Highlights of the Annual Lake Committee Meetings

Great Lakes Fishery Commission proceedings, Ypsilanti, Michigan

This is the third of a series of annual special reports and adds updates to the second report – Lake Erie – and adds information on St. Clair. These lake committee reports are usually from the annual Lake Committee meetings hosted by the Great Lakes Fishery Commission, but the Lake Committee meetings were canceled for this year. We encourage reproduction with appropriate credit to the GLSFC and the agencies involved. Our thanks to the staffs of the GLFC, OMNRF, USFWS, USGS, NYSDEC and Michigan & Ohio DNRs for their contributions to these science documents.

Lake Erie Update and Lake St. Clair

Index of Reports

Abbreviation	Expansion
CPH	Catch per hectare
CWT	Coded Wire Tag
DEC	NY Dept. of Environment Conservation
DFO	Dept. of Fisheries and Oceans
LEBS	Lake Erie Biological Station
LEC	Lake Erie Committee
MDNR	MI Dept. of Natural Resources
ODNR	Ohio Dept. of Natural Resources
OMNR	ON Ministry Natural Resources
OSU	The Ohio State University
SLCP	Sea Lamprey Control Program
USFWS	U.S. Fish and Wildlife Service
WTG	Walleye Task Group
YAO	Age 1 and older
YOY	Young of the year (age 0)

Ohio's Lake Erie Fisheries 2019 Report

Executive Summary

The ODNR-DOW Lake Erie Fisheries Program manages sport and commercial fisheries for the 2.24 million acres of water under Ohio's jurisdiction. Within this area, sampling activities are directed at three districts and provide information on how the fisheries and food web respond to changes in the ecosystem.
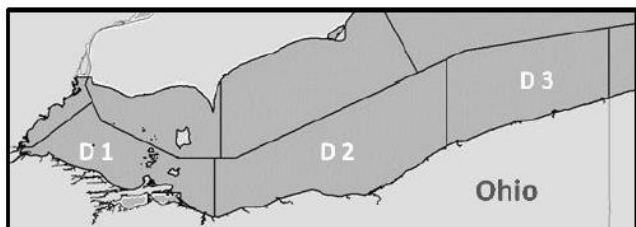

Fig 1- Ohio's Lake Erie districts: District 1 (western), District 2 (west-central), and District 3 (east-central).

Walleye

Walleye fishing was excellent in 2019 thanks to recent strong hatches. Ohio recruitment was the 2nd highest on record during 2019 in the western basin in both our August and Fall surveys. Additionally, central basin walleye hatches were some of the highest on record, indicating strong recruitment to the fishery in coming years.
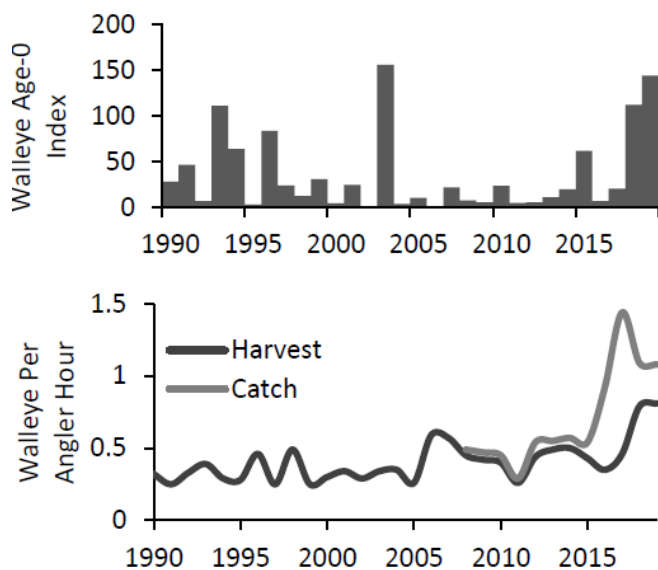

Fig 2-Ohio's Lake Erie walleye - Top: western basin recruitment index of age-0 fish (catch-per-hectare).
Bottom: Targeted walleye fishing rates. Recording of total catch started in 2008.

Yellow Perch

Yellow perch catch rates in the Western basin were low in 2019 despite recent years of recruitment. Hatches continue to be near or above average in the western basin, signaling consistent fishing opportunities across multiple year classes. However, angler harvest for 2019 was estimated at 559 thousand perch with a harvest rate of only 1.6 fish per angler hour.
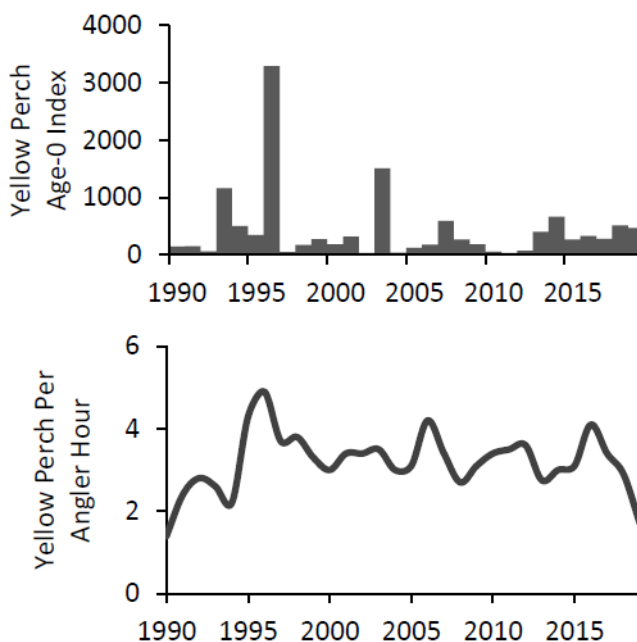
Fig 3-Ohio's western basin Lake Erie yellow perch – Top: Recruitment index of age-0 fish (catch-per-hectare).
Bottom: Targeted fishing rates for western basin yellow perch.

Yellow perch fishing catch rates in the Central basin were low in 2019. Recruitment indices have been below average since 2014. Angler harvest and targeted angler hours in 2019 were the lowest since the creel survey began 1980.

The Lake Erie yellow perch commercial fishery experienced reduced harvests in all three management units. The decreased harvest in MU2 is partially dictated by lower quota allocations. Catch rates declined 62% in MU1 and 44% in MU2 and MU3. The lakewide catch rate was 105 pounds per lift, down 46% from the 2018 catch rate of 193 pounds per lift.
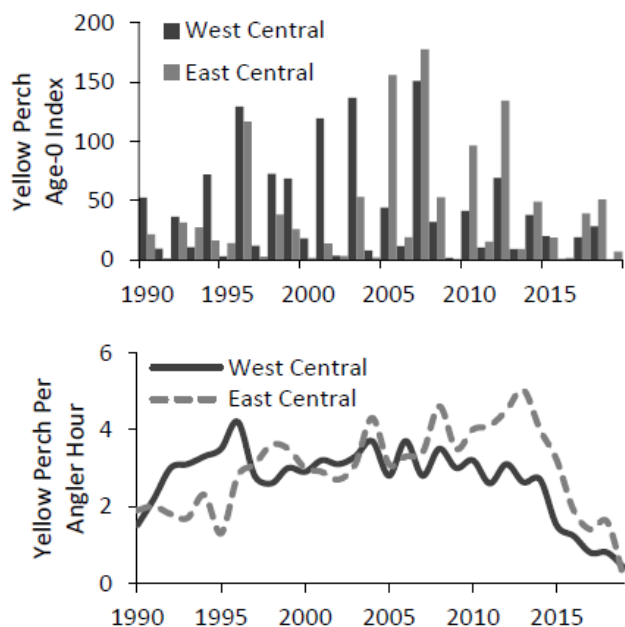
Fig 4-Ohio's Central basin Lake Erie yellow perch – Top: Relative abundance of age-0 fish (catch-per-hectare) Bottom: Targeted yellow perch fishing rates for the central basin.

Smallmouth and Largemouth Bass

Smallmouth bass fishing in 2019 was consistent with recent years. A new trophy regulation was imposed in 2019 where an angler may harvest one fish greater than 18″ daily from May 1 through June 21. Prior to this year, the spring season has been closed since 2004.

The average size of smallmouth bass in 2019 was 16 inches long with a weight of 2.6 pounds. Largemouth bass fishing continued to be strong in 2019. The average length of

harvested largemouth bass was 16.5 inches with an average weight of 2.4 pounds in 2019. This fishery continues to produce exceptional catches and some large fish in nearshore areas and harbors across Ohio's Lake Erie waters.
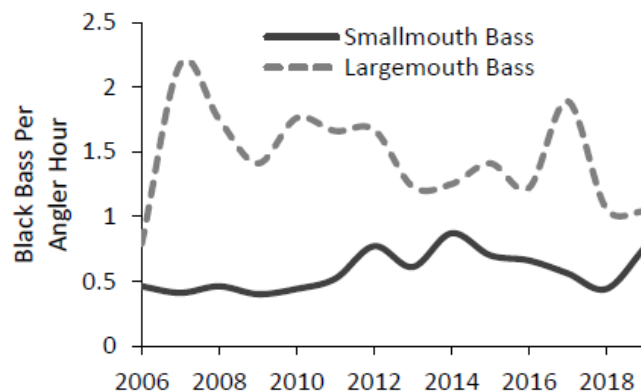

Fig 5-Smallmouth and largemouth bass targeted fishing rates.

Steelhead Trout

Tributary and open lake fisheries should remain stable with continued annual stocking of yearling steelhead. In 2019, ODNR hatchery personnel raised and stocked 586,413 steelhead that were a mix of Little Manistee, Chambers Creek and Ganaraska strains.

Annual targeted steelhead stocking numbers will remain the same for 2020 (450,000). Stocking locations will also remain the same as previous years. The Lake Erie 2019 recreational harvest came from the central basin and was below the 10-year mean with harvest and release rates around 0.02 to 0.01 fish per angler hour, respectively.

Table 1-Private and charter combined angler harvest (numbers of fish) of major species, by statistical district and month, in the Ohio waters of Lake Erie during 2019.

District	Fishery	Walleye	Yellow Perch	White Bass	Smallmouth Bass	Largemouth Bass	Freshwater Drum	Channel Catfish	White Perch	Steelhead Trout	Others[a]	Total
1	Private	1,076,249	499,516	8,843	1,444	1,485	695	5,869	5,834	0	7,682	1,607,617
	Charter	220,542	31,808	839	3,065	0	727	1,256	2,080	0	0	260,317
	All	1,296,791	531,324	9,682	4,509	1,485	1,422	7,125	7,914	0	7,682	1,867,934
2	Private	904,746	22,431	7,566	0	0	1,634	1,566	3,111	1,457	123	942,634
	Charter	42,365	421	394	0	0	0	8	527	22	0	43,737
	All	947,111	22,852	7,960	0	0	1,634	1,574	3,638	1,479	123	986,371
3	Private	283,286	4,391	140	247	0	0	535	132	1,220	386	290,337
	Charter	31,171	12	61	0	0	0	121	0	188	0	31,553
	All	314,457	4,403	201	247	0	0	656	132	1,408	386	321,890
All	Private	2,264,281	526,338	16,549	1,691	1,485	2,329	7,970	9,077	2,677	8,191	2,840,588
	Charter	294,078	32,241	1,294	3,065	0	727	1,385	2,607	210	0	335,607
	All	2,558,359	558,579	17,843	4,756	1,485	3,056	9,355	11,684	2,887	8,191	3,176,195

Forage Fish Community

Indices of abundance were about half of the ten-year averages for all forage species in the western basin in August. Adult and young emerald shiner abundances have plummeted to near zero and have been low since 2015. Gizzard shad abundance was also low (~14% of average), while round gobies increased to near average levels in 2019.

August forage indices in the central basin were below long-term means, with most species being below ten-year averages for the last two years. September forage indices did not improve over August relative to long-term trends. The main forage species of rainbow smelt, emerald shiner, and gizzard shad had indices below their ten-year averages.
End ✧

Ohio's Lake Erie Fisheries Assessment 2019

Lake Erie Fisheries Monitoring Program

The mission of the Ohio Department of Natural Resources is to conserve and improve fish and wildlife resources and their habitats for sustainable use and appreciation by all. The Lake Erie Fisheries Program within the ODNR manages sport and commercial fisheries for the 2.24 million acres of Lake Erie under Ohio's jurisdiction. In this report we summarize the annual Lake Erie fish and fisheries assessment, research, and other projects conducted by our fisheries personnel at our Sandusky and Fairport Harbor Fisheries Research Stations.

Objectives of Ohio's Lake Erie Fisheries Assessment Program:

● To monitor the fish community with standardized bottom trawl, gill net, electrofishing, and hydroacoustic gears to obtain detailed age-specific relative abundance, recruitment, growth rates, maturation rates, diets, and distribution for walleye, yellow perch, white bass, white perch, smallmouth bass, steelhead and lake whitefish, and general age-0, age-1 and older abundance for all other species.

● To conduct creel on targeted sport fisheries for walleye, yellow perch, white bass, smallmouth bass, and steelhead trout in the lake during April – October, and for walleye fisheries in the Sandusky and Maumee Rivers during March-

April, to quantify catch, effort, and size and age characteristics of the sport harvest.

● To collect water temperature, dissolved oxygen, water transparency, phytoplankton, zooplankton size/species composition, total phosphorus, and benthos data following protocols of the Forage Task Group to assess forage base conditions.

Sport Fishery Survey

Open lake access point direct contact creel surveys were conducted at 40 major boat departure sites along Ohio's portion of the Lake Erie shoreline April - October 2019. In total, 4,875 interviews were completed and 6,209 fish measurements were collected for the open lake survey. Interviews of anglers that fished Sandusky Bay (private boats) and Lake Erie tributaries (private and charter boats) were excluded from the estimates. Private and charter boat estimates of harvest and effort were based on 4,724 boat interviews and 8,097 interval boat counts. Tributary fisheries were assessed using a direct contact creel survey conducted at 12 access points on the Maumee and Sandusky rivers, March-April 2019 to characterize harvest, effort, and catch rates for walleye during the spring spawning run. A total of 257 interviews were completed and 128 fish length measurements were collected from the tributary fisheries.

Table 1-Summary of walleye and white bass angler interviews for the 2019 spring fishery on the Sandusky and Maumee rivers.

River	Target Species	Month	Type	Interviews N	Anglers	Angler Hours	Harvest Walleye
Sandusky	Walleye	March	Shore	78	141	403	0.05
		April	Shore	44	73	258	0.12
		May	Shore	-	-	-	-
		All		122	214	661	0.09
Maumee	Walleye	March	Shore	51	74	215	0.19
		April	Shore	45	89	393	0.24
		May	Shore	-	-	-	-
		All		96	163	608	0.22

Commercial Catch Reports

Catch reports (both electronic and paper reports) were edited and summarized by gear, month and species. In total, 1,443 daily catch records were summarized, which documented 3.81 million lbs of fish harvested during the 2019 season. Trap net harvested yellow perch were sampled for harvest-at-age estimates. Across all basins, 2,936 yellow perch were measured, with a subsample of 893 being sampled for weight and age analysis.

Bottom trawl

Population assessment surveys were conducted in the western basin from May 21, 2019 through October 8, 2019 and in the central basin from June 12, 2019, through October 28, 2019. For the central basin, the lake remained thermally stratified and hypoxic well into late October and caused the delay of the fall survey. Overall, 30 species were collected, including 67,021 fish in the western basin compared to 23 species and 44,213 individual fish in the central basin. From the western basin samples 633 yellow perch were aged. From the central basin trawl surveys, there were 1,526 fish aged and 877 diets were assessed across seven species (walleye, yellow perch, white bass, burbot, steelhead, whitefish, and smallmouth bass). Total number of trawls and corresponding water profile measurements are included below by month

Basin	Sample	May	June	July	August	September	October
Western	Trawls	23	23	23	37	22	14
	Water Profiles	23	23	23	37	22	14
Central	Trawls	-	54	24	20	-	36
	Water Profiles	-	18	10	13	-	12

Gill net

Twenty-four overnight gill net sets were fished during September 5-19, 2019 to assess smallmouth bass populations in the western (n=8) and central basins (n=16). Fifty-three overnight kegged gill net sets were planned during September 23 – November 11, 2019 to assess adult walleye and white bass population abundance, recruitment, maturity, age and growth in the western (n=12) and central (n=41) basins. We accomplished 35 overnight kegged gill nets in the western (n=12) and in the central (n=23) basins.

Hydroacoustics
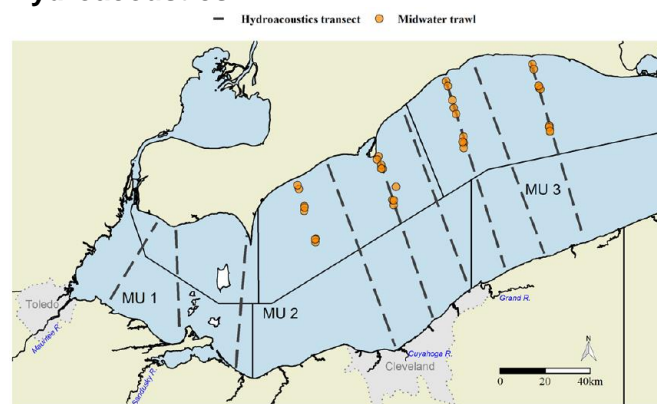
Fig 1-Hydroacoustic survey transects and midwater trawl sites for the western and central basins of Lake Erie, July 2019.

Approximately 140 km in three transects were surveyed in the western basin on three nights during July 9 - 11, 2019 (**Fig 5**). The survey resulted in the collection of approximately 16 hours and nearly 1.5 GB of acoustic data along with collecting water temperature and dissolved oxygen levels. In the central basin, 354 km were surveyed in six transects July 8-12, 2019. Thirty-six temperature and dissolved oxygen profiles and 8.9 GB of acoustic data were collected during the three-night survey. To maximize the amount of hydroacoustic data collected, the R/V *Grandon* did not conduct midwater trawls in 2019.

Monitoring Results
Overview
In 2019, sport anglers made an estimated 804,724 fishing trips on the Ohio waters of Lake Erie. Total angler effort (i.e., charter and private) was at the prior 10-year mean of 3.6 million angler hours. Most of the effort was directed toward walleye (84% to 95% for private and charter, respectively) and yellow perch (9% to 3% for private and charter, respectively). Anglers targeted eight other species including smallmouth bass, largemouth bass and steelhead trout. The Ohio commercial fishery harvested 3.8 million pounds of fish in 2019, below the 10-year average of 4.3 million. The harvest of buffalo, burbot, common carp, channel catfish, freshwater drum, quillback, suckers, white perch, and whitefish increased compared to 2018, while declines were observed for gizzard shad, goldfish, white bass, and yellow perch. Ohio's yellow perch commercial harvest (0.9 million pounds) was 34% lower than 2018 and well below the 10- year mean of 1.4 million pounds. The bulk (75%) of the commercial harvest by weight was taken by the end of June. The total dockside value of the commercial harvest was approximately $3.7 million USD, well below the 10-year mean.

Walleye
For 2019, Ohio sport harvest of 2.6 million walleye was a 30% increase from 2018 and was comprised mostly of fish from the 2015 and 2016 year-classes. The western and central basin walleye sport harvest increased 36% and 24%, respectively, compared to 2018. Angler effort increased in both the western and central basins, with an overall increase in angler effort of 28%. The mean annual walleye angler harvest rate increased to 0.83 fish/hour. This is the highest annual walleye harvest rate ever recorded in the Ohio angler creel survey. Angling effort on the Sandusky and Maumee Rivers was down compared to recent years due to flooding and poor weather. Targeted walleye harvest rate also decreased to 0.09 to 0.22 fish/hr for the Sandusky and Maumee Rivers, respectively.

Young-of-the-year walleye indices collected with bottom trawls indicate that the 2019 hatch was one of the largest in the August and September time series across districts (**Table 2**). Additionally, gill net catch rates for yearlings and older walleye in the western and central basins reflected the recent strong year classes, with substantial contributions from the age-4 cohort in both basins.

Table 2-Mean catch-per-hectare of age-0 fish for selected species during September trawls in the Ohio waters of District 1, 1992-2019.

Year	Trawls (N)	Walleye	Yellow Perch	White Perch	White Bass	Smallmouth Bass	Rainbow Smelt	Emerald Shiner	Spottail Shiner	Alewife	Gizzard Shad	Trout- Perch	Freshwater Drum	Silver Chub
1992	35	7.4	90.9	662.1	3.9	0.1	364.6	46.7	34.3	194.2	613.6	59.8	68.7	18.1
1993	40	26.8	256.4	333.9	3.6	0.4	12.7	227.9	29.5	689.4	694.8	55.0	59.3	1.5
1994	38	21.5	287.1	850.5	3.6	0.0	27.6	27.3	20.9	5.2	276.5	82.7	38.9	0.9
1995	38	0.5	82.4	432.2	1.0	0.6	1.7	204.8	43.7	3.5	55.1	126.2	139.6	2.6
1996	41	31.8	579.3	675.0	5.7	0.8	14.9	8.7	91.0	11.3	286.9	153.6	260.7	125.2
1997	39	15.5	33.7	317.7	3.7	0.1	274.1	429.7	54.6	16.9	129.3	109.5	25.4	16.2
1998	41	11.6	250.9	599.9	3.8	2.9	51.5	636.0	79.5	1.5	161.8	224.7	45.0	341.8
1999	38	13.0	155.3	557.4	7.1	0.8	21.5	71.6	71.7	1.5	169.5	135.6	293.2	141.1
2000	31	2.0	41.5	1155.0	2.1	0.0	111.8	38.6	2.0	29.4	93.7	52.9	69.2	1.8
2001	37	10.1	246.3	2060.8	3.0	1.8	14.4	60.5	56.6	15.3	87.1	189.3	484.7	0.1
2002	39	0.1	30.4	1152.0	16.4	1.7	230.8	432.5	12.0	17.6	137.2	218.8	126.7	23.0
2003	36	56.8	1111.6	1495.1	11.4	0.0	11.9	25.3	31.8	0.0	48.8	165.2	260.9	1.7
2004	37	1.6	9.3	1377.7	1.5	0.0	22.9	161.3	10.1	0.2	158.5	328.5	101.5	6.4
2005	31	2.3	62.3	1978.1	4.6	0.3	48.2	425.4	20.9	0.0	6.3	78.4	160.7	0.2
2006	34	0.4	121.9	1887.0	9.7	0.2	147.9	362.3	15.4	0.9	86.2	123.8	218.8	0.0
2007	29	22.4	631.5	3576.9	4.0	0.0	10.3	155.4	13.0	0.0	37.0	127.3	205.7	0.1
2008	31	1.9	74.7	1478.8	8.4	2.1	32.6	461.4	2.7	0.0	104.2	57.9	66.7	0.6
2009	30	3.9	69.4	1607.5	2.3	0.6	37.1	133.3	16.2	0.0	140.8	62.2	131.1	0.9
2010	31	10.2	26.9	1474.9	17.1	7.3	1.7	231.7	2.8	0.0	14.0	55.9	143.8	1.2
2011	37	4.0	12.0	888.7	7.0	0.6	13.2	344.4	12.6	0.0	248.5	35.4	184.5	1.3
2012	34	2.3	35.0	2735.5	9.3	0.5	0.1	149.9	3.3	0.0	194.4	24.3	65.3	0.0
2013	36	3.4	337.0	2154.3	1.9	1.0	85.1	91.5	17.2	0.1	309.5	118.2	140.1	0.1
2014	33	13.8	521.7	1759.1	2.8	0.6	233.6	21.1	15.5	0.0	109.2	5.5	59.2	0.0
2015	34	83.3	224.0	1620.5	4.2	0.2	7.3	0.0	8.9	0.0	85.8	30.4	135.2	8.0
2016	37	6.5	146.8	904.0	4.5	0.2	3.9	6.6	8.1	0.0	10.8	40.6	170.7	0.0
2017	37	11.4	125.5	1393.1	5.4	0.0	149.6	4.8	10.8	0.0	205.3	100.0	76.0	0.2
2018	31	54.3	429.6	1071.6	5.7	0.4	0.1	0.0	8.2	0.0	112.2	161.4	363.8	12.5
2019	34	75.9	161.1	600.5	22.4	0.1	24.5	0.0	0.5	0.0	9.6	38.2	111.1	1.3
Mean[a]		15.5	222.0	1,340.7	5.7	0.9	71.5	176.2	25.7	36.6	169.5	108.3	151.7	26.1

Yellow Perch

In 2019, Ohio yellow perch sport fisheries declined across Districts. Sport harvest was approximately 559 thousand fish lakewide in 2019, down 67% from 2018 and the lowest since the survey began in 1975. Angler effort was also down lakewide, falling 45% from 2018. Harvest rates in all three districts were among the lowest they have ever been since the creel survey began. Harvest rates in the western basin, west central, and east central basin were 1.71, 0.41, and 0.12 fish per hour, respectively. The lakewide harvest rate was 1.59 fish per hour, the second lowest since the inception of the creel survey.

The commercial fishery in District 1 harvested 193 thousand pounds at a harvest rate of 37 lbs/lift, a rate less than half of 2018. The commercial fishery also saw declines in District 2 harvest (420 thousand pounds) as dictated by lower quota allocations. The yellow perch trap net harvest rate in District 2 decreased 44% to 187 lbs/lift. In District 3, commercial harvest (318 thousand pounds) decreased compared to 2018; harvest rates decreased 44% to 109 lbs/lift. The 2014 and 2015 year-classes contributed the most to combined sport and commercial harvest in all three Districts. The yellow perch population has been assessed annually since 1969 with various bottom trawl surveys throughout Ohio's portion of Lake Erie. In 2019, the catch rate of age-2 and older yellow perch in District 1 was lower than observed in 2018, and below the long-term mean (**Table 3**). Catch rates in District 2 and 3 were the lowest since 1990. Reproduction in the western basin was strong (467 fish/ha) and well above the long-term mean, contributing to stability and enhancement of the yellow perch population over the next several years in the west. The central basin hatch has been below average since 2014. Specifically, the District 2 hatch was the lowest on record. Populations will be driven by the 2014 year-class in Districts 2 and 3, with contributions from other year classes expected to be low.

Table 3-Relative abundance[a,b] of age-2 and older yellow perch from fall trawl surveys in the Ohio waters of Lake Erie, 1990-2019.

District	Year	N	2	3	4	5	6+	District	Year	N	2	3	4	5	6+	District	Year	N	2	3	4	5	6+
1	1990	10	6.7	4.5	5.9	2.0	1.1	2	1990	11	8.3	3.0	11.4	2.7	1.5	3	1990	15	6.4	2.4	6.6	1.6	4.4
	1991	10	3.3	3.6	0.8	0.9	0.6		1991	19	15.2	2.9	0.7	2.0	1.2		1991	17	8.0	3.0	1.8	5.7	2.5
	1992	35	61.1	22.1	1.3	2.0	3.9		1992	22	39.7	7.7	0.2	0.2	0.9		1992	18	6.6	3.0	0.7	0.3	1.3
	1993	40	7.1	5.2	0.4	0.0	0.0		1993	23	7.0	21.4	1.6	1.0	1.0		1993	19	2.9	7.4	1.7	1.5	0.5
	1994	38	7.5	4.3	1.7	0.0	0.9		1994	23	8.1	4.8	2.5	1.1	0.9		1994	19	2.5	2.2	0.5	0.4	0.9
	1995	38	15.7	0.9	0.0	0.9	0.0		1995	37	28.2	16.6	12.4	6.3	2.1		1995	24	25.1	5.0	1.9	1.0	0.5
	1996	41	113.5	26.5	1.2	0.0	0.0		1996	37	38.5	15.1	2.6	0.3	0.9		1996	30	9.8	3.3	0.8	0.1	0.5
	1997	39	50.2	36.3	6.2	0.0	0.4		1997	47	20.6	22.5	4.3	0.0	0.2		1997	29	10.6	15.0	2.7	0.7	0.2
	1998	41	99.0	26.1	10.2	0.0	0.0		1998	40	38.8	18.7	7.4	1.7	0.2		1998	18	19.3	7.2	2.2	1.2	1.1
	1999	38	17.8	41.2	7.1	1.6	0.0		1999	42	12.3	40.2	2.8	1.2	0.7		1999	33	9.1	21.6	2.5	1.6	1.5
	2000	31	55.7	15.6	12.8	0.6	0.0		2000	42	59.5	11.6	20.8	3.0	3.0		2000	31	51.5	10.2	27.5	3.1	3.3
	2001	37	49.4	36.3	8.9	11.7	0.5		2001	42	18.8	17.2	3.5	3.5	0.4		2001	5	5.5	10.1	0.9	2.3	0.5
	2002	39	25.4	53.9	10.8	3.6	3.8		2002	42	5.9	24.4	12.1	1.0	1.0		2002	33	10.4	42.1	59.6	10.9	3.8
	2003	36	71.2	4.3	13.9	8.1	3.8		2003	38	36.1	2.1	4.7	3.9	1.5		2003	33	14.1	1.9	5.9	10.4	3.5
	2004	37	19.1	27.8	0.6	5.3	5.0		2004	29	7.8	43.0	1.1	0.6	1.6		2004	25	2.7	59.2	2.1	4.7	8.5
	2005	31	24.8	0.5	5.8	0.2	0.0		2005	33	92.8	6.7	25.7	0.9	2.1		2005	25	278.8	7.7	37.9	5.1	17.2
	2006	34	0.9	27.0	0.4	2.8	0.0		2006	32	7.6	56.3	3.1	8.5	1.0		2006	25	9.4	45.0	1.9	6.5	4.2
	2007	29	17.0	0.1	9.7	0.0	1.0		2007	32	29.6	11.1	81.2	1.2	4.8		2007	25	38.2	5.5	46.6	1.2	8.4
	2008	31	16.7	3.8	0.5	3.3	0.1		2008	33	17.6	14.1	2.1	20.3	2.0		2008	24	15.0	7.6	0.6	11.5	3.4
	2009	30	7.8	1.0	0.2	0.1	0.5		2009	32	18.4	3.9	3.0	0.4	3.5		2009	23	116.1	84.4	21.5	3.0	9.1
	2010	31	27.8	13.0	0.6	0.5	0.2		2010	10	9.9	8.3	1.1	0.4	0.7		2010	8	17.3	12.1	1.1	0.3	2.5
	2011	37	10.6	10.6	7.8	1.4	0.0		2011	32	10.4	17.2	29.6	5.9	4.6		2011	24	50.0	76.9	64.3	21.1	4.7
	2012	34	13.3	10.4	6.5	3.7	0.0		2012	33	16.3	7.1	10.7	3.3	1.3		2012	24	32.3	15.0	13.1	14.3	4.5
	2013	36	3.1	9.2	3.8	4.1	0.4		2013	33	8.6	6.7	1.5	2.6	2.3		2013	24	38.8	28.2	10.3	7.9	15.0
	2014	33	7.6	1.9	1.6	0.7	1.1		2014	8	48.4	18.7	6.6	0.8	5.2		2014	12	29.2	6.1	3.9	2.8	4.8
	2015	34	21.6	0.6	0.0	0.4	0.1		2015	12	3.3	12.5	3.9	0.9	1.1		2015	11	4.0	7.8	3.4	1.2	3.6
	2016	37	40.2	7.6	0.3	0.0	0.2		2016	24	7.6	4.0	5.6	1.3	1.1		2016	24	9.8	4.2	5.9	1.7	4.3
	2017	37	29.2	37.9	4.4	0.3	0.0		2017	33	21.8	19.0	2.9	3.1	1.7		2017	24	9.5	7.3	1.9	1.7	1.2
	2018	31	7.7	7.2	10.2	2.3	0.4		2018	12	7.2	2.4	1.1	0.6	0.4		2018	12	2.2	2.4	3.7	0.0	2.0
	2019	33	5.5	1.8	1.5	2.6	0.6		2019	12	0.2	0.2	1.3	0.7	0.6		2019	24	1.4	0.6	1.7	1.3	0.9
	Mean[c]		28.7	15.1	4.6	1.9	0.8		Mean[c]		22.2	15.1	9.2	2.7	1.7		Mean[c]		28.8	17.4	11.5	4.3	4.1

Smallmouth Bass

Smallmouth bass was the fourth most sought-after species by private boat anglers behind walleye, yellow perch, and largemouth bass. The 5-fish daily bag limit and a 14-inch minimum length limit remained unchanged since 2000. Additionally, beginning in 2019 the former bass "catch-and-immediate-release" season changed to a daily one fish bag, 18″ minimum length limit from May 1 until the 4th Saturday in June. This regulation change provides anglers the opportunity to keep a trophy fish while minimally affecting harvest. As in previous years, the smallmouth bass fishery was mainly catch and release, with an overall catch rate of 0.77 fish per angler hour, but only a targeted harvest rate of 0.04 fish per angler hour. In 2019, the 2010 and 2013 year-classes each contributed 17% of the with twelve year-classes in total contributing to the harvest. Mean age of harvested fish was 7.6 years and the mean size at harvest was 436 mm and 1,607 g (17.2 inches and 3.5 lbs., respectively).

In 2006, ODNR began a targeted smallmouth bass population survey using gillnets to track recruitment and biological parameters. In District 1, the catch rate of age-2+ smallmouth bass (7.3 fish/net) was the lowest since 2015 but was similar to the long-term mean (7.9 fish/net; **Table 4**). Average age of smallmouth bass caught in District 1 (5.4 years old) was older than average (3.8 years old). The District 2 catch rate (0.8 fish/net) was again the lowest in the time series for the second consecutive year. Catch rate was minimal in District 3 (0.12 fish/net) and well below the long-term mean (6.7 fish/net). Most fish collected were age-3 or

ages-6 to 7. Future smallmouth bass gillnet surveys will continue to use the same mesh configuration but target different habitats and bottom types to more effectively sample these fish.

Table 4-Mean catch-per-net of smallmouth bass in September gill net surveys in the Ohio waters of Lake Erie, 2006-2019. Continued next page

District	Year	N nets	Age 1	2	3	4	5	6	7	8	9	10
1	2006	5	1.12	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.12	0.12
	2007	8	1.75	5.38	0.12	1.88	0.75	0.62	0.12	0.25	0.38	0.00
	2008	6	0.33	1.67	3.50	0.17	1.67	0.83	1.00	0.50	0.17	0.83
	2009	8	0.50	2.50	2.00	2.00	0.00	0.75	0.62	0.50	0.62	0.38
	2010	8	0.62	1.25	3.25	1.25	1.88	0.25	0.75	1.00	0.75	0.25
	2011	7	0.88	1.12	1.38	1.25	0.88	1.75	0.00	0.62	0.38	0.12
	2012	8	0.12	0.88	0.62	0.88	0.38	1.00	1.62	0.38	0.75	0.25
	2013	8	0.38	0.62	1.00	0.25	0.38	0.50	0.12	0.12	0.00	0.12
	2014	8	0.75	2.62	0.62	1.88	0.38	1.00	0.50	0.25	0.38	0.12
	2015	8	0.38	0.00	0.75	0.75	0.25	0.12	0.25	0.25	0.25	1.00
	2016	8	0.38	1.12	1.88	1.50	0.62	1.12	0.12	0.75	0.75	0.62
	2017	8	1.62	0.25	2.00	3.25	2.62	0.62	0.75	0.38	0.25	0.12
	2018	8	0.00	1.50	0.00	1.50	1.38	1.25	0.25	0.88	0.25	0.25
	2019	8	0.38	0.62	2.12	0.00	0.88	1.00	1.25	0.25	0.50	0.25
	Mean[a]	7.57	0.66	1.40	1.39	1.18	0.86	0.77	0.53	0.44	0.40	0.32
2	2006	4	0.75	0.00	0.50	0.50	0.75	1.25	2.50	4.75	1.00	3.75
	2007	4	0.25	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25
	2008	4	0.25	0.50	0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.25
	2009	4	0.00	0.50	0.75	0.75	0.00	0.00	0.00	0.25	0.00	0.25
	2010	4	0.00	0.25	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00
	2011	8	0.12	0.00	0.25	0.62	0.00	0.00	0.00	0.00	0.00	0.38
	2012	8	0.00	0.75	0.75	0.62	0.62	0.38	0.25	0.00	0.12	0.12
	2013	8	0.25	0.38	0.38	0.12	0.00	0.12	0.25	0.12	0.00	0.00
	2014[b]	-	-	-	-	-	-	-	-	-	-	-
	2015[c]	8	0.00	0.12	0.50	0.38	0.50	1.25	0.12	0.25	0.12	0.12
	2016[b]	-	-	-	-	-	-	-	-	-	-	-
	2017[b]	-	-	-	-	-	-	-	-	-	-	-
	2018	8	0	0.62	0.12	0.38	0	0.12	0	0	0	0.12
	2019	8	0.12	0.25	0.12	0	0	0	0	0	0.12	0.12
	Mean	6.18	0.16	0.35	0.37	0.31	0.19	0.28	0.28	0.49	0.12	0.49
3	2006	4	0.00	0.00	0.50	0.00	1.75	0.00	0.50	0.75	0.75	0.00
	2007	4	4.75	3.00	0.00	0.50	0.25	0.75	0.00	0.75	0.50	0.00
	2008	4	1.75	6.25	4.00	0.00	0.00	0.25	2.00	1.75	1.00	1.25
	2009	4	0.75	1.00	1.25	2.25	0.00	0.75	0.00	0.00	0.25	0.00
	2010	4	4.75	2.00	1.75	8.75	1.25	0.00	0.00	0.25	1.25	0.00
	2011	8	3.50	1.00	0.38	0.75	2.25	0.50	0.00	0.00	0.00	0.00
	2012	8	0.00	5.12	3.38	0.62	0.62	0.50	1.12	0.25	0.12	0.00
	2013	8	0.25	1.62	1.00	0.38	0.50	1.12	0.75	0.38	0.12	0.00
	2014	8	0.00	0.00	0.25	0.25	0.00	0.00	0.25	0.62	0.12	0.00
	2015	12	0.00	0.00	0.17	0.08	3.00	0.42	0.17	0.42	0.75	0.33
	2016	12	0.00	0.25	0.08	0.17	0.17	0.50	1.42	0.42	0.50	0.50
	2017	8	0.00	0.38	0.00	0.25	0.25	0.75	0.50	0.00	0.00	0.00
	2018	8	0.00	0.62	0.25	0.12	0.00	0.00	0.12	1.50	0.62	0.00
	2019	8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00
	Mean	7.14	1.13	1.52	0.93	1.01	0.72	0.40	0.49	0.51	0.44	0.15

Table 4 con't. Mean catch-per-net of smallmouth bass in September gill net surveys in the Ohio waters of Lake Erie, 2006-2019

District	Year	Age							Sum N fish	Means			
		11	12	13	14	15	16	17+		Age 2+	Age	Depth (m)	Temp (°C)
1	2006	0.25	0.00	0.12	0.00	0.00	0.00	0.00	19	0.88	1.0	8.8	21.9
	2007	0.12	0.50	0.12	0.00	0.00	0.00	0.00	100	10.25			
	2008	0.17	0.00	0.17	0.00	0.00	0.00	0.00	66	10.67	2.6	4.0	22.8
	2009	0.12	0.00	0.25	0.12	0.00	0.00	0.00	84	9.88	3.5	4.1	22.3
	2010	0.38	0.12	0.12	0.00	0.12	0.00	0.00	99	11.38	3.5	3.8	20.4
	2011	0.25	0.00	0.25	0.12	0.00	0.00	0.00	72	8.12	3.7	4.4	21.4
	2012	0.38	0.12	0.12	0.12	0.00	0.12	0.00	64	7.62	4.3	2.8	23.7
	2013	0.00	0.12	0.00	0.12	0.00	0.00	0.12	32	3.50	4.4	4.1	22.6
	2014	0.25	0.00	0.12	0.00	0.00	0.00	0.00	72	8.12	2.7	4.1	21.6
	2015	0.12	0.12	0.12	0.12	0.00	0.00	0.00	36	4.12	3.4	4.3	23.7
	2016	0.38	0.00	0.25	0.12	0.25	0.00	0.00	82	9.50	4.3	3.9	23.7
	2017	0.12	0.25	0.00	0.00	0.00	0.00	0.00	98	10.62	4.4	3.5	20.1
	2018	0.38	0.12	0.38	0.00	0.00	0.00	0.00	65	8.12	5.8	3.9	23.2
	2019	0.00	0.00	0.25	0.12	0.00	0.00	0.00	61	7.25	5.4	4.3	21.8
	Mean	0.2	0.1	0.2	0.1	0.0	0.0	0.0	67.9	7.9	3.8	4.3	22.2
2	2006	3.75	2.00	1.25	0.00	0.00	0.00	0.00	91	22.00	7.8	4.4	22.3
	2007	0.50	0.25	0.25	0.25	0.00	0.00	0.00	9	2.00	6.2	7.9	23.8
	2008	0.00	0.50	0.25	0.00	0.25	0.00	0.00	11	2.50	4.2	5.9	22.0
	2009	0.00	2.00	0.25	1.25	0.25	0.25	0.25	29	6.75	7.1	6.1	21.7
	2010	0.25	0.50	0.25	0.00	0.00	0.00	0.25	7	1.75	8.3	7.2	24.0
	2011	0.25	0.25	0.25	0.00	0.00	0.25	0.12	20	2.38	4.4	6.6	19.2
	2012	0.00	0.00	0.25	0.62	0.12	0.62	0.12	44	5.38	6.4	6.7	22.4
	2013	0.00	0.12	0.00	0.12	0.00	0.00	0.12	16	1.75	4.8	7.1	20.5
	2014[b]	-	-	-	-	-	-	-	-	-	-	-	-
	2015[c]	0.00	0.12	0.00	0.00	0.00	0.00	0.25	30	3.75	6.8	6.5	25.0
	2016[b]	-	-	-	-	-	-	-	-	-	-	-	-
	2017	-	-	-	-	-	-	-	-	-	-	-	-
	2018	0.12	0	0	0	0	0	0	12	1.50	4.33	6.28	21.9
	2019	0	0.12	0	0	0	0	0	7	0.75	5.57	5.54	22.3
	Mean	0.4	0.5	0.3	0.2	0.1	0.1	0.1	25.1	4.6	6.0	6.4	22.3
3	2006	0.25	0.50	0.25	0.00	0.00	0.00	0.00	26	5.25	6.5	2.9	
	2007	0.00	0.25	0.75	0.00	0.00	0.00	0.00	46	6.75	3.1	7.6	23.7
	2008	0.00	0.00	1.00	0.75	0.25	0.00	0.00	81	18.50	3.7	6.3	21.1
	2009	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25	5.50	3.5	4.9	22.2
	2010	0.25	0.50	0.00	0.00	0.25	0.00	0.00	87	16.25	3.1	6.6	23.5
	2011	0.12	0.00	0.00	0.00	0.00	0.12	0.00	69	5.12	2.6	7.4	19.2
	2012	0.00	0.00	0.00	0.00	0.00	0.12	0.00	96	11.88	3.1	7.3	22.3
	2013	0.25	0.12	0.12	0.00	0.00	0.00	0.00	53	6.38	4.6	7.6	19.4
	2014	0.00	0.00	0.00	0.12	0.00	0.00	0.00	13	1.62	5.0	8.1	19.6
	2015	0.00	0.00	0.00	0.00	0.00	0.00	0.00	64	5.33	6.0	6.3	24.4
	2016	0.92	0.00	0.08	0.00	0.00	0.17	0.00	65	5.17	6.8	7.6	23.6
	2017	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17	2.12	5.2	6.9	20.5
	2018	0.00	0.00	0.00	0.00	0.00	0.00	0.12	27	3.38	6.9	6.8	23.9
	2019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1	0.12	9.0	11.1	20.4
	Mean	0.1	0.1	0.2	0.1	0.0	0.0	0.0	47.9	6.7	4.9	7.0	21.8

Steelhead Trout

The combined 2019 recreational harvest of steelhead trout decreased 46% compared to 2018 and was well below the 10-year average. Steelhead trout were harvested in the central basin with 51% of the harvest in District 2 and the remaining 49% in District 3. Private boat targeted effort (4,472 hours) decreased 44% compared to 2018 with harvest and release rates at 0.02 fish per angler hour and 0.01 fish per angler hour, respectively.

Tributary and lake fisheries should remain stable with continued annual stocking of yearling steelhead. In 2019, ODNRDOW hatchery personnel raised and stocked 586,413 steelhead that were a mix of Little Manistee, Chambers and Ganaraska strains (**Table 5).** Steelhead were stocked as age-1 (yearlings) in the Ashtabula, Chagrin, Grand, Rocky, and Vermilion rivers, and Conneaut Creek. An additional stocking of age-0 steelhead was done in Cleveland Harbor in October. Mean size of the steelhead ranged from 178 mm to 200 mm for fish stocked in the Tributaries, and 135 mm for fish stocked Cleveland Harbor.

The sea lamprey population and its parasitic effect on steelhead and other Lake Erie coldwater species remains a concern. In 2019, the sea lamprey abundance estimate decreased to below target levels in Lake Erie and was the lowest abundance estimate since 1995 (CWTG 2020). Wounding rates on lake trout, however, remain high. In

2019 wounding rates were 9.7 per 100 fish. Wounding rates have been over the acceptable target rate of five wounds per 100 fish since 2003. The West Branch of Conneaut Creek was treated with the lampricide 3-trifluoromethyl-4-nitrophenol (TFM) by the USFWS in 2019. The Grand River is scheduled to be treated with TFM in April of 2020.

Plans continue for work on the Grand River's Harpersfield Dam. The U.S. Army Corps of Engineers has selected an onsite rebuild as the preferred alternative and has completed the Detailed Project Report. Construction on the new barrier started in October of 2018 and is expected to be completed by December 2020.

Table 5-Steelhead stocked in Ohio drainages of Lake Erie, 2012-2019. Steelhead stocked in 2012-2015 were Little Manistee River strain (Michigan). In 2016, stocking included Little Manistee River, Chambers Creek and Ganaraska (Wisconsin) strains. In 2017, stocking strains were from Chambers Creek and Ganaraska. In 2018 and 2019 stocking strains were Little Manistee, Chambers Creek and Ganaraska.

Year	Stocking season	Location	Age	Number stocked	Avg length (mm)
2014	Spring	Chagrin River	Age-1	90,061	169
2014	Spring	Conneaut Creek	Age-1	75,040	165
2014	Spring	Grand River	Age-1	108,316	175
2014	Spring	Rocky River	Age-1	100,073	173
2014	Spring	Vermilion River	Age-1	55,117	174
		2014 Total		**428,607**	
2015	Spring	Chagrin River	Age-1	90,085	185
2015	Spring	Conneaut Creek	Age-1	84,866	180
2015	Spring	Grand River	Age-1	89,861	180
2015	Spring	Rocky River	Age-1	91,779	183
2015	Spring	Vermilion River	Age-1	65,149	180
		2015 Total		**421,740**	
2016	Spring	Chagrin River	Age-1	96,680	198
2016	Spring	Conneaut Creek	Age-1	56,045	198
2016	Spring	Grand River	Age-1	75,019	198
2016	Spring	Rocky River	Age-1	95,512	198
2016	Spring	Vermilion River	Age-1	90,069	198
		2016 Total		**413,325**	
2017	Spring	Ashtabula River	Age-1	41,940	195
2017	Spring	Chagrin River	Age-1	90,036	195
2017	Spring	Conneaut Creek	Age-1	75,092	192
2017	Spring	Grand River	Age-1	90,035	190
2017	Spring	Rocky River	Age-1	90,038	195
2017	Spring	Vermilion River	Age-1	55,087	202
		2017 Total		**442,228**	
2018	Spring	Ashtabula River	Age-1	69,928	178
2018	Spring	Chagrin River	Age-1	90,008	200
2018	Spring	Conneaut Creek	Age-1	75,079	191
2018	Spring	Grand River	Age-1	90,076	199
2018	Spring	Rocky River	Age-1	90,114	190
2018	Spring	Vermilion River	Age-1	63,203	191
		2018 Total		**478,408**	
2019	Spring	Ashtabula River	Age-1	55,870	195
2019	Spring	Chagrin River	Age-1	109,285	188
2019	Spring	Conneaut Creek	Age-1	75,021	192
2019	Spring	Grand River	Age-1	99,448	193
2019	Spring	Rocky River	Age-1	96,576	187
2019	Spring	Vermilion River	Age-1	73,645	200
2019	Fall	Cleveland Harbor	Age-0	76568	135
		2019 Total		**586,413**	

White Bass

White bass main lake angler harvest decreased to 17,843 fish compared to 21,082 in 2018. There were very few white bass angling trips in 2019, with less than 100 targeted hours. Most harvest was incidental while targeting other species. Most of the harvest came from Districts 1 and 2 (54% and 45%, respectively). The Maumee and Sandusky River white bass fisheries were not surveyed in 2019. Reported commercial harvest of white bass in 2019 was approximately 230 thousand pounds, a 7% decrease from 2018 and the lowest harvest in the previous ten years. Assessment surveys continued to show low numbers of age-0 white bass in both basins. Fall gill net catches in the western and central basins were carried by older (age-6+) white bass, reflecting low levels of recruitment in recent years.

Regional Angler Information

Of the 4,760 responses collected during the boat angler creel survey, 83% of the respondents resided in Ohio, while 17% were from out-of-state (35 states in total). The neighboring states of Pennsylvania (24%), Indiana (22%), and Michigan (12%) had the highest number of out-of-state responses. Within Ohio, the two Wildlife Districts which border Lake Erie - District 3 (61%) and District 2 (26%) - comprised most of the trips. Eighty-six of Ohio's 88 counties were represented in the 2019 survey. Boaters from the seven lakeshore counties comprised 47% of the total responses.

To determine how many boaters from the lakeshore counties remained in their home county for their Lake Erie trip, responses were grouped by county of origin and county of destination. Of the seven lakeshore counties, boaters from Ashtabula (94%), and Erie (84%) were most likely to stay in their home county. Only 56% of the trips by Lorain County boaters were in their home county. The top destination for Lorain County residents outside their home county was Erie County.

Addition of Third Fishing Rod Survey

Private and charter boat anglers were asked their opinion on the proposed regulation change that would allow individual anglers to fish with three rods instead of two rods in Ohio. Anglers in favor of the increase were asked to expand upon their opinion by selecting one of six options in which waterbodies the proposed change should take place (e.g. Statewide, statewide with exception, inland waters only with exceptions, inland waters, Lake Erie only, or don't know/don't care). Full questions and response options are listed in Tables 1.1.25 and 1.1.27. Overall, 49% of anglers were in favor of allowing an additional rod, whereas 35% where opposed. Walleye anglers (51% approval) were the most likely to be in favor of the proposed change, whereas smallmouth bass anglers were the least likely to approve the

change (23%). Angler responses to question two were also mostly in favor of making the changes applicable statewide (61%), followed by 33% anglers in favor of making the change on waters of Lake Erie only.

Angler Fishing Depth

All anglers were asked the depth of water they fished as well as the depth their lure was in the water column during their fishing trip. Responses included general increasing trends from west to east for both anglers targeting yellow perch and walleye with average fishing depths for walleye increasing from 31 feet to 57 feet, and 25 feet to 52 feet for yellow perch. Likewise, the percent of walleye anglers fishing off the bottom (defined as >2 ft off bottom) increased from west to east and averaged 80% lakewide. The percentage of Yellow perch anglers fishing off the bottom ranged from 18% in District 2 to 44% in District 3. The average fishing depth lakewide for smallmouth bass and largemouth bass anglers was 18 feet and 9 feet, respectively. The percentage of anglers fishing off the bottom was 22% for smallmouth bass and 37% for largemouth bass.

Lake Trout

Ohio continued their portion of the lakewide recovery plan for lake trout by stocking USFWS-produced fish in the west and central basins of Lake Erie. In May 2019, 80,026 lake trout were stocked at Catawba (40,012) and Fairport Harbor (40,014. Ohio-stocked lake trout are showing up in fisheries in the west and central basins. In the fall of 2019, ODNR and USGS staff were able to implant 9 lake trout caught in trap nets with acoustic transmitters. Movement and habitat use of the tagged lake trout will be monitored through the Great Lake Acoustic Telemetry Observation System.

Forage Fishes

In 2019, District 1 August trawl indices were around half of ten-year averages for combined forage fish species. Dominant species were typical in 2019: young-of-year white perch (67%) and yellow perch (14%) made up most of the catch. Age-0 white perch abundance in 2019 (1,300/ha) was near half of the long-term average (2,687/ha). Gizzard shad young-of-year abundance (36/ha) was very low, near 7% of the long-term average (523/ha). Adult silver chub abundance was eight times the long-term mean in 2019 (10/ha). Adult and young-of-year emerald shiner abundances were near zero and have been very low since 2015. In general, similar patterns were seen in District 1 September trawls. In 2019, a total of seven channel darters *Percina copelandi* were collected, the first instance of this species being detected since 2001. These specimens were sent to Ohio State U, Museum of Biological Diversity for verification and have been included in the specimen collection (OSUM 120447-120450).

Table 6-Arithmetic mean catch-per-hectare of age-0 fish for selected species during August trawls in the Ohio waters of Lake Erie District 1, 1987-2019.

Year	Trawls (N)	Walleye	Yellow Perch	White Perch	White Bass	Smallmouth Bass	Rainbow Smelt	Emerald Shiner	Spottail Shiner	Alewife	Gizzard Shad	Trout-Perch	Freshwater Drum	Silver Chub
1987	43	10.7	16.3	788.6	13.8	0.0	12.8	2.2	5.0	35.4	448.0	33.9	130.1	2.2
1988	49	14.3	188.6	4726.8	18.6	0.0	11.2	36.8	36.8	11.5	816.6	159.6	206.4	2.5
1989	45	6.5	106.1	6442.1	343.3	0.0	64.0	16.6	32.1	51.5	609.6	54.7	49.0	5.3
1990	35	28.0	144.4	11551.1	73.2	0.1	73.4	108.3	131.0	6.2	557.2	42.2	220.6	17.6
1991	42	46.4	146.9	3491.5	23.1	1.9	0.0	335.1	134.8	7.4	49.3	148.7	191.6	24.3
1992	39	6.6	60.7	877.6	39.4	0.0	477.9	0.8	13.2	4357.4	289.8	46.3	31.9	10.0
1993	37	111.0	1164.2	2012.0	156.8	0.0	14.5	18.2	13.9	475.4	2154.6	443.4	286.3	2.3
1994	40	63.4	508.5	728.7	33.3	0.1	62.5	101.6	49.7	3.7	973.4	77.9	46.9	13.6
1995	38	2.9	348.9	692.9	16.7	3.4	0.0	25.7	24.1	7.3	148.7	111.4	26.3	42.7
1996	39	83.3	3290.8	1750.0	88.4	0.0	201.3	40.2	36.7	4.3	400.9	204.3	258.7	184.4
1997	40	24.0	52.2	616.9	225.6	0.1	394.8	91.0	44.6	37.7	1598.4	133.3	23.4	6.7
1998	39	12.2	174.5	541.3	21.8	0.8	13.1	11.2	93.6	2.2	167.5	184.6	55.4	121.1
1999	37	30.6	270.1	1036.9	37.6	1.0	2.2	8.4	71.8	0.5	426.0	138.4	263.3	164.7
2000	30	4.5	186.4	2321.4	68.3	0.0	749.0	80.7	3.0	15.2	899.7	290.2	45.8	4.9
2001	31	24.8	322.1	1863.9	213.8	0.3	0.7	31.0	64.7	24.4	642.8	103.7	336.0	0.1
2002	35	0.1	33.1	1037.4	42.6	1.3	51.5	62.5	12.8	87.6	1649.1	273.2	80.9	3.7
2003	37	155.6	1509.9	2336.2	210.2	0.0	82.9	1.3	2.1	0.1	173.8	76.9	77.5	1.1
2004	34	3.6	40.9	4269.0	38.8	0.0	42.3	177.8	5.7	0.0	41.6	382.7	147.7	11.4
2005	34	10.3	124.2	3955.4	84.2	1.1	0.0	159.3	98.4	1.8	279.2	273.9	151.9	0.0
2006	31	1.3	180.2	2139.5	43.8	1.0	151.9	129.4	4.2	0.0	159.5	124.4	47.5	0.0
2007	34	21.5	592.9	4214.7	8.1	0.9	6.9	91.2	12.6	0.1	75.0	128.1	288.5	0.1
2008	29	7.6	267.0	4071.0	50.3	0.3	113.8	37.1	10.8	0.0	465.2	72.4	108.5	0.1
2009	32	5.5	186.0	3248.0	95.6	0.0	2550.3	135.3	7.9	0.0	816.2	21.3	55.6	2.0
2010	22	23.4	58.2	4698.6	84.4	0.6	0.0	51.8	39.4	0.4	34.6	109.1	412.4	3.2
2011	37	4.9	29.9	1176.1	26.8	0.5	1.5	9.3	8.3	0.0	260.1	242.1	106.2	0.5
2012	35	5.7	74.5	4603.6	71.8	0.7	0.0	165.2	7.8	0.0	245.0	55.6	289.2	0.0
2013	35	10.7	398.7	2800.1	31.9	0.3	80.3	15.0	0.6	3.3	1987.0	101.5	69.7	0.2
2014	34	19.6	668.9	2172.0	4.8	0.2	22.9	0.6	5.6	0.0	316.1	25.3	21.2	0.0
2015	34	61.5	264.9	1629.8	9.1	0.0	133.7	11.4	3.8	0.0	421.6	28.0	162.8	5.4
2016	36	6.7	329.4	2855.2	35.2	0.3	0.0	0.3	23.5	0.0	15.6	42.4	98.5	0.1
2017	36	20.6	279.5	4333.4	92.2	0.0	28.7	1.3	3.0	0.1	336.2	100.9	23.8	0.4
2018	36	112.0	514.1	2289.2	30.0	0.0	0.0	9.2	6.7	0.0	76.4	69.6	206.6	5.7
2019	34	143.8	466.9	1304.8	25.1	0.0	9.1	0.2	5.8	0.0	13.3	41.0	64.5	2.2
Mean[a]		29.4	391.6	2,852.2	72.9	0.5	167.0	61.4	31.5	160.4	547.9	134.4	141.3	19.9

The white perch age-0 index in District 3 was the only August index that was above the ten-year mean. All other forage indices for both age-0 and age-1+ in the central basin August trawl surveys were below long-term means, with most species being below long term means for two years or more. September central basin forage indices did not improve over August relative to ten-year means. All September indices in the central basin were below ten-year means. Young-of-year rainbow smelt and both age groups of round gobies increased from 2018 across the basin. Emerald shiner, gizzard shad and age-1+ rainbow smelt indices were some of the lowest in the time series.

The western basin hydroacoustic survey estimates density and biomass of forage and other small bodied fishes in aggregate. Unlike previous years, higher densities and biomass were found east of the islands. An increase in average fish densities (8,123 fish/ha) were observed compared to 2018 but remained below the long-term mean. Average fish size was slightly larger than in 2018 leading to a greater increase in biomass (15.9 kg/ha) but remained slightly below the long-term average.

Table 7- Percent composition of fish captured in midwater trawl samples collected in the central basin Lake Erie, July 2019.

Transect	Trawl ID	Depth	Latitude	Longitude	Yellow Perch Age-0	Rainbow Smelt Age-0	Rainbow Smelt Age-1+	Other species[a] all ages
58100	1001	5	42.6245	-81.007	51.7%	48.3%	0.0%	0.0%
58100	1003	5	42.533	-80.973	78.4%	21.6%	0.0%	0.0%
58100	1006	5	42.3808	-80.9177	22.8%	77.2%	0.0%	0.0%
58100	1007	8	42.3625	-80.913	14.4%	85.6%	0.0%	0.0%
58100	1004	9	42.5258	-80.9648	17.6%	82.2%	0.0%	0.1%
58100	1002	10	42.605	-81.0002	31.7%	67.6%	0.4%	0.3%
58100	1005	10	42.5393	-80.9747	8.1%	91.2%	0.0%	0.7%
58100	1008	15	42.3748	-80.9183	6.7%	93.3%	0.0%	0.0%
58100	1009	17	42.3585	-80.9137	0.0%	100.0%	0.0%	0.0%
57850	2001	6	42.5568	-81.4675	23.9%	74.8%	0.0%	1.3%
57850	2003	7	42.4823	-81.4345	14.0%	86.0%	0.0%	0.0%
57850	2006	7	42.3375	-81.3752	25.3%	73.5%	0.0%	1.2%
57850	2002	9	42.5377	-81.4578	27.8%	47.2%	13.9%	11.1%
57850	2004	9	42.4513	-81.4262	2.9%	94.5%	2.4%	0.2%
57850	2007	11	42.3118	-81.3715	10.1%	89.9%	0.0%	0.0%
57850	2005	12	42.4272	-81.4142	3.3%	84.2%	12.0%	0.4%
57850	2008	13	42.2927	-81.3738	1.2%	98.8%	0.0%	0.0%
57850	2009	19	42.3165	-81.3802	6.2%	78.5%	15.4%	0.0%
57600	3001	5	42.066	-81.7487	11.0%	86.3%	0.0%	2.7%
57600	3008	6	42.2595	-81.8277	40.7%	35.6%	0.0%	23.7%
57600	3005	7	42.2102	-81.8065	49.6%	47.8%	0.0%	2.7%
57600	3009	9	42.247	-81.836	1.6%	1.6%	94.7%	2.1%
57600	3002	10	42.0872	-81.7535	1.6%	98.4%	0.0%	0.0%
57600	3003	13	42.1385	-81.7345	1.5%	96.5%	1.0%	1.0%
57600	3006	13	42.2252	-81.8128	68.7%	28.4%	0.0%	3.0%
57600	3004	19	42.0853	-81.747	1.7%	97.0%	1.3%	0.0%
57600	3007	19	42.2105	-81.8133	3.7%	0.9%	93.1%	2.3%
57350	4001	6	41.9328	-82.1623	38.9%	44.4%	0.0%	16.7%
57350	4004	8	42.0627	-82.2235	18.5%	11.1%	0.0%	70.4%
57350	4007	8	42.1302	-82.2518	16.4%	4.4%	0.0%	79.3%
57350	4002	10	41.9195	-82.164	18.5%	63.0%	0.0%	18.5%
57350	4008	12	42.1453	-82.2597	28.9%	33.6%	0.0%	37.6%
57350	4003	13	41.9308	-82.1667	12.6%	75.7%	0.0%	11.7%
57350	4005	13	42.0435	-82.2242	28.6%	65.7%	0.0%	5.7%
57350	4006	15	42.0572	-82.2217	53.1%	34.4%	4.7%	7.8%

The central basin hydroacoustic survey is designed to estimate densities of the main pelagic forage species of emerald shiner and rainbow smelt. Central basin hydroacoustic density estimates were extremely low for age-1+ rainbow smelt and have been low since 2017. Young-of-year rainbow smelt increased from 2018 and were the main species caught in midwater trawls run by the R/V *Keenosay* (Table 3.4.1). Young-of-year yellow perch were also caught in every trawl, with the highest catches occurring on the east (58100) and west (57350) transects. Emerald shiners have been less than 1% of the total midwater trawl catch since 2016 and this trend continued in 2019 with only 10 captured in 4 out of 35 midwater trawls. Emerald shiners were not

included in spatial analysis of the 2019 survey. Age-0 rainbow smelt distribution tended to be uniform throughout the basin, like previous years. Yearling-and-older rainbow smelt distributions shifted to western and northern areas of the basin. Depth distribution of rainbow smelt was dramatically different in 2019. Typically, age-0 rainbow smelt are located above the thermocline and age-1+ below the thermocline.

In 2019, age-0 rainbow smelt were found throughout the water column. Yearling-and-older rainbow smelt were below the thermocline; however, their densities were very low and were masked by the high densities of age-0. Density

estimates are reported for the entire water column depth for each transect.

Lower Trophic

In 2019, District 1 sampling began in April to better assess post-ice out plankton blooms and linkage to gamefish recruitment; the following summaries are limited to comparable May – September data from 2007-2018. The 2019 average Secchi depth in District 1 (1.7 m) was close to the ten-year mean of 1.8 m. Average bottom temperature in 2019 (19.2 °C) was lower than 2018 and below the ten-year average (20.1 °C). Average bottom dissolved oxygen level (7.72 mg/L) was close to the ten-year average (7.78 mg/L) in

2019. Total phosphorus levels in the west basin averaged 0.058 mg/L. This was the greatest concentration since 2015 but slightly below the ten-year average (0.062 mg/L). In the central basin, average Secchi depths were 2.9 m in District 2 and 3.3 m in District 3. In both districts Secchi depth was slightly below the ten-year average. Surface water temperature in the central basin was 17.9 °C in District 2 and 18.4 °C in District 3. Both districts were lower than the 10-year average of 19.9 °C and 20.0 °C respectively. Phosphorus in 2019 central basin samples averaged 0.022 mg/l. This is the highest phosphorus concentration since 2012, and it is above the ten-year average of 0.020 mg/l.

Nearshore Fish Community

Thirty-seven species were collected as part of the 2019 District 1 electrofishing survey, including 4,178 individual fish. Out of those fish, 258 individuals were sunfish species, mostly bluegill and largemouth bass (n = 88 and 92, respectively). One new species (trout-perch) was detected in 2019. Average Index of Biotic Integrity (IBI) scores were close to their time-series average values in 2019, similar to 2018 **(Fig 2).** Proportional stock density of quality-sized largemouth bass (PSD-Q; > 12 inches,) was 73 in 2019, above the survey average (61). Bluegill PSD-Q in 2019 (32; > 6 inches) was also near the survey average (33). In the central basin transects, 22 species were collected with a total of 296 individuals. Out of those fish, 129

were sunfish species, primarily largemouth bass (71), smallmouth bass (16), and bluegill (24). Largemouth bass collected for age ranged up to 8 years old.

Fig2- Location of nearshore fish community assessment sites.
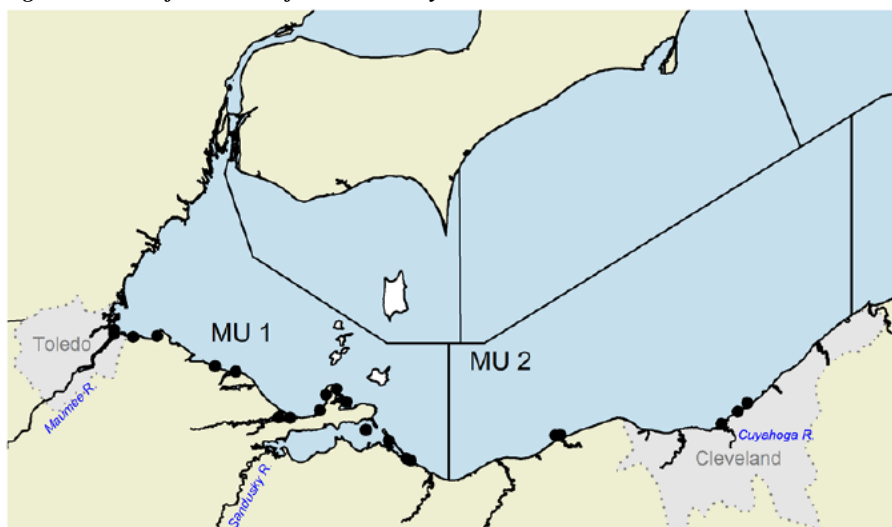
Conclusions

The Lake Erie Fisheries staff will continue to assess Lake Erie fish stocks annually with our standard programs. Division staff will continue to improve these assessment efforts through new gear development, evaluation, and ongoing collaborative research projects with universities. These data are essential to fisheries management, both within Ohio waters and across Lake Erie jurisdictions. Changes in the Lake Erie ecosystem will be addressed through new research and management, including work applied to harmful algal blooms, hypoxia, and their effects of fish populations and fisheries. Opportunities will be

sought to restore and enhance fish habitat in the Lake Erie basin through Lake Management Plan initiatives, partnerships with other Department of Natural Resources divisions, and targeted research to understand where fish species and specific spawning populations occur in the lake and how their populations can be enhanced. We will also assist in the implementation of strategic, tactical, and operational plans to move these initiatives forward. With new research and continued annual monitoring, the Ohio Division of Wildlife will ensure Lake Erie's natural resources are managed sustainably for current and future generations of stakeholders.
End ✧

NY Lake Erie Salmon Stocking Summary (NYDEC)

York has maintained a robust annual stocking program for salmonines (trout and salmon) into Lake Erie and its tributaries at least since 1968 when the first coho salmon were introduced. Initial introductions were made to create a recreational fishery and to utilize the lake's sparsely inhabited hypolimnion (below the thermocline). One exception is lake trout, which have been stocked by the USFWS since the mid-1970's to re-establish this native species. Coho and Chinook salmon are no longer stocked into Lake Erie by any jurisdiction and most of the lake wide stocking effort focuses on steelhead and lake trout.

The number of fish stocked is expressed as yearling equivalents; the majority of the salmonines stocked in Lake Erie are stocked at the yearling (one year old) life stage. However, in some years surplus fish become available and are typically stocked as fall fingerlings (~ 6 months old). In this instance, fall fingerlings are converted to yearling equivalents based on a lake wide standard of 0.03527 yearlings per fall fingerling for steelhead and brown trout (unpublished data), and 0.41 yearlings per fall fingerling for lake trout (B. Lantry, USGS, unpublished data).

A total of 332,164 salmonines were stocked into the New York waters of Lake Erie in 2019. The majority (230,941; 70%) were stocked as yearlings with the remainder being fall fingerlings. Stocking was below target for steelhead but exceeded target for both domestic rainbow trout and lake trout. The overall combined stocking of salmonines in yearling equivalents in 2019 was below average compared to the previous 30 years of the time-series and the second lowest number of salmonines stocked in New York's portion of Lake Erie since 1982 (**Fig 1).**
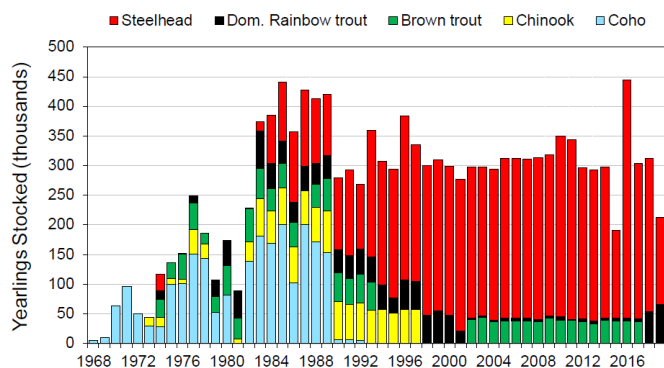
FIG.1-Number of coho and Chinook salmon, brown trout, and rainbow trout (domestic and steelhead) stocked in New York waters of Lake Erie, 1968-2019.

Steelhead

Steelhead were the most numerous salmonine species stocked in NY's portion of Lake Erie in 2019 (**Fig.1**). A total of 146,760 yearlings were stocked into the Lake Erie tributaries from the Salmon River State Fish Hatchery

(SRSFH). This was below the stocking target of 255,000 due to shortages at the hatchery.

A total of 61,000 fall fingerling domestic rainbow trout were stocked in 2019, exceeded the stocking target of 45,000 fish due to surplus fish being available at the Bath State Fish Hatchery (**Fig.1**). This was the second year of stocking fall fingerling domestic rainbow trout into the Lake Erie tributaries as replacements for yearling brown trout. Brown trout stocking was terminated because the most recent 16-year brown trout stocking effort failed to produce a reliable lake, harbor, or tributary fishery based on angler surveys (Markham and Todd 2018). The fall fingerling domestic rainbow trout were stocked into the four largest streams (Cattaraugus, Eighteen Mile, Canadaway, and Chautauqua Creeks) near the end of October. Due to their large size at stocking (average=6.5 the fall fingerling domestic rainbow trout were considered yearlings in Fig. H.1. In addition to the fall fingerlings, 5,000 yearling domestic rainbow trout were stocked into Eighteen Mile Creek in mid-April.

Lake Trout

A total of 79,181 Lake Champlain strain (LC) yearling lake trout were stocked in New York's portion of Lake Erie on 6–7 May 2019. The lake trout were stocked via the *R/V* Argo in 70 feet of water off Dunkirk. Additional yearling lake trout were also stocked into the Ohio (80,026; Finger Lakes (FL) strain), Pennsylvania (39,677; LC strain) and Ontario (52,566; Slate Island strain) waters of Lake Erie in 2019. The combined total of 251,450 yearlings exceeded Lake Erie's Lake Trout Management Plan (Markham et al. 2008) annual stocking target of 200,000 yearlings (**Fig. 2).** Lake trout stocking targets on Lake Erie have been met or exceeded in eleven of the past 13 years.
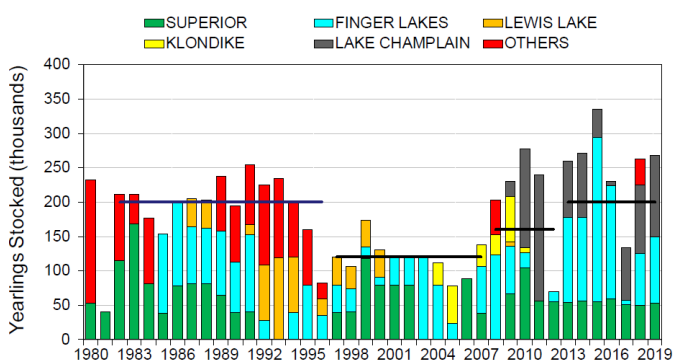

FIG.2-Number of lake trout stocked by all jurisdictions in Lake Erie, 1980–2019, by strain. Stocking targets through time are shown by black lines; the current annual stocking target is 200,000 yearlings.

In addition to the yearlings, 40,223 fall fingerling lake trout (FL strain) were stocked into Cattaraugus Creek in late October 2019. This was the second year of a three-year pilot stocking initiative to determine if stream stocked lake trout

can survive and return to the stream in the fall; the goal is to establish a successful adult spawning population. Evaluation of this pilot stocking program will begin in fall 2020 through electrofishing surveys and an ongoing tributary angler survey.

Cooperative Net Pen Project

An annual cooperative pen-rearing project pursued in partnership with the Bison City Rod and Gun Club in the lower Buffalo River did not occur in 2019 due to early steelhead stocking dates and a shortage of steelhead. This project is scheduled to resume in 2020.

TABLE 1- Numbers (in thousands of fish) of salmon and trout planted in New York waters of Lake Erie,1970-2019. Lake trout numbers include those stocked in Pennsylvania, Ontario, and Ohio waters. Totals do not include spring fingerling or fry stockings.

Species/Type	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Coho Y	64	96	50	30	29	100	87	149	144	50	81	0	139	181	169	200	102	200	169	148	0	0	0	0	0
Coho F	0	0	0	0	0	0	390	50	0	50	0	0	0	0	0	0	0	0	38	180	163	161	76	0	0
Coho f	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80	0	0	0	200	0	0
Chin f	0	0	0	125	125	85	65	362	206	0	0	71	280	550	478	547	529	500	520	620	574	525	565	497	500
Lake Y	0	0	0	0	0	0	0	0	236	201	41	41	196	205	176	154	199	205	203	213	195	206	225	217	200
Lake F	0	0	0	0	0	150	186	125	0	508	474	0	39	17	0	0	0	0	0	60	0	127	0	42	0
Lake fry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	150	0	0	150	200
Lake adt	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0
Brown Y	0	0	0	0	28	0	42	42	0	26	50	34	53	50	38	42	40	0	38	53	47	44	47	47	0
Brown F	0	0	0	0	60	26	25	81	0	0	0	0	85	50	0	0	0	50	0	22	42	37	0	0	0
Brown f	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0	0
Rbow Y	0	0	0	0	15	0	0	12	19	29	43	46	0	61	39	34	32	41	34	38	37	39	43	43	42
Rbow F	0	0	0	0	0	0	25	0	0	0	0	40	0	50	28	32	49	0	22	25	38	0	0	0	0
Rbow f	0	0	0	0	0	0	0	0	0	0	0	0	0	0	110	120	148	0	0	0	0	0	0	0	0
Rbow adt	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Sthd Y	0	0	0	0	28	0	0	0	0	0	0	0	0	15	81	100	118	270	107	103	121	143	105	214	208
Sthd F	0	0	0	0	0	0	0	0	0	0	0	0	37	0	38	0	0	0	0	13	48	0	130	0	0
TOTAL	64	96	50	155	285	361	820	821	605.1	864	689	232	829	1179	1157	1229	1267	1216	1253	1495	1260	1245	1391	1060	951

Species/Type	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Coho Y	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coho F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coho f	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chin f	500	500	500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lake Y	160	82.9	120	107	158	128	120	120	120	111.6	54.2	88	137.6	202.8	223.3	277.7	234.3	55.3	260	230.1	246.6	218.7	126.7	247.3	251.5
Lake F	82	0	0	0	40.5	7	0	0	0	0	58.4	0	0	0	0	0	0	123.7	0	99.1	81.7	26.9	17	40	40
Lake fry	0	0	301	81	0	262.7	130.2	283.5	109.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lake adt	2.7	1	0	0	1	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brown Y	0	0	0	0	0	0	0	38.7	43.4	36	37.4	37.5	37.9	36	37.6	37.5	38.1	35.5	32.6	38.5	37.8	38.1	36.5	0	0
Brown F	0	0	0	0	0	0	0	33.6	39.5	0	0	0	0	0	25	0	7.4	0	0	5	0	0	0	0	0
Brown f	0	0	0	0	0	0	35	0	0	0	0	0	0	0	0	40	0	0	0	0	0	0	0	0	0
Rbow Y	2.5	42.5	46.9	47	55.3	47.5	21.3	2.2	2.5	2.4	5	5	4.5	5	4.7	4.9	1	5	5	4	5	5	5	4.4	5
Rbow F	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	46	15	0	0	0	0	0	0	49.8	61
Rbow f	0	90.6	84	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rbow adt	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sthd Y	218	274.8	228	253	255	250.8	255	255	251.3	255	270	270	268	265	272	303.7	304.3	255	255	255	147.5	401.2	255	255	146.8
Sthd F	0	20	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	25	76.3	0
TOTAL	986.2	1012	1019	407	509.8	433.5	431.3	449.5	456.7	405	425	400.5	448	508.8	562.6	709.8	600.1	474.5	552.6	631.7	548.6	714.9	643.2	672.8	504.3

End ✧

Open Lake Sport Fishing Survey (NYDEC)

Since 1988, a direct contact sport fishing survey has been conducted to monitor boat fishing activity. This has been a standard, annual program that extends from May through October along the entire New York portion of Lake Erie. The principal objective of this survey is to estimate angler effort, catch, and harvest for all fish species in the open water sport fishery in the New York waters of Lake Erie. Walleye and yellow perch effort and harvest-at-age data are also contributed to the Lake Erie Committee's (LEC) interagency Walleye and Yellow Perch Task Groups for annual lake wide assessment, quota setting, and compliance.

TABLE1-The distribution of 2019 open water boat fishing effort (angler-hours) in New York's portion of Lake Erie.

Harbor	May	Jun	Jul	Aug	Sep	Oct	Total
Barcelona	2,238	11,178	14,234	11,868	4,574	1,130	45,223
Dunkirk	7,904	9,652	6,723	15,353	11,239	1,483	52,354
Cattaragus	13,357	12,581	15,676	17,884	32,637	1,962	94,097
Sturgeon Pt.	7,204	17,309	13,640	8,362	6,617	2,316	55,447
Buffalo	12,321	40,812	47,023	31,411	20,135	4,748	156,451
Grand Total	43,024	91,532	97,296	84,877	75,203	11,640	403,572

Estimated overall 2019 open water sport fishing effort in New York waters of Lake Erie was 403,572 angler-hours, the highest measured angler effort since 2001. Peak fishing activity occurred in July, but fishing activity remained high from June through September. The most frequently used site was Buffalo Harbor (Safe Harbor Marina, formerly Buffalo Small Boat Harbor), which accounted for 39% of estimated boat fishing effort in 2019 (**Table 1**). Effort targeting

Distribution of open water boat fishing effort
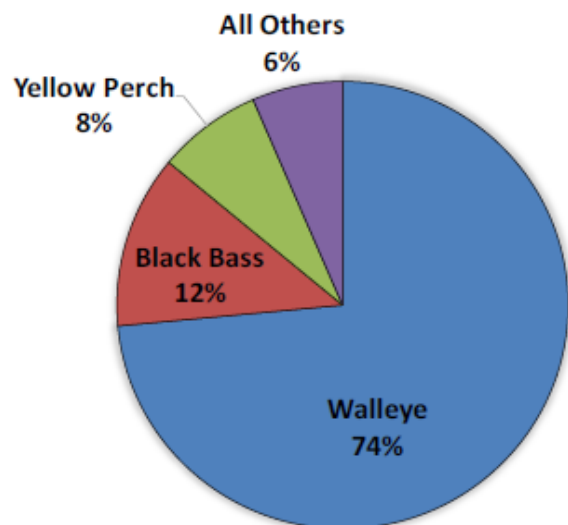
FIG 1-Distribution of directed sport fishing effort by boat anglers in NY waters of Lake Erie, May-October, 2019.

walleye was the largest component of the sport fishery, accounting for 74% of overall angling effort (**Fig 1**). Smallmouth bass and yellow perch angling effort accounted for 12% and 8% of the total effort, respectively

A major declining trend in boat fishing effort extended through the 1990's and 2000's to a low point in 2009. Since 2009 effort has generally increased (**Fig 2**). This increase is almost totally attributable to improvements in the status of walleye stocks and increases in targeted walleye effort. Lake Erie's major decline in boat fishing effort from the late 1980's through the 1990's is consistent with broad trends observed in other waters and is likely attributable to factors independent of fishing quality such as high fuel prices, aging of the boat angler population, and regional population decline.

Total open water boat fishing effort
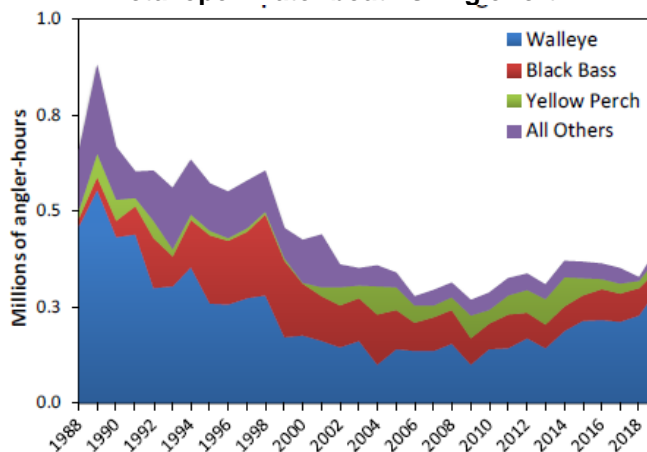
FIG.2-Open water sport fishing angler effort for walleye, bass, yellow perch and all other species, May–October, 1988-2019.

A total of 24 species were encountered by boat anglers in 2019, resulting in a total catch of 422,533 fish (**Table J.2**). Thirteen species were harvested resulting in a total harvest of 238,780 fish. Walleye and yellow perch accounted for 99% of the harvest and 68% of the catch.

TABLE.2-Harvest, catch, and two standard errors (2SE) of selected species by boat anglers, May-October, 2019.

Species	Harvested	2SE	Caught	2SE
Walleye	174,466	24,356	216,507	30,078
Yellow Perch	61,981	19,918	70,730	21,202
Smallmouth Bass	699	641	56,685	15,380
White Bass	385	242	11,477	2,157
Lake Trout	340	192	2,232	1,055
Pumpkinseed	307	614	307	614
*18 other species	602	322	64,595	9,317
Total	238,780	31,479	422,533	41,032

*11% of catch of other species were freshwater drum

Walleye

Estimated 2019 targeted walleye fishing effort was 296,678 angler-hours, a 29% increase from 2018 and the highest annual effort measured since 1994 (**Fig 3**). Estimated 2019 total daytime walleye harvest was 174,466 fish, the highest in the 32-year time series (**Table 2; Fig 3**).

Walleye harvest and effort
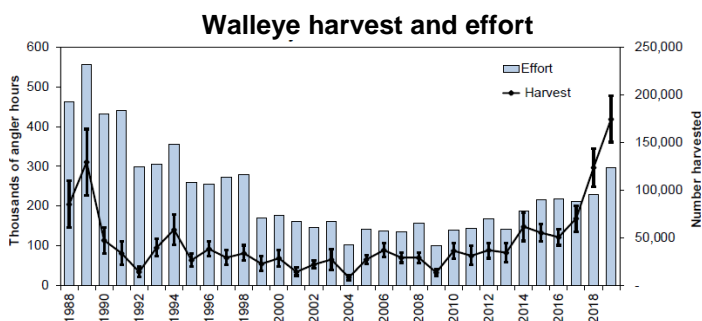
FIG.3-Annual trends in walleye sport fishing effort (angler-hours) and number harvested from May-October, 1988–2019.

Walleye was the most frequently caught species in 2019(**Table 2**). Walleye catch and harvest peaked in July, and the June–September period accounted for 98% of total catch and harvest**.** All five harbors were significant contributors to walleye catch and harvest in 2019. Walleye catch rates have been relatively high over the past decade and at record levels from 2017–2019. The 2019 targeted walleye catch rate was 0.68 fish per hour, the second highest recorded.

Measures of walleye angler success can also be expressed as frequency of boat limit catches and zero catches for targeted walleye trips. In 2019 24% of walleye fishing boats achieved a party limit while only 18% failed to harvest walleye. Both metrics represent time series records.

In the past, large decreases in the average size of harvested walleye have been a precursor to excellent fishing, as they are an indication of large pulses of young walleye entering the fishery. In the last four years the average size of harvested walleye decreased by 3.5 inches to 19.8 inches in 2019**,** one of the lowest observations in survey history. This decrease is a result of recent production of exceptionally strong year classes in the east and west basins and is an indicator of excellent fishing quality now and in the coming years.

The age distribution of the walleye harvest was determined from otolith samples taken at fish cleaning stations and was expanded to estimate number harvested by age **(Fig 4).** Walleye harvest was dominated by the 2015 (age-4) and 2016 (age-3) year classes, comprising approximately 48% and 29% of the total harvest, respectively. It is likely that most of the age-4 fish are the result of exceptional west basin recruitment in 2015.

2019 age distribution of walleye harvest
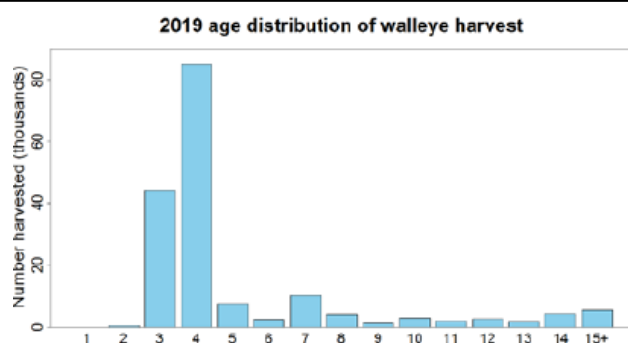
FIG 4-Age distribution of the 2019 walleye harvest estimated by expanding the age distribution of samples at fish cleaning stations by the 2019 walleye harvest estimate.

In general, walleye weight at length has been trending down over the last decade. In 2019 the estimated weight of a 20-, 24- and 28-inch harvested walleye was 2.5, 4.3 and 6.9 lbs., respectively, compared to long-term averages of 2.7, 4.8 and 7.6 lbs. Decreasing weight at length may indicate a lack of suitable forage and increased predator density. In 2019, round goby dominated angler-caught walleye diets while smelt contributed a record low 2% **(Fig 5).** Walleye reliance on smelt has been decreasing since 2015 as walleye have switched to goby as their dominant diet item. The past five years were the only period in which smelt did not dominate walleye diets. Other fishes, including yellow perch have also become increasingly prevalent in walleye diets recently.

NY Angler Caught Walleye Diets
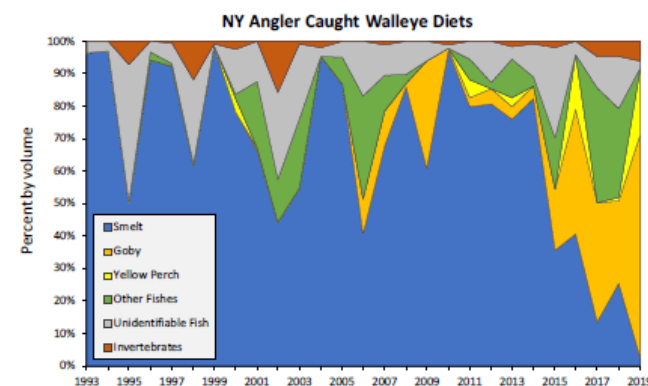
FIG 5-Diet composition (percent by volume) of angler caught walleye from the New York waters of Lake Erie, collected at fish cleaning stations, 1993–2019.

The exceptional eastern basin 2016 and west basin 2015 walleye year classes supported record fishing quality in 2019. There is also evidence of an exceptional 2017 east basin year class and strong 2018 and 2019 year classes in the western basin. Overall strong walleye recruitment throughout Lake Erie in recent years should continue to result in excellent fishing quality in New York waters for years to come.

Targeted walleye angling effort increased in response to excellent fishing quality over the last decade. However, though the quality of walleye fishing in the New York waters of Lake Erie is at record levels, walleye effort is nowhere near the highs recorded in the late 1980's and early 1990's (**Fig 3**). This may indicate limited capacity for increased walleye effort in the NY waters of Lake Erie by the current angling population. Walleye exploitation in New York's portion of Lake Erie is relatively modest compared to other jurisdictions indicating that efforts to further publicize the current, unprecedented walleye fishing quality are justified.

The most important factor contributing to walleye fishing quality in the east basin of Lake Erie is likely summertime movements of walleye from western Lake Erie into the central and eastern basins. The magnitude of this migration varies between years and may be attributable to high walleye population densities in western Lake Erie as well as other factors independent of walleye densities. Beginning in 2015 the Lake Erie Unit began a study which uses acoustic telemetry technology to quantify this annual walleye migration and its importance to the eastern basin fishery.

Smallmouth Bass

Estimated targeted fishing effort for smallmouth bass in 2019 was 50,455 angler hours (**Fig 6**). Though targeted smallmouth bass effort has been very stable over the past decade, 2019 effort decreased to levels not observed since the late 1980's, prior to the implementation of New York's spring bass season (1994). Smallmouth bass angling quality has been quite variable over the last decade, ranging from 1.37 to 0.88 fish per hour. The amount of trip-to-trip variability has also increased. Overall catch rate by bass anglers was 1.03 bass per hour in 2019, which is equal to the average quality since the spring season began. Smallmouth bass harvest was estimated at only 700 fish in 2019, only 1.2% of the total bass catch (56,685) and a time series low (**Fig 6**). Approximately 66% of the catch and 51% of the harvest was reported from the Buffalo Harbor survey location in 2019.
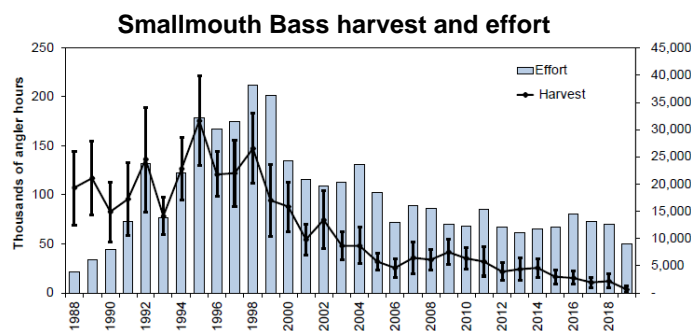
FIG 6-Annual trends in smallmouth bass fishing effort (angler-hours) and number harvested, May - October, 1988–2019.

A long-term decline in smallmouth bass harvest rates has been underway since this survey began in the 1980's. This notable trend of increasing catch-and-release fishing has caused catch rates by anglers targeting smallmouth bass to diverge from overall harvest totals. In recent years, smallmouth bass harvest totals have been the lowest observed in the time series. Anglers targeting species other than smallmouth bass can account for as much as 70% of the total smallmouth bass harvest in a given year. The excellent quality percid fishing observed recently may provide a more appealing alternative for anglers interested in consuming their day's catch.

Measures of bass angler success can also be expressed as catch per boat and frequency of zero catches for targeted bass fishing trips. Table J.6 indicates that the 2019 catch per boat was 11.4 (average 12.7) and the percentage of boats that caught no bass was 12% (average 16.2%). Lake Erie's bass angling quality can still be characterized as excellent, especially relative to other bass populations.

Yellow Perch

Yellow Perch was the second most caught species by boat anglers in 2019 (**Table 2**). Estimated 2019 targeted yellow perch effort (30,285 angler-hours) was the highest in the last four years and was slightly below average (35,000 angler-hours) for the 32-year survey (**Fig 7**). Estimated 2019 yellow perch harvest (61,981 fish) was slightly above average (**Fig 7**). Boats launching out of Cattaraugus Creek accounted for highest catch and harvest of yellow perch in 2019. The highest monthly yellow perch harvest occurred in May (56% of total).
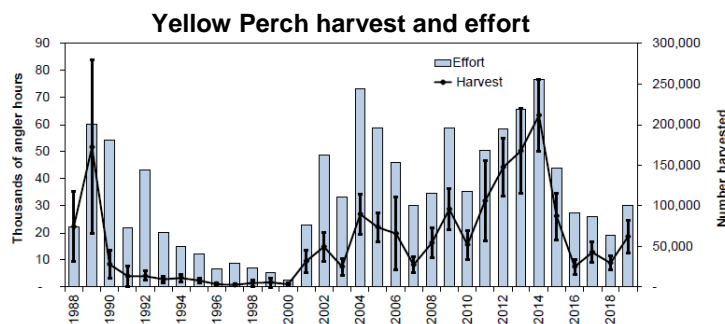

FIG 7-Annual trends in yellow perch fishing effort (angler-hours) and number harvested, May - October, 1988–2019.

The overall 2019 yellow perch catch rate was 1.96 perch per hour, well above the time-series average of 1.46 fish per hour. The mean length of harvested yellow perch was 10.8 inches in 2019. The age distribution of the yellow perch harvest was determined from anal spine samples and was expanded to estimate harvest at age. Yellow perch harvest in 2019 was dominated by the 2016 and 2015 year classes (ages 3 and 4, respectively) making up approximately 77% of the total harvest. (**Fig 8**).

Measures of yellow perch angler success can also be expressed as frequency of boat limit catches and frequency of zero catches for targeted yellow perch fishing trips. Boat

limit catches of yellow perch remain a rare occurrence across all years, while complete lack of success (zero harvest) occurs more commonly. During 2019, only 4% (average 1.4%) of yellow perch fishing boats achieved a party limit, while 26% (average 40%) failed to harvest any perch.
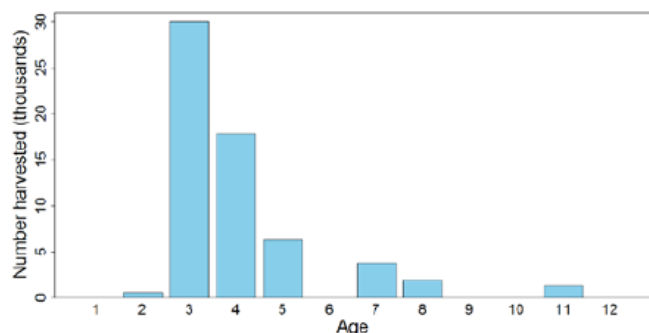
2019 age distribution of yellow perch harvest

FIG 8- Age distribution of the 2019 yellow perch harvest

Beginning in 2001, excellent yellow perch fishing quality returned after a full decade of poor fishing. Improvements in yellow perch fishing quality were consistent with other population metrics indicating improved status relative to the 1990's. Yellow perch fishing effort and harvest peaked in 2014, supported by the two strongest year classes observed to that point (2008 & 2010). These two strong year classes were followed by three consecutive years of weak recruitment in 2011–2013. As the 2008 and 2010 year classes aged and exited the population, fishing quality declined as evidenced by the relatively low observed catch rates in 2016 and 2017. However, strong year classes of yellow perch in '14, '15, and '16 led to improved fishing

quality in 2018 and 2019. These three cohorts will be concurrently abundant in the harvestable population (ages 4-6) in 2020, which should produce catch rates similar to 2019. However, two poor year classes in 2017 and 2018 should begin to reduce catch rates in 2021.

In recent years trends in perch catch and harvest have decoupled from catch-per-effort and abundance, i.e. increases in perch abundance have not resulted in increased effort, catch, and harvest as they have in the past. We hypothesize that the reason for this decoupling is that exceptional walleye fishing has caused some perch anglers to shift their effort to walleye.

Perch fisheries in New York's portion of Lake Erie typically operate in deeper water (> 40 ft) and some anglers tend to release smaller, but otherwise harvestable-sized yellow perch. Yellow perch that are retrieved from depths greater than 30 ft. are known to experience barotrauma resulting in high mortality for released fish. Ongoing outreach efforts are conveying this message to the angling community with recommendations to harvest all perch with barotrauma or count them towards your limit.

Other Species
Freshwater drum (56,685; 11%) and white bass (11,477; 3%) were routinely caught by anglers in 2019. Round goby (11,513) also remained a commonly encountered nuisance species. Lake trout (2,232), steelhead (621), brown trout (39), coho salmon (21), Chinook salmon (17), and lake whitefish (16) were the salmonines identified in the 2019 angler catch. Lake trout (340) and steelhead (224) were the most commonly harvested of the salmonine species.
End ✧

Fisheries status in Michigan Waters of Lake Erie and Lake St. Clair, 2019

Highlights for 2019
• Anglers spent over 583,000-hours fishing the Michigan waters of Lake Erie and Lake St. Clair in 2019, taking 112,000 total trips
• The 2019 Lake Erie Walleye year class was the largest in our survey time series, which started in 2014
• Lake Erie Walleye harvest by anglers was the second highest on record since 2006, following the 12-year record high in 2018
• Nearly 1 in 10 Smallmouth Bass captured on Lake St. Clair was over 20″ long, while 2/3 of fish were over 17″ in total length
• The 2019 Yellow Perch fishery in Lake Erie was challenging, with very low harvest rates in both the recreational fishery and the charter fishery
• 18 Muskie were tagged with acoustic tags in Anchor Bay, Lake St. Clair; anglers assisted in collecting 16 of these fish for tagging
• Station personnel handled 147 Lake Sturgeon from the St. Clair River and Lake St. Clair; these fish averaged nearly 50″ in length

About the Lake St. Clair Fisheries Research Station
The Lake St. Clair Fisheries Research Station is a unit of the Research Section of the MDNR Fisheries Division. The station conducts research and stock assessment on fish populations of Lake Erie, the St. Clair-Detroit River System (St. Clair River, Lake St. Clair and the Detroit River), and Saginaw Bay. Results of this work are instrumental in fisheries management decisions affecting these waters. The station works closely with MDNR fisheries managers and routinely collaborates in joint projects with other state and federal partner agencies, local units of government, non-government organizations, academic institutions, and stakeholder groups. Federal Aid in Sport Fish Restoration (SFR) Act dollars provide support for the majority of the station's assessment activities.

The SFR Program provides grant funds to restore and better manage America's fishery resources through excise taxes on the purchase of fishing equipment, motorboat and small engine fuels, import duties, and interest. More information on the SFR Program can be found at: http://wsfrprograms.fws.gov/Subpages/GrantPrograms/SFR/SFR.htm.
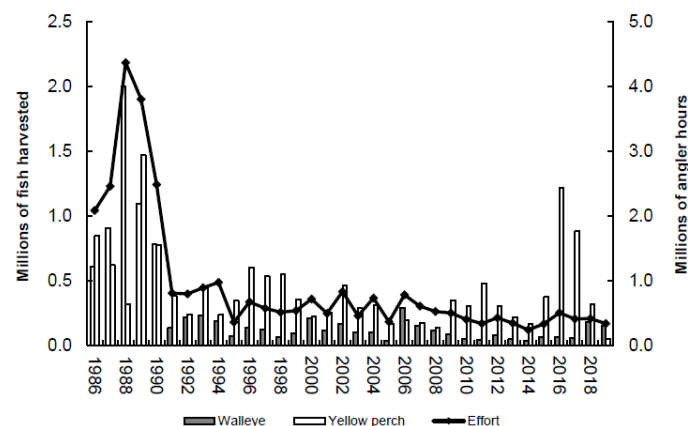
Lake Erie
Sport Fishery Summary
The annual creel survey conducted by the MDNR during 2019 produced an effort estimate of 334,026 angler hours and a total harvest estimate of 208,164 fish (**Table 1**) for Michigan's Lake Erie non-charter recreational boat fishery. Angling effort and harvest both decreased (**Fig 1**) compared to 2018 (2018 effort: 411,581 hours, 2018 total harvest: 490,372 fish). The decrease in both angler effort and total harvest in 2019 was driven by the poor Yellow Perch fishery; targeted Yellow Perch effort (57,929 angler hours) and total harvest (48,595 fish) decreased by 58% and 84% from 2018. Total harvest was mostly comprised of Walleye (74%), followed by Yellow Perch (23%) and White Bass (1%). Channel Catfish, White Perch, Freshwater Drum, Smallmouth Bass, Rock Bass, Rainbow Trout, and Northern Pike accounted for the remaining 2% of total harvest.

Fig 1- Estimated harvest and effort for Michigan's Lake Erie sport fishery, 1986-2019.

Species	Rate (fish/hr)	Apr	May	Jun	Month Jul	Aug	Sep	Oct	Season
HARVEST									
Yellow Perch*	0.84	509	898	3,838	2,232	9,576	14,845	16,697	48,595
Walleye*	0.58	9,623	39,963	50,500	40,751	7,319	980	4,035	153,171
Channel Catfish	<0.01	158	28	307	580	240	347	0	1,660
White Bass	0.01	250	1,556	356	52	71	19	282	2,586
White Perch	<0.01	0	371	416	462	21	78	0	1,348
Freshwater Drum	<0.01	0	0	26	405	25	103	0	559
Smallmouth Bass	<0.01	0	32	0	26	0	4	0	62
Total Harvest	0.62	10,540	42,879	55,508	44,553	17,252	16,376	21,056	208,164
EFFORT									
Angler hours		24,700	56,655	87,072	72,964	36,715	29,084	26,836	334,026
Angler trips		5,367	11,477	16,959	14,969	7,661	6,149	5,418	68,000
RELEASED									
Yellow Perch*	0.47	18	267	1,263	506	4,394	11,740	8,963	27,151
Walleye*	0.03	1,851	3,483	333	1,608	298	161	421	8,155
Largemouth Bass	0.02	0	53	1,480	1,993	638	1,269	1,329	6,762
Smallmouth Bass	0.01	0	155	306	735	1,095	237	440	2,968
White Bass	0.19	2,758	19,319	13,455	9,776	6,149	2,655	9,096	63,208

Table 1- Estimated harvest, total harvest rate, effort and released catch for Michigan's 2019 Lake Erie non-charter boat fishery.

In 2019, Michigan charter boat operators reported a total harvest of 21,935 fish of all species from Michigan waters of Lake Erie during 884 excursions, down substantially from 2018 (40,256 fish during 1,117 excursions). The steep decline reflected the challenging fishing conditions for Yellow Perch in Michigan waters of Lake Erie in 2019. Similar to the non-charter recreational boat fishery, Walleye comprised 87% of all fish harvested in the charter fishery.

Yellow Perch

The difficult Yellow Perch fishery in Lake Erie during 2019 is reflected not only in angler effort and total harvest, but also in the harvest rate, which provides a standardized annual measure of fishery performance. The non-charter recreational boat fishery targeted harvest rate for Yellow Perch in 2019 was 0.84 fish per angler hour, a 63% decrease from the 2018 targeted harvest rate of 2.3 fish per angler hour and the 2nd lowest harvest rate observed in the 1986-2019 creel survey time series (**Fig 2**). The targeted Yellow Perch charter harvest rate was 1.63 fish per hour, a 60% decrease from 2018 (4.05 fish per hour). Similar results were observed in Ohio waters of Lake Erie's west and central basins, where angler harvest decreased from 41-93% in the west, west central, and east central basins compared to 2018. Changes in Yellow Perch abundance do not explain the poor fishery performance, as the population size of Yellow Perch was projected to decrease in a smaller proportion (1-13%) than the observed change in harvest in the west, west central, and east central basins of Lake Erie from 2018 to 2019. For more information on Yellow Perch fishery performance and abundance across Lake Erie, refer to the annual report of the Lake Erie Yellow Perch Task Group which is available on the Great Lakes Fishery Commission website: http://www.glfc.org/lake-erie-committee.php.
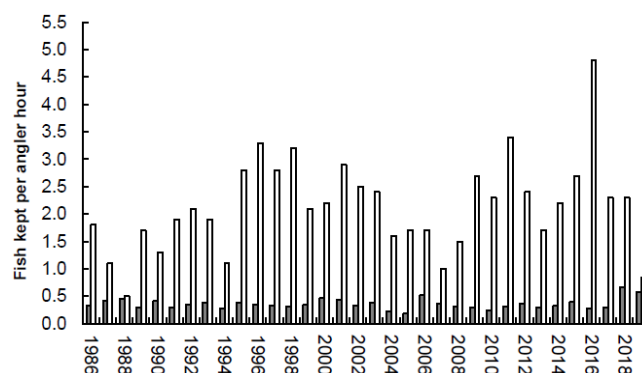

Fig 2- Walleye and Yellow Perch targeted harvest rates (fish per hour) for Michigan's Lake Erie sport fishery, 1986-2019.

Yellow Perch harvested in the Michigan Lake Erie non-charter recreational boat fishery were primarily age-2-4 fish from the 2015-2017 year classes, which each contributed between 23-27% of the total harvest by age. Age-5 fish from the 2014 year class accounted for 17% of the Yellow Perch harvest, with smaller contributions from age1 (2018 year class), age-6 (2013 year class) and age-7 (2012 year class) fish (**Fig 3**). Average lengths of age-3-5 Yellow Perch in 2019 were slightly lower than 2018 but above longterm averages. Yellow Perch reproduction continues to be successful, as evidenced by young-of-year catch rates in the August bottom trawl survey. During 2019 we captured 611 age-0 Yellow highest began in 2014.
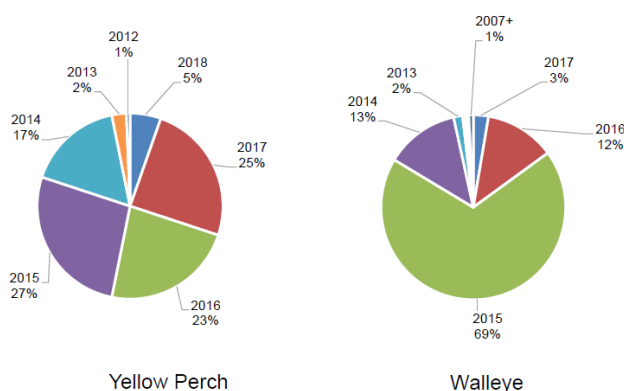
Fig 3-Year-class contribution to Michigan sport harvest for Yellow Perch and Walleye from Lake Erie in 2019.

Walleye

While the total harvest and harvest rate of Lake Erie Walleye during the 2019 non-charter recreational boat fishery decreased compared to 2018, the fishery remained excellent. A total of 265,330 angler hours were spent harvesting 153,171 Walleye, the second-highest harvest observed since 2006 and only 13% below the 12year high of 176,089 Walleye harvested in 2018. The targeted harvest rate of 0.58 Walleye per angler hour in 2019 was the fifth highest in the 1975-2019 time series (**Fig 2**). The harvest rates of the past two years, which include the time series record of 0.67 Walleye per angler hour in 2018, have not been observed since the early 1980s and are well above the long-term average of 0.37 Walleye per angler hour for Michigan waters, and 0.43 Walleye per hour for the western and central basins of Lake Erie. Walleye fishing in the Lake Erie charter fishery was also strong; the 2019 charter targeted harvest rate was 1.23 fish per hour, similar to last year (1.22 fish per hour).

The decrease in Walleye catch-per-unit-effort (CPUE) during the 2019 gill net survey (**Fig 4**) was due to a lower proportion of fish from the large 2015 year class being represented in the catch, an artifact of the gear's size selectivity towards younger, smaller individuals (particularly yearlings). Clearly, the 2015 year class
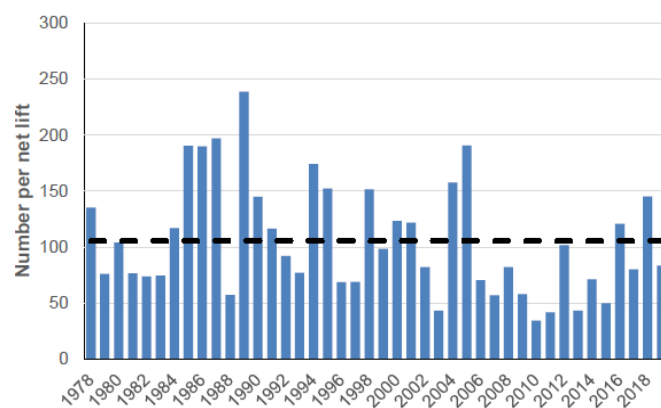

Fig 4-Average total Walleye catch per unit effort, by year for Michigan Lake Erie index gill nets, 1978-2019. The horizontal line represents the average for the time series.

continues to be a strong contributor to the fishery as indicated by fishery-dependent data from the creel survey, which showed that age-4 (2015 year class) Walleye comprised 69% of the total non-charter sport fishery harvest. While slightly lower than 2018, the 2019 gill net catch rate of yearling walleye remained above average for the second year in a row and is the 4th highest yearling CPUE observed since 2004 (**Fig 5**), when the very strong 2003 year class was sampled as age-1 fish. Age-0 Walleye catch rates from the 2019 trawl survey (32 fish per 10-minute tow, the highest in the 6-year bottom trawl survey time series), in combination with yearling Walleye catch rates from the gill net survey, show continued strong Walleye reproduction in Lake Erie's western basin during recent years. Pending good overwinter survival, the 2018 and 2019 year classes should be strong contributors to the Lake Erie Walleye fishery in the future. For more information on Walleye fishery performance and abundance across Lake Erie, refer to the annual report of the Lake Erie Walleye Task Group, which is available on the GLFC website: http://www.glfc.org/lakeerie-committee.php.
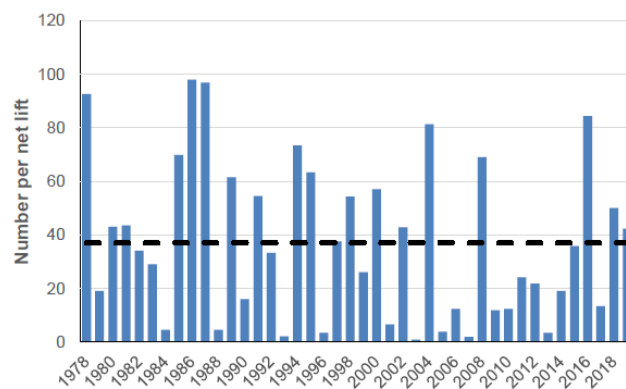

Fig 5-Average yearling Walleye catch per unit effort for Michigan Lake Erie index gill nets, 1978-2019. The horizontal line represents the average of the time series.

Forage fish

A total of 7,282 forage fish representing 14 different species were captured during 8 trawl tows for an average CPUE of 931 fish per 10-minute tow. Young-of-year Yellow Perch had the highest average CPE (611 fish per 10-minute tow). Young-of-year White Perch (179 fish per 10-minute tow), Mimic Shiner (64 fish per 10-minute tow), young-of-year Walleye (32 fish per 10-minute tow), and Round Goby (11 fish per 10-minute tow) were also substantial contributors to the catch. Trout-perch, young-of-year White Bass, Emerald Shiner, Spottail Shiner, Freshwater Drum, Silver chub, Logperch, Channel Catfish, and Gizzard Shad were also captured.

The 2019 forage catch rate was equal to the median (50th percentile) CPUE observed since Michigan's modern-day bottom trawl survey began in 2014. Since this was only the sixth annual trawl survey in recent years, it is difficult to put these catch rates into a broader context for the West Basin of Lake Erie. However, Michigan's young-of-year Walleye CPE paralleled that of the decades-long Ontario and Ohio bottom trawl survey, which also indicated another large Walleye year class in 2019.

Commercial Fishery Summary

Since 1979 the commercial fishery in Michigan waters of Lake Erie has primarily harvested rough fish species using seines in the shallow embayments along the shoreline, although a small-mesh trap net license has been active since 2006. In 2019, one Michigan commercial fishing operator fished two active licenses on Lake Erie. The 2019 commercial harvest included 14 types of fish for a total of 328,194 pounds **(Table 2)**. In combination, Channel Catfish (31%), Goldfish (13%), White Bass (12%), and Common Carp (12%) accounted for 69% of the total harvest by weight. The 2019 total harvest rebounded slightly from 2018 (307,128 total lbs).

Table 2- Commercial harvest (pounds caught) of selected species from Michigan waters of Lake Erie, 1982-2019.

Year	Buffalo	Bullhead	Common carp	Channel catfish	Gizzard shad	Goldfish	Quillback	Freshwater drum	Sucker	White bass	White perch	Whitefish	Grand Total
1982	22,474	58	676,896	20,354	76,000	0	1,430	608	178	1,742	0	0	799,740
1983	7,837	997	622,604	28,990	665,000	0	1,510	3,555	185	12,042	0	0	1,342,720
1984	789	152	422,571	9,208	1,265,200	0	56,061	116	44	2,041	0	0	1,756,182
1985	7,885	7,340	738,857	9,253	878,000	0	80,018	905	1,378	4,764	0	0	1,728,400
1986	14,732	7,687	367,310	11,183	0	0	2,217	2,032	123	1,397	0	0	406,681
1987	17,814	4,462	685,395	39,603	0	551	1,062	1,825	88	4,142	0	0	754,942
1988	9,471	5,421	417,365	15,208	0	188	1,380	1,180	0	1,049	0	0	451,262
1989	19,549	3,572	194,320	11,481	0	2,951	568	0	0	991	0	0	233,432
1990	40,064	488	158,151	2,025	0	877	0	0	0	0	0	0	201,605
1991	0	704	206,244	1,941	0	466	6,894	0	0	19	8	0	216,276
1992	0	444	251,365	2,929	2,845	1,025	30,204	290	0	357	10	0	289,469
1993	0	844	238,805	9,152	395	501	28,175	4,206	0	1,180	0	0	283,258
1994	0	659	94,662	5,760	2,103	111	8,930	111	0	1,819	0	0	114,155
1995	0	827	329,262	16,168	23	517	66,013	39,673	436	1,850	64	0	454,833
1996	104	828	387,671	24,969	36,996	7,138	73,662	48,218	4,286	2,923	45	0	586,840
1997	91,877	744	325,433	17,936	24,494	10,497	33,937	8,823	72	7,306	4	0	521,123
1998	15,721	2,139	620,015	16,573	4,988	6,862	22,990	24,507	6,180	1,326	0	0	721,301
1999	25,894	7,050	211,055	7,561	6,200	0	0	265	1,945	23	0	0	259,993
2000	27,843	1,742	313,200	14,400	4,595	3,025	0	0	0	1,776	0	0	366,581
2001	24,393	1,197	185,495	16,328	55	8,281	310	2,935	0	492	0	0	239,486
2002	45,367	6,500	336,820	39,778	6,655	4,660	1,300	4,035	0	3,810	0	0	448,925
2003	9,350	900	65,020	7,890	0	0	2,150	0	0	0	0	0	85,310
2004	18,883	1,650	97,380	23,600	5,120	0	3,400	0	550	1,973	0	0	152,556
2005	96,621	5,495	319,700	15,657	14,910	78,333	1,600	331	2,390	1,338	0	0	536,375
2006	85,269	7,277	378,123	42,931	52,382	67,171	5,030	7,876	1,410	5,237	796	10,693	664,195
2007	215,282	12,536	241,356	98,979	242,695	39,140	9,900	67,072	9,712	77,249	35,946	8,800	1,058,667
2008	142,726	31,969	204,881	71,385	134,008	84,361	2,257	137,304	11,244	98,041	56,867	0	975,043
2009	130,295	45,294	196,888	63,725	122,379	90,771	3,900	116,312	11,339	96,456	34,522	9,439	921,320
2010	68,511	47,612	191,321	64,913	0	77,550	107,037	130,533	7,919	37,021	19,524	963	752,904
2011	107,610	57,670	401,034	138,540	0	84,857	84,727	227,873	17,435	47,058	31,949	4,155	1,202,908
2012	221,255	24,450	507,305	129,666	110,800	57,015	93,296	136,679	12,520	96,916	26,070	6,436	1,422,408
2013	164,345	8,600	256,546	102,197	40,050	28,146	138,841	73,101	10,234	187,848	32,954	0	1,042,862
2014	136,743	7,556	353,979	117,835	31,800	34,054	70,180	81,734	1,500	172,126	42,646	0	1,050,153
2015	100,135	26,396	227,946	144,500	50	88,791	76,203	128,510	332	179,246	53,245	267	1,025,621
2016	73,119	29,493	187,838	155,315	0	86,818	69,213	17,282	705	166,613	35,708	0	822,104
2017	21,547	16,820	46,707	81,639	40,200	28,082	25,281	9,777	120	63,270	14,672	0	348,115
2018	11,182	4,645	34,721	51,828	118,000	11,428	11,335	4,549	149	50,444	4,747	4,100	307,128
2019	24,787	14,713	37,876	102,491	6,427	44,273	13,288	13,909	1,990	40,393	26,064	1,683	32,8194*
Grand Total	1,999,474	396,931	11,532,117	1,733,891	3,892,370	948,440	1,134,299	1,296,126	104,464	1,372,278	415,841	46,536	24,544,873

St. Clair River – Lake St. Clair

Sport Fishery Summary

Non-charter recreational anglers spent a total of 249,300 hours fishing the Michigan waters of Lake St. Clair in 2019, down roughly 40% from 2018. A total of 40,423 fish were harvested, down 54% from 2018. Walleye accounted for just under half of all fish harvested in 2019.

For the St. Clair-Detroit River System (St. Clair River, Lake St. Clair and Detroit River), charter boat anglers reported a harvest of 28,260 fish of all species from the American waters of the system. Walleye accounted for (89%) of total charter harvest in 2019.

In 2019, charter boat captains reported a total of 2,524 excursions on the American waters of the St. Clair-Detroit River System, a 13% increase from 2018, which continues a trend of increased charter activity since 2012.

Table 3-Estimated harvest, total harvest rate, effort, and released catch for the 2019 Lake St. Clair non-charter boat fishery. Released numbers represent legal sized fish where applicable.

	Rate				Month				
Species	(fish/hr)	Apr	May	Jun	Jul	Aug	Sep	Oct	Season
HARVEST									
Yellow Perch	0.040	553	515	364	1,640	2,112	2,350	2,372	9,906
Walleye	0.073	1,448	6,095	4,981	2,365	3,130	122	-	18,141
Bluegill	0.025	1,505	611	118	-	560	517	3,043	6,354
Pumpkinseed	0.001	-	-	322	-	57	-	-	379
Smallmouth Bass	0.007	-	-	420	313	788	55	280	1,856
Total Harvest	0.162	5,436	8,216	6,828	4,521	6,647	3,061	5,714	40,423
EFFORT									
Angler hours		23,017	68,392	47,192	28,394	51,219	17,489	13,596	249,300
Angler trips		4,625	11,565	8,192	4,780	9,370	3,327	2,185	44,044
RELEASED									
Walleye	0.027	31	2,482	2,418	909	548	144	97	6,629
Largemouth Bass	0.054	770	4,719	3,977	1,241	1,728	782	149	13,366
Smallmouth Bass	0.286	17,688	14,391	13,389	8,583	13,268	2,807	1,271	71,397
Yellow Perch	0.097	222	820	1,221	3,736	10,285	5,280	2,529	24,093
Northern Pike	0.012	142	1,158	740	294	170	293	227	3,024
Muskellunge	0.003	99	295	141	141	38	72	37	823

Yellow Perch and Walleye

Non-charter recreational anglers harvested a total of 18,141 Walleye and 9,906 Yellow Perch (**Table 3**) in 2019 from the Michigan waters of Lake St. Clair. Both values were down substantially from 2018 (Walleye ~60% decline; Yellow Perch ~41% decline) but were roughly congruent with the decline in effort observed.

Charter anglers harvested a total of 25,311 Walleye from the American waters of the St. Clair-Detroit River system, up 9% from 2018 (23,179 fish harvested). Of these, the vast majority (99%) were taken by charters targeting Walleye, and 73% of total harvest occurred in the Detroit River. The targeted charter catch rate of Walleye was 0.84 fish per hour.

There are currently no Walleye-specific survey programs taking place in the St. Clair River and Lake St. Clair. However, Walleye continued to be captured at relatively high rates (2.98 per 24-hour set) in trap nets in Anchor Bay during 2019, down from 2018 and 2017. Nevertheless, this catch rate is slightly above the long-term average from 2002-present (2.31 per 24-hour set). Age-0 Walleye are rarely captured during the fall trawl survey, indicating low levels of reproduction from Lake St. Clair and its tributaries.
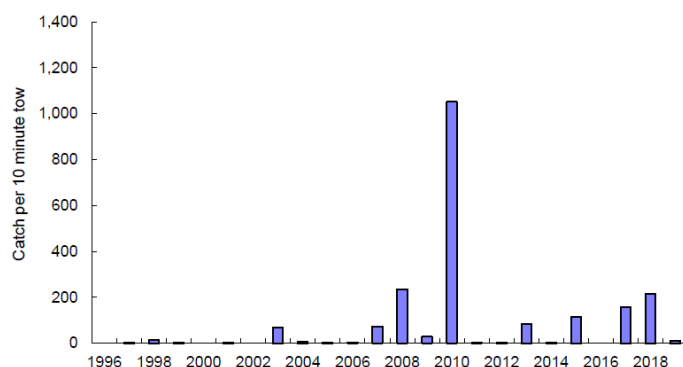

Fig 6-Year-class strength for Yellow Perch in Lake St. Clair as indicated by fall trawl age 0 catch rates, 1996-2019.

Yellow Perch reproductive success as indexed by age-0 catch rate in the fall trawl survey decreased from 2018 and was the lowest observed since 2014 (**Fig 6**). However, high reproductive success doesn't necessarily lead to increased recruitment to the adult population in Lake St. Clair. For example, the 2017 age-0 Yellow Perch catch rate in the fall trawls was the second highest since 2010; however, this did not translate to higher catch rates of age-1 fish in the spring 2018 trawls.

Growth of Yellow Perch in Lake St. Clair continues to be below the statewide average. Average length-at-age for Yellow Perch is below the statewide average at all consistently observed ages (age-1 to age-5. Additionally, Yellow Perch growth is lower than it has been historically as seen by average length-at-age estimates from pervious time periods.

Black Bass (Smallmouth Bass and Largemouth Bass)

Non-charter recreational anglers reported capturing 108,145 Smallmouth Bass in the Michigan waters of Lake St. Clair in 2019. Of these fish, 71,397 legal-sized fish were released and 1,856 legal-sized fish were harvested. Both Smallmouth Bass release and harvest were down in comparison to 2018, but again declines were of similar magnitude to the decrease in fishing effort. A total of 58,821 Largemouth Bass were captured by anglers in the Michigan waters of Lake St. Clair in 2019. A total of 13,366 legal-sized fish were released, and 176 legal-sized fish were harvested.

Charters targeting Smallmouth Bass in the St. Clair-Detroit River System captured and released 14,539 fish in 2019, virtually unchanged from 2018 (14,600 total). Only 602 fish were harvested, resulting in a total release rate of about 96%. Targeted Smallmouth Bass catch rates were 1.42 fish per hour, down slightly from 2018 (1.46 fish per hour).
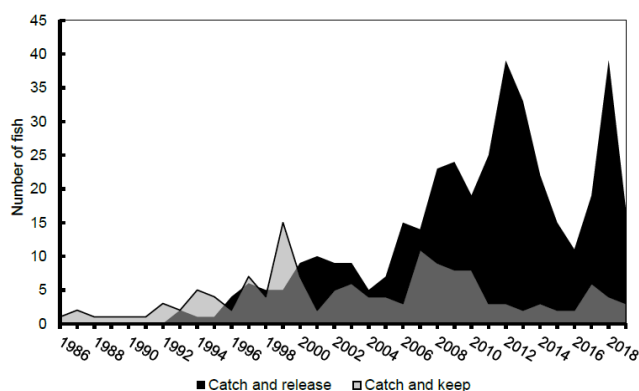
Fig 7-Lake St. Clair Smallmouth Bass entered in the Michigan DNR Master Angler Program, 1986-2019.

Statistics from the Master Angler program indicate that Lake St. Clair is the premier waterbody in the state for trophy Smallmouth Bass. With 20 entries in the Master Angler program in 2019, Lake St Clair represented 36% of the total Smallmouth Bass entries statewide. The next highest waterbody had 4 total entries and that was the adjoining St. Clair River. Master Angler catches of Smallmouth Bass on Lake St. Clair vary over time **(Fig 7)** due to a combination of biological, weather, and human-related factors. The continued strong representation of Lake St. Clair Smallmouth Bass in the statewide Master Angler program is likely a reflection of an abundance of trophy-size Smallmouth Bass in the lake, a high degree of angler effort targeting the species, and widespread practice of catch-and-release among Smallmouth Bass anglers.

A total of 343 Smallmouth Bass were captured in the spring 2019 Anchor Bay trap net survey for a catch rate of 3.82 fish per 24-hour set, which was up from last year (2.89 fish per 24-hour set), but slightly below the long term average of 4.16 fish per 24-hour set (2002-2019). Of these 343 captures, 306 individuals received jaw tags, with the remainder being too small to tag. Concurrent with our spring trap net survey, we sampled additional Smallmouth Bass by electrofishing near the "Mile Roads" area of Lake St. Clair, east of St. Clair Shores. An additional 59 Smallmouth Bass were sampled, with 58 receiving tags as part of this electrofishing effort. Therefore the total sample size for 2019 was 402 Smallmouth Bass handled, 364 of which were tagged. Valid age estimates were obtained for 389 individuals.
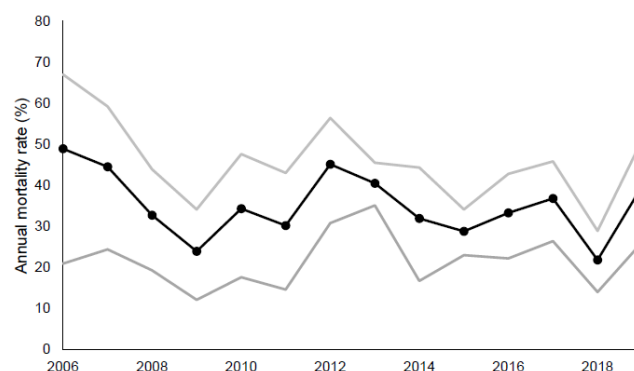

Fig 8-Smallmouth Bass annual mortality rates for Lake St. Clair, 2006-2019, estimated from catch curve regression. Black line and points represent estimates; grey lines represent the upper and lower 95% confidence interval.

Analysis of age composition and annual mortality includes individuals from both trap netting and electrofishing efforts pooled together. Year-class contribution to Smallmouth Bass catch was relatively uniform; the 2010 year class was most abundant (16% of the catch), but strong contributions by the 2011, 2012, and 2015 year classes were evident as well (range 11-15% of total catch). Smallmouth Bass averaged 17.3 inches in length across the two surveys. We estimated proportional size distributions for Smallmouth Bass, which can be thought of as the percent of the adult population (considered 8 inches in total length or larger for this exercise) that is larger than a given threshold. We calculated these values for fish 14, 17, and 20 inches and greater. In 2019, 88% of adult Smallmouth Bass we caught were 14 inches or larger, 67% were 17 inches or larger, and 9% were 20 inches or larger. Smallmouth Bass sampled in the Anchor Bay trap net surveys had an average weight of 3.4 lbs (weights are not collected electrofishing). The annual mortality rate was estimated using catch curve analysis, which assumes that the abundance of year classes in a given sample is related to the population mortality rate. For 2019 the annual mortality rate was estimated at 39.8%, maintaining an overall flat trend since 2006. This suggests no change in Smallmouth Bass mortality has occurred across the time series.

Since 2002, a total of 5,648 Smallmouth Bass captured in survey trap nets in Anchor Bay have been tagged and released. Smallmouth Bass movements appear rather localized, with nearly all the Smallmouth Bass tag recoveries reported to date coming from the Michigan waters of Lake St. Clair. The northernmost Smallmouth Bass tag recovery has been from the Port Huron area of the St. Clair River, and the southernmost recovery came from the Oak Harbor area in Ohio waters of Lake Erie. On average, recaptured Smallmouth Bass tagged during 2002-2019 traveled less than 6 mi (9.7 km) from the Anchor Bay tagging site.

In 2019, Michigan tagged a total of 306 Smallmouth Bass with non-reward jaw tags in Anchor Bay of Lake St. Clair. A total of 18 non-reward tags placed on Smallmouth Bass in 2019 were recovered by anglers for a single-season reporting rate of 5.8%.

A total of three of the 58 non-reward tags placed on Smallmouth Bass in the Mile Roads area during 2019 were recovered by anglers for a single season reporting rate of 5.1%, nearly identical to the reporting rate in Anchor Bay. Similar reporting rates suggest that, all else being equal, angling pressure for Smallmouth Bass is likely similar in Anchor Bay and along the Mile Roads area of Lake St. Clair. Like tagged Anchor bay fish, recaptured Smallmouth Bass that were jaw-tagged during 2016-2019 did not travel far, ranging an average of 5.0 mi (8.0 km) from the Mile Roads tagging site.
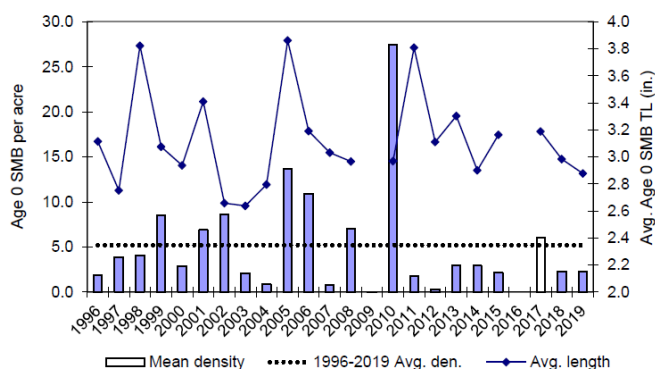

Fig 9-Year-class strength for Lake St. Clair Smallmouth Bass as indicated by fall age-0 catch rates (bars) and average length (solid line), 1996-2019. Average year class strength indicated by the horizontal dashed line

Recruitment of age-0 Smallmouth Bass as indexed by our August Lake St. Clair trawl survey was down slightly to 2.2 age-0 Smallmouth Bass per acre trawled (**Fig 9**; 2018 value: 2.3 Smallmouth Bass per acre trawled). The average size of age-0 recruits, which is a critical indicator of overwinter survival, was 2.9 inches, slightly below the long-term average (1996-2019 average age-0 Smallmouth Bass length: 3.1 inches). While monitoring of age-0 Smallmouth Bass abundance is a useful indicator of summer conditions and nesting success, strong compensatory effects are known to occur for Smallmouth

Bass, such that year class strength is not necessarily correlated with high abundance of adults in the future.

Generally, few Largemouth Bass are captured during spring trap netting in Anchor Bay, and 2019 was no exception with eight individuals sampled. These eight fish ranged from 10.4 to 15.8 inches in total length, with weights ranging from 0.6 to 2.3 lbs.

During the fall nearshore electrofishing survey 254 Largemouth Bass of all sizes were captured (1.6 to 18.1 inches). Total catch rates of Largemouth Bass have varied from 17.4 fish per 10-minutes of shocking in 2016 to a low of 7.7 fish per 10minutes of shocking in 2017. The average catch rate of Largemouth Bass was 9.8 fish per 10minutes of shocking in 2019. The size structure of Largemouth Bass indicated many large, catchable-size individuals, and no apparent cropping at the legal harvest size. Moving forward the nearshore survey will provide a strong basis for evaluating change in size structure and recruitment of Largemouth Bass in Lake St. Clair.

Northern Pike and Muskellunge
In 2019 five Muskellunge were reported harvested from Lake St. Clair, with 4 additional fish reported harvested from the Detroit River. 2018 was the first year of mandatory harvest reporting of Muskellunge in the State of Michigan, and five Muskellunge were registered as harvested from Lake St. Clair that year. Anglers are reminded to report harvested Muskellunge within 24 hours by visiting **http://www.michigan.gov/registerfish** or call 844-345-3474.

A total of 2,163 Muskellunge were captured by non-charter recreational anglers in the Michigan waters of Lake St. Clair in 2019. Of these, 824 legal-sized fish were estimated released. A total of 4,011 Northern Pike were estimated captured in the Michigan waters of Lake St. Clair, of which 3,024 were estimated released and 186 were estimated harvested.

Charter captains reported a total catch of 647 Muskellunge in 2019 throughout the American waters of the St. Clair – Detroit River System, with two fish harvested. Charter targeted catch rates were 0.08 fish per angler hour.

Muskellunge catch rates derived from the Sport Fishery Diary Program on Lake St. Clair improved through the late 1980's and early 1990's, but were more variable in the 2000's. In 2019, the catch rate showed a small decrease from the previous year (**Fig 10).** The observed Muskellunge catch rates for 2019 continues a pattern of increased variability in catch rates over the past 17 years. Efforts are in place in 2020 to increase the number of Muskie anglers in the Angler Diary program, which we hope will provide more consistency in Muskie catch rate reporting.
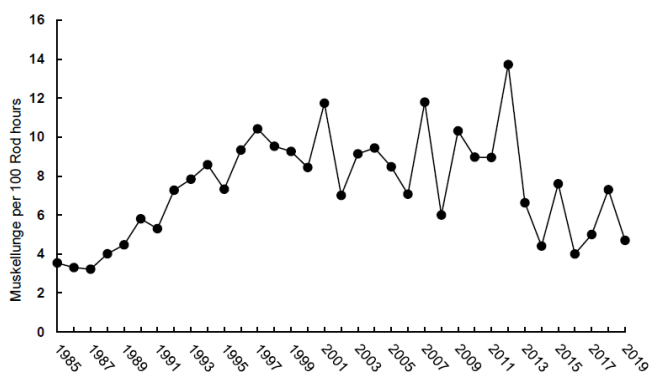
Fig 10- Lake St. Clair Muskellunge catch rate from the Angler Diary Program, 1986-2019.

Lake St. Clair continued to dominate the statewide Master Angler entries for Muskie in 2019 with 19 of the 31 total entries (61%). Another six fish were entered from the adjoining St. Clair and Detroit rivers. This year was the first decline in entries since 2011, though there has been a general decline in Muskellunge entries since the peak in 2001. We suspect this is largely a reflection of waning interest in submitting Master Angler entries for Muskellunge less than 50 inches in length, which has become a local benchmark for "trophy" status for Muskellunge from the St. Clair-Detroit River System. By all accounts, the Muskellunge population continues to provide excellent fishing opportunities.

Two Muskellunge were captured during our 2019 Anchor Bay trap net survey, continuing a trend of decreased gear effectiveness observed in Anchor Bay since 2010. We believe this decline in catch is correlated with increased water clarity, which makes trap nets easier to see and likely increases the ability of Muskellunge to avoid the gear.

In 2019 we tagged 18 Muskellunge with acoustic telemetry tags. Sixteen of these fish were captured by angler partners before being tagged by MDNR fisheries personnel. Since 2016, 48 Muskellunge have been tagged in the American waters of Lake St. Clair and the Detroit River, with an additional 92 fish tagged by our Canadian counterparts in the Ontario waters of Lake St. Clair. These acoustic telemetry tags have an expected battery life of 7+ years and can be detected by stationary listening stations located throughout the Great Lakes as part of the Great Lakes Acoustic Telemetry Observation System (GLATOS; **https://glatos.glos.us/).** Since 2016, more than 1.1 million detections of these tagged fish have been logged, revealing substantial movements and use of Lake St. Clair, the Detroit River, and Lake Erie.

A total of two age-0 Muskellunge were captured during our fall nearshore electrofishing survey, for a catch rate of 0.05 fish per 10-minutes of shocking. This value was down from 0.10 fish per 10-minutes of shocking in 2018. Over time this annual Muskellunge recruitment index will provide valuable information about the success of

Muskellunge spawning, as well as the spatial distribution of age-0 Muskellunge within Michigan waters of Lake St. Clair.

We captured a total of 101 Northern Pike during our spring trap net survey in Anchor Bay. Valid age estimates were obtained for 98 individuals. The majority of the catch was comprised of the 2015 (37%) and 2014 (32%) year classes. Across all individuals captured the average length was 28.7 inches; total length ranged from 20.5 inches to 33.7 inches.

Lake Sturgeon

A total of 147 Lake Sturgeon were collected during assessment surveys on Lake St. Clair and the St. Clair River in 2019. Captured Lake Sturgeon averaged 49.7 inches in total length, ranging from 23.0 inches to 72.7 inches. A total of 103 Lake Sturgeon were caught in the St. Clair River during the annual setline survey in June, while 44 fish were caught with trawls in Lake St. Clair during August. The length frequency for setline and trawl-captured Lake Sturgeon in 2019 illustrates the higher proportion of large individuals in the trawl catch in the lake (**Fig 11**). We suspect this reflects a difference in the actual size structure of the Lake Sturgeon population present in the lake during the summer, rather than a product of differences in size bias between the two survey gear types. Survey setlines were modified in 2002 to include small hooks, providing a less biased sample of the Lake Sturgeon population in the St. Clair River. In addition to sampling Lake Sturgeon, each setline is also set with two minnow traps, one attached to each end. These traps target Northern Madtom, a small catfish species that is endangered in the State of Michigan and Province of Ontario. Each trap is baited with earthworms, which experimentation in past years has suggested as being the preferred bait. A total of 44 Northern Madtoms were sampled in 2019. Northern Madtoms have very specific habitat and water quality requirements, making them a sensitive indicator of environmental quality. The high catch rate suggests high quality habitat conditions exist in the St. Clair River at this time.
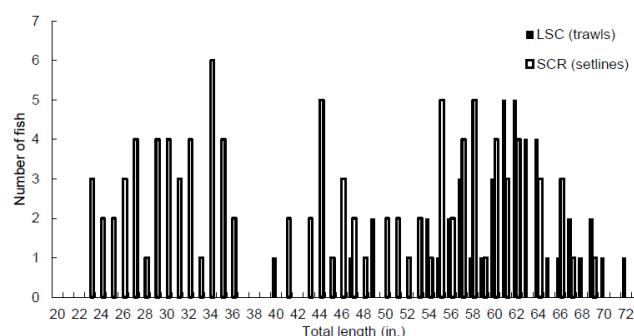

Fig 11- Length frequency distribution for Lake Sturgeon caught in 2019 with survey setlines in the St. Clair River (SCR), and bottom trawls in Lake St. Clair (LSC).

A total of 3,449 Lake Sturgeon have been tagged and released in the St. Clair River and Lake St. Clair since 1996. To date, 918 tagged Lake Sturgeon have been recaptured with survey gear or reported by fishermen. A total of 551 tagged sturgeon have been recovered with survey setlines. One was recovered in a survey trap net in Anchor Bay, one in a survey gill net, and 16 have been recaptured in assessment trawls on Lake St. Clair. Sport anglers have reported 315 recoveries, most from the North Channel of the St. Clair River. Twenty-six recoveries have been reported from the Ontario commercial trap net fishery in southern Lake Huron, approximately 70 km (43.5 mi) from the tag site. Seven recoveries have been made on Lake Sturgeon that were found dead from boat strikes or unknown causes.

Forage fish community

Recent declines of most shiner species in our spring and fall trawling continued in 2019. However, we captured 86.6 Spottail Shiners per acre trawled in our spring trawls, up from 10.9 fish per acre trawled last year and the highest catch rate observed since 2014 (but well below the longterm average). Along with Spottail Shiner, Johnny Darter (24.2 fish per acre trawled) and Round Goby (4.5 fish per acre trawled) were the most common forage-sized fish captured during spring trawls. During our fall trawl survey Spottail Shiner (38.9 fish per acre trawled), Round Goby (7.7 fish per acre trawled), and Mimic Shiner (6.9 fish per acre trawled) were the most common forage species captured.

Brook Silversides were again the most frequently captured forage-sized fish species during our fall nearshore electrofishing survey (46.3 fish per 10minute sample period). This value was up from 2018 (40.5 fish per 10-minute sample period) and the highest observed across the four-year time frame of the survey. Other key forage species captured included Emerald Shiner (29.8 fish per 10-minute sample period), Spottail Shiner (13.1 fish per 10-minute sample period), and Gizzard Shad (14.8 fish per 10-minute sampling period). While still new (2019 was the fourth consecutive year of effort), the nearshore electrofishing survey provides important additional insight into the lake's forage fish community, which can in time be compared to our traditional trawl surveys to provide a more complete picture of the status and trends of Lake St. Clair forage species and their potential availability to sportfish.

Commercial Fishery Summary

No state regulated commercial fishery exists in the Michigan.

End ✧