Inland Seas Angler

# GREAT LAKES BASIN REPORT©

**Special Report – Lake Erie**

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# Highlights of the Annual Lake Committee Meetings

**Great Lakes Fishery Commission proceedings**

This first of a series of annual special reports is an extensive summary of Lake Erie. 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

***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) |

# Lake Erie Yellow Perch and Walleye catch levels for 2020

ANN ARBOR, MI – The binational Lake Erie Committee (LEC), composed of fishery managers from Michigan, New York, Ohio, Ontario and Pennsylvania—the five jurisdictions that manage the Lake Erie fishery—set total allowable catches (TACs) for 2020 of 7.805 million pounds of yellow perch and 10.237 million walleye. Yellow perch are allocated in pounds and walleye are allocated by number of fish. These TACs represent a decrease for yellow perch from 8.552 million pounds of fish last year and an increase in walleye from 8.531 million fish. Specific allocations of both species are presented below by jurisdiction.

TAC decisions are made by consensus of the LEC. These decisions are reflective of the status of Lake Erie's fish populations and consider the goal of sustainable harvest each year. The allocations are determined by the LEC after extensive, lakewide biological assessments, analyses, discussions, and consultations with stakeholders. The individual state and provincial governments implement the TAC in their jurisdiction in accordance with their respective regulations and management objectives.

## Walleye

Guided by the Walleye Management Plan, the LEC set a 2020 lakewide walleye TAC of 10.237 million fish, a 20% increase over the 2019 TAC of 8.531 million fish. The increased TAC reflects strong recruitment during the previous few years and expected increases in population size. The Province of Ontario and the states of Ohio and Michigan share the TAC based on a formula of walleye habitat within each jurisdiction in the western and central basins of the lake. Under a 2020 TAC of 10.237 million fish, Ohio will be entitled to 5.232 million fish, Ontario 4.408 million fish, and Michigan 0.597 million fish. Jurisdictions in eastern Lake Erie are outside of the TAC area, but harvest limits are set consistent with lakewide objectives.

## Yellow Perch

Yellow perch TAC decisions are the result of deliberations among scientists, managers, and stakeholders through the Lake Erie Percid Management Advisory Group, known as "LEPMAG." Based on science and those extensive LEPMAG discussions, the LEC set a 2020 combined TAC of 7.805 million pounds of yellow perch.

The yellow perch fishery is divided into four management units, which generally correspond to the eastern, east-central, west-central and western basins of Lake Erie. The LEC has strived to maintain sustainable harvest while responding to changing population trajectories. The LEC acknowledges that there has been poor recruitment of yellow perch in the central basin and expects that the TAC could continue to decline there.

The five jurisdictions on the lake share Lake Erie's yellow perch under an area-based formula. Pursuant to the 2020 TAC, Ontario will receive 3.737 million pounds, Ohio 3.139 million pounds, Michigan 0.192 million pounds, New York 0.203 million pounds, and Pennsylvania 0.534 million pounds. As with walleye, each Lake Erie jurisdiction is responsible for allocating its portion of the TAC.

## The Lake Erie Percid Management Advisory Group (LEPMAG)

Since 2010, the LEPMAG has served as the primary method to incorporate stakeholder needs and objectives into the decision-making process regarding harvest of walleye and yellow perch. The LEPMAG consists of senior representatives from all provincial and state jurisdictions on the lake, recreational fishers, commercial fishers, and other interested organizations. Through the LEPMAG, fishery managers and stakeholders work together to identify the harvest policies for Lake Erie percids that meet the needs of all stakeholders while maintaining stability in the percid fishery. Michigan State University's Quantitative Fisheries Center facilitates the LEPMAG process. Walleye are now being managed under the Walleye Management Plan, which was developed through the LEPMAG and formally adopted by the LEC in December, 2015. The LEPMAG is also advising the LEC as it seeks to finalize a yellow perch management plan in 2020.

## The Lake Erie Committee (LEC) And Total Allowable Catches (TAC)

The LEC's work is facilitated by the Great Lakes Fishery Commission, a Canada and U.S. agency on the Great Lakes. Each year the committee reaches consensus TAC decisions for walleye and yellow perch. The TAC represents what the committee considers as a sustainable level of harvest, as guided by recommendations from the Yellow Perch and Walleye Task groups. The individual agencies allocate the TAC through setting commercial fishing quotas and recreational fishing daily limits intended to maintain annual harvest levels within the TAC.

The table below reflects the distribution of the 2020 yellow perch TAC within each management unit for each agency. Units are expressed in millions of pounds.

| Mgmt Unit | Agency | '20 TAC | Mgmt Unit | Agency | '20 TAC |
|---|---|---|---|---|---|
| 1 | Ontario | 0.857 | 3 | Ontario | 1.579 |
| | Michigan | 0.192 | | Ohio | 0.978 |
| | Ohio | 1.061 | | Pennsylvania | 0.462 |
| | Total | 2.110 | | Total | 3.020 |
| | | | | | |
| 2 | Ontario | 0.922 | 4 | Ontario | 0.379 |
| | Ohio | 1.099 | | Pennsylvania | 0.072 |
| | Total | 2.021 | | New York | 0.203 |
| | | | | Total | 0.654 |
| | | | | | |
| | | | | Lakewide | 7.805 |

End ✧

# Lake Erie Fish Ohio Report

The daily bag limit for walleye in Ohio waters of Lake Erie is 6 fish per angler, and the minimum size limit is 15 inches. The daily bag limit for yellow perch is 30 fish per angler in all Ohio waters of Lake Erie. The trout and salmon daily bag limit is 2 fish (singly or in combination) per angler. The minimum size limit is 12 inches. Black bass (largemouth and smallmouth bass): The daily bag limit is 5 fish (singly or in combination) per angler with a 14-inch minimum size limit. A Lake Erie fishing permit is required for nonresidents from January 1 to April 30, 2020 when fishing Lake Erie and areas immediately upstream in creeks, rivers, and tributaries.

Effective January 1, 2020, it is legal to use three rods per angler in the Lake Erie Sportfishing District.

Effective March 1, 2020 the spring bag limit for walleye will remain at 6 fish, with the exception of Sandusky Bay and the Sandusky River, which will remain at 4 fish March 1st through April 30th. See the **Ohio Fishing Regulations** for more information.
End ✧

# 2020 Lake Erie Sport Fishing Outlook again Great News for Anglers

COLUMBUS, OH – Lake Erie anglers will again experience excellent fishing opportunities on Lake Erie in 2020, according to Ohio DNR. Walleye angler harvest rates set records in 2019, and numerous large hatches point to a bright future for the Walleye Capital of the World.

Based on the 2020 integrated SCAA model, the 2019 west-central population (MU1-3) was estimated at 47.132 million age 2 and older Walleye. An estimated 24.617 million age 4 (2015 year class) fish comprised 52% of the age 2 and older Walleye population. Age 2 (2017 year class) Walleye represented the second largest (21%) and age 5 (2014 year class) the third largest (10%) components of the population. Based on the integrated model, the number of age 2 recruits entering the population in 2020 (2018 year class) and 2021 (2019 year class) are estimated to be 86.404 and 77.942 million Walleye, respectively. The 2020 projected abundance of age 2 and older Walleye in the west-central population is estimated to be 116.354 million fish.

The Walleye Task Group (WTG) RAH range estimate is an AD Model Builder generated value based on estimating ± one standard deviation of the mean RAH. AD Model Builder uses a statistical technique called the delta method to determine this standard deviation for the calculated RAH, incorporating the standard errors from abundance estimates at age and combined gear selectivity at age. The target fishing rate in the harvest policy was applied since the probability of the projected spawner biomass in 2021 (96.566 million kg) falling below the limit reference point after fishing at 60%FMSY in 2020 was less than 5% ($p < 0.05$). Thus, the control rule (P*) to reduce target fishing rate and conserve spawner biomass was not invoked during the 2020 determination of RAH. In addition to the RAH, the Harvest Control Rule adopted by LEPMAG limits the annual change in TAC to ± 20% of the previous year's TAC. According to this rule, the maximum change in TAC would be (+) or (-) 20% of the 2019 TAC (8.531) million fish), and the range in 2020 TAC for LEC consideration would be from 6.825 million fish to 10.237 million fish.

Eager anglers and scientists will have to wait until at least August before numbers about likely spawning successes or failures, are known. But currently, fisheries biologists estimate there are about 100 million walleye, two years and older, in the entire lake. And next year, estimates place another 50 million entering that category.

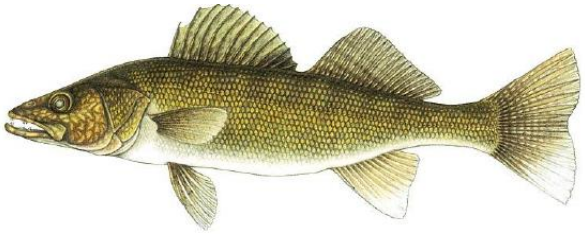
"In 2018 we had the third-highest walleye index, and in 2019 we had the second-highest index behind 2003," explained Eric Weimer, fisheries biology supervisor at the **Ohio Division of Wildlife's** research station in Sandusky. Despite the fact the 2003 walleye hatch was the largest since the Ohio Department of Natural Resources first implemented the current survey system, the combined 2018 and 2019 hatches offer unprecedented numbers of fish in the lake.

The Lake Erie Committee of the Great Lakes Fishery Commission set its lake-wide Total Allowable Catch (TAC) for Ohio and the other state and provincial members of the Lake Erie Committee. The walleye TAC is a 20% boost over last year's 8.5 million fish, which was a 20% increase from the 7.1 million walleye in 2018.
End ✧

# Lake Erie Walleye Task Group 2020

## • Review of Walleye Fisheries in 2019

Fishery effort and Walleye harvest data were combined for all



fisheries, jurisdictions and Management Units (MUs) to produce lake-wide summaries. The 2019 total estimated lake-wide harvest was 6.897 million Walleye **(Table 1**), of which 6.074 million were harvested in the total allowable catch (TAC) area. This TAC-area harvest represents 71% of the 2019 TAC (8.531 million Walleye) and includes Walleye harvested in commercial and sport fisheries in MU 1, 2, and 3. An additional 0.824 million Walleye (12% of the lake-wide total) were harvested outside of the TAC area in MU 4&5 **(Table 1**). The estimated sport fish harvest of 3.390 million Walleye in 2019 represented a 29% increase from the 2018 harvest of 2.627 million Walleye; this harvest was 50% above the long-term (1975-2018) average of 2.267 million fish **(Table 2**).

***Table 1. Summary of walleye harvest by jurisdiction in Lake Erie, 2019***

| in number of fish | TAC Area (MU-1, MU-2, MU-3) | | | | Non-TAC Area (MU-4 & MU-5) | | | | All Areas |
|---|---|---|---|---|---|---|---|---|---|
| | Michigan | Ohio | Ontario | Total | NY | Penn. | Ontario | Total | Total |
| TAC | 497,357 | 4,360,194 | 3,673,449 | 8,531,000 | - | - | - | - | 8,531,000 |
| TAC % Share | 5.83% | 51.11% | 43.06% | 100.00% | - | - | - | - | 100.00% |
| Harvest | 153,171 | 2,558,359 | 3,362,053 | 6,073,583 | 174,466 | 419,975 | 229,466 | 823,907 | 6,897,490 |
| Harvest %TAC | 30.8% | 58.7% | 91.5% | 71.2% | | | | | |

The 2019 Ontario commercial harvest was 3.507 million Walleye lake-wide, with 3.290 million caught in the TAC area **(Table 2**). The 2019 Ontario angler estimates of harvest and effort were derived from the 2014 lake-wide aerial creel survey because angler creel surveys are not conducted annually in Ontario waters. It assumes 71,000 Walleye were harvested in Ontario within the TAC area during 2019; an estimate included in total Walleye harvest, but not used in catch-at-age analysis. Total harvest of Walleye in Ontario TAC waters was 3.362 million Walleye, representing 92% of the 2019 Ontario TAC allocation of 3.673 million Walleye. In 2019, the lake-wide Ontario commercial harvest was 4% lower than in 2018, and 69% above the long-term average (1976-2018.

***Table 2-Ontario walleye gillnet effort in 2019***

| | Unit 1 | Unit 2 | Unit 3 | Unit 4 & 5 |
|---|---|---|---|---|
| Effort (km) | 4,165 | 6,365 | 2,402 | 1,353 |
| change from 2018 | -48% | -12% | -34% | -11% |

Sport fishing effort increased 30% from 2018 in 2019 to total 4.083 million angler hours**.** Compared to 2018, sport effort increased by 34% in MU 1, 27% in MU 2, and 54% in MU4, while effort decreased in MU 3 (-13%). Lake-wide commercial gill net effort (14,285 km) decreased 17% from 2018**.**

The 2019 lake-wide average sport harvest per unit effort (HUE) of 0.81 Walleye/angler hour remained consistent relative to 2018 and was 85% above the long-term (1975-2018) average of 0.44 Walleye/angler hour. In 2019, the sport HUE increased from 2018 levels in MU2 (+12%) and MU 3 (+3%), and decreased slightly in MU 1 (-5%) and MU 4&5 (-2%), although sport HUE was well above long-term averages in all MUs.

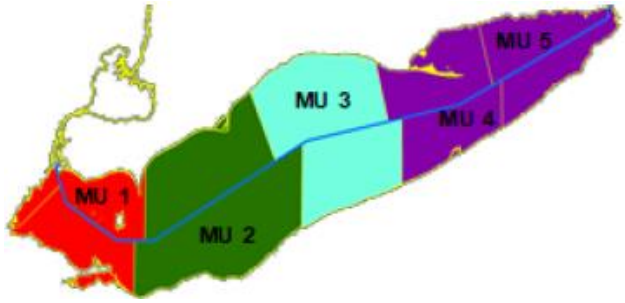



**Fig 1 – Lake Erie Walleye management units**

The total commercial gill net HUE in 2018 (245.5 Walleye/kilometer of net) increased 15% relative to 2018 and remained above the long-term (1976-2018) lake-wide average (123.1 Walleye/kilometer of net**.** Commercial gill net harvest rates increased in all MUs except MU 3, where a slight decrease occurred (Table 4). All MUs' HUE were more than 100% above their long-term averages**.**

Lake-wide harvest in the sport and commercial fisheries was composed mostly of age 4 Walleye from the 2015 (76%) year class. Age 3 (2016 year class; 8%) and age 5 (2014 year class; 6%) were the next most harvested age groups, combining to represent 14% of the lakewide harvest in 2019. In the commercial fishery the 2015 year class comprised 77% of the harvest, followed by the 2017 year class (7% of lakewide harvest). Similarly, the 2015 year class (age 4) comprised 74% of lakewide sport fishery harvest, followed by the 2016 year class (13% of lakewide sport harvest).

Across all jurisdictions, the mean age of Walleye harvested in 2019 ranged from 4.1 to 5.1 years old in the sport fishery, and from 3.8 to 4.3 years old in the Ontario commercial fishery**.** The mean age in the sport and commercial fisheries

were approximately equal to the long-term means (1975-2018.

### Recommended Allowable Harvest (RAH) for 2020

Using results from the 2020 integrated SCAA model, the estimated abundance of 116.354 million age-2 and older Walleye in 2020, and the harvest policy described above, the calculated mean RAH for 2020 was 13.466 million Walleye, with a range from 10.012 (minimum) to 16.921 (maximum) million Walleye. The WTG RAH range estimate is an AD Model Builder (ADMB, generated value based on estimating ± one standard deviation of the mean RAH. AD Model Builder uses a statistical technique called the delta method to determine this standard deviation for the calculated RAH, incorporating the standard errors from abundance estimates at age and combined gear selectivity at age. The target fishing rate, (60%FMSY = 0.331) in the harvest policy was applied since the probability of the projected spawner biomass in 2021 (96.566 million kg) falling below the limit reference point (SSB20% = 11.861 million kg) after fishing at 60%FMSY in 2020 was less than 5% ($p < 0.05$). Thus, the probabilistic control rule (P*) to reduce target fishing rate and conserve spawner biomass was not invoked during the 2020 determination of RAH.

In addition to the RAH, the Harvest Control Rule adopted by LEPMAG limits the annual change in TAC to ± 20% of the previous year's TAC. According to this rule, the maximum change in TAC would be (+) or (-) 20% of the 2019 TAC (8.531) million fish), and the range in 2020 TAC for LEC consideration would be from 6.825 million fish to 10.237 million fish.

| | 2020 Stock Size (millions of fish) | 60% $F_{msy}$ | | Rate Functions | | | 2020 RAH (millions of fish) | | | Projected 2021 Stock Size (millions) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Age** | **Mean** | **F** | **Sel(age)** | **(F)** | **(S)** | **(u)** | **Min.** | **Mean** | **Max.** | **Mean** |
| 2 | 86.404 | | 0.285 | 0.094 | 0.661 | 0.077 | 4.862 | 6.673 | 8.484 | 77.942 |
| 3 | 6.797 | | 0.952 | 0.315 | 0.530 | 0.233 | 1.223 | 1.584 | 1.945 | 57.094 |
| 4 | 2.778 | | 1.000 | 0.331 | 0.522 | 0.243 | 0.514 | 0.675 | 0.836 | 3.603 |
| 5 | 15.217 | | 0.894 | 0.296 | 0.540 | 0.221 | 2.542 | 3.358 | 4.175 | 1.449 |
| 6 | 3.033 | | 0.903 | 0.298 | 0.539 | 0.223 | 0.504 | 0.675 | 0.846 | 8.223 |
| 7+ | 2.125 | | 0.964 | 0.319 | 0.528 | 0.236 | 0.367 | 0.501 | 0.635 | 2.756 |
| **Total (2+)** | 116.354 | 0.331 | | | | 0.116 | 10.012 | 13.466 | 16.921 | 151.067 |
| **Total (3+)** | 29.951 | | | | | | 5.150 | 6.793 | 8.437 | 73.125 |
| SSB | 61.782 | mil. kgs | | | | | | | | 96.566 |

**Table 3- Stock size estimates and RAH values.**

## Catch-at-Age Analysis Population Estimate and Projected Recruitment for 2019 and 2020

Based on the 2020 integrated SCAA model, the 2019 MU 1 to 3 population estimate was 47.132 million age 2 and older Walleye (Figure 2). An estimated 24.617 million age 4 (2015 year class) fish comprised 52% of the age 2 and older Walleye population. Age 2 (2017 year class) represented the second largest (21%) and age 5 (2014 year class) the third largest (10%) components of the population. Using the 2020 integrated SCAA model, the number of age 2 recruits entering the population in 2020 (2018 year-class) and 2021 (2019 year-class) will be 86.404 million and 77.942 million, respectively.

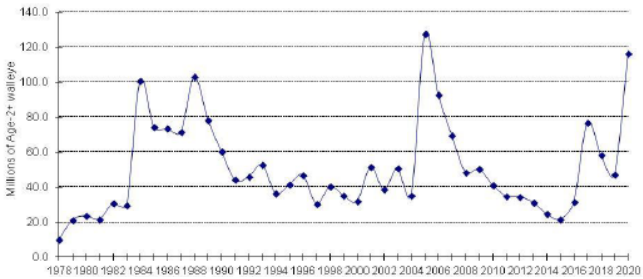



***Fig 2-Population estimate of Lake Erie Walleye ages 2 and older, 1978 to 2019, and the projection for 2020***

Using the 2020 integrated SCAA model, the projected abundance of age 2 and older Walleye in the MUs 1 to 3 population is 116.354. million Walleye in 2020 (Table 4). The most abundant year class (74%) in the population is projected to be age 2 Walleye from the 2018 cohort (86.404 million fish). The next most abundant are age 5 (2015 year class),15.217 million fish (13%). Age 7 and older fish are expected to account for 2% of the 2020 population size. The projected spawning stock biomass (SSB) for 2020 is 61.782 million kilograms.

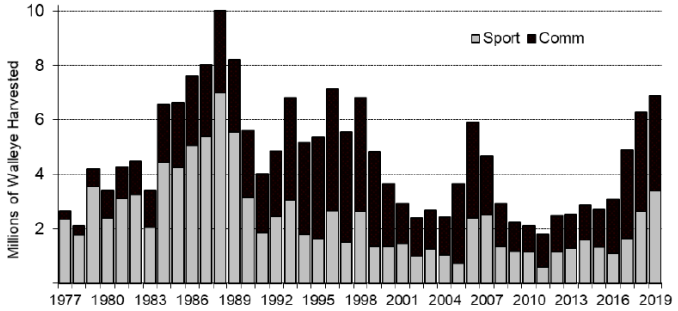



***Fig 3- Lake-wide harvest of Walleye by sport and commercial fisheries, 1977-2019***

## Recruitment

Evidence of multiple Walleye stocks in Lake Erie exists, with decreasing stock productivity from west to east. However, migrations and mixing of stocks throughout the lake make evaluation of individual stock productivity difficult. For example, adult Walleye from western basin spawning grounds in the spring migrate to the cooler waters of the central and eastern basins in the summer, and then return to the west basin before spawning. While juvenile Walleye from both the western and eastern basin are believed to disperse from natal basins during the summer and fall, it is unknown if their migrations are similar to those of adults. To address uncertainty surrounding juvenile dispersal and productivity of Walleye stocks across Lake Erie, the WTG has reported basin-specific densities of

yearling Walleye with standardized gill net indices since 2011 (WTG 2012).

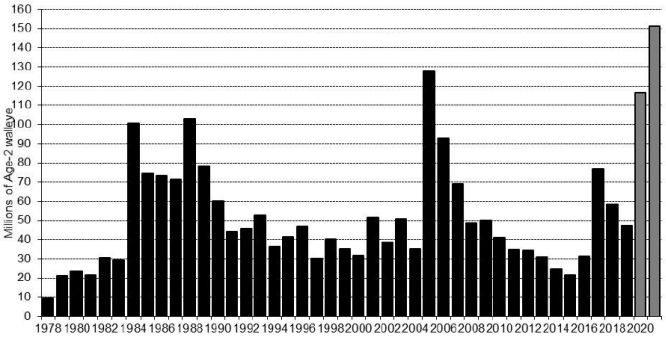



***Fig 4- Estimated (1978 – 2019) and projected (2020) number of age-2 Walleye in the west-central Lake Erie Walleye population from the latest ADMB integrated model run.***

Walleye catches were standardized for net length (50 ft [15.2 m] panels) of mesh sizes ≤ 5.5" (140 mm) but correction factors were not applied to standardize fishing power between monofilament and multifilament nets. New York and Ontario monofilament nets share the same configurations with the exception that Ontario nets contain 2 panels instead of the one 50 ft (15.2 m) panel for mesh sizes ≥ 2" (51 mm). New York's index gill nets were fished exclusively on bottom and were confined to shallower depths than nets fished in Ontario's waters of eastern Lake Erie**.**

In 2019, yearling Walleye catches occurred lake-wide where index nets were fished but fish were absent from nets on the north shore of the east basin. Yearlings were also absent from offshore bottom nets set in New York waters. In west and central Lake Erie trawl and gill net surveys conducted since 2016, the yearling Walleye indices from 2019 were second only to the 2016 assessment. These results suggest that only the 2015 hatch was stronger than the 2018 hatch during that time period in the west and central basins. Yearling Walleye catches in the east were lower in 2019 than in 2016 and 2017, suggesting that the 2018 hatch was not as strong as the 2015 and 2016 cohorts in the east basin. When bottom set and suspended nets were fished in the same area, yearling catches in suspended set nets exceeded bottom nets in the west and central basin. A comparison between suspended and bottom catches could not be made in the east due to low catches. In Ontario Partnership index nets, average catches of age 1 Walleye are often greater in suspended nets than in bottom nets, however this phenomenon varies by year and basin.

**Table 4. Annual harvest (thousands of fish) of Lake Erie walleye by gear, management unit, and agency from 1999 - 2018. Means contain data from 1975 to 2018**

| | Sport Fishery | | | | | | | | | | | | | | | Commercial Fishery | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Unit 1 | | | | Unit 2 | | | Unit 3 | | | Units 4 & 5 | | | | | Unit 1 | Unit 2 | Unit 3 | Unit 4 | | Grand |
| Year | OH | MI | ON[a] | Total | OH | ON[a] | Total | OH | ON[a] | Total | ON[a] | PA | NY | Total | Total | ON | ON | ON | ON | Total | Total |
| 2000 | 674 | 252 | 34 | 961 | 165 | 5 | 170 | 93 | 5 | 98 | 19 | 78 | 29 | 125 | 1,354 | 1,603 | 444 | 196 | 48 | 2,291 | 3,645 |
| 2001 | 941 | 160 | 34 | 1,135 | 171 | 5 | 176 | 46 | 5 | 51 | 19 | 53 | 15 | 87 | 1,449 | 1,004 | 310 | 141 | 20 | 1,475 | 2,924 |
| 2002 | 516 | 194 | 34 | 744 | 141 | 5 | 146 | 46 | 5 | 51 | 19 | 22 | 18 | 59 | 1,000 | 937 | 309 | 146 | 17 | 1,409 | 2,409 |
| 2003 | 715 | 129 | 34 | 878 | 232 | 5 | 237 | 68 | 5 | 73 | 2 | 44 | 27 | 73 | 1,261 | 948 | 283 | 182 | 14 | 1,427 | 2,688 |
| 2004 | 515 | 115 | 34 | 664 | 272 | 2 | 274 | 72 | 0 | 72 | 2 | 20 | 8 | 30 | 1,040 | 866 | 334 | 175 | 11 | 1,386 | 2,426 |
| 2005 | 374 | 38 | 27 | 438 | 110 | 2 | 112 | 126 | 0 | 126 | 2 | 20 | 27 | 49 | 725 | 1,878 | 625 | 401 | 15 | 2,920 | 3,645 |
| 2006 | 1,194 | 306 | 27 | 1,526 | 503 | 2 | 505 | 170 | 0 | 170 | 2 | 152 | 37 | 191 | 2,392 | 2,137 | 784 | 545 | 66 | 3,532 | 5,924 |
| 2007 | 1,414 | 166 | 27 | 1,607 | 578 | 2 | 580 | 169 | 0 | 169 | 2 | 116 | 29 | 147 | 2,502 | 1,348 | 450 | 333 | 35 | 2,167 | 4,669 |
| 2008 | 524 | 121 | 44 | 689 | 333 | 2 | 335 | 225 | 0 | 225 | 2 | 74 | 29 | 105 | 1,354 | 954 | 335 | 241 | 35 | 1,565 | 2,919 |
| 2009 | 553 | 94 | 44 | 691 | 287 | 2 | 288 | 128 | 0 | 128 | 2 | 42 | 14 | 58 | 1,166 | 705 | 212 | 135 | 28 | 1,079 | 2,244 |
| 2010 | 587 | 55 | 44 | 686 | 257 | 2 | 259 | 114 | 0 | 115 | 2 | 54 | 37 | 93 | 1,152 | 607 | 184 | 147 | 23 | 962 | 2,115 |
| 2011 | 224 | 50 | 44 | 318 | 104 | 2 | 106 | 89 | 0 | 90 | 2 | 45 | 32 | 79 | 593 | 736 | 262 | 181 | 29 | 1,208 | 1,801 |
| 2012 | 596 | 87 | 44 | 726 | 233 | 2 | 235 | 93 | 0 | 93 | 2 | 45 | 37 | 84 | 1,138 | 834 | 285 | 191 | 28 | 1,338 | 2,476 |
| 2013 | 757 | 54 | 44 | 855 | 190 | 2 | 192 | 136 | 0 | 136 | 2 | 60 | 35 | 97 | 1,280 | 737 | 297 | 195 | 31 | 1,260 | 2,540 |
| 2014 | 909 | 42 | 45 | 996 | 177 | 13 | 190 | 218 | 13 | 231 | 13 | 85 | 62 | 160 | 1,577 | 756 | 259 | 238 | 40 | 1,292 | 2,869 |
| 2015 | 746 | 66 | 45 | 857 | 187 | 13 | 200 | 140 | 13 | 153 | 13 | 47 | 55 | 115 | 1,325 | 633 | 354 | 325 | 77 | 1,388 | 2,713 |
| 2016 | 577 | 66 | 45 | 688 | 139 | 13 | 152 | 140 | 13 | 153 | 13 | 33 | 51 | 97 | 1,090 | 946 | 594 | 348 | 100 | 1,988 | 3,078 |
| 2017 | 592 | 57 | 45 | 694 | 316 | 13 | 330 | 353 | 13 | 367 | 13 | 163 | 70 | 246 | 1,636 | 1,735 | 918 | 508 | 116 | 3,277 | 4,913 |
| 2018 | 955 | 176 | 45 | 1,177 | 666 | 13 | 679 | 351 | 13 | 365 | 13 | 270 | 124 | 407 | 2,627 | 1,523 | 1,433 | 451 | 250 | 3,657 | 6,284 |
| 2019 | 1,297 | 153 | 45 | 1,495 | 947 | 13 | 960 | 314 | 13 | 327 | 13 | 420 | 174 | 607 | 3,390 | 1,666 | 1,237 | 387 | 217 | 3,507 | 6,897 |
| Mean | 1,457 | 248 | 41 | 1,745 | 277 | 10 | 284 | 175 | 12 | 184 | 9 | 79 | 42 | 75 | 2,267 | 1,367 | 468 | 297 | 51 | 2,074 | 4,341 |

**Table 5 Annual Lake Erie walleye total allowable catch (TAC, top) and measured harvest (Har; bottom, bold), in numbers of fish from 2000 to 2019.**

| | | TAC Area (MU-1, MU-2, MU-3) | | | | Non-TAC Area (MUs 4&5) | | | | All Areas |
|---|---|---|---|---|---|---|---|---|---|---|
| Year | | Michigan | Ohio | Ontario [a] | Total | NY | Penn. | Ontario | Total | Total |
| 2000 | TAC | 408,100 | 3,957,800 | 3,334,100 | 7,700,000 | | | | 0 | 7,700,000 |
| | **Har** | **252,280** | **932,297** | **2,287,533** | **3,472,110** | **28,599** | **77,512** | **67,000** | **173,111** | **3,645,221** |
| 2001 | TAC | 180,200 | 1,747,600 | 1,472,200 | 3,400,000 | | | | 0 | 3,400,000 |
| | **Har** | **159,186** | **1,157,914** | **1,498,816** | **2,815,916** | **14,669** | **52,796** | **39,498** | **106,963** | **2,922,879** |
| 2002 | TAC | 180,200 | 1,747,600 | 1,472,200 | 3,400,000 | | | | 0 | 3,400,000 |
| | **Har** | **193,515** | **703,000** | **1,436,000** | **2,332,515** | **18,377** | **22,000** | **36,000** | **76,377** | **2,408,892** |
| 2003 | TAC | 180,200 | 1,747,600 | 1,472,200 | 3,400,000 | | | | 0 | 3,400,000 |
| | **Har** | **128,852** | **1,014,688** | **1,457,014** | **2,600,554** | **27,480** | **43,581** | **32,692** | **103,753** | **2,704,307** |
| 2004 | TAC | 127,200 | 1,233,600 | 1,039,200 | 2,400,000 | | | | 0 | 2,400,000 |
| | **Har** | **114,958** | **859,366** | **1,419,237** | **2,393,561** | **8,400** | **19,969** | **29,864** | **58,233** | **2,451,794** |
| 2005 | TAC | 308,195 | 2,988,910 | 2,517,895 | 5,815,000 | | | | 0 | 5,815,000 |
| | **Har** | **37,599** | **610,449** | **2,933,393** | **3,581,441** | **27,370** | **20,316** | **17,394** | **65,080** | **3,646,521** |
| 2006 | TAC | 523,958 | 5,081,404 | 4,280,638 | 9,886,000 | | | | 0 | 9,886,000 |
| | **Har** | **305,548** | **1,868,520** | **3,494,551** | **5,668,619** | **37,161** | **151,614** | **68,774** | **257,549** | **5,926,168** |
| 2007 | TAC | 284,080 | 2,755,040 | 2,320,880 | 5,360,000 | | | | 0 | 5,360,000 |
| | **Har** | **165,551** | **2,160,459** | **2,159,965** | **4,485,975** | **29,134** | **116,671** | **37,566** | **183,371** | **4,669,346** |
| 2008 | TAC | 209,530 | 1,836,893 | 1,547,576 | 3,594,000 | | | | 0 | 3,594,000 |
| | **Har** | **121,072** | **1,082,636** | **1,574,723** | **2,778,431** | **29,017** | **74,250** | **34,906** | **138,173** | **2,916,604** |
| 2009 | TAC | 142,835 | 1,252,195 | 1,054,970 | 2,450,000 | | | | 0 | 2,450,000 |
| | **Har** | **94,048** | **967,476** | **1,095,500** | **2,157,024** | **13,727** | **42,422** | **27,725** | **83,874** | **2,240,898** |
| 2010 | TAC | 128,260 | 1,124,420 | 947,320 | 2,200,000 | | | | 0 | 2,200,000 |
| | **Har** | **55,248** | **958,366** | **983,397** | **1,997,011** | **34,552** | **54,056** | **23,324** | **111,932** | **2,108,943** |
| 2011 | TAC | 170,178 | 1,491,901 | 1,256,921 | 2,919,000 | | | | 0 | 2,919,000 |
| | **Har** | **50,490** | **417,314** | **1,224,057** | **1,691,861** | **31,506** | **45,369** | **28,873** | **105,748** | **1,797,609** |
| 2012 | TAC | 203,292 | 1,782,206 | 1,501,502 | 3,487,000 | | | | 0 | 3,487,000 |
| | **Har** | **86,658** | **921,390** | **1,355,522** | **2,363,570** | **36,975** | **44,796** | **28,260** | **110,031** | **2,473,601** |
| 2013 | TAC | 195,655 | 1,715,252 | 1,445,094 | 3,356,000 | | | | 0 | 3,356,000 |
| | **Har** | **54,167** | **1,083,395** | **1,274,945** | **2,412,507** | **34,553** | **60,332** | **30,591** | **125,476** | **2,537,983** |
| 2014 | TAC | 234,774 | 2,058,200 | 1,734,026 | 4,027,000 | | | | 0 | 4,027,000 |
| | **Har** | **42,142** | **1,303,133** | **1,324,201** | **2,669,476** | **61,982** | **84,843** | **52,675** | **199,500** | **2,868,977** |
| 2015 | TAC | 239,846 | 2,102,665 | 1,771,488 | 4,114,000 | | | | 0 | 4,114,000 |
| | **Har** | **65,740** | **1,073,263** | **1,382,600** | **2,521,603** | **55,201** | **46,523** | **89,882** | **191,606** | **2,713,209** |
| 2016 | TAC | 287,827 | 2,523,301 | 2,125,872 | 4,937,000 | | | | 0 | 4,937,000 |
| | **Har** | **65,816** | **855,820** | **1,959,573** | **2,881,209** | **50,963** | **32,937** | **112,743** | **196,643** | **3,077,852** |
| 2017 | TAC | 345,369 | 3,027,756 | 2,550,874 | 5,924,000 | | | | 0 | 5,924,000 |
| | **Har** | **56,938** | **1,261,327** | **3,232,817** | **4,551,082** | **70,010** | **162,949** | **129,217** | **362,176** | **4,913,258** |
| 2018 | TAC | 414,455 | 3,633,410 | 3,061,135 | 7,109,000 | | | | 0 | 7,109,000 |
| | **Har** | **176,089** | **1,972,295** | **3,478,713** | **5,627,097** | **123,503** | **270,189** | **263,204** | **656,896** | **6,283,993** |
| 2019 | TAC | 497,357 | 4,360,194 | 3,673,449 | 8,531,000 | | | | 0 | 8,531,000 |
| | **Har** | **153,171** | **2,558,359** | **3,362,053** | **6,073,583** | **174,466** | **419,975** | **229,466** | **823,907** | **6,897,490** |

**Table 6. Annual fishing effort for Lake Erie walleye by gear, management unit, and agency from 1975 to 2019.**

| | Sport Fishery [a] | | | | | | | | | | | | | | | Commercial Fishery [b] | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Unit 1 | | | | Unit 2 | | | Unit 3 | | | Units 4 & 5 | | | | | Unit 1 | Unit 2 | Unit 3 | Units 4&5 | |
| Year | OH | MI | ON[c] | Total | OH | ON[c] | Total | OH | ON[c] | Total | ON[c] | PA | NY | Total | Total | ON | ON | ON | ON | Total |
| 2000 | 1,975 | 540 | – | 2,516 | 540 | – | 540 | 281 | – | 281 | – | 244 | 177 | 421 | 3,757 | 22,238 | 11,049 | 7,896 | 1,781 | 43,054 |
| 2001 | 1,952 | 362 | – | 2,314 | 697 | – | 697 | 261 | – | 261 | – | 241 | 163 | 404 | 3,676 | 9,372 | 5,746 | 5,021 | 639 | 20,778 |
| 2002 | 1,393 | 606 | – | 1,999 | 444 | – | 444 | 246 | – | 246 | – | 130 | 132 | 262 | 2,951 | 4,431 | 4,212 | 4,427 | 445 | 13,515 |
| 2003 | 1,719 | 326 | – | 2,045 | 675 | – | 675 | 236 | – | 236 | 30 | 159 | 162 | 321 | 3,277 | 4,476 | 3,946 | 3,725 | 365 | 12,512 |
| 2004 | 1,257 | 504 | – | 1,761 | 736 | 27 | 736 | 178 | 7 | 178 | – | 88 | 101 | 189 | 2,864 | 3,875 | 2,977 | 2,401 | 240 | 9,493 |
| 2005 | 1,180 | 212 | 40 | 1,392 | 573 | – | 573 | 261 | – | 261 | – | 109 | 142 | 251 | 2,477 | 7,083 | 4,174 | 4,503 | 174 | 15,934 |
| 2006 | 1,757 | 587 | – | 2,344 | 899 | – | 899 | 260 | – | 260 | – | 239 | 137 | 376 | 3,879 | 5,689 | 4,008 | 3,589 | 822 | 14,107 |
| 2007 | 2,076 | 448 | – | 2,524 | 1,147 | – | 1,147 | 321 | – | 321 | – | 232 | 135 | 367 | 4,358 | 4,509 | 2,927 | 2,665 | 383 | 10,484 |
| 2008 | 1,027 | 392 | 63 | 1,419 | 809 | – | 809 | 356 | – | 356 | – | 187 | 156 | 343 | 2,927 | 4,990 | 3,193 | 1,909 | 497 | 10,590 |
| 2009 | 1,063 | 310 | – | 1,373 | 777 | – | 777 | 289 | – | 289 | – | 124 | 100 | 224 | 2,663 | 3,537 | 2,164 | 1,746 | 478 | 7,925 |
| 2010 | 1,403 | 226 | – | 1,629 | 652 | – | 652 | 219 | – | 219 | – | 188 | 140 | 328 | 2,828 | 1,918 | 1,371 | 1,401 | 247 | 4,937 |
| 2011 | 862 | 165 | – | 1,026 | 346 | – | 346 | 217 | – | 217 | – | 156 | 145 | 301 | 1,891 | 2,646 | 1,884 | 1,572 | 489 | 6,591 |
| 2012 | 1,283 | 242 | – | 1,525 | 560 | – | 560 | 182 | – | 182 | – | 160 | 169 | 329 | 2,597 | 4,674 | 2,480 | 2,298 | 352 | 9,804 |
| 2013 | 1,424 | 182 | – | 1,606 | 503 | – | 503 | 236 | – | 236 | – | 154 | 143 | 297 | 2,641 | 3,802 | 2,774 | 2,624 | 304 | 9,503 |
| 2014 | 1,552 | 131 | 101 | 1,683 | 459 | 85 | 459 | 441 | 71 | 441 | 70 | 171 | 187 | 358 | 2,940 | 7,351 | 4,426 | 2,911 | 254 | 14,943 |
| 2015 | 1,430 | 165 | – | 1,595 | 564 | – | 564 | 341 | – | 341 | – | 162 | 215 | 377 | 2,876 | 6,980 | 6,487 | 5,379 | 792 | 19,637 |
| 2016 | 1,514 | 236 | – | 1,750 | 439 | – | 439 | 397 | – | 397 | – | 141 | 217 | 358 | 2,944 | 6,980 | 7,969 | 4,523 | 1,448 | 20,920 |
| 2017 | 1,351 | 187 | – | 1,538 | 726 | – | 726 | 501 | – | 501 | – | 228 | 213 | 441 | 3,207 | 8,056 | 7,239 | 3,636 | 1,527 | 20,458 |
| 2018 | 1,239 | 261 | – | 1,500 | 813 | – | 813 | 354 | – | 354 | – | 248 | 229 | 477 | 3,144 | 5,215 | 7,421 | 2,636 | 1,896 | 17,168 |
| 2019 | 1,739 | 265 | – | 2,004 | 1036 | – | 1,036 | 307 | – | 307 | – | 439 | 297 | 736 | 4,083 | 4,165 | 6,365 | 2,402 | 1,353 | 14,285 |
| Mean | 2,869 | 655 | 102 | 3,584 | 749 | 62 | 764 | 415 | 111 | 446 | 106 | 211 | 231 | 273 | 5,015 | 8,771 | 5,658 | 4,446 | 733 | 18,719 |

End ✧

# Yellow Perch Task Group Report, 2020 (LEC)

## 2019 Fisheries Review

The lakewide total allowable catch (TAC) of Yellow Perch in 2019 was 8.552 million lbs. This allocation represented a 19% decrease from a TAC of 10.498 million lbs in 2018. For Yellow Perch assessment and allocation, Lake Erie is partitioned into four management units (MUs; **Fig 1).** The 2019 TAC allocation was 2.425, 2.208, 3.374 and 0.545 million pounds for MUs 1 through 4, respectively.

The lake-wide harvest of Yellow Perch in 2019 was 4.467 million lbs, or 52% of the total '19 TAC. This was a 34%

decrease from the 2018 harvest of 6.782 million lbs. Harvest from MUs 1 through 4 was 1.221, 1.174, 1.689, and 0.235 million lbs, respectively **(Table 1).** The portion of TAC harvested was 50%, 53%, 50%, and 70%, in MUs 1 through 4, respectively. In 2019, Ontario harvested 3.243 million lbs, followed by Ohio (1.112 million lbs.), New York (0.056 million lbs.), Pennsylvania (0.040 million lbs.), and Michigan (0.016 million lbs**. (Table 1).**

Targeted (i.e., small mesh) commercial gill net effort in 2019 increased from 2018 in MU1, MU3, and MU4 (+24%, +34%, and +7%, respectively), but decreased in MU2 (-26%). Sport angling effort in U.S. waters decreased in 2019 from 2018, in management units 1, 2, and 3, by 46%, 46%, and 67%, respectively, and increased by 44% in MU4. Sport effort in 2019 was at its lowest in the time series for MU1, MU2 and MU3. Compared to 2018, commercial trap net effort (lifts) in U.S. waters in 2019 increased by 9% in MU1, 41% in MU2, 28% in MU3, and 66% in MU4. Fishing effort by jurisdiction and gear type is presented in **Table 2.**

Targeted gill net harvest rates in 2019 decreased relative to 2018 rates by 47% in MU1, 36% in MU2, and 46% in MU3, and increased by 12% in MU4. Angling harvest rates, in fish harvested per angler hour decreased in Michigan (-63%) and Ohio waters of MU1 (-41%), decreased in Ohio waters of MU2 (-47%), decreased in Ohio waters of MU3 (-93%), and increased in Pennsylvania waters of MU3 (+80%) and MU4 (+72%), and increased in New York waters of MU4 (+18%). In 2019, trap net harvest rates decreased in MU1 (-60%), MU2 (-44%), MU3 (-44%), and increased in MU4 (+6%), compared to 2018 harvest rates.

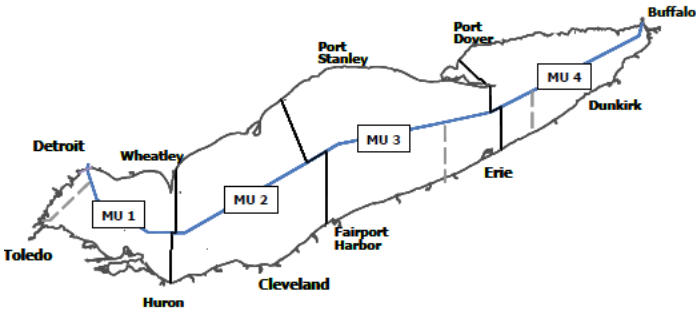



*Fig 1-Yellow Perch Management Units (MUs) of Lake Erie*

**Table 1- Yellow Perch harvest by jurisdiction and gear type for 2019**

| MU | Harvest by jurisdiction (lbs) | | | | | | | | Total (lbs) |
|---|---|---|---|---|---|---|---|---|---|
| | Michigan | Ontario | Ohio | | Pennsylvania | | New York | | |
| | sport | all commercial* | sport | commercial trap net | sport | commercial trap net | sport | commercial trap net | |
| 1 | 15,745 | 847,476 | 164,290 | 193,243 | | | | | 1,220,754 |
| 2 | | 740,490 | 13,846 | 419,631 | | | | | 1,173,967 |
| 3 | | 1,328,966 | 2,667 | 318,089 | 4,630 | 34,323 | | | 1,688,675 |
| 4 | | 326,179 | | | 1,485 | 0 | 37,469 | 18,750 | 383,883 |
| Total | 15,745 | 3,243,111 | 180,803 | 930,963 | 6,114 | 34,323 | 37,469 | 18,750 | 4,467,278 |

**Table 2-Yellow Perch fishing effort by jurisdiction and gear type for 2019**

| MU | Effort by jurisdiction | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Michigan | Ontario | Ohio | | Pennsylvania | | New York | |
| | sport (angler hours) | commercial (km gill net)* | sport (angler hours) | commercial (trap net lifts) | sport (angler hours) | commercial (trap net lifts) | sport (angler hours) | commercial (trap net lifts) |
| 1 | 57,929 | 6,363 | 284,068 | 3,811 | | | | |
| 2 | | 4,431 | 24,826 | 2,192 | | | | |
| 3 | | 6,956 | 2,475 | 2,901 | 5,668 | 382 | | |
| 4 | | 947 | | | 2,730 | 0 | 30,285 | 224 |
| Total | 57,929 | 18,697 | 311,369 | 8,904 | 8,398 | 382 | 30,285 | 224 |

## Abundance Estimate for 2020

Population size for 1975 to 2020 for each MU was estimated by statistical catch-at-age analysis (SCAA). The PR ADMB model incorporates a recruitment index which is used to project total abundance estimates to 2020. Using the PR model, abundance estimates of age-2-and-older Yellow Perch in 2020 are projected to increase by 60% in MU1, and by 23% in MU2, and to decrease by 15% in MU3, and 30% in MU4, compared to the 2019 abundance estimates. Age-2-and-older Yellow Perch abundance in 2020 is projected to be 53.920, 47.247, 62.396, and 9.821 million fish in MUs 1 through 4, respectively. Using mean weight-at-age information from assessment surveys, age-2-and-older biomass estimates in 2020 are projected to increase in MU1 (+36%), and decrease in MU2 (-6%), MU3 (-11%), and MU4 (-23%), compared to 2019 estimates.

## Recommended Allowable Harvest (RAH) for 2020

Following the completion of a Management Strategy Evaluation and adoption of a new harvest policy for the 2019 TAC setting year, the Lake Erie Percid Management Advisory Group (LEPMAG) completed an additional management strategy evaluation to evaluate four probabilistic risk tolerances (P* = 0.05, 0.1, 0.2, and 0.5), and compared the hierarchy of a 20% TAC constraint overriding the P* rule to scenarios where invoking the P* negates the 20% TAC constraint (**Table 5)**. The original review of the harvest control rules did not incorporate the 20% TAC constraints in the same manner that they were used during the 2019 TAC setting year. From this exercise new harvest control rules for Yellow Perch were selected. These harvest control rules will form the foundation of the Yellow Perch Management Plan for the next 5 years. The finalized harvest control rules (HCR) are comprised of:

• Target fishing mortality as a percent of the fishing mortality at maximum sustainable yield (Fmsy)
• Limit reference point of the biomass at maximum sustainable yield (Bmsy)
• Probabilistic risk tolerance, P*=0.20
• A limit on the annual change in TAC of ± 20% (when P* < 0.20; see Yellow Perch Management Plan, STC, 2020)

Target fishing rates and limit reference points are estimated annually using results from the SCAA models. Target fishing rates are reduced when the probability of the projected spawning stock biomass being equal to or less than the limit reference point (Bmsy) is greater than 0.20 (P*). Fishing rates are applied to population estimates and their standard errors, to determine minimum, mean, and maximum RAH values for each management unit **(Table 4).**

**Table 3-Yellow Perch fishing rates and RAH (millions of lbs) For 2020 by management unit**

| MU | Fishing Rate | Recommended Allowable Harvest (millions lbs.) | | |
|---|---|---|---|---|
| | | MIN | MEAN | MAX |
| 1 | 0.672 | 1.605 | 2.110 | 2.611 |
| 2 | 0.487 | 2.021 | 2.420 | 2.815 |
| 3 | 0.653 | 3.020 | 3.711 | 4.396 |
| 4 | 0.513 | 0.753 | 0.942 | 1.129 |
| Total | | 7.399 | 9.182 | 10.951 |

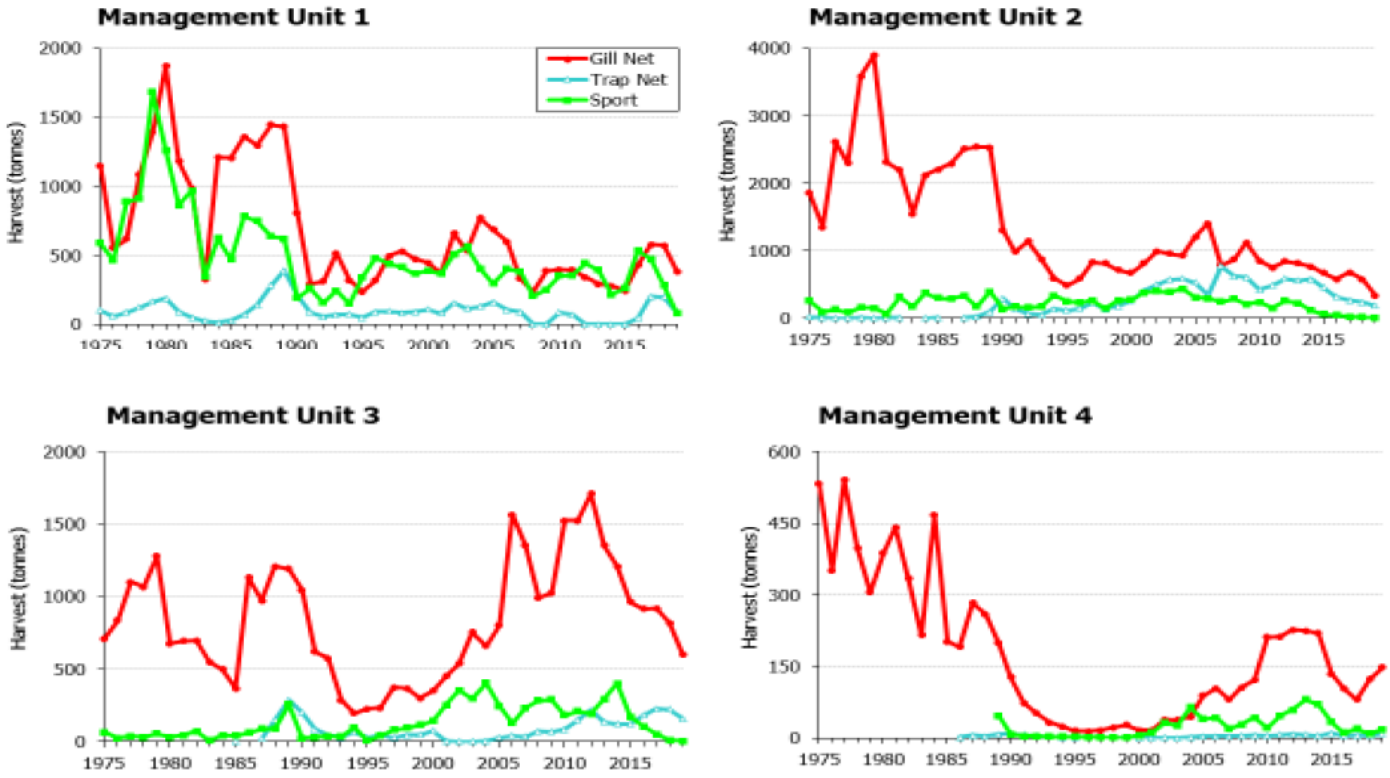
**Table 4-Yellow Perch stock size (millions of fish) in each Lake Erie management unit. Abundance in the years 2000 to 2020 are estimated by ADMB catch-age analysis.**

| | Age | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit 1 | 2 | 28.353 | 26.644 | 6.698 | 32.762 | 3.405 | 39.232 | 1.999 | 10.150 | 13.180 | 29.219 | 23.376 | 9.258 | 11.576 | 2.627 | 6.620 | 19.857 | 51.661 | 18.540 | 8.429 | 17.625 | 36.994 |
| | 3 | 6.667 | 18.002 | 17.219 | 4.249 | 20.608 | 2.143 | 24.790 | 1.266 | 6.417 | 8.503 | 18.593 | 14.599 | 5.773 | 7.089 | 1.566 | 4.041 | 12.018 | 30.555 | 11.275 | 5.293 | 11.218 |
| | 4 | 13.732 | 3.560 | 10.524 | 9.204 | 2.233 | 10.363 | 1.101 | 12.830 | 0.683 | 3.731 | 4.624 | 9.471 | 7.419 | 2.832 | 3.109 | 0.728 | 1.809 | 4.805 | 13.549 | 5.558 | 2.616 |
| | 5 | 2.758 | 5.912 | 1.872 | 4.578 | 3.979 | 0.830 | 4.034 | 0.434 | 5.833 | 0.359 | 1.709 | 1.877 | 3.834 | 3.011 | 0.932 | 1.087 | 0.236 | 0.458 | 1.440 | 4.789 | 1.844 |
| | 6+ | 0.992 | 1.378 | 3.539 | 2.112 | 2.536 | 1.963 | 0.932 | 1.585 | 0.859 | 3.265 | 1.558 | 1.161 | 1.062 | 1.758 | 1.336 | 0.689 | 0.475 | 0.143 | 0.135 | 0.424 | 1.249 |
| | 2 and Older | 52.502 | 55.496 | 39.852 | 52.906 | 32.761 | 54.530 | 32.856 | 26.264 | 26.972 | 45.077 | 49.859 | 36.367 | 29.664 | 17.318 | 13.563 | 26.402 | 66.198 | 54.501 | 34.828 | 33.689 | 53.920 |
| | 3 and Older | 24.149 | 28.852 | 33.153 | 20.143 | 29.356 | 15.299 | 30.857 | 16.114 | 13.792 | 15.857 | 26.483 | 27.109 | 18.088 | 14.691 | 6.943 | 6.546 | 14.538 | 35.961 | 26.399 | 16.063 | 16.926 |
| Unit 2 | 2 | 51.256 | 48.256 | 11.426 | 99.419 | 6.600 | 175.632 | 7.268 | 24.230 | 25.964 | 59.393 | 45.673 | 8.158 | 20.679 | 12.953 | 32.846 | 10.952 | 43.016 | 22.472 | 11.026 | 11.476 | 25.046 |
| | 3 | 8.651 | 33.192 | 31.508 | 7.433 | 64.860 | 4.318 | 114.257 | 4.747 | 16.012 | 17.176 | 39.049 | 30.097 | 5.379 | 13.590 | 8.468 | 21.477 | 7.117 | 28.182 | 14.792 | 7.289 | 7.603 |
| | 4 | 16.232 | 4.721 | 19.108 | 17.554 | 4.189 | 37.159 | 2.387 | 64.138 | 2.899 | 9.893 | 10.084 | 23.429 | 18.056 | 3.154 | 7.648 | 4.712 | 11.304 | 3.993 | 16.402 | 8.907 | 4.449 |
| | 5 | 1.095 | 6.916 | 2.264 | 8.435 | 7.883 | 1.946 | 16.106 | 1.068 | 34.465 | 1.617 | 4.874 | 5.226 | 12.124 | 8.828 | 1.401 | 3.267 | 1.756 | 4.915 | 1.910 | 8.539 | 4.760 |
| | 6+ | 0.408 | 0.553 | 3.188 | 2.089 | 4.092 | 4.849 | 2.575 | 7.444 | 4.207 | 20.265 | 9.804 | 6.952 | 5.776 | 7.811 | 6.455 | 2.901 | 1.907 | 1.385 | 2.726 | 2.258 | 5.389 |
| | 2 and Older | 77.641 | 93.638 | 67.493 | 134.929 | 87.625 | 223.904 | 142.592 | 101.626 | 83.546 | 108.345 | 109.484 | 73.861 | 62.013 | 46.336 | 56.816 | 43.309 | 65.100 | 60.946 | 46.856 | 38.469 | 47.247 |
| | 3 and Older | 26.386 | 45.382 | 56.067 | 35.510 | 81.025 | 48.272 | 135.324 | 77.396 | 57.582 | 48.952 | 63.811 | 65.703 | 41.335 | 33.383 | 23.971 | 32.357 | 22.084 | 38.474 | 35.830 | 26.993 | 22.201 |
| Unit 3 | 2 | 46.522 | 32.861 | 9.221 | 53.015 | 6.398 | 132.805 | 9.197 | 37.032 | 46.884 | 64.581 | 55.636 | 13.291 | 31.537 | 24.767 | 48.517 | 9.952 | 50.023 | 20.562 | 32.172 | 28.627 | 19.388 |
| | 3 | 9.481 | 31.011 | 21.903 | 6.140 | 35.316 | 4.262 | 88.537 | 6.130 | 24.712 | 31.314 | 43.104 | 37.128 | 8.867 | 21.023 | 16.509 | 32.285 | 6.626 | 33.282 | 13.710 | 21.457 | 19.079 |
| | 4 | 18.039 | 6.024 | 19.754 | 13.914 | 3.851 | 22.427 | 2.699 | 54.751 | 3.905 | 15.966 | 20.100 | 27.336 | 23.466 | 5.532 | 13.169 | 10.142 | 19.759 | 3.995 | 20.628 | 8.479 | 13.108 |
| | 5 | 2.315 | 10.446 | 3.514 | 11.483 | 7.722 | 2.230 | 12.815 | 1.424 | 31.753 | 2.365 | 9.489 | 11.481 | 15.466 | 12.795 | 3.053 | 6.869 | 5.213 | 9.724 | 2.128 | 10.900 | 4.321 |
| | 6+ | 1.393 | 1.960 | 6.679 | 5.340 | 8.333 | 8.427 | 5.452 | 8.380 | 5.154 | 21.109 | 12.782 | 11.513 | 11.721 | 13.087 | 12.667 | 6.952 | 6.048 | 4.594 | 6.673 | 4.015 | 6.501 |
| | 2 and Older | 77.750 | 82.301 | 61.072 | 89.893 | 61.619 | 170.151 | 118.699 | 107.715 | 112.409 | 135.335 | 141.111 | 100.748 | 91.056 | 77.203 | 93.915 | 66.200 | 87.669 | 72.157 | 75.310 | 73.478 | 62.396 |
| | 3 and Older | 31.228 | 49.440 | 51.851 | 36.878 | 55.221 | 37.346 | 109.502 | 70.684 | 65.525 | 70.755 | 85.475 | 87.457 | 59.519 | 52.436 | 45.398 | 56.248 | 37.646 | 51.595 | 43.138 | 44.851 | 43.008 |
| Unit 4 | 2 | 8.322 | 3.185 | 1.691 | 4.272 | 0.921 | 6.447 | 0.756 | 6.828 | 4.593 | 5.235 | 6.760 | 0.737 | 7.624 | 1.647 | 3.244 | 0.576 | 3.636 | 5.137 | 14.624 | 1.371 | 1.733 |
| | 3 | 0.724 | 5.543 | 2.127 | 1.125 | 2.836 | 0.610 | 4.229 | 0.493 | 4.498 | 3.022 | 3.425 | 4.384 | 0.474 | 4.875 | 1.043 | 2.040 | 0.364 | 2.326 | 3.365 | 9.502 | 0.893 |
| | 4 | 1.277 | 0.472 | 3.656 | 1.378 | 0.722 | 1.805 | 0.371 | 2.515 | 0.306 | 2.774 | 1.817 | 1.979 | 2.446 | 0.257 | 2.535 | 0.525 | 1.056 | 0.198 | 1.404 | 1.960 | 5.584 |
| | 5 | 0.126 | 0.810 | 0.306 | 2.277 | 0.847 | 0.433 | 0.994 | 0.197 | 1.445 | 0.174 | 1.493 | 0.913 | 0.925 | 1.081 | 0.105 | 0.977 | 0.214 | 0.473 | 0.108 | 0.720 | 1.019 |
| | 6+ | 0.518 | 0.417 | 0.794 | 0.681 | 1.816 | 1.595 | 1.171 | 1.209 | 0.855 | 1.335 | 0.860 | 1.241 | 1.099 | 0.982 | 0.933 | 0.524 | 0.666 | 0.471 | 0.536 | 0.377 | 0.593 |
| | 2 and Older | 10.967 | 10.426 | 8.573 | 9.733 | 7.141 | 10.890 | 7.520 | 11.242 | 11.696 | 12.541 | 14.356 | 9.253 | 12.569 | 8.843 | 7.861 | 4.641 | 5.937 | 8.605 | 20.036 | 13.931 | 9.821 |
| | 3 and Older | 2.644 | 7.241 | 6.883 | 5.461 | 6.220 | 4.443 | 6.764 | 4.414 | 7.103 | 7.306 | 7.596 | 8.516 | 4.945 | 7.196 | 4.617 | 4.066 | 2.301 | 3.468 | 5.412 | 12.560 | 8.088 |

**Table 5-Lake Erie Yellow Perch harvest in pounds by management unit (Unit) and agency, 2010-2019**

| | | Ontario* | | Ohio | | Michigan | | Pennsylvania | | New York | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Year | Harvest | % | Harvest | % | Harvest | % | Harvest | % | Harvest | % | Harvest |
| Unit 1 | 2010 | 879,358 | 47 | 889,512 | 48 | 83,725 | 5 | -- | -- | -- | -- | 1,852,595 |
| | 2011 | 870,802 | 48 | 796,447 | 44 | 145,960 | 8 | -- | -- | -- | -- | 1,813,209 |
| | 2012 | 752,872 | 44 | 883,245 | 51 | 93,291 | 5 | -- | -- | -- | -- | 1,729,408 |
| | 2013 | 648,884 | 43 | 789,088 | 52 | 76,994 | 5 | -- | -- | -- | -- | 1,514,966 |
| | 2014 | 620,667 | 56 | 391,361 | 36 | 87,511 | 8 | -- | -- | -- | -- | 1,099,539 |
| | 2015 | 541,938 | 48 | 485,744 | 43 | 94,225 | 8 | -- | -- | -- | -- | 1,121,907 |
| | 2016 | 947,052 | 42 | 886,068 | 40 | 397,044 | 18 | -- | -- | -- | -- | 2,230,164 |
| | 2017 | 1,277,587 | 46 | 1,239,575 | 45 | 255,605 | 9 | -- | -- | -- | -- | 2,772,767 |
| | 2018 | 1,262,229 | 54 | 956,016 | 41 | 107,789 | 5 | -- | -- | -- | -- | 2,326,034 |
| | 2019 | 847,476 | 69 | 357,533 | 29 | 15,745 | 1 | -- | -- | -- | -- | 1,220,754 |
| Unit 2 | 2010 | 1,888,876 | 56 | 1,457,823 | 44 | -- | -- | -- | -- | -- | -- | 3,346,699 |
| | 2011 | 1,665,258 | 54 | 1,399,503 | 46 | -- | -- | -- | -- | -- | -- | 3,064,761 |
| | 2012 | 1,877,615 | 50 | 1,851,846 | 50 | -- | -- | -- | -- | -- | -- | 3,729,461 |
| | 2013 | 1,803,684 | 51 | 1,721,668 | 49 | -- | -- | -- | -- | -- | -- | 3,525,352 |
| | 2014 | 1,679,175 | 52 | 1,543,226 | 48 | -- | -- | -- | -- | -- | -- | 3,222,401 |
| | 2015 | 1,489,433 | 57 | 1,131,993 | 43 | -- | -- | -- | -- | -- | -- | 2,621,426 |
| | 2016 | 1,283,379 | 62 | 792,869 | 38 | -- | -- | -- | -- | -- | -- | 2,076,248 |
| | 2017 | 1,498,437 | 70 | 643,554 | 30 | -- | -- | -- | -- | -- | -- | 2,141,991 |
| | 2018 | 1,271,365 | 69 | 559,122 | 31 | -- | -- | -- | -- | -- | -- | 1,830,487 |
| | 2019 | 740,490 | 63 | 433,477 | 37 | -- | -- | -- | -- | -- | -- | 1,173,967 |
| Unit 3 | 2010 | 3,370,099 | 85 | 476,808 | 12 | -- | -- | 117,640 | 3 | -- | -- | 3,964,547 |
| | 2011 | 3,366,412 | 81 | 636,686 | 15 | -- | -- | 153,233 | 4 | -- | -- | 4,156,331 |
| | 2012 | 3,768,183 | 81 | 746,999 | 16 | -- | -- | 161,751 | 3 | -- | -- | 4,676,933 |
| | 2013 | 2,983,539 | 76 | 796,307 | 20 | -- | -- | 155,193 | 4 | -- | -- | 3,935,039 |
| | 2014 | 2,668,921 | 70 | 979,937 | 26 | -- | -- | 168,690 | 4 | -- | -- | 3,817,548 |
| | 2015 | 2,131,211 | 77 | 572,736 | 21 | -- | -- | 77,558 | 3 | -- | -- | 2,781,505 |
| | 2016 | 2,020,470 | 76 | 522,549 | 20 | -- | -- | 107,972 | 4 | -- | -- | 2,650,991 |
| | 2017 | 2,027,235 | 77 | 504,223 | 19 | -- | -- | 107,335 | 4 | -- | -- | 2,638,793 |
| | 2018 | 1,807,645 | 78 | 460,797 | 20 | -- | -- | 54,085 | 2 | -- | -- | 2,322,527 |
| | 2019 | 1,328,966 | 79 | 320,756 | 19 | -- | -- | 38,953 | 2 | -- | -- | 1,688,675 |
| Unit 4 | 2010 | 467,612 | 89 | -- | -- | -- | -- | 19,989 | 4 | 37,730 | 7 | 525,331 |
| | 2011 | 468,001 | 80 | -- | -- | -- | -- | 37,040 | 6 | 80,848 | 14 | 585,889 |
| | 2012 | 502,778 | 77 | -- | -- | -- | -- | 41,362 | 6 | 106,499 | 16 | 650,639 |
| | 2013 | 496,666 | 72 | -- | -- | -- | -- | 74,277 | 11 | 119,869 | 17 | 690,812 |
| | 2014 | 485,899 | 74 | -- | -- | -- | -- | 16,671 | 3 | 149,668 | 23 | 652,238 |
| | 2015 | 297,716 | 76 | -- | -- | -- | -- | 10,055 | 3 | 85,535 | 22 | 393,306 |
| | 2016 | 231,063 | 87 | -- | -- | -- | -- | 6,791 | 3 | 28,078 | 11 | 265,932 |
| | 2017 | 179,730 | 76 | -- | -- | -- | -- | 16,078 | 7 | 39,598 | 17 | 235,407 |
| | 2018 | 272,733 | 90 | -- | -- | -- | -- | 1,452 | 0 | 29,159 | 10 | 303,344 |
| | 2019 | 326,179 | 85 | -- | -- | -- | -- | 1,485 | 0 | 56,219 | 15 | 383,883 |
| Lakewide Totals | 2010 | 6,605,945 | 68 | 2,824,143 | 29 | 83,725 | 1 | 137,629 | 1 | 37,730 | <1 | 9,689,172 |
| | 2011 | 6,370,473 | 66 | 2,832,636 | 29 | 145,960 | 2 | 190,273 | 2 | 80,848 | 1 | 9,620,190 |
| | 2012 | 6,901,448 | 64 | 3,482,090 | 32 | 93,291 | 1 | 203,113 | 2 | 106,499 | 1 | 10,786,441 |
| | 2013 | 5,932,773 | 61 | 3,307,063 | 34 | 76,994 | 1 | 229,470 | 2 | 119,869 | 1 | 9,666,169 |
| | 2014 | 5,454,662 | 62 | 2,914,524 | 33 | 87,511 | 1 | 185,361 | 2 | 149,668 | 2 | 8,791,726 |
| | 2015 | 4,460,298 | 64 | 2,190,473 | 32 | 94,225 | 1 | 87,613 | 1 | 85,535 | 1 | 6,918,144 |
| | 2016 | 4,481,964 | 62 | 2,201,486 | 30 | 397,044 | 5 | 114,763 | 2 | 28,078 | 0 | 7,223,335 |
| | 2017 | 4,982,989 | 64 | 2,387,352 | 31 | 255,605 | 3 | 123,413 | 2 | 39,598 | 1 | 7,788,958 |
| | 2018 | 4,613,972 | 68 | 1,975,935 | 29 | 107,789 | 2 | 55,537 | 1 | 29,159 | 0 | 6,782,393 |
| | 2019 | 3,243,111 | 73 | 1,111,766 | 25 | 15,745 | 0 | 40,437 | 1 | 56,219 | 1 | 4,467,278 |

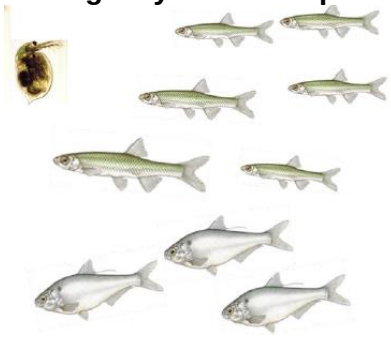
**Fig 3- Historic Lake Erie Yellow Perch harvest (metric tonnes) by management unit and gear type.**




End ✧

# Forage Task Group, 2020 (LEC)

## Interagency Lower Trophic Level Monitoring



The lower trophic level monitoring (LTLA) program has measured nine environmental variables at 18 stations around Lake Erie since 1999 to characterize ecosystem trends. The Trophic State Index, which is a combination of phosphorus levels, water transparency, and chlorophyll a concentration, indicate that the western basin is slightly above the targeted mesotrophic status, the central basin is within targeted mesotrophic status, and both the nearshore and offshore waters of the eastern basin are oligotrophic. Trends across Lake Erie in recent years indicate that overall productivity has slowly declined since 2010. Low hypolimnetic dissolved oxygen continues to be an issue in the central basin during the summer months.

## West Basin Status of Forage

In 2019, hypolimnetic dissolved oxygen levels were below the 2 mg/L threshold at twenty sites during the August trawling survey and, as a result, data from only 56 sites were used in 2019 (down from 71 in 2018). Total forage density averaged 2,633 fish per hectare across the western basin, which is a decline of 48% from 2018 and near half of the ten-year mean (5,029 fish/ha). Age-0 Walleye relative abundance in 2019 remained high and was the second greatest in the time series (225/ha). Young-of-the-year Yellow Perch (555/ha) declined 42% from 2018 but remained above the ten-year mean (400/ha). Young-of-the-year White Perch (1,573/ha) declined 50% from 2018 and is currently half the ten year average (2,961/ha). Young-of-the-year White Bass (80/ha) was similar to 2018 and below the ten-year mean (130/ha). Young-ofthe-year Gizzard Shad abundance (39/ha) was the lowest in the time series, well below the ten-year mean (914/ha). Densities of age-0 (0.4/ha) and age-1+ Emerald Shiners (0.1/ha) were also the lowest in the time series.

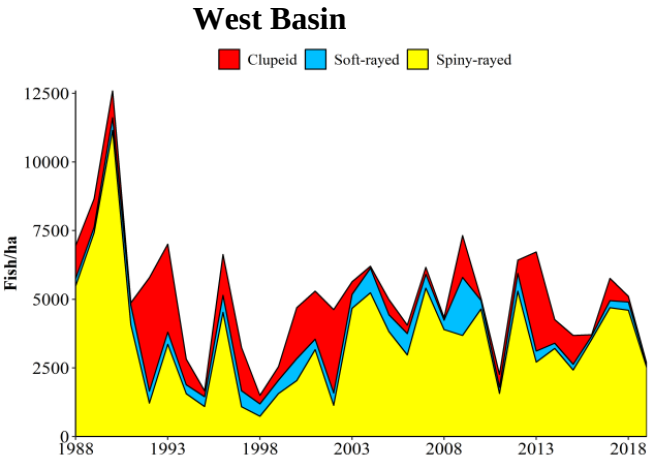



**Fig 1-Density (# per hectare) of prey fish by group in western Lake Erie, August 1988-2019.**

## Central Basin Status of Forage

Forage abundance in Pennsylvania increased from 2018 and was primarily composed of Rainbow Smelt and spiny-rayed species. Forage densities in Ohio were similar to 2018, but species composition switched from spiny-rayed species to primarily Rainbow Smelt in 2019. Forage densities remain well below long-term means in both Pennsylvania and Ohio. Young-of-the-year Rainbow Smelt was the only species that increased from 2018 across the basin. In contrast, age-1+ Rainbow Smelt indices declined from 2018 and were some of the lowest indices in the time period. Round Goby increased in Ohio trawls but decreased in Pennsylvania. Gizzard Shad and Emerald Shiner indices were similar to 2018. Emerald Shiners have only been sampled occasionally since 2015. Since 2005, Yellow Perch cohorts in the central basin have tended to be strongest in the east relative to the west. In 2019, Yellow Perch age-0 indices increased in Pennsylvania but decreased in Ohio. Yearling-and-older Yellow Perch indices in the central basin decreased from 2018 and were well below long-term means. Ohio indices for age-1+ Yellow Perch have been generally below long-term means since 2013.

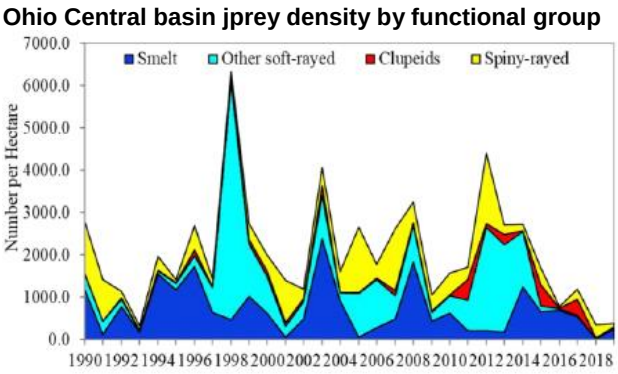



**Fig 2-Density of prey fish (# per hectare) by group in Pennsylvania and Ohio waters of the central basin, Lake Erie, 1990-2019.**

## East Basin Status of Forage

Total forage fish abundance in 2019 increased in Ontario over 2018 but remained well below the long-term mean. Abundance decreased for the third consecutive year in New York. Total forage fish abundance was one of the lowest values recorded in Pennsylvania waters. Catches of age-0 Rainbow Smelt were below long-term means in all jurisdictions. Abundance of age 1+ Smelt and Emerald Shiners (all life stages) were very low in all jurisdictions. Catches of age-0 Yellow Perch were above average in Long Point Bay, but below average in both New York and Pennsylvania. Round Goby densities were generally consistent with long-term means. Catches of all other species were low.

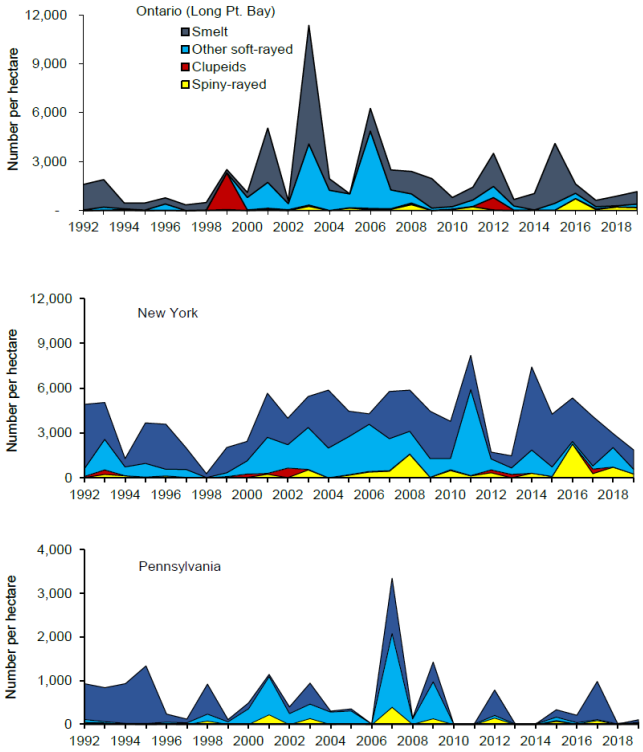



**Fig 3- Density of prey fish (# per hectare) by group in the Ontario, New York, and Pennsylvania waters of the eastern basin, Lake Erie, 1992-2019.**

## Hydroacoustic Assessments

The Forage Task Group introduced fisheries hydroacoustic technology on Lake Erie to provide a more comprehensive assessment of pelagic forage fish species abundance and distribution. In 2019, the east basin survey was conducted from July 8-18, the central basin survey from July 8-12, and the west basin survey on July 8-11. East basin forage fish density was the lowest in the time series, with a mean of 180 fish the size of age-1+ Rainbow Smelt per hectare. Similarly, hydroacoustic densities and midwater trawl catch rates of age-1+ Rainbow Smelt in the central basin were some of the lowest in the time series. Emerald Shiner have been generally declining in the central basin since 2011 and have been in very low abundance in the survey since 2015. In the west basin, average forage fish densities were highest along the transect bordering the central basin (9687 fish/ha).

Average western basin forage fish densities (8,335 fish/ha) were slightly higher than 2018 densities (6,435 fish/ha), but below the time series average (14,298 fish/ha).

## Aquatic Invasive Species

No new invasive fish species were reported in Lake Erie or its' connected waterways in 2019. Grass Carp reporting is now handled by the Grass Carp Working Group, which includes representatives from all Lake Erie jurisdictions and participating agencies. We continue to track populations of Rudd in the Lake Erie watershed. Tench is an emerging species of concern given its rapid expansion in the St. Lawrence River and recent entrance into Lake Ontario.

## 2019 Results

Total forage abundance in 2019 declined 48% from last year and was near half of the ten-year mean (**Fig 2)**. Spiny-rayed abundance declined 46% from 2018, while soft-rayed species declined 66% from 2018 – the lowest abundance in the time series. Clupeid abundance also declined to the minimum in the time series (since 1988). Total forage density averaged 2,633 fish/ha across the western basin, which represents a decline of 48% from 2018 and near half of the ten-year mean (5,029 fish/ha). Clupeid density was only 39 fish/ha (ten-year mean 914 fish/ha), soft-rayed fish density was 99 fish/ha (mean 478 fish/ha), and spiny-rayed fish density was 2,495 fish/ha (mean 3,637 fish/ha). Relative abundance of the dominant species includes: age-0 White Perch (60%), age-0 Yellow Perch (21%), age-0 Walleye (9%), followed by age-0 White Bass (3%) and age-0 Freshwater Drum (2%; other fishes = 5%). Total forage biomass in 2019 decreased by nearly half (47%) compared to 2018**.** Relative biomass of clupeid, soft-rayed, and spiny-rayed species in 2019 was 3%, 4%, and 94%, respectively, and differed from their respective ten-year averages by 24%, 5%, and 72%.

Recruitment of individual species remains highly variable in the western basin**.** Age-0 Walleye relative abundance in 2019 was the second greatest in the time series (225/ha), which is down 12% from 2018's largest year class on record but well above even the 2003 year class (183/ha). Young-of-the-year Yellow Perch (555/ha**)** declined 42% from 2018 and remained above the ten-year mean (400/ha) for the second year in a row. Young-of-the-year White Perch (1,573/ha) declined 50% from 2018, half the ten-year average (2,961/ha**).** Young-of-the-year White Bass (80/ha) was similar to 2018 and below the ten-year mean (130/ha). Densities of age-0 Rainbow Smelt (11/ha) and age-1+ Rainbow Smelt (0/ha) were minimal. Young-of-the-year Gizzard Shad abundance (39/ha) was the lowest in the time series (914/ha) and continued a trend of high annual variation**.** Densities of age-0 (0.4/ha) and age-1+ Emerald Shiners (0.1/ha) were also the lowest in the time series and well under their ten-year means (56/ha and 62/ha, respectively**.** Age-1+ Silver Chub relative abundance (10/ha) was the greatest since 2003, well above the ten-year mean (1.2/ha). Age-1+ Spottail Shiner 2019 density (2.4/ha) declined to just under the ten-year mean (2.8/ha). Young-of-the-year Freshwater Drum density (61/ha) declined from a big 2018 year class, well under the ten-year mean (99/ha). Young-of-the-year and age-1+ Trout-perch densities (24/ha and 25/ha, respectively) declined from 2018 numbers; adults were well above the ten-year mean (18/ha), while age-0 fish were well below (89/ha).

## Michigan Lake Erie Forage Trawls

The 2019 trawl survey saw a return to typical catches of forage after the high observed in 2018, with the catch of forage sized individuals averaging 1,988.5 fish per hectare trawled (fish/ha). This represents the second highest catch of our time series but represents a considerable decline from the high of 10,603 fish/ha observed last yea. Age-0 Yellow Perch (1,291/ha) and White Perch (389.1/ha) were the most abundant forage sized fish captured, though both were down considerably from last year. Shiner species including Emerald Shiners (11.4/ha), Mimic Shiners (141.5/ha), and Spottail Shiners (10.6/ha) all increased compared to 2018. Finally, age-0 Walleye were again at their highest observed abundance in 2019 (68.5/ha trawled,) indicating another strong year hatch of Walleyes in the Michigan waters of Lake Erie.

The continued development of this dataset will allow for the evaluation of trends in forage abundance and the recruitment of sportfishes in Michigan's Lake Erie waters in future years. Based on the current time series, 2019 appears to have been an exceptional year for the production of age-0 Walleye in Michigan's Lake Erie waters, while Yellow Perch and White Perch returned to more typical abundances. Michigan plans to continue forage trawling at these sites annually to contribute to lake wide estimates of forage and age-0 sportfish abundance.

## Eastern Basin PredatorDiet and Growth

### Diet

In 2019, Rainbow Smelt and Round Goby were again the prominent diet items for Lake Trout, occurring in 61% and 37% of the stomachs, respectively. It should be noted that Round Goby were much more numerically abundant in Lake Trout diets compared to Rainbow Smelt; some Lake Trout stomachs contained in excess of 50 Round Goby compared to a few adult smelt. Other fish species comprised 8% of the diets, which is the second highest occurrence in the time series. Yellow Perch comprised the majority of this group (5%); other species included *Morone* spp. (White Perch, White Bass; <1%), Freshwater Drum (<1%), White Sucker (<1%), Emerald Shiner (<1%), Clupeids (Gizzard Shad, Alewife; <1%), and a young-of0the-year Walleye (<1%). This was the first time that a Walleye or a White Sucker appeared in Lake Trout diets.

Similar to Lake Trout, the only diet information available for Burbot was collected during the CWA survey. Analysis of stomach contents (N=12) revealed a diet comprised mostly of fish. Burbot diets continue to be diverse, with four different identifiable fish species found in stomach samples. Round Goby was the dominant prey item, occurring in 50%

of Burbot diet samples; other species detected were Rainbow Smelt (8%), Yellow Perch (8%), and *Morone spp.* (8**%)** Round Goby have become the dominate prey species for Burbot in most years since 2003.

**Growth**

Walleye length at age-1 and age-2 from netting surveys targeting juveniles in New York had remained relatively stable for the past decade but has declined in the past three years. In 2019, age-1 and age-2 Walleye were 1.2 and 1.1 inches below the long-term average length, respectively; both metrics ranked near the lowest observed in the 38-year time series In general, age-0 and age-1 Yellow Perch have exhibited stable growth rates over the past ten years. In 2019, age-0 Yellow Perch were 0.3 inches below their time series average and were the second lowest in the 28-year time series while age-1 fish were below average and at their smallest length-at-age since 2005.

## Central Basin Predator Diet and Growth

**Diet**

Diets of adult Walleye are collected from the central basin fall gill net survey in Ohio waters. In 2019, Walleye diets consisted of Gizzard Shad (74%), unidentified fish (22%), Rainbow Smelt (3%) and Emerald Shiner (1%**).** Emerald Shiner and Rainbow Smelt have contributed up to 30% and 12%, respectively, of Walleye diets in previous years. Contributions from both species to Walleye diets have declined since 2017.

**Growth**

Growth rates of age-0 Walleye declined from 2018 and were below the long-term mean. Young-of-the-year Walleye growth rates have been below long-term means since 2015. Mean length of age-0 Walleye was the lowest in the time series, most likely due to the exceptional cohort in 2019. Growth rates of most age-0 forage species in 2019 were at or above long-term means. Mean length at age for Walleye cohorts through age-6 have declined from 2018 and are generally below long-term means. Mean length of Yellow Perch cohorts through age-6 have generally increased from 2018 and are above long-term means.

## Western Basin Predator Diet and Growth

**Diet**

In 2019, age-1 Walleye diets (by percent dry weight; 10 stomachs excluding empty) taken from ODNR fall gillnet catches consisted of Gizzard Shad (51%), Yellow Perch (7%), Round Goby (2%), and unidentifiable fish remains (39%) in the western basin. Adult Walleye (73 stomachs excluding empty) relied on Gizzard Shad (69%), Rainbow Smelt (2%), and unidentifiable fish remains (29%). No age-0 Walleye diets were taken from the fall gillnet survey in 2019.

USGS collected stomachs from all ages of Yellow Perch captured in bottom trawls from 41 sites throughout the western basin in June and September 2019. Captured fishes were dissected in the field immediately after capture. Stomach contents were placed in Whirl-Pak bags and frozen at -80° C, then transferred to -20° C after flash freezing. Contents were processed in the lab. Prey items were identified to the lowest taxonomic level possibly by coarse visual inspection (i.e., no effort was made to use taxonomic keys to identify species of *Hexagenia* spp.), dried in a Heratherm drying oven at 60°C until a constant mass was achieved, then weighed to the nearest 0.001 g. USGS collected 62 diets in June (0 empty) and 82 diets in September (13 empty, 69 full). Analyses below are based on stomachs containing food.

Yellow Perch diet content varied seasonally for food item frequency of occurrence. In June, perch diets were dominated by benthic invertebrates (found in 85% of diets), followed by zooplankton (34%) and fish (16%). Benthic macroinvertebrates and zooplankton were both found in high frequency in Yellow Perch diets in September (51% and 75%, respectively; Figure 2.5.3.1). Specifically, in June the most common prey items were lake flies (Chironomidae; 53%), mayflies (Ephemeridae; 37%), caddisflies (Tricoptera; 29%), *Bythotrephes* spp. (19%), and *Daphnia* spp. (18%). In September, specific diet items changed to *Bythotrephes* spp. (62%), followed by *Daphnia* spp. (29%), lake flies (Chironomidae; 14%), and amphipods (11%**).**

Benthic macroinvertebrates (65%) contributed the most to Yellow Perch diet dry weight in June 2019, while zooplankton (60%) contributed the most in September**.** The largest proportions of dry weight in June by diet item were mayflies (Ephemeridae; 35%), Dreissenid mussels (28%), lake flies (Chironomidae; 11%), unidentified fishes (9%), and *Bythotrephes* spp. (9%). In September, diet dry weights were made up of *Bythotrephes* spp. (50%), snails (Gastropods; 20%), *Daphnia* spp. (9%), and mayflies (*Hexagenia* spp.; 7%). 25.

**Growth**

Overall, mean length of age-0 sport fish in 2019 was similar to 2018. Lengths of select age-0 species in 2019 include Walleye (101 mm), Yellow Perch (67 mm), White Bass (82 mm), and White Perch (70 mm). Walleye average length was the lowest in the time series and has declined for six consecutive years, likely due to high abundance of age-0 Walleye. White Bass have been well above the time series average for two years. Smallmouth Bass average length has been dropped from this reporting due to consistently small sample size within years.

**Table 1-Relative abundance of selected forage fish species from bottom trawl surveys conducted by Ontario, New York, and Pennsylvania in the eastern basin of Lake Eire for the most recent 10-year period.**

| | Age | Trawl | | | | | | | | | | 10-Yr & Long-term Avg. by decade | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Species | Group | Survey | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 10-Yr | 2000's | 1990's |
| Rainbow Smelt | YOY | ON-DW | 326.9 | 509.2 | 1657.7 | 217.9 | 1001.6 | 3245.2 | 538.3 | 372.3 | 584.8 | 739.6 | 919.3 | 1267.2 | 431.7 |
| | YOY | NY-Fa | 1453.6 | 1621.7 | 424.4 | 755.2 | 5520.2 | 2930.7 | 2901.3 | 3225.3 | 861.7 | 1255.7 | 2095.0 | 1416.9 | 1468.0 |
| | YOY | PA-Fa | NA | NA | 560.2 | NA | NA | 129.1 | 166.9 | 872.3 | NA | 62.7 | 358.2 | 106.0 | 421.1 |
| | YAO | ON-DW | 222.7 | 277.1 | 367.8 | 165.3 | 4.6 | 411.0 | 20.2 | 0.1 | 0.1 | 11.3 | 148.0 | 490.1 | 358.6 |
| | YAO | NY-Fa | 1023.8 | 656.8 | 22.7 | 45.8 | 24.8 | 590.1 | 5.8 | 67.5 | 65.5 | 27.0 | 253.0 | 1004.2 | 583.3 |
| | YAO | PA-Fa | NA | NA | 22.3 | NA | NA | 39.6 | 0.0 | 0.5 | NA | 0.4 | 12.5 | 202.2 | 1108.8 |
| Emerald Shiner | YOY | ON-DW | 117.6 | 70.3 | 438.3 | 58.7 | 2.9 | 346.7 | 2.0 | 0 | 0.7 | 3.8 | 104.1 | 422.3 | 52.3 |
| | YOY | NY-Fa | 64.6 | 3006.7 | 96.8 | 130.9 | 526.3 | 137.6 | 6.1 | 51.6 | 23.8 | 5.6 | 405.0 | 174.4 | 115.1 |
| | YOY | PA-Fa | NA | NA | 14.8 | NA | NA | 68.2 | 0.0 | 0 | NA | 0.0 | 16.6 | 289.3 | 39.9 |
| | YAO | ON-DW | 30.7 | 201.1 | 119.2 | 188.6 | 2.5 | 6.5 | 28.2 | 0.4 | 1.3 | 12.5 | 59.1 | 741.1 | 37.7 |
| | YAO | NY-Fa | 21.1 | 1874.0 | 96.2 | 67.1 | 822.8 | 24.8 | 22.2 | 4.5 | 1108.3 | 95.9 | 413.7 | 294.4 | 108.1 |
| | YAO | PA-Fa | NA | NA | 86.9 | NA | NA | 146.9 | 0.0 | 0 | NA | 0.0 | 46.8 | 761.3 | 10.3 |
| Spottail | YOY | ON-OB | 3.0 | 2.5 | 19.1 | 8.1 | 5.0 | 5.8 | 4.1 | 38.2 | 36.7 | 27.5 | 15.0 | 107.7 | 815.9 |
| | YOY | NY-Fa | 6.7 | 0.7 | 1.8 | 0.0 | 0.1 | 0.0 | 0.1 | 0.4 | 3.5 | 2.7 | 1.6 | 5.7 | 20.4 |
| | YOY | PA-Fa | NA | NA | 0.0 | NA | NA | 0.0 | 0.0 | 0 | NA | 0.0 | 0.0 | 0.2 | 3.6 |
| | YAO | ON-OB | 2.1 | 0.5 | 1.6 | 3.0 | 0.2 | 1.5 | 0.0 | 2.8 | 3.3 | 9.2 | 2.4 | 10.1 | 74.6 |
| | YAO | NY-Fa | 10.7 | 29.7 | 2.1 | 0.3 | 0.2 | 0.0 | 9.3 | 0.8 | 6.2 | 2.1 | 6.1 | 6.6 | 4.0 |
| | YAO | PA-Fa | NA | NA | 0.1 | NA | NA | 0.0 | 0.0 | 0 | NA | 0.0 | 0.0 | 0.0 | 5.7 |
| Alewife | YOY | ON-DW | 0.9 | 2.1 | 707.3 | 17.7 | 0.0 | 0.7 | 0.8 | 36.1 | 0.0 | 0.0 | 76.6 | 20.2 | 231.2 |
| | YOY | ON-OB | 0.0 | 6.8 | 6.0 | 26.1 | 0.0 | 3.4 | 0.0 | 28.3 | 0.0 | 0.7 | 7.1 | 74.1 | 88.5 |
| | YOY | NY-Fa | 15.8 | 12.7 | 188.6 | 223.9 | 0.0 | 5.6 | 0.8 | 297.7 | 8.7 | 0.8 | 75.5 | 87.0 | 53.4 |
| | YOY | PA-Fa | NA | NA | 4.6 | NA | NA | 0.0 | 0.0 | 0 | NA | 0.0 | 1.1 | 1.0 | 2.2 |
| Gizzard Shad | YOY | ON-DW | 13.3 | 18.9 | 47.6 | 0.0 | 0.0 | 0.4 | 1.9 | 1.9 | 0.0 | 0.0 | 8.4 | 19.2 | 7.5 |
| | YOY | ON-OB | 3.8 | 3.4 | 20.0 | 0.3 | 0.4 | 10.1 | 0.0 | 4.1 | 1.6 | 4.0 | 4.8 | 6.9 | 13.4 |
| | YOY | NY-Fa | 42.0 | 15.4 | 4.9 | 3.9 | 0.6 | 3.3 | 1.9 | 3.8 | 2.1 | 2.0 | 8.0 | 11.6 | 4.4 |
| | YOY | PA-Fa | NA | NA | 1.0 | NA | NA | 41.5 | 0.0 | 0 | NA | 0.0 | 10.6 | 0.0 | 0.3 |
| White Perch | YOY | ON-DW | 1.6 | 0.0 | 0.8 | 0.0 | 0.0 | 0.5 | 96.1 | 0.3 | 1.0 | 1.3 | 10.2 | 2.7 | 1.8 |
| | YOY | ON-OB | 0.0 | 0.0 | 0.9 | 0.0 | 0.0 | 0.2 | 0.0 | 0.7 | 38.6 | 1.2 | 4.2 | 2.5 | 17.6 |
| | YOY | NY-Fa | 161.3 | 37.5 | 18.7 | 4.5 | 36.1 | 17.3 | 79.3 | 44.2 | 43.2 | 96.5 | 53.9 | 70.7 | 30.1 |
| | YOY | PA-Fa | NA | NA | 380.0 | NA | NA | 287.9 | 2.3 | 150.4 | NA | 70.5 | 205.1 | 267.8 | 71.5 |
| Trout Perch | All | ON-DW | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | 0.0 | 0.0 | 0.0 | 0.1 | 0.9 | 0.6 |
| | All | NY-Fa | 473.7 | 671.4 | 347.8 | 152.7 | 64.9 | 33.1 | 26.1 | 8.6 | 6.6 | 6.9 | 179.2 | 815.0 | 417.5 |
| | All | PA-Fa | NA | NA | 52.2 | NA | NA | 2.1 | 0.2 | 4.2 | NA | 0.2 | 11.8 | 179.5 | 64.6 |
| Yellow Perch | YOY | ON-Comp | 51.8 | 176.7 | 27.4 | 0.5 | 28.4 | 58.5 | 360.6 | 65.5 | 328.8 | 227.0 | 132.5 | 33.0 | 79.5 |
| | YOY | NY-Fa | 197.7 | 89.5 | 280.0 | 4.4 | 274.2 | 68.6 | 2178.2 | 247.0 | 662.4 | 169.1 | 417.1 | 40.2 | 251.0 |
| | YOY | PA-Fa | NA | NA | 286.8 | NA | NA | 69.3 | 56.3 | 300.4 | NA | 27.7 | 148.1 | 259.8 | 27.4 |
| Round Goby | All | ON-DW | 9.7 | 125.4 | 129.0 | 14.5 | 0.5 | 67.2 | 300.9 | 137.9 | 64.2 | 194.2 | 104.3 | 216.7 | 0.0 |
| | All | ON-OB | 67.6 | 103.3 | 68.0 | 76.3 | 98.5 | 359.1 | 54.0 | 93.5 | 315.1 | 34.4 | 127.0 | 87.3 | 0.1 |
| | All | ON-IB | 135.1 | 114.6 | 80.2 | 49.6 | 95.4 | 151.6 | 160.8 | 28.2 | 110.5 | 80.9 | 100.7 | 136.1 | 0.1 |
| | All | NY-Fa | 177.81 | 170.15 | 184.89 | 86.06 | 140.33 | 441.58 | 104.9 | 146.9 | 164.5 | 204.1 | 182.1 | 656.0 | 1.0 |
| | All | PA-Fa | NA | NA | 32.1 | NA | NA | 47.2 | 85.6 | 30.1 | NA | 20.9 | 43.2 | 1002.4 | 42.0 |

**Table 2-Catch per hectare (arithmetic mean) of selected age-1+ species from fall trawl surveys conducted in the Ohio and Pennsylvania waters of the central basin, Lake Erie, from 2009-2019.**

| | | Year | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | Mean |
| Species | Survey | | | | | | | | | | | | |
| Yellow | OH West | 20.2 | 11.9 | 6.3 | 7.4 | 34.9 | 15.4 | 41.3 | 5.0 | 3.7 | 7.9 | 1.1 | 15.4 |
| Perch | OH East | 139.4 | 12.4 | 55.5 | 23.3 | 109.5 | 24.2 | 30.2 | 8.7 | 7.6 | 6.6 | 4.8 | 41.7 |
| | PA | 121.8 | - | - | 117.7 | 73.7 | - | 59.0 | 61.2 | 114.1 | 24.8 | 7.8 | 81.8 |
| White | OH West | 45.8 | 32.6 | 25.9 | 45.8 | 195.9 | 5.8 | 1.7 | 47.5 | 29.9 | 3.5 | 7.0 | 43.4 |
| Perch | OH East | 282.3 | 44.8 | 49.8 | 7.7 | 546.9 | 4.4 | 1.4 | 55.4 | 17.6 | 6.6 | 20.7 | 101.7 |
| | PA | 62.6 | - | - | 7.8 | 18.4 | - | 78.9 | 4.0 | 19.6 | 0.9 | 11.1 | 27.5 |
| Rainbow | OH West | 368.8 | 9.0 | 15.6 | 9.1 | 8.1 | 34.9 | 340.8 | 0.5 | 53.8 | 16.7 | 13.0 | 85.7 |
| Smelt | OH East | 98.2 | 49.8 | 186.0 | 95.4 | 200.7 | 6.2 | 295.4 | 17.1 | 35.7 | 9.4 | 0.3 | 99.4 |
| | PA | 406.5 | - | - | 20.5 | 25.1 | - | 69.7 | 5.0 | 0.9 | 0.0 | 0.5 | 75.4 |
| Round | OH West | 60.4 | 44.0 | 68.6 | 11.8 | 24.3 | 6.9 | 35.8 | 3.7 | 19.6 | 4.5 | 9.9 | 28.0 |
| Goby | OH East | 19.3 | 36.0 | 118.1 | 27.0 | 46.3 | 89.1 | 72.4 | 16.1 | 14.3 | 3.5 | 22.9 | 44.2 |
| | PA | 76.0 | - | - | 72.9 | 8.6 | - | 50.3 | 12.7 | 183.9 | 30.9 | 4.8 | 62.2 |
| Emerald | OH West | 127.7 | 51.5 | 138.2 | 998.8 | 298.0 | 55.8 | 0.9 | 1.3 | 0.0 | 0.0 | 0.0 | 167.2 |
| Shiner | OH East | 167.8 | 375.1 | 149.7 | 433.2 | 8.4 | 333.5 | 1.8 | 0.0 | 0.0 | 0.0 | 0.0 | 147.0 |
| | PA | 172.5 | - | - | 8.9 | 17.2 | - | 179.5 | 6.4 | 0.0 | 0.0 | 0.0 | 54.9 |
| Spottail | OH West | 1.9 | 0.0 | 20.7 | 0.0 | 0.5 | 1.7 | 0.0 | 0.0 | 0.0 | 0.7 | 0.0 | 2.6 |
| Shiner | OH East | 0.0 | 0.0 | 3.1 | 3.0 | 2.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.9 |
| | PA | 0.0 | - | - | 0.0 | 0.0 | - | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Trout- | OH West | 0.9 | 0.7 | 3.3 | 1.6 | 3.3 | 0.6 | 0.7 | 0.0 | 0.4 | 2.0 | 0.6 | 1.4 |
| perch | OH East | 1.5 | 5.0 | 7.9 | 11.7 | 1.0 | 0.4 | 3.0 | 0.1 | 0.3 | 5.3 | 2.2 | 3.6 |
| | PA | 127.5 | - | - | 30.4 | 9.3 | - | 8.3 | 2.4 | 5.2 | 0.0 | 8.0 | 26.2 |

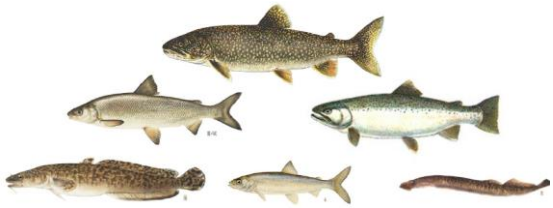
End ✧

# Coldwater Task Group, 2020 (LEC)

## East Basin Cold Water Assessment Program

Two cold water assessments are conducted each year: the inter-agency August Coldwater Assessment (hereafter referred to as the "Coldwater Assessment Survey") in New York, Ontario, and Pennsylvania waters of the eastern basin, and the Ontario Partnership Index Fishing Program (hereafter referred to as the "Partnership Survey") in Ontario waters.

The Coldwater Assessment Survey is a stratified, random, deep-water bottom set gill net



assessment program conducted since 1986. The eastern basin of Lake Erie is divided into eight sampling areas (A1-A8. A1 and A2 have been the most consistently sampled areas across survey years while effort has varied in all other areas. Area A4 has been periodically sampled due to the lack of enough cold water to set gill nets according to the sampling protocol. Sampling was conducted in all eight areas in 2019. Total sampling effort was 130 sets. Additional sampling was conducted in 2019 in areas offshore of traditional netting; for the purposed of this report, this data will only be used for sea lamprey wounding and length and weight information.

The Partnership Survey is a lake wide gill net survey of the Canadian waters that has provided a spatially robust assessment of fish species abundance and distribution since 1989. The Partnership Survey uses suspended and bottom set gill nets.

### Lake Trout

A total of 570 Lake Trout were collected in 130 gill net lifts across the eastern basin of Lake Erie in 2019. Basin wide Lake Trout abundance was 4.1 fish/lift, which is above average for the time series but well below the rehabilitation target of 8.0 fish/lift. However, adult abundance (ages 5+) was at its third highest measure in the time series and slightly above the target of 2.0 fish/lift**.** Lake Trout ages 3, 4, 9, and 10 were the dominate cohorts; Lake Trout older than age-10 continue to increase in abundance. Finger Lakes and Lake Champlain strains comprise the majority of the population. The Lake Erie Lake Trout population continues to be supported by binational stocking efforts; natural reproduction has not been documented in Lake Erie despite more than 30 years of restoration efforts.

All Lake Trout in the Coldwater Assessment Survey are measured for total length and weight, as well as examined for sex, maturity, fin clips, and wounds by Sea Lamprey. Snouts from each Lake Trout are retained and coded-wire tags (CWT) are extracted in the laboratory to accurately determine age and genetic strain. Otoliths and genetic samples are also retained when the fish is not adipose fin-clipped. Stomach content data are usually collected as on-site enumeration or from preserved samples.

A total of 570 Lake Trout were caught in 130 unbiased lifts in 2019. Areas A6, A2 and A1 produced the highest catch per unit effort (CPE) values with slightly lesser catches in areas A5, A4, and A3. Areas A7 and A8 produced the lowest catches. The highest CPE's are typically recorded in Areas A1 and A2, coinciding with higher yearling Lake Trout stocking over time. Lake Trout catches are typically much lower in Ontario waters (A5-A8), where annual stocking is less and did not commence until 2006.

Lake Trout captured in 2019 represented nineteen age-classes among five different strains. Ages 3, 4, 9 and 10 cohorts were the most abundant and represented 64% of the total catch. The abundance of Lake Trout older than age-10 continues to increase and now comprises nearly 19% of the overall catch. Lake Champlain (LC) and Finger Lakes (FL) were the most numerous Lake Trout strains caught in 2019, followed by the Slate Island (SI) strain. These three strains have been the most commonly stocked Lake Trout strains in Lake Erie over the past eleven years. Catches of the Klondike (KL) strain have declined to the point that they were scarcely detected. One age-18 Superior (SUP) strain Lake Trout was caught in 2019; this was the first detection of this strain since 2011 in the Coldwater Assessment Survey.

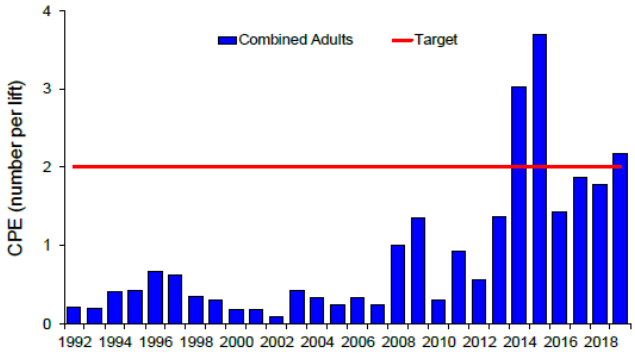



**Fig 1- Basinwide Adult Lake Trout Abundance**

### Lake Whitefish

Lake Whitefish harvest in 2019 was 114,703 pounds, distributed between Ontario (71%), Ohio (27%) and Pennsylvania (2%). Harvest more than doubled compared to 2018 but was low. Gill net fishery age composition ranged from ages 4 to 25 with additional ages (0,1,2) present in non-random samples. The 2015 and 2014 year classes (ages 4, 5) represented the majority of Lake Whitefish harvested. Gill net surveys caught Lake Whitefish from ages 1 to 27 with more diverse, older ages present in Coldwater Assessment nets fished in US waters. Central and east basin bottom trawl

surveys forecast additional recruitment to follow the 2014 and 2015 cohorts; 2018 may be the most recent strong cohort. Conservative harvest is recommended until Lake Erie's Lake Whitefish status is better understood.

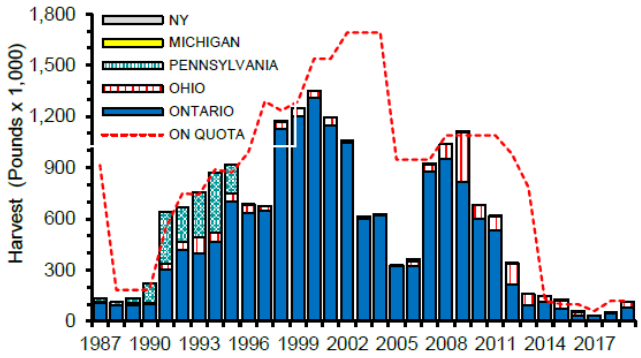



**Fig 2- Commercial Lake Whitefish Harvest**

**Burbot**

Total commercial harvest of Burbot in Lake Erie in 2019 was 2,128 pounds. All harvest was incidental. Burbot abundance and biomass indices from annual Coldwater and Ontario Partnership Gillnet Assessment Surveys remained at low levels, continuing a downward trend since the early-2000s. The catch rate in the Interagency Coldwater Assessment Survey averaged 0.3 fish/lift and in the Ontario

Partnership Assessment Survey averaged 0.2 fish/lift. Burbot in the Coldwater Assessment Survey ranged in age from 4 to 26 and mean age was 12.0 years. Round Goby was the dominant prey item in Burbot diets.

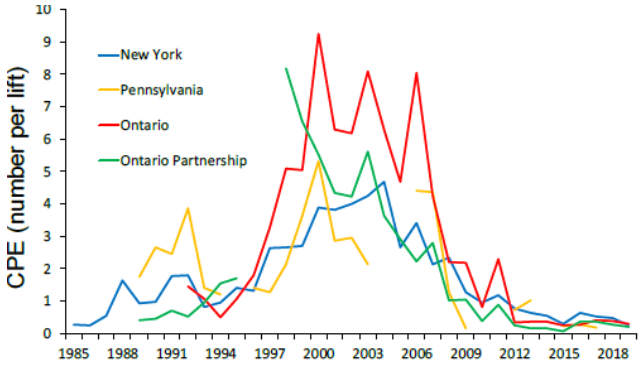



**Fig 3- Basinwide Burbot Abundance**

**Sea Lamprey**

The A1-A3 wounding rate on Lake Trout over 532 mm was 5.1 wounds per 100 fish in 2019. This was the lowest wounding rate since 2002 and near the target rate of 5.0 wounds per 100 fish. Wounding rates have been above target for 23 of the past 24 years. Large Lake Trout over 635 mm continue to be the preferred targets for Sea Lamprey in Lake Erie. The Index of Adult Sea Lamprey Abundance (1,587) represents a substantial decrease compared to recent estimates and was below the target population of 4,435 for the second consecutive year. Lampricide treatments were completed in four tributaries and comprehensive stream evaluations continued in 2019, including extensive detection surveys around the basin to inventory all sources contributing to the Lake Erie population.

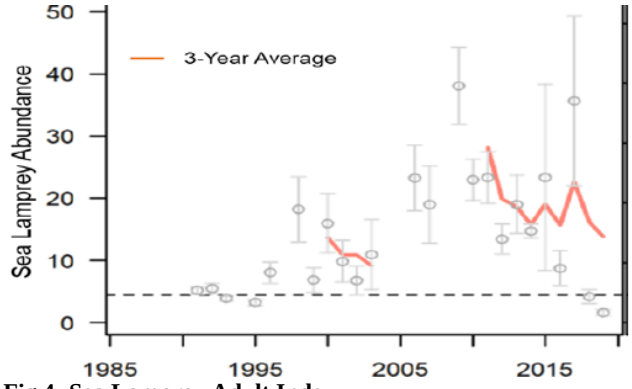



**Fig 4- Sea Lamprey Adult Index**

**Lake Erie Salmonid Stocking**

which was near the long-term average (1990-2018). Lake Trout stocking was above targets for the sixth time in the past seven years, and three different strains were stocked in 2019. By species, there were 268,660 yearling Lake Trout stocked in all three basins of Lake Erie, 132,496 Brown Trout stocked in Pennsylvania waters, and 1,861,694 Rainbow/Steelhead Trout stocked across all four US jurisdictional waters.

A total of 2,262,850 yearling salmonids were stocked in Lake Erie in 2019,, including rainbow/steelhead trout, Brown Trout and Lake Trout**.** Total 2019 salmonid stocking increased 1.2 % from 2018, and 1.5 % above the long-term average (1990-2018). All of the US fisheries resource agencies and a few non-governmental organizations (NGO's) in Pennsylvania currently stock rainbow/steelhead trout in the Lake Erie watershed. A total of 1,861,694 yearling *CWTG Report 2020* rainbow/steelhead trout were stocked in 2019, accounting for 82% of all salmonids stocked. This was essentially equal to the 2018 steelhead stocking numbers as well as the long-term (1990-2018) average of 1,854,343 yearling steelhead. About 58% of all steelhead stocking occurred in Pennsylvania waters, followed by 28% in Ohio waters, 11% in New York waters, and 3% in Michigan waters. No Rainbow Trout were stocked in Ontario waters in 2019.

The NYSDEC stocked 146,760 yearling steelhead in 2019, which was 42% below stocking target (255,000 yearlings) due to shortages at the Salmon River Hatchery. New York also stocked 66,000 domestic Rainbow Trout in 2019. Steelhead stocking increased 7% in Ohio and was 28% above a target objective of 400,000 yearling steelhead. Pennsylvania steelhead stocking increased 9% from 2018 and was 7% above a stocking objective of 1 million yearlings. Michigan steelhead stocking increased 4% from 2018 and was 7% above their stocking objective of 60,000 yearling steelhead. A full account of rainbow/steelhead trout stocked in Lake Erie by jurisdiction for 2019 can be found

under Charge 4 of this report, which also provides details about the locations and strains of steelhead/rainbow trout stocked across Lake Erie.

Brown Trout stocking in Lake Erie totaled 132,496 yearling and adults in 2019, all in Pennsylvania waters. This was a 34% increase from 2018 and 51% above the long-term (1990-2018) average annual stocking of 87,972 brown trout.

Between12 April and 15 May, about 22,000 adult Brown Trout were stocked by the PFBC to provide catchable trout for the opening of the 2019 Pennsylvania trout season. In a continued effort to provide a trophy Brown Trout program, Pennsylvania NGO hatcheries stocked about 53,000 yearling Brown Trout and the PFBC stocked about 47,000 yearling Brown Trout. These fish are in support of a put-grow-take Brown Trout program that was initiated in 2009. This program was implemented through the annual donation of 100,000 certified IPN-free eggs from the NYSDEC. The PFBC has now developed a captive brood egg source for this program to decrease the reliance on New York Brown Trout eggs. Brown Trout stocking levels for catchable trout are expected to continue at the current rates in Pennsylvania. The NGO hatcheries will no longer stock Brown Trout in support of the trophy Brown Trout program after 2019.

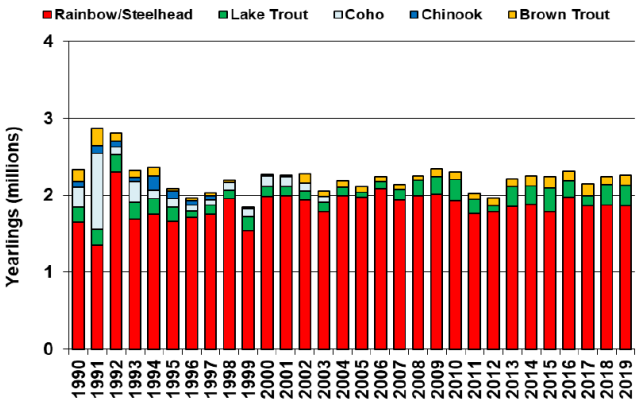



**Fig 5- Annual stocking of all Salmonids, by all agencies, 1990--2019**

## Steelhead Stocking

All Lake Erie jurisdictions stocked steelhead in 2019. Based on these efforts, a total of 1,795,694 yearling steelhead and 66,000 domestic strain Rainbow Trout were stocked in 2019, nearly equal to 2018 and the long-term (1990-2017) average. Nearly all (97%) of the steelhead stocked in Lake Erie originated from West Coast strains naturalized to the Great Lakes. Pennsylvania stocked a naturalized Lake Erie strain collected from Trout Run in Pennsylvania. New York stocked a Washington strain collected from Lake Ontario's Salmon River. Ohio stocked a combination of Manistee River strain (Lake Michigan), Ganaraska River strain (Lake Ontario) and Chambers Creek strain. Michigan stocked a Manistee River strain which is a naturalized strain from Lake Michigan. About 4% of the Rainbow Trout stocked in Lake Erie are a domestic strain stocked by the NYSDEC.

Fisheries agency stocking of spring yearlings took place between 22 February and 10 May, with smolts averaging about 183 mm in length (Table 4.3). MDNRF did an adipose (AD) fin clip on the steelhead they stocked in 2019. The is the first fin clip applied to steelhead since 2016. Table 4.4 provides a list of all fin clips on steelhead from 2000 – 2019

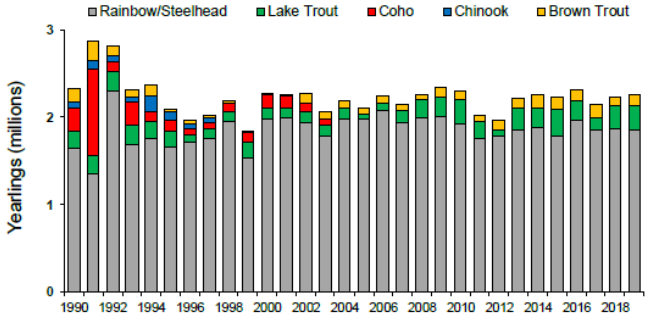



**Fig 6-Lake Erie Trout & Salmon Stocking 1990-2019**

**TABLE 1-(Continued) Summary of salmonid stockings in number of yearling equivalents, 1990-2019**

| Year | Jurisdiction | Lake Trout | Coho | Chinook | Brown Trout | Rainbow/Steelhead | Total |
|---|---|---|---|---|---|---|---|
| **2000** | ONT. | -- | -- | -- | -- | 10,787 | 10,787 |
| | NYS DEC | 92,200 | -- | -- | -- | 298,330 | 390,530 |
| | PFBC | 40,000 | 137,204 | -- | 17,163 | 1,237,870 | 1,432,237 |
| | ODNR | -- | -- | -- | -- | 375,022 | 375,022 |
| | MDNR | -- | -- | -- | -- | 60,000 | 60,000 |
| | **2000 Total** | **132,200** | **137,204** | **0** | **17,163** | **1,982,009** | **2,268,576** |
| **2001** | ONT. | -- | -- | -- | 100 | 40,860 | 40,960 |
| | NYS DEC | 80,000 | -- | -- | -- | 276,300 | 356,300 |
| | PFBC | 40,000 | 127,641 | -- | 17,000 | 1,185,239 | 1,369,880 |
| | ODNR | -- | -- | -- | -- | 424,530 | 424,530 |
| | MDNR | -- | -- | -- | -- | 67,789 | 67,789 |
| | **2001 Total** | **120,000** | **127,641** | **0** | **17,100** | **1,994,718** | **2,259,459** |
| **2002** | ONT. | -- | -- | -- | 4,000 | 66,275 | 70,275 |
| | NYS DEC | 80,000 | -- | -- | 72,300 | 257,200 | 409,500 |
| | PFBC | 40,000 | 100,289 | -- | 40,675 | 1,145,131 | 1,326,095 |
| | ODNR | -- | -- | -- | -- | 411,601 | 411,601 |
| | MDNR | -- | -- | -- | -- | 60,000 | 60,000 |
| | **2002 Total** | **120,000** | **100,289** | **0** | **116,975** | **1,940,207** | **2,277,471** |
| **2003** | ONT. | -- | -- | -- | 7,000 | 48,672 | 55,672 |
| | NYS DEC | 120,000 | -- | -- | 44,813 | 253,750 | 418,563 |
| | PFBC | -- | 69,912 | -- | 22,921 | 866,789 | 959,622 |
| | ODNR | -- | -- | -- | -- | 544,280 | 544,280 |
| | MDNR | -- | -- | -- | -- | 79,592 | 79,592 |
| | **2003 Total** | **120,000** | **69,912** | **0** | **74,734** | **1,793,083** | **2,057,729** |
| **2004** | ONT. | -- | -- | -- | -- | 34,600 | 34,600 |
| | NYS DEC | 111,600 | -- | -- | 36,000 | 257,400 | 405,000 |
| | PFBC | -- | -- | -- | 50,350 | 1,211,551 | 1,261,901 |
| | ODNR | -- | -- | -- | -- | 422,291 | 422,291 |
| | MDNR | -- | -- | -- | -- | 64,200 | 64,200 |
| | **2004 Total** | **111,600** | **0** | **0** | **86,350** | **1,990,042** | **2,187,992** |
| **2005** | ONT. | -- | -- | -- | -- | 55,000 | 55,000 |
| | NYS DEC | 62,545 | -- | | 37,440 | 275,000 | 374,985 |
| | PFBC | -- | -- | -- | 35,483 | 1,183,246 | 1,218,729 |
| | ODNR | -- | -- | -- | -- | 402,827 | 402,827 |
| | MDNR | -- | -- | -- | -- | 60,900 | 60,900 |
| | **2005 Total** | **62,545** | **0** | **0** | **72,923** | **1,976,973** | **2,112,441** |
| **2006** | ONT. | 88,000 | -- | -- | 175 | 44,350 | 132,525 |
| | NYS DEC | | -- | -- | 37,540 | 275,000 | 312,540 |
| | PFBC | -- | -- | -- | 35,170 | 1,205,203 | 1,240,373 |
| | ODNR | -- | -- | -- | -- | 491,943 | 491,943 |
| | MDNR | -- | -- | -- | -- | 66,514 | 66,514 |
| | **2006 Total** | **88,000** | **0** | **0** | **72,885** | **2,083,010** | **2,243,895** |
| **2007** | ONT. | -- | -- | -- | | 27,700 | 27,700 |
| | NYS DEC | 137,637 | -- | -- | 37,900 | 272,630 | 448,167 |
| | PFBC | -- | -- | -- | 27,715 | 1,122,996 | 1,150,711 |
| | ODNR | -- | -- | -- | -- | 453,413 | 453,413 |
| | MDNR | -- | -- | -- | -- | 60,500 | 60,500 |
| | **2007 Total** | **137,637** | **0** | **0** | **65,615** | **1,937,239** | **2,140,491** |
| **2008** | ONT. | 50,000 | -- | -- | -- | 36,500 | 86,500 |
| | NYS DEC | 152,751 | -- | -- | 36,000 | 269,800 | 458,551 |
| | PFBC | | -- | -- | 17,930 | 1,157,968 | 1,175,898 |
| | ODNR | | -- | -- | | 465,347 | 465,347 |
| | MDNR | | -- | -- | | 65,959 | 65,959 |
| | **2008 Total** | **202,751** | **0** | **0** | **53,930** | **1,995,574** | **2,252,255** |
| **2009** | ONT. | 50,000 | -- | -- | -- | 18,610 | 68,610 |
| | NYS DEC | 173,342 | -- | -- | 38,452 | 276,720 | 488,514 |
| | PFBC | 6,500 | -- | -- | 64,249 | 1,186,825 | 1,257,574 |
| | ODNR | -- | -- | -- | -- | 458,823 | 458,823 |
| | MDNR | -- | -- | -- | -- | 70,376 | 70,376 |
| | **2009 Total** | **229,842** | **0** | **0** | **102,701** | **2,011,354** | **2,343,897** |

**TABLE 1-(Continued) Summary of salmonid stockings in number of yearling equivalents, 1990-2019**

| Year | Jurisdiction | Lake Trout | Coho | Chinook | Brown Trout | Rainbow/Steelhead | Total |
|---|---|---|---|---|---|---|---|
| 2010 | ONT. | 126,864 | -- | -- | | 33,447 | 160,311 |
| | NYS DEC | 144,772 | -- | -- | 38,898 | 310,194 | 493,864 |
| | PFBC | 1,303 | -- | -- | 63,229 | 1,085,406 | 1,149,938 |
| | ODNR | -- | -- | -- | | 433,446 | 433,446 |
| | MDNR | -- | -- | -- | | 66,536 | 66,536 |
| | **2010 Total** | **272,939** | **0** | **0** | **102,127** | **1,929,029** | **2,304,095** |
| 2011 | ONT. | -- | -- | -- | -- | 36,730 | 36,730 |
| | NYS DEC | 184,259 | -- | -- | 38,363 | 305,780 | 528,401 |
| | PFBC | -- | -- | -- | 36,045 | 1,091,793 | 1,127,838 |
| | ODNR | -- | -- | -- | -- | 265,469 | 265,469 |
| | MDNR | -- | -- | -- | -- | 61,445 | 61,445 |
| | **2011 Total** | **184,259** | **0** | **0** | **74,408** | **1,761,217** | **2,019,883** |
| 2012 | ONT. | 55,330 | -- | -- | -- | 21,050 | 76,380 |
| | NYS DEC | -- | -- | -- | 35,460 | 260,000 | 295,460 |
| | PFBC | -- | -- | -- | 65,724 | 1,018,101 | 1,083,825 |
| | ODNR | 17,143 | -- | -- | -- | 425,188 | 442,331 |
| | MDNR | -- | -- | -- | -- | 64,500 | 64,500 |
| | **2012 Total** | **72,473** | **0** | **0** | **101,204** | **1,788,839** | **1,962,516** |
| 2013 | ONT. | 54,240 | -- | -- | -- | 2,000 | 56,240 |
| | NYS DEC | 41,200 | -- | -- | 32,630 | 260,000 | 333,830 |
| | PFBC | 82,400 | -- | -- | 71,486 | 1,072,410 | 1,226,296 |
| | ODNR | 82,200 | -- | -- | -- | 455,678 | 537,878 |
| | MDNR | -- | -- | -- | -- | 62,400 | 62,400 |
| | **2013 Total** | **260,040** | **0** | **0** | **104,116** | **1,852,488** | **2,216,644** |
| 2014 | ONT. | 55,632 | -- | -- | | 56,700 | 112,332 |
| | NYS DEC | 40,691 | -- | -- | 38,707 | 258,950 | 338,348 |
| | PFBC | 53,370 | -- | -- | 97,772 | 1,070,554 | 1,221,696 |
| | ODNR | 83,885 | -- | -- | | 428,610 | 512,495 |
| | MDNR | -- | -- | -- | | 67,800 | 67,800 |
| | **2014 Total** | **233,578** | **0** | **0** | **136,479** | **1,882,614** | **2,252,671** |
| 2015 | ONT. | 55,370 | -- | -- | -- | 70,250 | 125,620 |
| | NYS DEC | 81,867 | -- | -- | 37,840 | 153,923 | 273,630 |
| | PFBC | 82,149 | -- | -- | 103,173 | 1,079,019 | 1,264,341 |
| | ODNR | 85,433 | -- | -- | -- | 421,740 | 507,173 |
| | MDNR | -- | -- | -- | -- | 64,735 | 64,735 |
| | **2015 Total** | **304,819** | **0** | **0** | **141,013** | **1,789,667** | **2,235,499** |
| 2016 | ONT. | 60,005 | -- | -- | -- | 4,324 | 64,329 |
| | NYS DEC | 51,461 | -- | -- | 38,110 | 407,111 | 496,682 |
| | PFBC | 32,500 | -- | -- | 83,249 | 1,074,849 | 1,190,598 |
| | ODNR | 75,650 | -- | -- | -- | 416,593 | 492,243 |
| | MDNR | -- | -- | -- | -- | 66,000 | 66,000 |
| | **2016 Total** | **219,616** | **0** | **0** | **121,359** | **1,968,877** | **2,309,852** |
| 2017 | ONT. | 50,982 | -- | -- | -- | 59,750 | 110,732 |
| | NYS DEC | 76,456 | -- | -- | 36,480 | 267,166 | 380,102 |
| | PFBC | | -- | -- | 123,186 | 1,032,421 | 1,155,607 |
| | ODNR | | -- | -- | -- | 442,228 | 442,228 |
| | MDNR | | -- | -- | -- | 60,706 | 60,706 |
| | **2017 Total** | **127,438** | **0** | **0** | **159,666** | **1,862,271** | **2,149,375** |
| 2018 | ONT. | 55,940 | -- | -- | -- | 35,500 | 91,440 |
| | NYS DEC | 95,445 | -- | -- | -- | 311,843 | 407,288 |
| | PFBC | 39,660 | -- | -- | 98,966 | 979,851 | 1,118,477 |
| | ODNR | 79,230 | -- | -- | -- | 478,408 | 557,638 |
| | MDNR | | -- | -- | -- | 62,000 | 62,000 |
| | **2018 Total** | **270,275** | **0** | **0** | **98,966** | **1,867,602** | **2,236,843** |
| 2019 | ONT. | 53,285 | -- | -- | -- | -- | 53,285 |
| | NYS DEC | 95,672 | -- | -- | -- | 212,760 | 308,432 |
| | PFBC | 39,677 | -- | -- | 132,496 | 1,072,012 | 1,244,185 |
| | ODNR | 80,026 | -- | -- | -- | 512,548 | 592,574 |
| | MDNR | -- | -- | -- | -- | 64,374 | 64,374 |
| | **2019 Total** | **268,660** | **0** | **0** | **132,496** | **1,861,694** | **2,262,850** |

**TABLE 2-Estimated Steelhead harvest by open lake boat anglers in Lake Erie, 1999-2019**

| Year | Ohio | Pennsylvania | New York | Ontario | Michigan | Total |
|---|---|---|---|---|---|---|
| 1999 | 20,396 | 7,401 | 1,000 | 13,000 | 100 | 41,897 |
| 2000 | 33,524 | 11,011 | 1,000 | 28,200 | 100 | 73,835 |
| 2001 | 29,243 | 7,053 | 940 | 15,900 | 3 | 53,139 |
| 2002 | 41,357 | 5,229 | 1,600 | 75,000 | 70 | 123,256 |
| 2003 | 21,571 | 1,717 | 400 | N/A* | 15 | 23,703 |
| 2004 | 10,092 | 2,657 | 896 | 18,148 | 0 | 31,793 |
| 2005 | 10,364 | 2,183 | 594 | N/A* | 19 | 13,160 |
| 2006 | 5,343 | 2,044 | 354 | N/A* | 0 | 7,741 |
| 2007 | 19,216 | 4,936 | 1,465 | N/A* | 68 | 25,685 |
| 2008 | 3,656 | 1,089 | 647 | N/A* | 39 | 5,431 |
| 2009 | 7,662 | 857 | 96 | N/A* | 150 | 8,765 |
| 2010 | 3,911 | 5,155 | 109 | N/A* | 3 | 9,178 |
| 2011 | 2,996 | 1,389 | 92 | N/A* | 3 | 4,480 |
| 2012 | 6,865 | 2,917 | 374 | N/A* | 9 | 10,165 |
| 2013 | 3,337 | 1,375 | 482 | N/A* | 53 | 5,247 |
| 2014 | 3,516 | 2,552 | 419 | 4,165 | 0 | 10,652 |
| 2015 | 4,622 | 1,165 | 673 | N/A* | 0 | 6,460 |
| 2016 | 3,577 | 806 | 452 | N/A* | 0 | 4,835 |
| 2017 | 6,804 | 1,727 | 516 | N/A* | 0 | 9,047 |
| 2018 | 5,330 | 837 | 783 | N/A* | 0 | 6,950 |
| 2019 | 2,887 | 1,719 | 224 | N/A* | 59 | 4,889 |
| mean | 12,169 | 3,205 | 645 | 25,736 | 32 | 23,771 |

End ✧

# New York Lake Erie 2019 Annual Report (DEC)

The New York State Department of Environmental Conservation's Lake Erie Fisheries Research Unit (LEFRU) is responsible forresearch, assessment and fisheries management activities for one of New York's largest and most diverse freshwater fishery resources. Our annual monitoring programs are designed to improve our understanding of the Lake Erie fish community, guide fisheries management, and safeguard this valuable resource for current and future generations.

This document shares just a few of the highlights from the 2019 program year. Our complete annual report is available on DEC's website at **http://www.dec.ny.gov/outdoor/32286.html**.

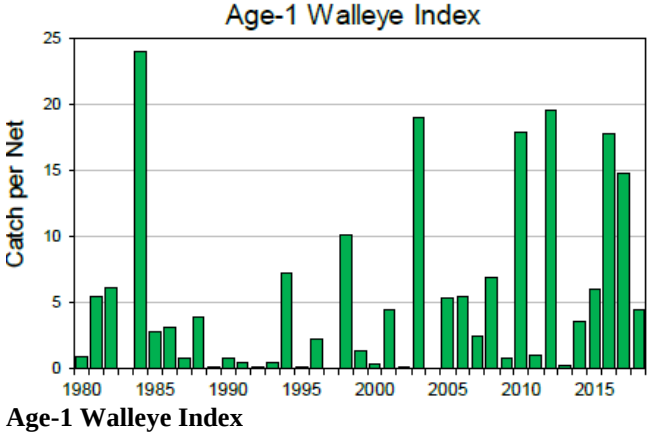
### Walleye

The relative walleye abundance index in 2019 was 20.8 fish per net, the 11th highest index in the 39-year survey (Figure D.2). Juvenile walleye are not typically caught at offshore sites so only nearshore sets are included in the walleye abundance index. Fourteen walleye age groups were represented in the

2019 sample (nearshore and offshore). Age-2 walleye dominated the catch (2017 year class; 39%) followed by age-3 fish (2016 year class; 33%).

Yearling walleye catch rates in 2019 ranked the 2018 year class as the 15th largest recorded at 4.5 age-1 walleye per net, falling within our established threshold for a "moderate" year class. Five of the six exceptional year classes observed during the 39-year survey have occurred in the last 17 years and are still represented in the current walleye population. Consecutive weak walleye year classes have not been observed since the early 1990's and only a single weak year class has been observed in the last 15 years. Four exceptional local walleye year classes (2010, 2012, 2016, 2017) have occurred since 2010. Exceptional local walleye recruitment, especially the 2016 and 2017 cohorts, coupled with strong western basin recruitment should contribute to excellent walleye fishing for several years.

Age-1 and age-2 walleye were 1.2 and 1.1 inches below the long-term average length, respectively, in 2019. Both the age-1 and age-2 length metrics rank near the lowest observed since the survey began. Evidence of reduced forage biomass coupled with increasing walleye abundance in recent years is likely influencing walleye growth even at early ages. A more thorough investigation of the impact of forage biomass and predator density on growth and condition may be warranted in the coming years if these trends continue.




**Age-1 Walleye Index**

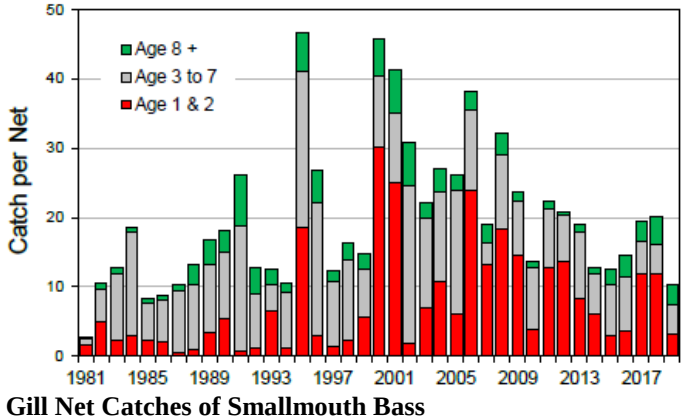
## Smallmouth Bass

The smallmouth bass gill net index of relative abundance has remained relatively stable for the last decade. However, smallmouth bass relative abundance in 2019 (10.3 fish per night) was approximately half of the time series average (19.7 fish per net) and the index has declined substantially since its peak in the early 2000's. Age-1 and Age-3 smallmouth bass dominated the 2019 nearshore sample (28% and 30% respectively), which included 15 age groups from age-0 to age-17. Offshore gill nets caught fewer sub-adult smallmouth bass and fewer smallmouth bass overall than companion nearshore gill nets, which is typical.

The relative abundance index for age-2 smallmouth bass ("recruitment index") in 2019 (0.4 fish per net) was well below the time series average of 4.3 fish per net. This deviates from the observation that mean summer water temperatures are positively related to bass year class strength. Water temperatures during the summer of 2017 were about 0.7°F above average but produced a poor year class.

Age-2 and age-3 smallmouth bass averaged 11.6 in and 14.5 in total length, respectively, well above the respective long-term averages of 10.9 and 12.9 inches and a time series high for age-3 bass. Beginning in the late 1990's, smallmouth bass showed significantly elevated growth rates that roughly correspond to the invasion of eastern Lake Erie by round goby. Increased bass growth following the invasion of round goby has persisted to the present day and has recently been more rigorously examined using this data series by Crane et al. (2016). They found that bass diet composition shifted from crayfish and a diversity of prey fish species to predominantly goby after the invasion. Increases in size at age and overall growth rate were attributed to a shift to goby as the major bass prey item. Presently, the observed mean length of Lake Erie smallmouth bass exceeds measures for New York's other fast-growing populations. Reasons for the continued increases in bass growth are not understood but may be related to declining bass abundance.

From 2007–2014 older smallmouth bass (Age-8+) were less abundant than they were in the early to mid-2000's, which was a source of concern for bass anglers. In response to these concerns we examined trends in bass survival to better understand the possible reasons for the reduction in older bass. Ages 3-10 were used to calculate annual survival estimates for each year class from 1978-2009 using catch curve analysis. Year classes that lived their entire life without goby, those that lived a portion of their life with goby, and those that lived their entire life with goby are separated in the figure to examine the potential role that goby introduction played in the observed changes in survival.

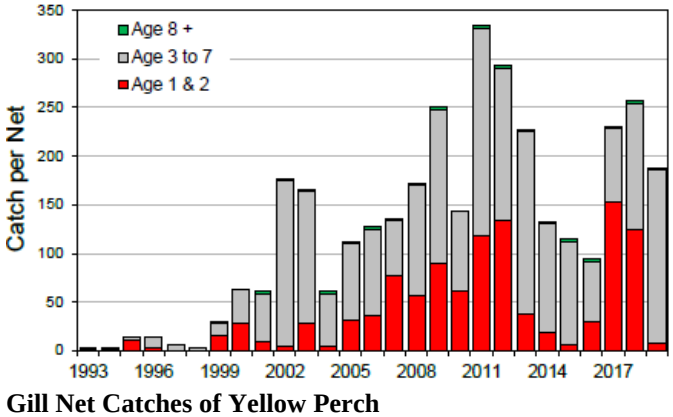



**Gill Net Catches of Smallmouth Bass**

## Yellow Perch

Yellow perch are not typically encountered in high densities in the shallower, nearshore (0 to 50 ft.) gill net locations. Therefore, the offshore gill net sets (50 to 100 ft.) are used to index yellow perch abundance. This deeper stratum has been sampled since the interagency index fishing protocol was implemented in New York, starting in 1993.

Yellow perch relative abundance was 187.9 fish per net in 2019, well above the time series average of 126.2, and the seventh highest index observed. Age-3 yellow perch (2016 year class) dominated the catch in 2019, accounting for 76% of the yellow perch captured. The age three index in 2019 was the highest in the time series. Yellow perch abundance has remained relatively high since a period of low abundance during the 1990's. Relatively consistent juvenile recruitment, coupled with a conservative harvest strategy by eastern basin management jurisdictions (YPTG 2019) seem to have fostered improved status of yellow perch in Lake Erie's eastern basin, the lake's least biologically productive zone. Yellow perch abundance declined from 2011– 2016, largely due to poor recruitment. This decrease did not initially influence yellow perch angler catch rates, which reached the highest observed level in 2014. However, angler catch rates declined substantially in 2015 and 2016 indicating that decreases in abundance began to influence fishery performance. From 2017–2019 relative abundance of yellow perch increased substantially largely due to the success of the 2015 and 2016 year classes.

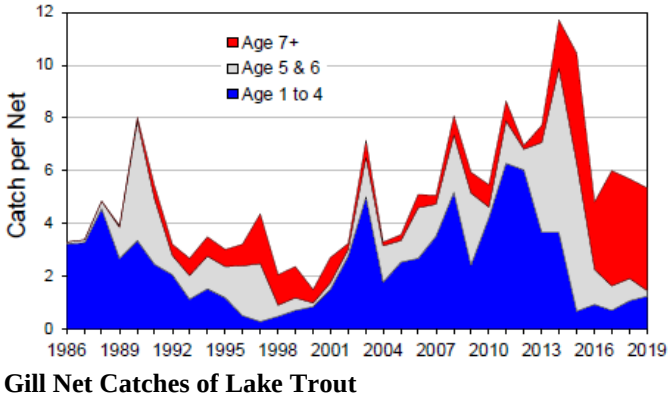



**Gill Net Catches of Yellow Perch**

## Lake Trout Restoration

Re-establishing a self-sustaining lake trout population in Lake Erie continues to be a major goal of Lake Erie's coldwater program. Lake trout have been stocked since 1978 and annual assessments monitor progress towards lake trout rehabilitation plan restoration objectives. The overall index of abundance of lake trout in the New York waters of Lake Erie has remained stable for the past four years but below the 8.0 fish/lift target. Adult lake trout (age 5+) abundance decreased slightly in 2019 but remains high relative to the entire time series; older fish (age 10+) are increasing in abundance and are currently at the highest levels observed. Natural reproduction has not yet been detected in Lake Erie. Significant stocking and sea lamprey control efforts must be continued to build and maintain the adult population necessary to foster natural reproduction. An acoustic telemetry study that began in 2016 is providing valuable information on movements and spawning locations used by stocked lake trout during the fall.

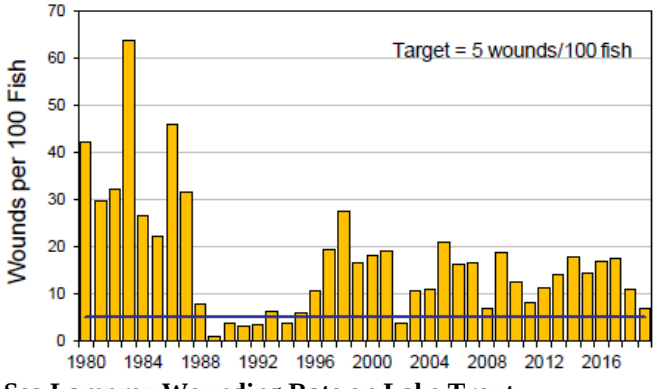
Four lake trout strains were collected among the 325 fish caught with hatchery-implanted CWT's or fin-clips. Lake Champlain, Finger Lakes, and Slate Island have been the most commonly stocked lake trout strains in Lake Erie over the past ten years. Lake Champlain and Finger Lakes strains were the most numerous strains caught in Lake Erie in 2019. Catches of the Klondike strain have declined to the point that they were scarcely detected in our most recent survey. Despite being stocked in the Ontario waters of Lake Erie since 2005, Slate Island strain fish are not commonly sampled in the New York assessment survey. The Finger Lakes strain remains the most common lake trout strain caught at older ages; all lake trout age-12-and-older were FL strain fish.




**Gill Net Catches of Lake Trout**

## Sea Lamprey

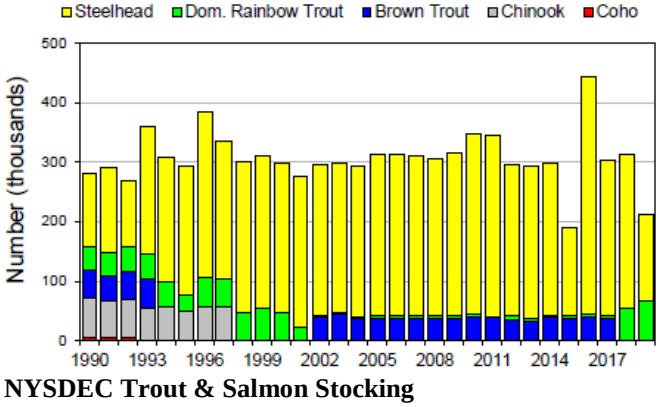
Sea lamprey invaded Lake Erie and the upper Great Lakes in the 1920s and have played an integral role in the demise of many native coldwater fish populations. Great Lakes Fishery Commission (GLFC) coordinated sea lamprey control in Lake Erie began in 1986 in support of lake trout rehabilitation efforts, and regular treatments are conducted to reduce sea lamprey populations. Annual monitoring undertaken by LEFRU includes observations of sea lamprey wounds on lake trout and other fish species. Wounding rates on lake trout have been relatively stable over the past 20 years but remain above targets. Inspections of sportfish also documented sea lamprey wounding on warmwater species like bass and walleye. GLFC surveys conducted in recent years indicate the largest source of Lake Erie's sea lamprey production may be the St. Clair River rather than traditionally monitored and treated eastern basin streams.




**Sea Lamprey Wounding Rate on Lake Trout**

## Salmonid Management

New York annually stocks approximately 255,000 steelhead and 50,000 domestic rainbow trout into Lake Erie and its tributaries to provide recreational angling opportunities. Wild reproduction of steelhead also occurs in some tributaries but remains a minor contributor to the fishery. Steelhead stocking was below target in 2019 due to shortages at the Salmon River Hatchery while domestic rainbow stocking was above target due to surplus fish. The final report on a study examining the impact on size at stocking and stocking location on adult returns was completed in 2019. The Upper Cattaraugus Fisheries Management Plan was also completed in 2019, providing guidance for fisheries management in the Upper Cattaraugus system following fish passage at the Springville Dam.

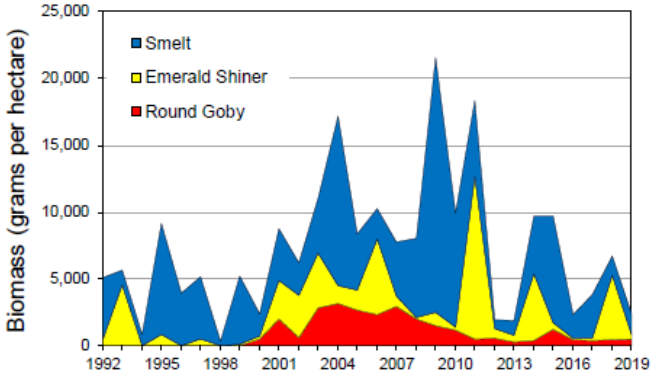



**NYSDEC Trout & Salmon Stocking**

## Forage Fish

The LEFRU conducts an annual trawl survey and predator diet studies to assess the status of forage fish populations. Since the onset of our trawl survey, rainbow smelt have been the dominant species in the open lake forage fish community. Following their introduction in the late 1990's, round goby abundance increased rapidly but has since stabilized at a lower level. In recent years overall forage fish biomass has been generally lower due to reductions in adult smelt abundance and variability in emerald shiner recruitment. Overall biomass of soft-rayed forage fishes decreased in 2019 and was well below average due to a decrease in emerald shiners and low abundance of adult smelt. Smelt were almost absent from walleye diets in 2019 but remained an important diet item for lake trout. Over the past three years we have observed a general shift in predator diets from a reliance on smelt to a more diverse diet that includes goby, yellow perch, and other fishes.

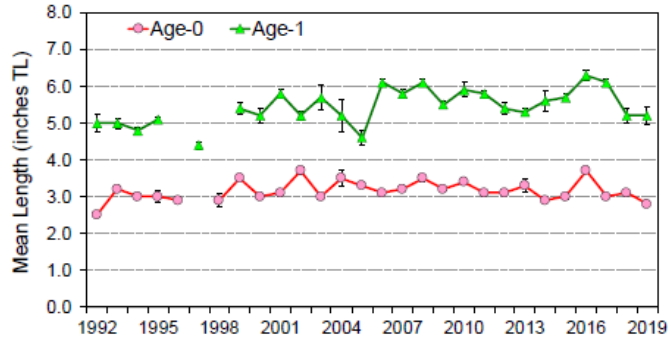
Much of the decrease compared to 2018 was due to declines in emerald shiners (soft-rayed) and YOY yellow perch (spiny-rayed). Clupeids (YOY gizzard shad, YOY alewife) remain a relatively minor contributor to this forage fish assessment. Rainbow smelt (all life stages) were the most abundant species by weight (42%) sampled in 2019. The majority of the rainbow smelt biomass was comprised of YOY fish (84%). Other species that made a significant biomass contribution in 2019 included YOY white perch (18%), YOY yellow perch (17%), round goby (all life stages; 13%), and emerald shiners (all life stages; 9%).




**Forage Fish Biomass Trends**

## Juvenile Yellow Perch Assessment

The 2019 mean density estimate for age-0 (YOY) yellow perch (169.1/ha) was well below average but ranked as average (11$^{th}$ ; 58$^{th}$ percentile) for the time series. Two of the highest YOY yellow perch abundance indices have occurred in the past four years with moderate levels of abundance in the other two years. The age-1 yellow perch (2018 year class) density estimate was 2.5/ha in 2019, ranking it as 5$^{th}$ (14$^{th}$ percentile) lowest in the time series and well below average. The low age-1 abundance of the 2018 year class was unexpected given the high abundance of these fish as YOY in 2018; high abundances of YOY yellow perch rarely translate into weak year classes measured at age-1.




## Juvenile Yellow Perch Growth

Adult (age 2+) yellow perch relative abundance decreased to 14.3/ha in 2019, ranking it as 21$^{st}$ (25$^{th}$ percentile) in the time series. This was also unexpected given the high abundance of adult yellow perch caught in the 2018 trawl survey and the the 2019 warmwater gill net survey (see Section D). The majority of the adult (age 2+) trawl catches in 2019 were comprised of the very strong age-3 (2016 year class) cohort. The dominance of the age-3 cohort was consistent across all surveys in 2019. Overall, this trawling program continues to indicate a period of sustained yellow perch recruitment success and overall elevated abundance since 2003. Average or better age-1 yellow perch indices have been recorded in nine of the last 16 years, including 2015, 2016, and 2017.

Trends in juvenile yellow perch length-at-age indicate relative stability for both age-0 and age-1 groups over the past decade. The average total length for age-0 yellow perch was 2.8 inches and age-1 yellow perch averaged 5.2 inches in 2019, which were both lower than the time series average (3.1 and 5.5 inches, respectively). Average lengths of age-1 yellow perch were similar to 2018 and the lowest measures since 2005; average lengths of age-0 yellow perch were the second lowest in the time series.
End ✧

## PFBC 2020 daily creel limits for Lake Erie Yellow Perch and Walleye

HARRISBURG, Pa – The Pennsylvania Fish and Boat Commission (PFBC) announced that the 2020 creel limit for Lake Erie yellow perch will remain at 30 per day and the creel limit for walleye will stay at six per day.

"The 2019 assessment showed that both yellow perch and walleye populations remain at maintenance levels," said Chuck Murray, the PFBC's Lake Erie biologist. "Based on this, the 2020 creel limits will remain the same as last year." The Lake Erie Committee allotted to Pennsylvania a yellow perch total allowable catch (TAC) of 530,000 lbs, an 8% decrease from 2019, but 5% above the long-term average of 551,314 lbs. The 2020 level includes a yellow perch TAC for Pennsylvania's commercial trap net fishery of 100,000 lbs.
Since 1996, the average harvest of yellow perch by Pennsylvania's combined recreational (122,000 lbs.) and commercial fisheries (17,000 lbs.) is 139,000 lbs.

Based on a 2020 abundance estimate exceeding 100 million walleyes age two or older, the walleye population has more than doubled from 2019, but will be comprised mostly (75%) of two-year-old fish. The large two-year-old cohort (2018 year class) will result in a significant portion of the walleyes being under 15″ or much of the 2020 season. "Based on large year classes in 2015, 2018 and 2019, walleye fishing on Lake Erie should remain very good for several years," added Murray.

The PFBC adopted a regulation in 2012 which established flexible creel limits for walleyes and yellow perch based on the annual quotas established by the Lake Erie Committee, which consists of fisheries managers from Pennsylvania; Ohio; New York; Michigan; and Ontario, Canada. Under the regulation, the PFBC sets daily creel limits for these species by April 15 each year.

Ohio gets 10.2 million lakewide TAC in 2020, an allocation of 5.2 million walleye. Ontario gets 4.4 million walleye, followed by Michigan's .59 million. The walleye TAC is a 20 % boost over last year's 8.5 million fish, which was a 20% increase from the 7.1 million walleye in 2018, and it's estimated today's population of walleye that are two years old, or older, is about 121 million.
End ✧

## Lake Erie Committee extends Walleye Management Plan (2015-2019)

The Lake Erie Committee is extending the Walleye Management Plan (WMP) an additional five (5) years. After a review of the available data and consultation with stakeholders in all of the Lake Erie jurisdictions, LEC determined that no change to the WMP is required. The current WMP is a five year plan with a commitment to evaluate the plans performance commencing at the end of the plan cycle in 2019. By extending the WMP, the plan performance evaluation would commence in 2024.

The LEC has decided to adjust the review period for the following reasons;
• The current WMP is working well with harvest policy adapting to annual fluctuations in Walleye abundance.
• Recruitment of strong year classes in 2014 and 2015 and moderate recruitment in 2017, minimize the risk to the Walleye fishery
• The Walleye sport and commercial fisheries are performing very well
• To allow LEC agencies to continue to shift effort towards completion of the development of a Yellow Perch Management Plan
• To allow for the completion of current research over the next 4 years that will contribute new information for incorporation into the next WMP including;
- The extent of the east basin stock contribution
- Migration rates from west to east basin
- Composition of mixed stock fisheries
- Refinement of estimates of natural mortality (M)

End ✧

# Lake Erie Grass Carp Adaptive Response Strategy 2019-2023

Fisheries management within the Lake Erie basin is coordinated under the auspices of the Great Lakes Fishery Commission's (GLFC) Lake Erie Committee (LEC). The LEC is comprised of senior fisheries managers from Michigan, New York, Ohio, the Province of Ontario, and Pennsylvania. This document offers strategic guidance to coordinate inter-jurisdictional fisheries management and research for reducing the likelihood that an established Grass Carp (*Ctenopharyngodon idella*) population will expand and threaten vegetated habitats, associated fish communities, and fisheries of Lake Erie.

As selective herbivores, Grass Carp in sufficient densities could reduce the biomass and diversity of vegetation in wetlands, bays, and other nearshore areas to levels that affect ecosystem functions such as nutrient cycling, turbidity control, and habitats for aquatic organisms, including many fish species of Lake Erie. Only 10% of Lake Erie's original coastal marshes remain today, increasing their ecological importance and need for protection against further threats. Although Grass Carp have already invaded Lake Erie and reproduction has been documented, key biologists do not consider the population to be established.

**Our intent is to prevent Grass Carp from attaining densities that cause adverse impacts, by using a science-based, adaptive management approach to guide effective decision-making by fisheries management agencies.**

### Current status of Grass Carp in Lake Erie:

- Individual fish have been captured since the 1980s but are becoming more apparent in fishery catches and agency assessments since 2015.
- Most (85%) fish from recent collections are diploid (fertile), which are illegal to possess in all jurisdictions of the Lake Erie basin.
- Three states (Ohio, Pennsylvania, New York) permit regulated possession of triploid (sterile) Grass Carp for vegetation control in their lakes and ponds, excluding Lake Erie.
- Reproduction is occurring in the Lake Erie basin, particularly in the Sandusky River (Ohio).
- Abundance remains below a threshold of causing detectable levels of adverse impacts.

### Key management considerations:

- Likely sources of natural reproduction and pathways of additional introductions of Grass Carp
- Accuracy of Grass Carp abundance estimates in Lake Erie
- Efficiency and effectiveness of agency Grass Carp removal efforts

### Objectives:

- Improve the collective understanding of Grass Carp population dynamics, behavior, and impacts in Lake Erie to inform effective management actions.
- Implement controls to minimize population expansion, by removing fish and/or blocking access to preferred habitats
- Minimize the likelihood of introduction and establishment of new breeding populations of Grass Carp in the tributaries and nearshore areas of Lake Erie and Lake St. Clair.

### Implementation:

- This strategy will be implemented during 2019-2023 by federal and state agencies, working in partnership via the Great Lakes Fishery Commission's Lake Erie Committee.
- Future revisions to the strategy will be informed by changes in Grass Carp population status in the Lake Erie basin, in the sources and pathways for new introductions, and in the availability of new science, tools, and resources for detection, monitoring, and control.

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