet Harbor, 2000-2020. *Caution should be used comparing 2020 CPUE among years due to reduced sampling effort as a result of Covid-19 restrictions.

	Location			
Year	North Point Marina	Waukegan South Harbor	Jackson Inner Harbor	Calumet Harbor
2000	22.67	0.80	6.00	69.62
2001	20.66	8.00	9.06	19.64
2002	22.34	6.91	12.67	42.67
2003	10.19	3.69	5.65	12.57
2004	13.21	2.00	7.95	34.07
2005	15.35	3.98	1.09	15.71
2006	11.34	10.36	1.41	28.93
2007	4.17	2.62	0	30.79
2008	9.19	8.67	2.75	26.38
2009	7.67	2.14	2.11	20.70
2010	4.49	0.56	2.80	21.51
2011	12.57	5.79	2.41	14.52
2012	5.59	7.12	1.47	20.16
2013	5.43	3.60	0.54	17.42
2014	3.58	5.92	3.91	18.75
2015	2.49	3.82	1.23	22.67
2016	1.17	3.90	0	16.03
2017	5.17	3.86	1.89	16.24
2018	3.78	2.14	4.12	16.30
2019	1.67	1.38	4.56	15.66
2020*	1.38	7.07	1.25	6.15

Table 5. Catch-per-unit-effort (No. fish / hr electrofishing) of Stock size (≥200 mm) Largemouth Bass in three Illinois harbors and along the shoreline in Calumet Harbor, 2000-2020. *Caution should be used comparing 2020 CPUE among years due to reduced sampling effort as a result of Covid-19 restrictions.

	Location			
Year	North Point Marina	Waukegan South Harbor	Jackson Inner Harbor	Calumet Harbor
2000	26.33	17.20	30.00	0.63
2001	22.70	35.50	38.19	0.36
2002	26.98	24.73	42.67	0.67
2003	22.27	14.29	31.85	0.58
2004	54.40	35.00	74.43	1.47
2005	64.82	42.61	115.22	1.19
2006	36.51	31.53	56.34	1.02
2007	33.82	31.46	20.97	0
2008	51.59	14.67	48.62	0.43
2009	33.92	16.43	24.47	0
2010	19.16	10.61	30.84	0
2011	15.50	4.96	39.76	0
2012	10.66	7.12	19.06	0
2013	15.13	15.2	18.80	0
2014	19.32	9.17	16.29	0
2015	8.19	3.82	16.31	0
2016	3.51	1.46	13.66	0.42
2017	7.68	2.97	19.73	0
2018	5.26	4.50	16.25	0
2019	2.65	1.38	8.46	0
2020*	4.83	0.51	1.92	0

Table 6. Catch-per-unit-effort (No. fish / hr electrofishing) of Stock size (≥ 100 mm) Rock Bass in three Illinois harbors and along the shoreline in Calumet Harbor, 2000-2020. *Caution should be used comparing 2020 CPUE among years due to reduced sampling effort as a result of Covid-19 restrictions.

	Location			
Year	North Point Marina	Waukegan South Harbor	Jackson Inner Harbor	Calumet Harbor
2000	17.00	27.20	0.67	2.53
2001	11.48	22.50	0	5.09
2002	17.17	24.36	2.67	7.33
2003	12.09	31.34	2.42	3.51
2004	10.88	28.00	1.14	0.49
2005	19.83	21.02	4.35	0
2006	14.74	10.81	0	5.08
2007	16.18	14.98	0	5.30
2008	45.94	30.67	0	7.23
2009	47.49	5.71	1.27	4.85
2010	19.46	10.06	0.47	4.66
2011	31.58	21.49	4.22	0
2012	50.00	22.37	1.17	3.46
2013	50.66	22.40	3.27	2.44
2014	32.92	16.57	5.54	2.50
2015	29.54	10.88	5.85	1.00
2016	33.33	20.49	4.92	0.84
2017	37.22	21.36	3.24	1.86
2018	50.88	17.13	5.03	0.92
2019	33.01	22.93	2.82	1.96
2020*	36.55	8.08	1.28	0

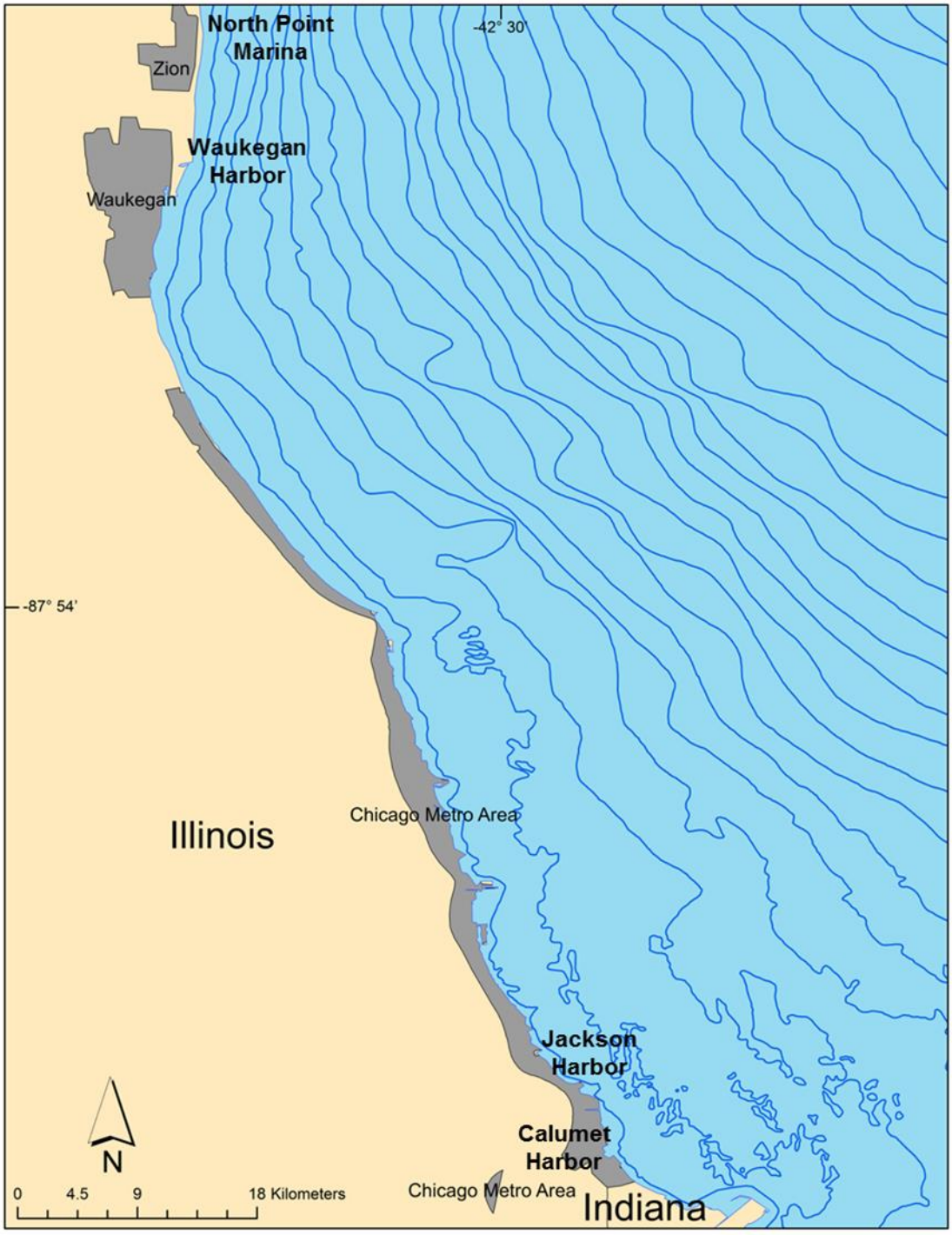

Figure 1. Location of Lake Michigan harbors sampled in 2020.

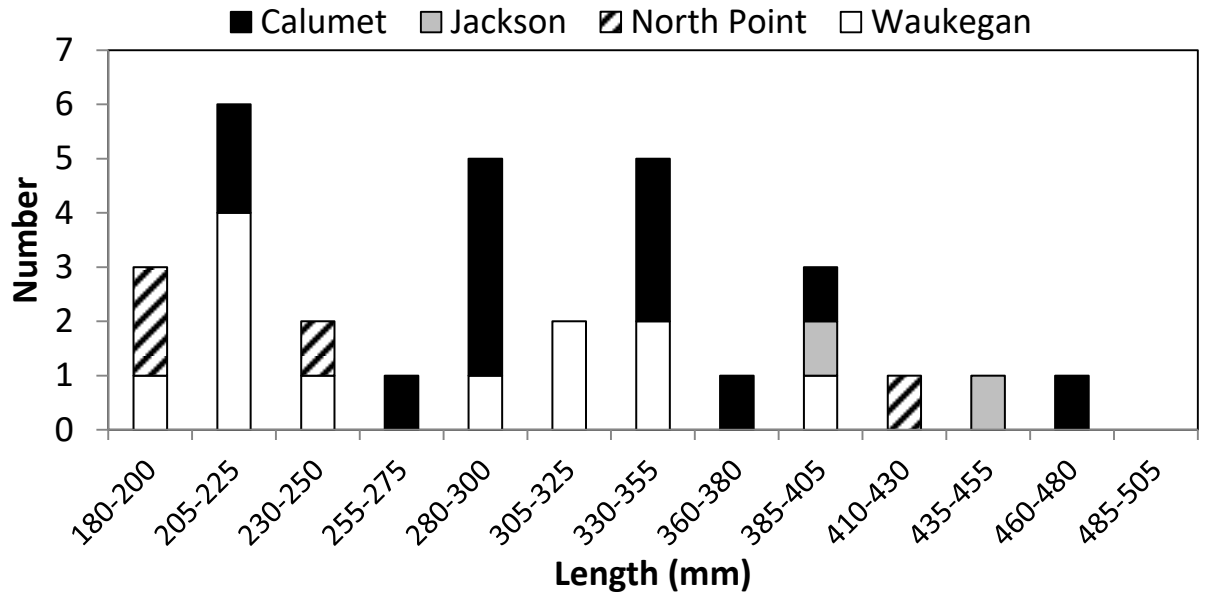

Figure 2. Length distribution of Stock size (≥ 180 mm) Smallmouth Bass sampled at three Illinois harbors and along the shoreline in Calumet Harbor during 2020.

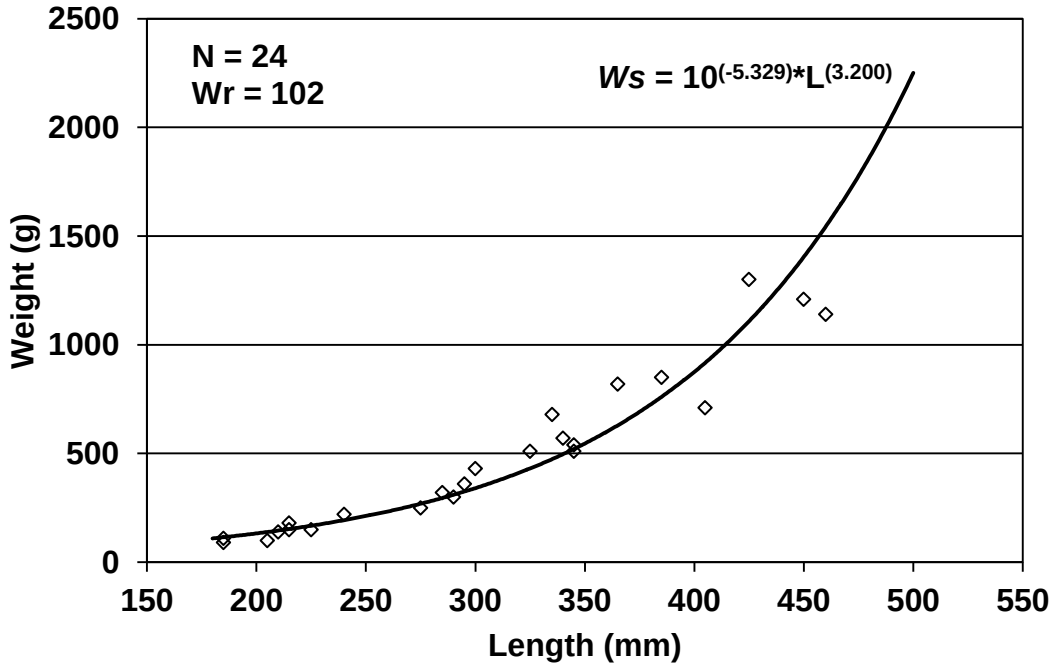

Figure 3. Observed weight-length relationship (white diamonds) and standard weight equation (*Ws*; black line) of Stock size (≥ 180 mm) Smallmouth Bass sampled at three Illinois harbors and along the shoreline in Calumet Harbor during 2020.

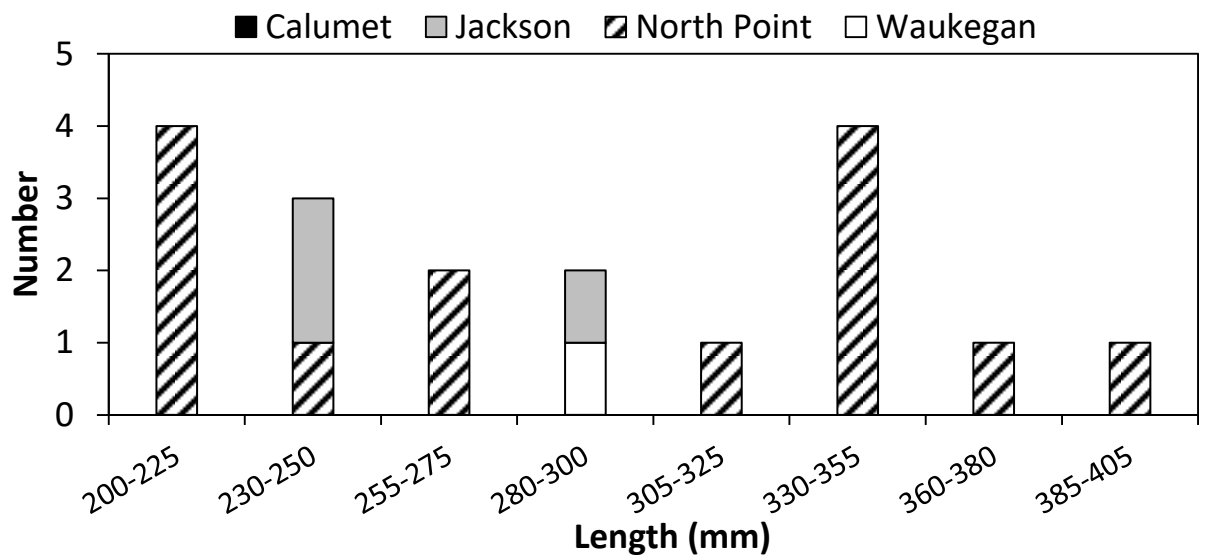

Figure 4. Length distribution of Stock size (≥ 200 mm) Largemouth Bass sampled at three Illinois harbors during 2020. No Largemouth Bass were sampled at Calumet Harbor.

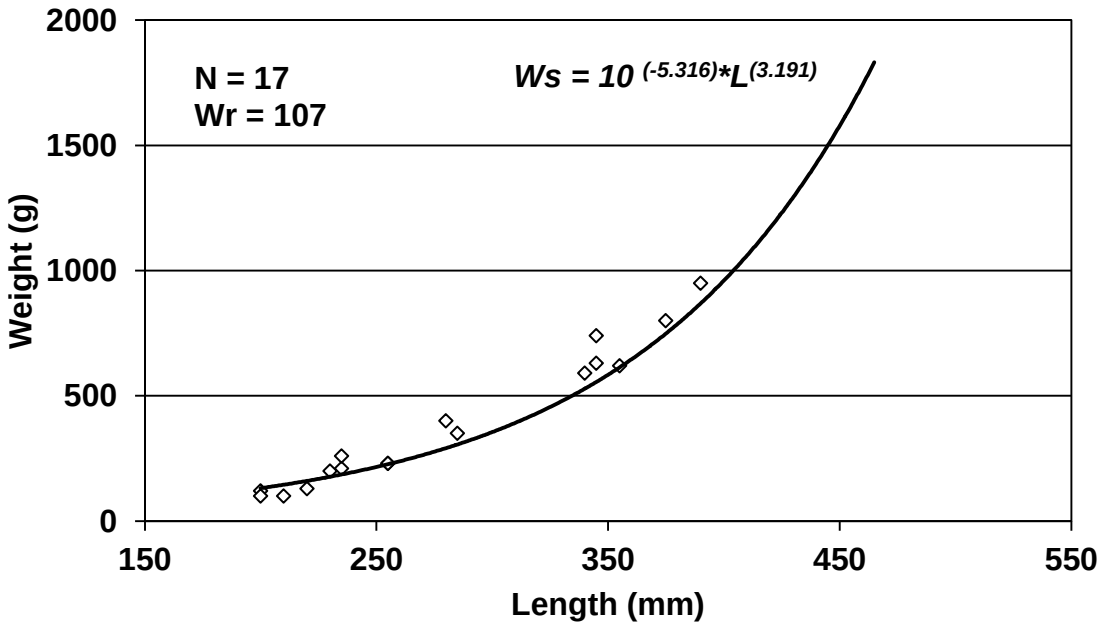

Figure 5. Observed weight-length relationship (white diamonds) and standard weight equation (*Ws*; black line) of Stock size (≥ 200 mm) Largemouth Bass sampled at three Illinois harbors during 2020.

]

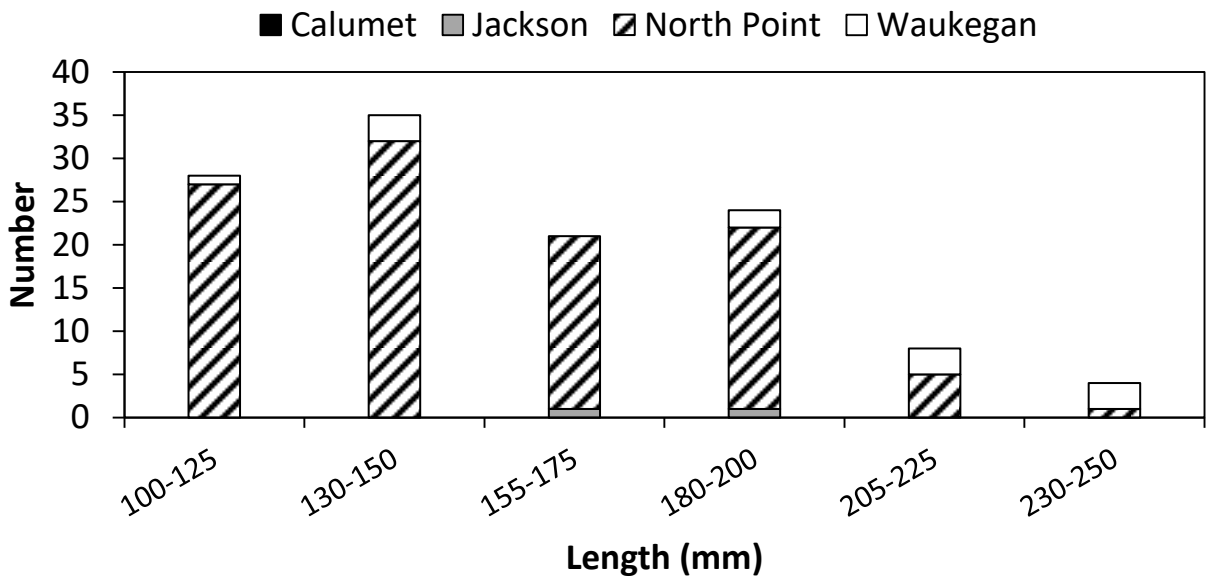

Figure 6. Length distribution of Stock size (≥ 100 mm) Rock Bass sampled at three Illinois harbors during 2020. No Rock Bass were sampled at Calumet Harbor.

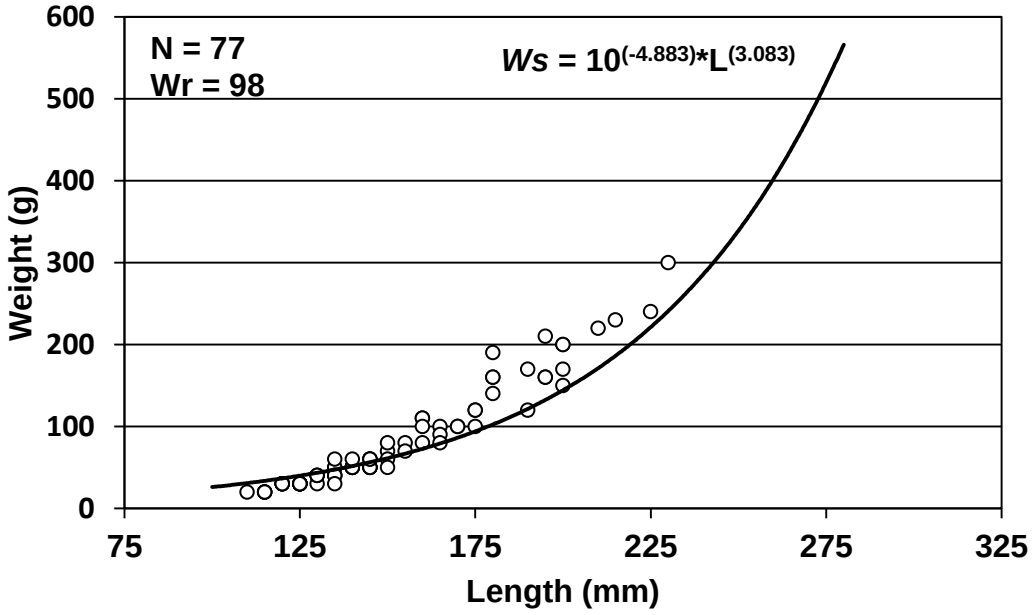

Figure 7. Observed weight-length relationship (white circles) and standard weight equation (*Ws*; black line) of Stock size (≥ 100 mm) Rock Bass sampled at three Illinois harbors during 2020.