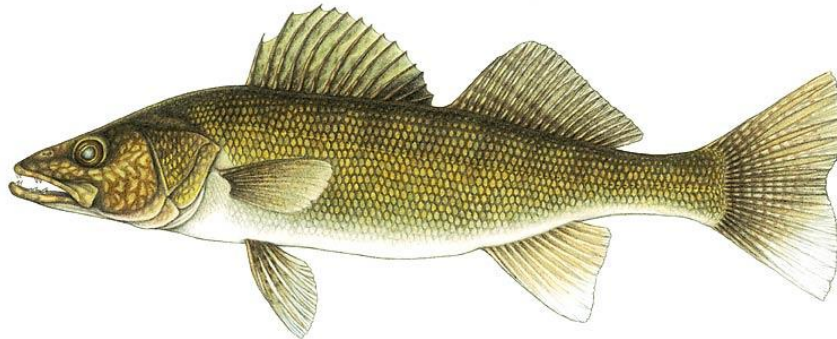Report for 2023 by the

LAKE ERIE WALLEYE TASK GROUP

March 2024

Prepared:

Todd Wills[1], Pascal Wilkins[2], Matt Faust[3] (co-chair), Ann Marie Gorman[3], Mike Thorn[4] (co-chair), Megan Belore[4], Tom MacDougall[4], Andy Cook[4], Stephen Marklevitz[4], Yingming Zhao[4], and Mike Hosack[5]

[1]Michigan Department of Natural Resources
[2]New York Department of Environmental Conservation
[3]Ohio Department of Natural Resources
[4]Ontario Ministry of Natural Resources and Forestry
[5]Pennsylvania Fish and Boat Commission

Submitted to:
Standing Technical Committee
Lake Erie Committee
Great Lakes Fishery Commission
March 21st, 2024

Note: Data and management summaries contained in this report are provisional. Every effort has been made to ensure their correctness. Contact individual agencies for complete state and provincial data.

Citation:

Walleye Task Group. 2024. 2023 Report by the Lake Erie Walleye Task Group, March 2024. Presented to the Standing Technical Committee, Lake Erie Committee of the Great Lakes Fishery Commission. Ann Arbor, Michigan, USA.

Charges to the Walleye Task Group, 2023-2024

The charges from the Lake Erie Committee's (LEC) Standing Technical Committee (STC) to the Walleye Task Group (WTG) for the period of April 2023 to March 2024 were to:

1. Maintain and update the centralized time series of datasets:
   a. Required for bi-national population models and assessment and
   b. Produce the annual Recommended Allowable Harvest (RAH)

2. Supply needed technical support throughout the upcoming Walleye Management Plan review process.

3. Support LEC Walleye management efforts by:

   a. Maintain working knowledge of the most current academic and agency research related to Lake Erie Walleye population assessment and modeling including estimating and forecasting:
      - Abundance
      - Age/size/spatial stock structure (migration rates)
      - Recruitment and mortality (M)
   b. Provide critical evaluation and guidance for incorporating new research into Lake Erie Walleye management to produce the most scientifically sound and reliable population models.

Review of Walleye Fisheries in 2023

2023 fishery performance and characteristics

Fishery effort and Walleye harvest data were combined for all fisheries, jurisdictions, and Management Units (MUs) to produce lake-wide summaries (Figure 1). The 2023 total estimated lake-wide harvest was 8.541 million Walleye, of which 7.913 million were harvested in the total allowable catch (TAC) area (Table 1). This TAC-area harvest represents 59% of the 2023 TAC (13.526 million Walleye) and includes Walleye harvested in commercial and sport fisheries in MUs 1-3. An additional 0.628 million Walleye (7% of the lake-wide total) were harvested outside of the TAC area in MUs 4&5 (Table 1). The estimated sport Walleye harvest was 2.636 million fish in 2023; harvest in 2023 was above the long-term mean (1975-2022 = 2.327 million Walleye; Table 2).

The 2023 Ontario commercial harvest was 5.905 million Walleye lake-wide, with 5.610 million caught in the TAC area (Table 2). The 2023 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 72,000 Walleye were harvested in Ontario within the TAC area during 2023, which is included in total Walleye harvest, but not used in catch-at-age analysis. In 2023, the lake-wide Ontario commercial harvest was above the long-term average (1975-2022 = 2.288 million Walleye; Table 2, Figure 2). Similarly, the TAC area harvest was well above the current Walleye Management Plan's performance metric of at least 4.0 million pounds of commercial yield (2023 TAC area commercial harvest = 12.1 million pounds).

Lake-wide sport fishing effort decreased slightly in 2023 to 3.998 million angler hours, which is a pattern present in all MUs (Table 3, Figure 3). The 2023 lake-wide average sport harvest per unit effort (HUE) also decreased slightly to 0.64 Walleye/angler hour but is well above the long-term (1975-2022) average of 0.46 Walleye/angler hour. The TAC area sport harvest per angler hour of 0.7 Walleye/angler

hour is also well above the current Walleye Management Plan's performance metric of 0.40 Walleye/angler hour (Table 4, Figure 4). In 2023, the sport HUE remained above long-term averages in all MUs (Table 4).

Lake-wide commercial fishing effort decreased in 2023 (16,619 km) relative to 2022 (17,596 km) and was below the long-term average (1975-2022 = 18,556 km; Table 3, Figure 5). Commercial effort increased in MU3 and MU 4&5 and decreased in MU1 and MU2. The total commercial gill net HUE increased in 2023 (355 Walleye/kilometer of gill net) and remained above the long-term (1975-2022) lake-wide average (136 Walleye/kilometer of gill net; Table 4, Figure 4). Commercial gill net harvest rates increased in MUs 3 and 4, and decreased in MUs 1 and 2, with all MUs' HUE well above the long-term averages (Table 4).

Lake-wide harvest in the commercial fishery was mostly composed of age 4 Walleye (43%) from the 2019 year class, along with a large contribution from age 2 Walleye from the 2021 (20%) year class (Table 5; Table 6). The mean age of fish caught in the commercial fishery has remained stable since 2019 and in 2023 (3.98) was near the long-term average (1975-2022 = 3.84; Table 7, Figure 6). Age composition of the lake-wide sport harvest was more varied, with age 4 Walleye (41%; 2019 year class) and age 7+ Walleye (26%; 2016 year class and older) making the largest contributions (Table 6). The mean age of Walleye captured in the sport fishery increased slightly (5.20) and was above the long-term average (1975-2022 = 4.45; Table 7, Figure 6).

Statistical Catch-at-Age Analysis (SCAA): Abundance

The WTG uses a SCAA model to estimate the abundance of Walleye in Lake Erie from 1978 to 2023. This model estimates population abundance of age 2 and older Walleye using fishery-dependent and fishery-independent data sources, which includes fishery-dependent data from the Ontario commercial fishery (MUs 1-3) and sport fisheries in Ohio (MUs 1-3) and Michigan (MU 1), along with data collected from three fishery-independent gill net surveys (i.e., Ontario Partnership, Michigan, and Ohio).

Summary of 2024 SCAA model results

Based on the 2024 SCAA model, the 2023 west-central population (MUs 1-3) was estimated at 88.5 million age 2 and older Walleye (Table 8, Figure 7). An estimated 37.5 million age 2 (2021 year class) fish comprised 42% of the age 2 and older Walleye population. Fish from the 2019 (age 4), 2016 and older (age 7+), and 2020 (age 3) year classes represented the next most abundant ages. The number of age 2 recruits entering the population in 2024 (2022 year class) and 2025 (2023 year class) are projected to be 13.8 and 20.1 million Walleye, respectively (Table 9). Age 2 recruitment forecasts were based on August west basin age 0 interagency trawl indices; this survey is integrated within the SCAA model (Table 10). The 2024 abundance of age 2 and older Walleye in the west-central population is projected to be 72.1 million fish, with 58.3 million fish age 3 and older (Table 8; Figure 7).

Harvest Policy and Recommended Allowable Harvest (RAH) for 2024

In March 2024, the WTG applied the following Harvest Control Rule as identified in the Walleye Management Plan (WMP; 2015-2024):

- *Target Fishing Mortality* of **60%** of the fishing mortality Maximum Sustainable Yield (60%F_{MSY});
- Threshold *Limit Reference Point* of **20%** of the Unfished Spawning Stock Biomass (20%SSB_0);
- Probabilistic Control Rule, P-star, P*= **0.05**;
- A limitation on the annual change in TAC of ± **20%**.

Using results from the 2024 SCAA model, the projected abundance of 72.1 million age-2 and older Walleye in 2024, and the harvest policy described above, the calculated mean RAH for 2024 was 12.858 million Walleye, with a range from 10.453 (minimum) to 15.264 (maximum) million Walleye (Table 9). The WTG RAH range estimate is an AD Model Builder (ADMB, Fournier et al. 2012) 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 ($60\%F_{MSY} = 0.291$) in the harvest policy was applied because the probability of the projected spawner biomass in 2025 (59.090 million kg; Figure 8) falling below the limit reference point ($20\%\ SSB_0 = 13.614$ million kg) after fishing at 60% of F_{MSY} in 2024 was less than 5% ($p < 0.001$). Thus, the probabilistic control rule (P*) to reduce the target fishing rate and conserve spawner biomass was not invoked during the 2024 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 would be + or - 20% of the 2023 TAC (13.526 million fish) with a range from 10.821 to 16.231 million Walleye. Because P* was not invoked, the 20% TAC constraints along with the RAH min/max produce a range in 2023 TAC for LEC consideration from 10.821 to 15.264 million Walleye.

Other Walleye Task Group Activities

The following represents WTG progress and developments on Charge 3a and 3b. During 2023–2024, this work focused on *(1) Unaccounted/missing harvest*.

Unaccounted/missing harvest reporting

Within each jurisdiction and management unit, Walleye harvest occurs that is presently unaccounted for in the current SCAA model and not incorporated into the lake-wide harvest summary. The reason for this information being excluded from the current SCAA model is multifaceted. In the TAC area, several angler creel surveys are historically sporadic while other creel surveys lack the age structure data needed for use by the current model. East basin creel and commercial harvest data is excluded from the SCAA model because it is collected outside of the TAC area and there is uncertainty regarding the proportion of west/central migrants in the east basin harvest. To examine the issue of unaccounted harvest, the WTG has begun compiling current and historical Walleye harvest data from previously overlooked sources and leveraging new research to estimate harvests from mixed stock fisheries, such as those in the east basin.

In MU1, spring tributary fisheries for Walleye are an additional source of Walleye harvest that is not reported. In Ohio, the Maumee and Sandusky rivers have been assessed annually since 2001 and periodically back to 1975. In 2023, a total of 64,384 and 7,665 Walleye were harvested in the Maumee and Sandusky Rivers, respectively. In Michigan, the Detroit River is monitored periodically using an angler creel survey with the most recent survey estimating that 298,294 Walleye were harvested from U.S. waters in 2022. Additionally, Michigan requires charter fishers to report harvest in Michigan waters of both Lake Erie and the Detroit River, which accounted for an additional 50,937 Walleye in 2022. In Ontario, the Detroit River is also monitored periodically using an angler creel survey and a 2023 survey found that 124,225 Walleye were harvested by boat and shore anglers in Ontario waters. The Detroit River serves as a spawning location for Walleye and as a corridor for seasonal Walleye migrations to and from Lake Erie. Overall, riverine Walleye fisheries account for several hundred thousand additional Walleye harvests each year.

In MU4 and MU5, Pennsylvania, New York, and Ontario Walleye harvest includes a combination of east basin Walleye stock (originating in the Non-TAC area) and fish migrating from the west/central

basin Walleye stock (originating in the TAC area). A recent Walleye genetics study by Euclide et al. (2021) in the east basin showed that there were spatial (west/central basin contribution declined in easterly grids) and temporal (west/central contribution increased during summer and fall) differences in stock contribution, with a basin-wide average contribution of 51% and 49% west/central basin Walleye stocks to the eastern basin recreational (NY) and commercial fisheries (ON), respectively. Using this contribution percentage applied to 2023 east basin harvest information, west/central basin Walleye stocks accounted for 122,070 Walleye in Pennsylvania's recreational fishery, 41,097 Walleye in New York's recreational fishery, 144,760 Walleye Ontario's MU4 and MU5 commercial fishery, and 6,558 Walleye in Ontario's MU4 and MU5 recreational fishery. Using the MU4 and MU5 harvest estimates in Table 2 for 2023, the total estimated harvest of Walleye originating from the TAC area but not accounted for in the SCAA model is approximately 314,485 fish. The reverse occurrence, harvest of walleye in the TAC area originating from MU4 and 5, has not been fully quantified. Acoustic telemetry studies may provide some insight in the future.

Another source uncertainty in Walleye harvest is Ontario's Lake Erie recreational fishery, which is periodically assessed and was last done in 2014. Since 2014, recreational fisheries in other jurisdictions of MU1 have seen a combined 31% increase in Walleye harvest. Ohio's recreational Walleye harvest has increased 284% in MU2 and 44% in MU3, and MU4 and MU5 jurisdictions have seen an increase of 118% since 2014. In 2023, harvest by Ohio anglers in Ontario waters was the highest since 1990, totaling 118,064 Walleye. Thus, it is likely that Ontario's recreational Walleye harvest has increased since 2014. Ontario's recreational fishery TAC allocation will be updated following a lake-wide angler creel in 2024.

Additional sources of unaccounted harvest exist lake-wide due to changes in angling patterns relative to creel surveys. Current creel surveys are designed to estimate main-lake harvest and effort during April-October, but increasingly mild winters, highly mobile and well informed anglers, and popular angling tournaments during autumn months all likely have increased Walleye harvest outside the traditional survey period. Spring harvest outside of the surveyed western basin has also likely increased due to anecdotal reports from anglers fishing nearshore areas of the central basin in Ohio waters of Lake Erie.

In contrast to long term underestimates of harvested walleye originating from the TAC area and its' tributaries, there also exists unquantified harvest of walleye in the TAC area comprised of walleye that immigrate to the TAC area from outside of Lake Erie. One example is the Thames River walleye stock which is known to disperse through Lake St Clair north into Lake Huron and south into Lake Erie. Acoustic telemetry may describe the rate of seasonal immigration to further inform assessment and management of walleye.

These sources of uncertainty offer challenges to Lake Erie walleye assessment and management. Data limitations, knowledge gaps, and addressing complexities of multiple stocks using an aggregate stock SCAA model are not easily resolved. Many of these elements have persisted over the long-term requiring more research and broad consultation through LEPMAG to improve Lake Erie walleye assessment and management.

WTG Centralized Datasets

WTG members currently manage several databases that consist of fishery-dependent and fishery-independent surveys conducted by the respective agencies. Annually, data are compiled by WTG members to form spatially-explicit versions of agency-specific harvest data (e.g., harvest-at-age and fishery effort by management unit) and population assessment (e.g., the interagency trawl program and gill net surveys) databases. These databases are used for trends and status evaluations, estimating population abundance, and to inform the decision-making process regarding RAH. Ultimately, annual

population abundance estimates are used to assist LEC members with setting TACs for the upcoming year and evaluate past harvest policy decisions. Use of WTG databases by non-members is only permitted following a specific protocol established in 1994, described in the 1994 WTG Report and reprinted in the 2003 WTG Report (WTG 2003).

Literature Cited

Euclide, P.T., T. MacDougall, J.M. Robinson, M.D. Faust, C.C. Wilson, K.-Y. Chen, E.A. Marschall, W. Larson, S. Ludsin. 2021. Mixed-stock analysis using Rapture genotyping to evaluate stock-specific exploitation of a walleye population despite weak genetic structure. Evol. Appl. 14(5): 1403-1420.

Fournier, D.A., H.J. Skaug, J. Ancheta, J. Ianelli, A. Magnusson, M.N. Maunder, A. Nielsen, and J. Sibert. 2012. AD Model Builder: using automatic differentiation for statistical inference of highly parameterized complex nonlinear models. Optim. Methods Softw. 27:233-249.

Kayle, K., Oldenburg, K., Murray, C., Francis, J., & Markham, J. 2015. Lake Erie Walleye Management Plan 2015-2019. Lake Erie Committee, Great Lakes Fishery Commission. 42 pp.

Standing Technical Committee. 2007. Quota Allocation Strategies: Report of the Standing Technical Committee to the Lake Erie Committee. Great Lakes Fishery Commission. 8pp.

Stepien, C.A., M.R. Snyder, and C.T. Knight. 2018. Genetic divergence of nearby Walleye spawning groups in central Lake Erie: implications for management. North American Journal of Fisheries Management 38: 783-793.

Walleye Task Group (WTG). 2003. Report of the Lake Erie Walleye Task Group to the Standing Technical Committee, Lake Erie Committee of the Great Lakes Fishery Commission. 26 pp.

Walleye Task Group (WTG). 2012. Report of the Lake Erie Walleye Task Group to the Standing Technical Committee, Lake Erie Committee of the Great Lakes Fishery Commission. 28 pp.

Table 1. Annual Lake Erie walleye total allowable catch (TAC, top) and measured harvest (Har; bottom, bold), in numbers of fish from 2013 to 2023. TAC allocations are based on water area: Ohio, 51.11%; Ontario, 43.06%; and Michigan, 5.83% (Standing Technical Committee 2007). New York and Pennsylvania do not have assigned quotas, but are included in annual total harvest.

| Year | | TAC Area (MU-1, MU-2, MU-3) | | | | Non-TAC Area (MUs 4&5) | | | | All Areas |
		Michigan	Ohio	Ontario [a]	Total	NY	Penn.	Ontario	Total	Total
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**	**32,591**	**127,476**	**2,539,983**
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**
2020	TAC	596,817	5,232,131	4,408,052	10,237,000				0	10,237,000
	Har	**191,490**	**1,973,038**	**3,680,335**	**5,844,863**	**84,615**	**208,760**	**243,175**	**536,550**	**6,381,413**
2021	TAC	716,000	6,278,352	5,289,490	12,284,000				0	12,284,000
	Har	**177,948**	**2,492,386**	**4,940,829**	**7,611,163**	**43,772**	**145,261**	**186,192**	**375,225**	**7,986,388**
2022	TAC	847,274	7,427,816	6,257,910	14,533,000				0	14,533,000
	Har	**114,465**	**2,581,307**	**6,047,336**	**8,743,108**	**75,774**	**232,780**	**217,116**	**525,670**	**9,268,777**
2023	TAC	788,566	6,913,139	5,824,296	13,526,000				0	13,526,000
	Har	**142,619**	**2,089,520**	**5,680,932**	**7,913,071**	**80,582**	**239,353**	**308,428**	**628,363**	**8,541,434**

[a] Ontario sport harvest values were estimated from the 2014 lakewide aerial creel survey

These values are included in Ontario's total walleye harvest, but are not used in catch-at-age analysis.

Table 2. Annual harvest (thousands of fish) of Lake Erie walleye by gear, management unit, and agency from 2013 to 2023. Means contain data from 1975 to 2022.

| | 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
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	328	13	420	174	607	3,391	1,666	1,237	387	217	3,507	6,897
2020	537	191	45	774	908	13	921	528	13	541	13	209	85	306	2,543	1,938	1,185	486	230	3,839	6,381
2021	1,318	178	45	1,541	810	13	824	364	13	377	13	145	44	202	2,944	2,750	1,375	745	173	5,042	7,986
2022	1,298	114	45	1,458	771	13	784	513	13	526	13	233	76	321	3,089	3,222	1,976	778	204	6,180	9,269
2023	1,099	143	45	1,287	677	13	690	313	13	326	13	239	81	333	2,636	2,981	1,556	1,073	295	5,905	8,541
Mean	1,428	240	41	1,710	325	11	333	199	12	208	9	104	48	98	2,327	1,454	551	325	76	2,288	4,616

Table 3. Annual fishing effort for Lake Erie walleye by gear, management unit, and agency from 2013 to 2023. Means contain data from 1975 to 2022.

| | 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,d]	Total	OH	ON [c,d]	Total	OH	ON [c,d]	Total	ON [c,d]	PA	NY	Total	Total	ON	ON	ON	ON	Total
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	1,036	--	1,036	307	--	307	--	439	297	736	4,083	4,165	6,365	2,402	1,353	14,285
2020	1,111	301	--	1,413	1,511	--	1,511	659	--	659	--	395	279	674	4,257	5,759	6,576	3,049	1,738	17,122
2021	2,148	325	--	2,473	1,430	--	1,430	584	--	584	--	258	183	441	4,928	7,279	6,528	3,168	1,236	18,212
2022	1,891	275	--	2,166	1,219	--	1,219	498	--	498	--	306	224	530	4,412	7,017	7,013	2,642	924	17,596
2023	1,855	266	--	2,121	1,018	--	1,018	376	--	376	--	285	198	483	3,998	6,691	6,000	2,965	963	16,619
Mean	2,773	625	102.4	3,453	795	61.92	808	424	110.6	452	105.6	231	232	300	4,965	8,540	5,740	4,290	826	18,556

[a] Ohio, Michigan, Pennsylvania and New York sport units of effort are thousands of angler hours.

[b] Estimated Standard (Total) Effort in kilometers of gill net = (walleye targeted effort x walleye total harvest) / walleye targeted harvest.

[c] Ontario sport fishing effort was estimated from 2014 lakewide aerial creel survey, values are in rod hours

[d] Ontario sport fishing effort is not included in area and lakewide totals due to effort reporting in rod hours

Table 4. Annual catch per unit effort for Lake Erie walleye by gear, management unit, and agency. Means contain data from 1975 to 2022.

| | Sport Fishery [a] | | | | | | | | | | | | | | | | Commercial Fishery [b] | | | | |
| | Unit 1 | | | | Unit 2 | | | Unit 3 | | | Units 4 & 5 | | | | | | Unit 1 | Unit 2 | Unit 3 | Unit 4 | |
Year	OH	MI	ON [c,d]	Total	OH	ON [c,d]	Total	OH	ON [c,d]	Total	ON [c,d]	PA	NY	Total	Total		ON	ON	ON	ON	Total
2013	0.53	0.30	--	0.51	0.38	--	0.38	0.58	--	0.58	--	0.39	0.24	0.32	0.47		194.0	107.0	74.2	100.7	132.5
2014	0.59	0.32	0.45	0.56	0.39	0.16	0.39	0.49	0.19	0.49	0.18	0.50	0.33	0.41	0.51		102.8	58.4	81.8	156.8	86.5
2015	0.52	0.40	--	0.51	0.33	--	0.33	0.41	--	0.41	--	0.29	0.26	0.27	0.43		90.6	54.5	60.3	97.3	70.7
2016	0.38	0.28	--	0.37	0.32	--	0.32	0.35	--	0.35	--	0.23	0.23	0.23	0.34		135.5	74.6	77.0	69.0	95.0
2017	0.44	0.30	--	0.42	0.44	--	0.44	0.70	--	0.70	--	0.71	0.33	0.53	0.48		215.3	126.9	139.6	76.2	160.2
2018	0.77	0.67	--	0.75	0.82	--	0.82	0.99	--	0.99	--	1.09	0.54	0.83	0.81		292.0	193.1	171.0	132.0	213.0
2019	0.75	0.58	--	0.72	0.91	--	0.91	1.02	--	1.02	--	0.96	0.59	0.81	0.81		399.9	194.4	161.3	160.1	245.5
2020	0.48	0.64	--	0.52	0.60	--	0.60	0.80	--	0.80	--	0.53	0.30	0.44	0.58		336.5	180.2	159.3	132.5	224.2
2021	0.61	0.55	--	0.60	0.57	--	0.57	0.62	--	0.62	--	0.56	0.24	0.43	0.58		377.7	210.6	235.0	140.1	276.9
2022	0.69	0.42	--	0.65	0.63	--	0.63	1.03	--	1.03	--	0.76	0.34	0.58	0.68		459.1	281.8	294.3	221.0	351.2
2023	0.59	0.54	--	0.59	0.67	--	0.67	0.83	--	0.83	--	0.84	0.41	0.66	0.64		445.5	259.3	361.9	306.3	355.3
Mean	0.50	0.38	0.40	0.48	0.37	0.26	0.37	0.45	0.19	0.44	0.11	0.41	0.21	0.29	0.46		192.6	100.4	88.1	86.7	136.0

[a] Ohio, Michigan, Pennsylvania and New York sport CPE = Number/angler hour

[b] Commercial CPE = Number/kilometer of gill net

[c] Ontario sport fishing CPE was estimated from the 2014 lakewide aerial creel survey values are in number/rod hour

[d] Ontario sport fishing CPE is not included in area and lakewide totals due to effort reporting in rod hours

Table 5. Catch at age of walleye harvest by management unit, gear, and agency in Lake Erie during 2023. Units 4 and 5 are combined in Unit 4.

Unit	Age	Commercial Ontario	Sport Ohio	Sport Michigan	Sport New York	Sport Pennsylvania	Sport Total	All Gear Total
1	1	33,080	0	0			0	33,080
	2	468,999	29,453	0			29,453	498,452
	3	290,623	111,930	17,095			129,025	419,648
	4	1,351,845	473,493	62,203			535,696	1,887,541
	5	425,029	186,467	32,791			219,258	644,287
	6	42,976	27,805	8,425			36,230	79,206
	7+	368,448	270,089	22,106			292,195	660,643
	Total	2,981,000	1,099,237	142,620	--	--	1,241,857	4,222,857
2	1	0	0				0	0
	2	176,289	24,609				24,609	200,898
	3	273,493	79,574				79,574	353,067
	4	818,294	293,391				293,391	1,111,685
	5	125,990	105,416				105,416	231,406
	6	13,361	11,594				11,594	24,955
	7+	148,615	162,809				162,809	311,424
	Total	1,556,042	677,393	--	--	--	677,393	2,233,435
3	1	67,424	0				0	67,424
	2	457,316	15,228				15,228	472,544
	3	89,170	45,039				45,039	134,209
	4	278,440	105,496				105,496	383,936
	5	70,232	41,468				41,468	111,700
	6	9,168	8,227				8,227	17,395
	7+	101,140	97,435				97,435	198,575
	Total	1,072,890	312,893	--	--	--	312,893	1,385,783
4	1	73,088			0	0	0	73,088
	2	76,780			246	7,577	7,823	84,603
	3	18,168			10,000	22,732	32,732	50,900
	4	79,207			22,668	77,556	100,224	179,431
	5	18,761			10,925	26,298	37,223	55,984
	6	6,246			3,581	16,492	20,073	26,319
	7+	23,178			33,162	88,699	121,861	145,039
	Total	295,428	--	--	80,582	239,354	319,936	615,364
All	1	173,592	0	0	0	0	0	173,592
	2	1,179,384	69,290	0	246	7,577	77,113	1,256,497
	3	671,454	236,543	17,095	10,000	22,732	286,370	957,824
	4	2,527,786	872,380	62,203	22,668	77,556	1,034,807	3,562,593
	5	640,012	333,351	32,791	10,925	26,298	403,365	1,043,377
	6	71,751	47,626	8,425	3,581	16,492	76,124	147,875
	7+	641,381	530,333	22,106	33,162	88,699	674,300	1,315,681
	Total	5,905,360	2,089,523	142,620	80,582	239,354	2,552,079	8,457,439

Table 6. Age composition (in percent) of walleye harvest by management unit, gear, and agency in Lake Erie during 2023. Units 4 and 5 are combined in Unit 4.

Unit	Age	Commercial Ontario	Sport Ohio	Sport Michigan	Sport New York	Sport Pennsylvania	Sport Total	All Gears Total
1	1	1.1	0.0	0.0	--	--	0.0	0.8
	2	15.7	2.7	0.0	--	--	2.4	11.8
	3	9.7	10.2	12.0	--	--	10.4	9.9
	4	45.3	43.1	43.6	--	--	43.1	44.7
	5	14.3	17.0	23.0	--	--	17.7	15.3
	6	1.4	2.5	5.9	--	--	2.9	1.9
	7+	12.4	24.6	15.5	--	--	23.5	15.6
	Total	100.0	100.0	100.0	--	--	100.0	100.0
2	1	0.0	0.0	--	--	--	0.0	0.0
	2	11.3	3.6	--	--	--	3.6	9.0
	3	17.6	11.7	--	--	--	11.7	15.8
	4	52.6	43.3	--	--	--	43.3	49.8
	5	8.1	15.6	--	--	--	15.6	10.4
	6	0.9	1.7	--	--	--	1.7	1.1
	7+	9.6	24.0	--	--	--	24.0	13.9
	Total	100.0	100.0	--	--	--	100.0	100.0
3	1	6.3	0.0	--	--	--	0.0	4.9
	2	42.6	4.9	--	--	--	4.9	.
	3	8.3	14.4	--	--	--	14.4	9.7
	4	26.0	33.7	--	--	--	33.7	27.7
	5	6.5	13.3	--	--	--	13.3	8.1
	6	0.9	2.6	--	--	--	2.6	1.3
	7+	9.4	31.1	--	--	--	31.1	14.3
	Total	100.0	100.0	--	--	--	100.0	100.0
4	1	24.7	--	--	0.0	0.0	0.0	11.9
	2	26.0	--	--	0.3	3.2	2.4	13.7
	3	6.1	--	--	12.4	9.5	10.2	8.3
	4	26.8	--	--	28.1	32.4	31.3	29.2
	5	6.4	--	--	13.6	11.0	11.6	9.1
	6	2.1	--	--	4.4	6.9	6.3	4.3
	7+	7.8	--	--	41.2	37.1	38.1	23.6
	Total	100.0	--	--	100.0	100.0	100.0	100.0
All	1	2.9	0.0	0.0	0.0	0.0	0.0	2.1
	2	20.0	3.3	0.0	0.3	3.2	3.0	14.9
	3	11.4	11.3	12.0	12.4	9.5	11.2	11.3
	4	42.8	41.8	43.6	28.1	32.4	40.5	42.1
	5	10.8	16.0	23.0	13.6	11.0	15.8	12.3
	6	1.2	2.3	5.9	4.4	6.9	3.0	1.7
	7+	10.9	25.4	15.5	41.2	37.1	26.4	15.6
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 7. Annual mean age (years) of Lake Erie walleye by gear, management unit, and agency from 2013 to 2023. Means include data from 1975 to 2022.

	Sport Fishery															Commercial Fishery					All Gears
	Unit 1				Unit 2			Unit 3			Units 4 & 5						Unit 1	Unit 2	Unit 3	Unit 4		
Year	OH	MI	ON	Total	OH	ON	Total	OH	ON	Total	ON	PA	NY	Total	Total		ON	ON	ON	ON	Total	Total
2013	5.16	4.26	--	5.10	6.91	--	6.91	8.09	--	8.09	--	8.79	8.13	8.55	5.95		4.91	4.64	7.09	7.36	5.24	5.60
2014	5.79	6.05	--	5.80	7.13	--	7.13	8.30	--	8.30	--	8.29	8.00	8.17	6.57		5.26	5.80	8.29	8.35	6.02	6.31
2015	6.23	5.85	--	6.20	6.88	--	6.88	8.73	--	8.73	--	7.43	8.29	7.89	6.74		4.57	6.30	8.58	8.08	6.14	6.42
2016	5.17	4.98	--	5.15	5.46	--	5.46	6.91	--	6.91	--	7.48	8.06	7.83	5.68		3.25	4.07	4.97	8.69	4.07	4.61
2017	4.54	4.39	--	4.52	3.52	--	3.52	3.67	--	3.67	--	4.17	5.68	4.63	4.14		2.90	2.65	2.86	5.86	2.93	3.32
2018	3.91	3.73	--	3.88	3.56	--	3.56	3.95	--	3.95	--	4.09	4.92	4.35	3.88		3.25	3.18	3.18	4.19	3.28	3.53
2019	4.36	4.12	--	4.33	4.37	--	4.37	4.53	--	4.53	--	4.70	5.10	4.82	4.45		3.82	3.99	3.86	4.29	3.91	4.17
2020	NA	NA	--	--	NA	--	--	NA	--	--	--	4.95	6.05	5.27	NA		3.83	4.11	4.12	3.63	3.94	NA
2021	5.05	5.16	--	5.06	4.54	--	4.54	4.65	--	4.65	--	4.59	5.99	4.91	4.85		4.21	4.32	3.11	3.38	4.05	4.34
2022	4.82	4.65	--	4.80	4.62	--	4.62	5.03	--	5.03	--	4.26	5.47	4.56	4.77		3.79	3.81	3.66	3.42	3.77	4.10
2023	5.13	4.84	--	5.10	4.99	--	4.99	5.38	--	5.38	--	5.84	5.90	5.86	5.20		4.23	4.08	3.36	3.14	3.98	4.35
Mean	4.24	3.93	--	4.19	4.49	--	4.50	5.45	--	5.47	--	6.30	7.19	6.71	4.45		3.62	3.86	4.80	6.28	3.84	4.09

Table 8. Estimated abundance at age, survival (S), fishing mortality (F) and exploitation (u) for Lake Erie walleye, 1987-2024 (from ADMB 2024 catch at age analysis recruitment integrated model, M=0.32).

Year	Age 2	3	4	5	6	7+	Total	Ages 2+ S	F	u
1987	23,879,300	16,685,500	2,752,120	21,636,700	1,715,690	2,702,490	69,371,800	0.642	0.123	0.099
1988	56,278,700	16,124,800	10,518,000	1,702,180	13,479,300	2,737,280	100,840,260	0.640	0.126	0.102
1989	11,648,300	37,437,600	9,889,380	6,304,830	1,032,680	9,889,990	76,202,780	0.636	0.133	0.107
1990	10,202,200	7,876,080	23,653,300	6,140,300	3,957,900	6,815,300	58,645,080	0.642	0.123	0.099
1991	5,217,460	6,953,640	5,027,830	14,909,100	3,909,780	6,855,910	42,873,720	0.653	0.107	0.087
1992	16,750,500	3,592,000	4,514,780	3,234,480	9,663,260	6,971,740	44,726,760	0.647	0.115	0.093
1993	22,463,700	11,366,700	2,263,740	2,811,910	2,035,050	10,482,900	51,424,000	0.624	0.152	0.121
1994	3,607,200	14,853,700	6,757,400	1,327,360	1,674,650	7,451,320	35,671,630	0.612	0.171	0.135
1995	18,726,300	2,408,280	8,990,600	4,047,960	808,276	5,575,970	40,557,386	0.619	0.160	0.127
1996	21,330,100	12,319,700	1,405,150	5,195,330	2,385,320	3,782,730	46,418,330	0.597	0.196	0.153
1997	2,436,960	13,707,600	6,835,220	769,698	2,915,040	3,485,220	30,149,738	0.586	0.214	0.166
1998	22,337,000	1,596,890	7,945,390	3,917,050	449,753	3,759,970	40,006,053	0.600	0.191	0.150
1999	10,944,800	14,285,200	875,124	4,300,720	2,174,600	2,354,110	34,934,554	0.615	0.166	0.132
2000	10,160,500	7,239,850	8,438,360	512,321	2,566,930	2,720,710	31,638,671	0.626	0.149	0.119
2001	31,807,700	6,792,100	4,378,340	5,063,710	313,106	3,253,030	51,607,986	0.677	0.070	0.058
2002	3,686,250	22,001,500	4,449,620	2,846,430	3,317,790	2,333,580	38,635,170	0.676	0.071	0.059
2003	25,379,700	2,583,410	14,826,600	2,981,840	1,920,160	3,818,840	51,510,550	0.685	0.058	0.048
2004	362,937	17,776,400	1,738,710	9,918,680	2,005,490	3,858,260	35,660,477	0.683	0.061	0.051
2005	109,339,000	258,842	12,150,800	1,182,280	6,774,000	4,003,100	133,708,022	0.702	0.034	0.029
2006	3,608,630	77,400,900	174,576	8,166,760	799,806	7,306,020	97,456,692	0.675	0.072	0.060
2007	7,385,800	2,560,550	52,183,400	117,045	5,506,890	5,461,480	73,215,165	0.676	0.072	0.060
2008	1,973,260	5,253,890	1,730,470	35,020,700	78,873	7,386,890	51,444,083	0.681	0.064	0.053
2009	18,971,800	1,403,430	3,572,960	1,171,410	23,830,300	5,077,160	54,027,060	0.694	0.045	0.038
2010	6,952,430	13,526,300	959,339	2,430,230	800,160	19,779,300	44,447,759	0.691	0.050	0.042
2011	7,062,040	4,972,070	9,311,670	656,969	1,669,290	14,092,800	37,764,839	0.691	0.049	0.041
2012	11,867,900	5,031,650	3,410,750	6,367,340	451,449	10,839,500	37,968,589	0.676	0.071	0.059
2013	8,869,900	8,372,780	3,338,320	2,249,010	4,228,350	7,492,950	34,551,310	0.671	0.079	0.065
2014	4,391,780	6,262,590	5,536,350	2,189,610	1,483,670	7,722,330	27,586,330	0.647	0.115	0.094
2015	6,671,440	3,069,550	4,011,810	3,510,070	1,398,850	5,859,570	24,521,290	0.648	0.113	0.092
2016	23,461,900	4,642,960	1,944,000	2,514,110	2,219,870	4,579,490	39,362,330	0.674	0.074	0.061
2017	90,941,000	16,382,900	2,974,020	1,233,490	1,609,340	4,350,050	117,490,800	0.691	0.050	0.042
2018	8,933,230	63,861,400	10,683,900	1,923,620	803,538	3,877,070	90,082,758	0.670	0.081	0.066
2019	11,517,100	6,316,630	42,559,500	7,073,110	1,281,110	3,112,890	71,860,340	0.666	0.087	0.071
2020	31,764,400	8,136,520	4,181,940	27,947,100	4,670,650	2,895,620	79,596,230	0.671	0.079	0.065
2021	45,764,200	22,283,100	5,293,760	2,699,050	18,181,900	4,931,160	99,153,170	0.664	0.090	0.074
2022	13,559,300	31,863,600	14,162,600	3,332,260	1,715,180	14,737,900	79,370,840	0.643	0.121	0.098
2023	37,472,800	9,409,250	20,181,300	8,898,930	2,116,720	10,457,100	88,536,100	0.659	0.097	0.080
2024	13,754,500	25,986,900	5,962,150	12,695,800	5,662,620	8,016,510	72,078,480			

Table 9. Estimated harvest of Lake Erie walleye for 2024, and population projection for 2025 when fishing with 60% F_{msy}. The 2024 and 2025 projected spawning stock biomass values are from the ADMB-2024 recruitment-integrated model. The range in the RAH was calculated using $\pm$ one standard deviation from the mean RAH.

$SSB_0 =$ 68.070   million kilograms

20% $SSB_0 =$ 13.614   million kilograms

$F_{msy} =$ 0.485

Age	2024 Stock Size (millions of fish) Mean	60% F_{msy} F	Sel(age)	Rate Functions (F)	Rate Functions (S)	Rate Functions (u)	2024 RAH (millions of fish) Min.	2024 RAH (millions of fish) Mean	2024 RAH (millions of fish) Max.	Projected 2025 Stock Size (millions) Mean
2	13.755		0.264	0.077	0.673	0.063	0.658	0.870	1.082	20.094
3	25.987		0.913	0.266	0.557	0.201	4.300	5.223	6.147	9.251
4	5.962		1.000	0.291	0.543	0.218	1.061	1.297	1.534	14.469
5	12.696		0.941	0.274	0.552	0.206	2.139	2.620	3.101	3.237
6	5.663		0.902	0.262	0.559	0.199	0.913	1.126	1.339	7.012
7+	8.017		0.985	0.286	0.545	0.215	1.382	1.722	2.061	7.535
Total (2+)	72.078	0.291				0.178	10.453	12.858	15.264	61.598
Total (3+)	58.324						9.794	11.988	14.182	41.504
SSB	72.247 mil. kgs									59.090 mil. kgs

probability of 2024 spawning stock biomass being less than 20% SSB_0 =   0.000%

Table 10. Mean catch per hectare of age-0 Walleye observed in bottom trawls towed in the western basin by the Ontario Ministry of Natural Resources and Forestry (ONT) and Ohio Department of Natural Resources (OH) between 2000 and 2023.

Year Class	Year of Recruitment to Fisheries	OH+ONT Trawl Age-0 CPHa
2000	2002	4.113
2001	2003	28.499
2002	2004	0.139
2003	2005	183.015
2004	2006	5.402
2005	2007	12.665
2006	2008	2.051
2007	2009	25.408
2008	2010	7.238
2009	2011	7.107
2010	2012	26.260
2011	2013	6.502
2012	2014	6.417
2013	2015	10.584
2014	2016	29.050
2015	2017	84.105
2016	2018	9.224
2017	2019	22.852
2018	2020	255.581
2019	2021	225.310
2020	2022	97.480
2021	2023	345.599
2022	2024	83.413
2023	2025	132.470
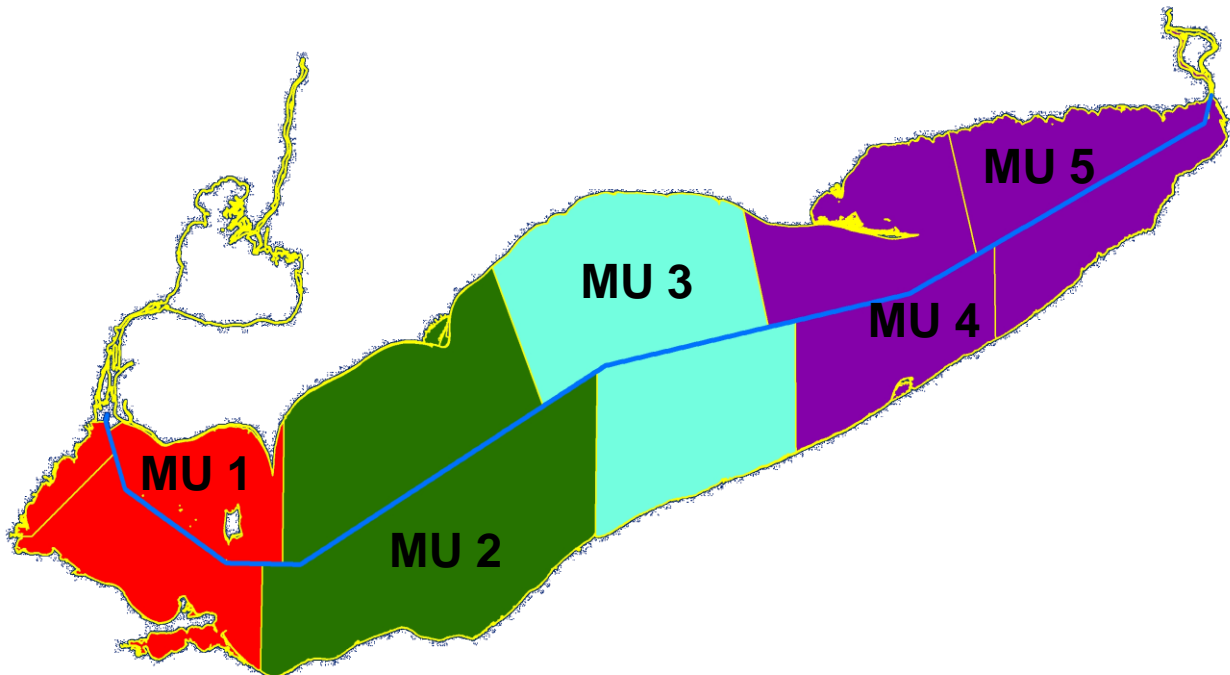
Figure 1.   Map of Lake Erie with management units (MU) recognized by the Walleye Task Group for interagency management of Walleye.
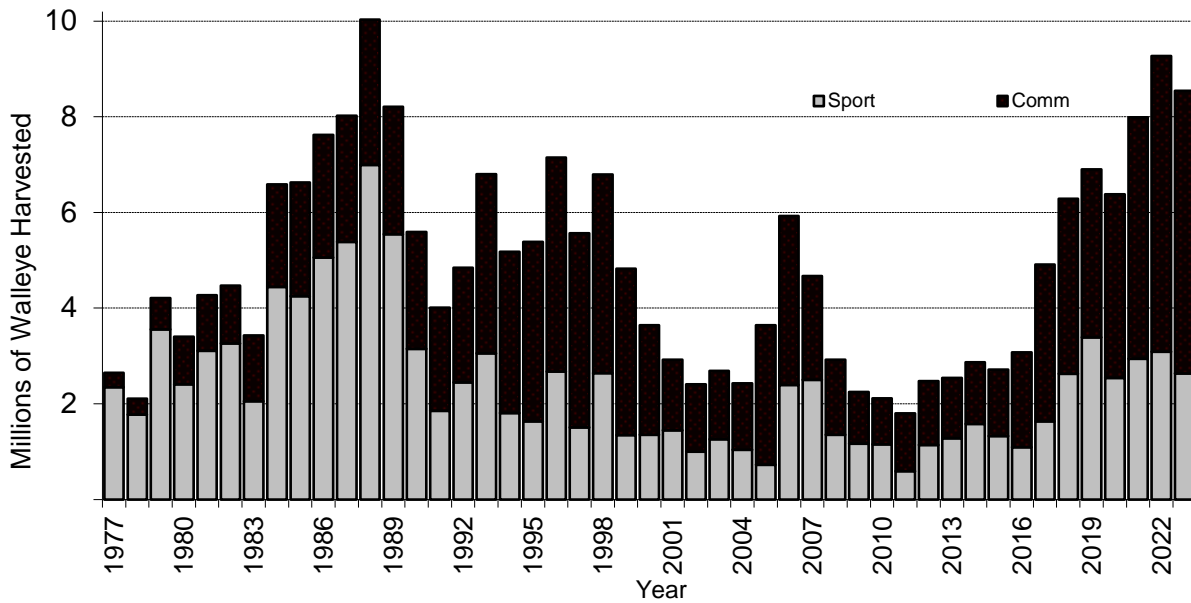
Figure 2.   Lake-wide harvest of Lake Erie Walleye by sport and commercial fisheries during 1977-2023.
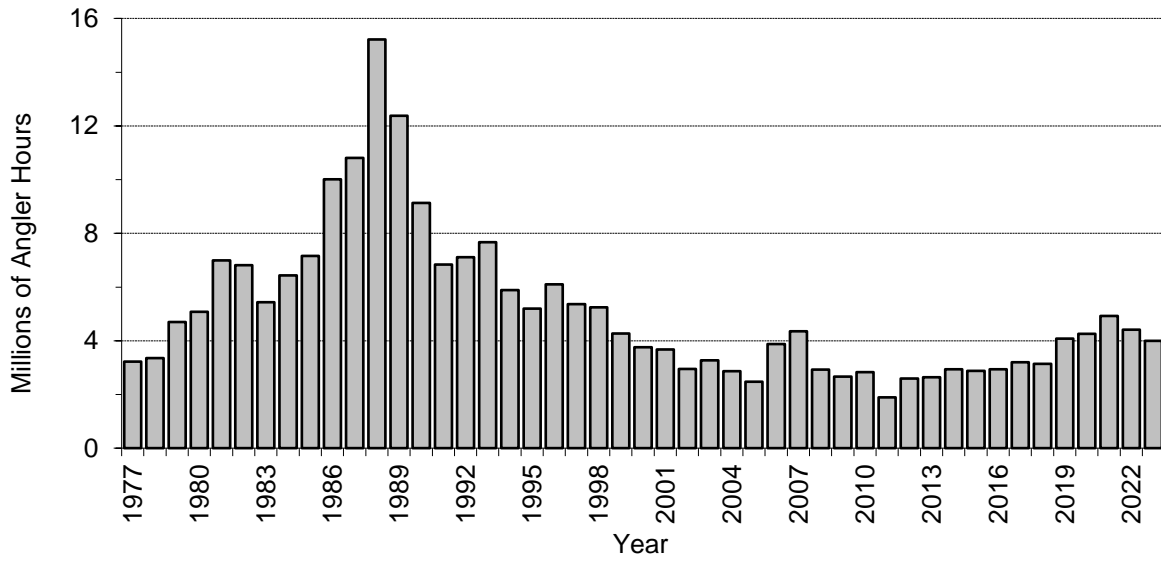
Figure 3.   Lake-wide total effort (angler hours) by U.S. sport fisheries for Lake Erie Walleye during 1977-2023.
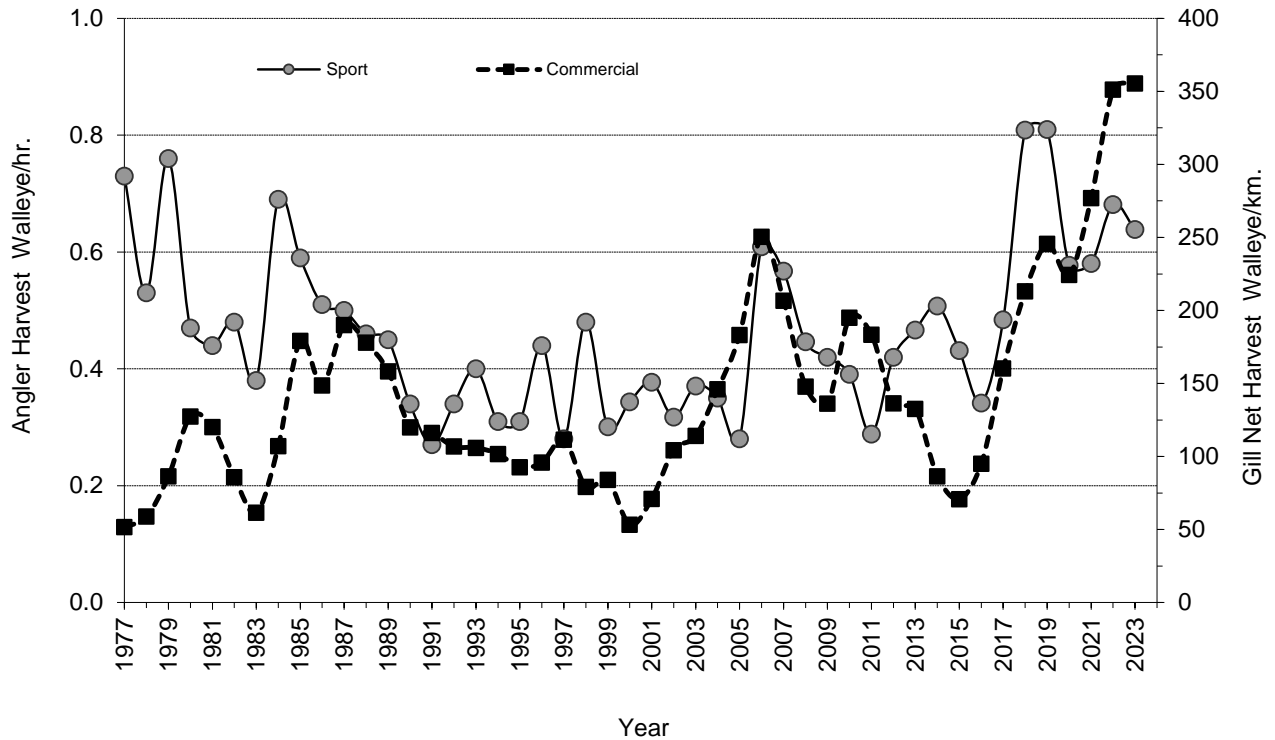

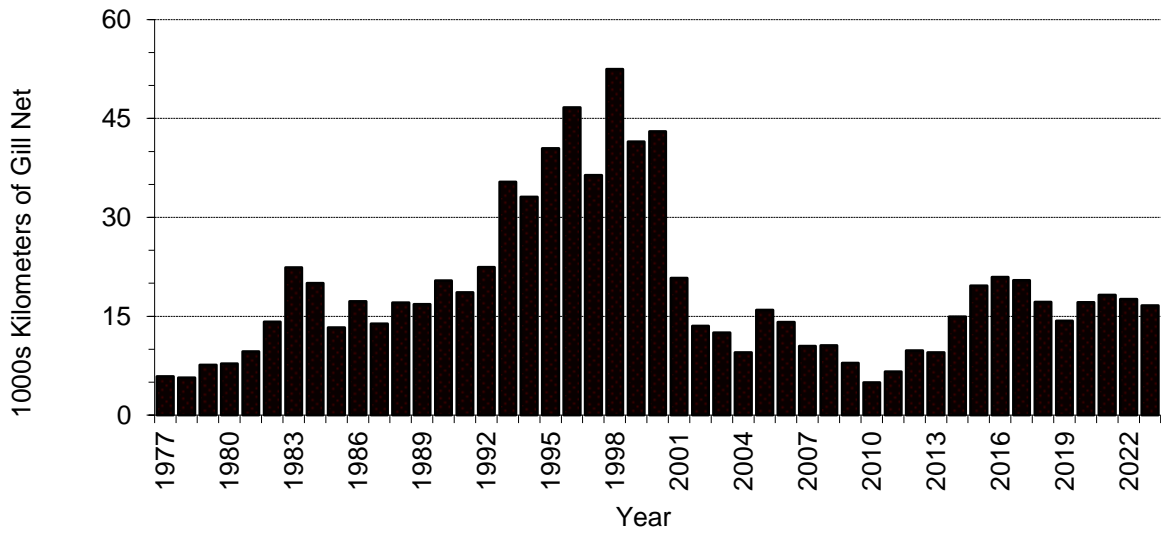Figure 4.   Lake-wide harvest per unit effort (HPE) for Lake Erie sport and commercial Walleye fisheries during 1977-2023.

19

Figure 5.   Lake-wide total effort (thousand kilometers of gill net) by Ontario commercial fisheries for Lake Erie Walleye during 1977-2023.
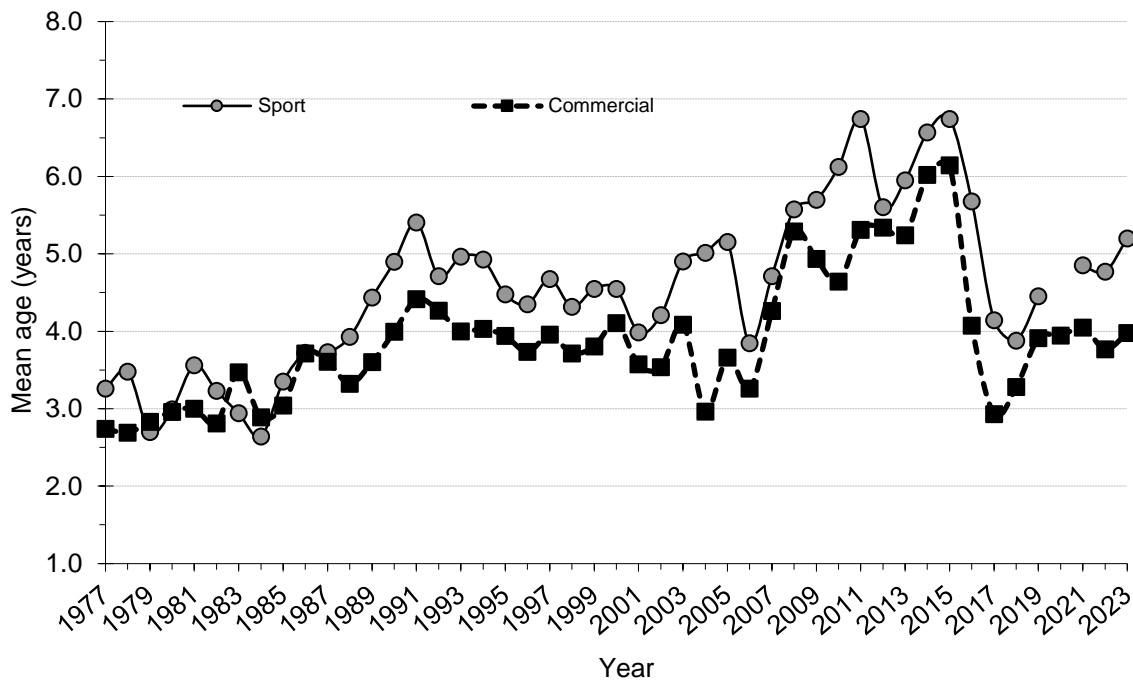

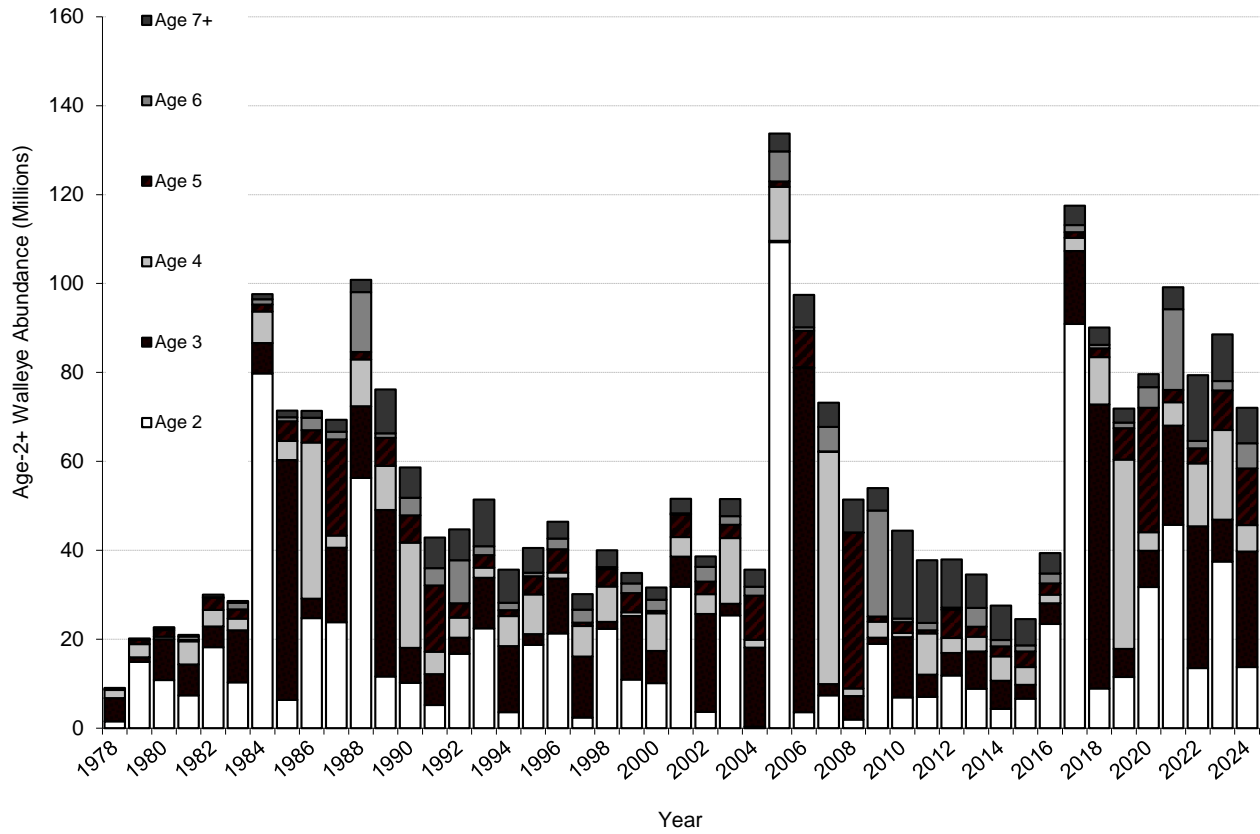Figure 6.   Lake-wide mean age of Lake Erie Walleye in sport and commercial harvests during 1977-2023.

Figure 7. Abundance at age for age-2 and older Walleye in Lake Erie's west and central basins during 1978-2023 and the 2024 projection, estimated from the ADMB model. Data shown are from Table 8.
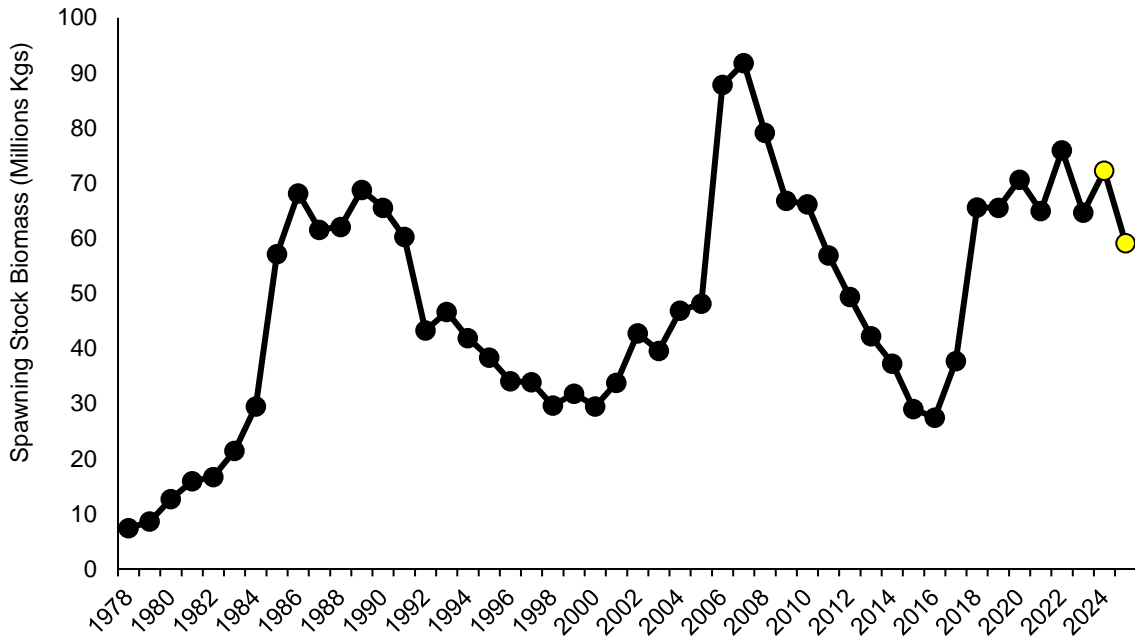
Figure 8. Spawning stock biomass of Walleye in Lake Erie's west and central basins from 1978-2023, with the 2024 and 2025 projection, estimated from the ADMB model.