YELLOW PERCH TASK GROUP
EXECUTIVE SUMMARY REPORT
MARCH 2023

Lake Erie Committee

REPRESENTING THE FISHERY MANAGEMENT AGENCIES OF LAKE ERIE AND LAKE ST. CLAIR

2022 Fisheries Review

The lakewide total allowable catch (TAC) of Yellow Perch in 2022 was 7.185 million pounds. This allocation represented a 15% increase from a TAC of 6.238 million pounds in 2021. For Yellow Perch assessment and allocation, Lake Erie is partitioned into four management units (MUs; Figure 1). The 2022 TAC allocation was 3.038, 0.537, 3.082, and 0.528 million pounds for MUs 1 through 4, respectively. The lakewide harvest of Yellow Perch in 2022 was 3.400 million pounds, or 47% of the total 2022 TAC. This was a 3% increase from the 2021 harvest of 3.296 million pounds. Harvest from MUs 1 through 4 was 1.497, 0.296, 1.208, and 0.399 million pounds, respectively (Table 1). The portion of TAC harvested was 49%, 55%, 39%, and 76%, in MUs 1 through 4, respectively. In 2022, Ontario harvested 2.195 million pounds, followed by Ohio (0.988 million lbs.), New York (0.084 million lbs.), Michigan (0.068 million lbs.), and Pennsylvania (0.064 million lbs.).
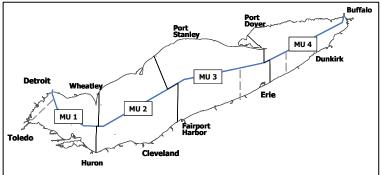

Figure 1. Yellow Perch Management Units (MUs) of Lake Erie

In 2022, targeted (i.e., small mesh) commercial gill net effort in Canadian waters decreased in all management units relative to 2021, by 18%, 24%, 5%, and 37% in MU1 to MU4 respectively. Sport angling effort in U.S. waters during 2022 was highest in MU1 and lowest in MU3. Angler effort in 2022 increased 1303% from a record low in MU2 and by 64% in MU4, decreased 53% in MU3, and remained relatively unchanged in MU1. In 2022, angling effort in U.S. waters of MU3 was at its lowest in the time series, and effort in MU2 was the third lowest in the time series. Fishing effort by jurisdiction and gear type is presented in Table 2.

Ontario targeted commercial gill net harvest rates in 2022 decreased less than 2% relative to 2021 rates in MU1, while increasing in MU2 by 33%, MU3 by 53%, and MU4 by 62%. Trends in angling harvest rates (fish harvested per angler hour) for 2022 compared to 2021 were not consistent across states within MUs. Harvest per angler hour decreased in Michigan (-11%) and increased in Ohio waters of MU1 (+5%). In the central basin, sport angler harvest rate increased in the Ohio waters of MU2 (+513%), although the rate of 0.5 fish/hour is still one of the lowest in the time series, and decreased in the Ohio (-63%) waters of MU3 while increasing in Pennsylvania (+30%) waters of MU3. In MU4, harvest rates declined in both New York waters (-7%) and Pennsylvania waters of MU4 (-100%). In 2022, trap net harvest rates in U.S. waters increased by 2% in MU3, and decreased by 22% in MU1, 55% in MU2, and 25% in MU4.

Table 1. Lake Erie Yellow Perch harvest by jurisdiction and gear type for 2022.

MU	Michigan	Ontario	Ohio		Pennsylvania		New York		Total (lbs)
	sport	all commercial*	sport	commercial trap net	sport	commercial trap net	sport	commercial trap net	
1	67,667	770,476	470,196	188,739					1,497,078
2		177,919	20,201	97,659					295,779
3		932,682	3,554	207,890	3,207	60,665			1,207,998
4		314,039			533	0	69,486	14,913	398,971
Total	67,667	2,195,116	493,951	494,288	3,740	60,665	69,486	14,913	3,399,826

*Small mesh gill net, large mesh gill net, trap net (MU1), and incidental trawl (MUs 2-4) harvest combined.

Table 2. Lake Erie Yellow Perch fishing effort by jurisdiction and gear type for 2022.

MU	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	115,916	8,588	621,067	4,943				
2		1,479	26,634	1,571				
3		4,942	2,341	2,405	3,779	150		
4		1,317			600	0	49,968	241
Total	115,916	16,326	650,042	8,919	4,379	150	49,968	241

*Targeted small mesh gill net effort only.

Abundance Estimate for 2023

Population size for 1975 to 2022 for each MU was estimated by statistical catch-at-age analysis (SCAA). The SCAA model incorporates a recruitment index that is used to project total abundance estimates to 2023. Using the model, 2023 age-2-and-older Yellow Perch abundances are projected to decrease in MU3 (-17%) and MU4 (-22%) and to increase by 51% in MU1 and 16% in MU2, relative to the 2022 abundance estimates. The 2023 Age-2-and-older Yellow Perch abundance projections are 53.028, 36.365, 56.912, and 8.947 million fish in management units 1 through 4, respectively. Using mean weight-at-age information from assessment surveys, 2023 age-2-and-older biomasses are projected to increase in MU1-MU4 by 43%, 37%, 4% and 4%, respectively, compared to 2022 estimates.

Recommended Allowable Harvest (RAH) for 2023

Harvest control rules (HCR) are comprised of:
- Target fishing mortality as a percent of the fishing mortality at maximum sustainable yield (F_{msy})
- Limit reference point of the biomass at maximum sustainable yield (B_{msy})
- Probabilistic risk tolerance, $P^*=0.20$
- A limit on the annual change in TAC of $\pm 20\%$ (when $P(SSB<B_{msy}) < P^*$)

Target fishing rates and limit reference points are estimated annually using results from the SCAA models. Limit reference points and target fishing rates for each management unit are presented in Table 3. Target fishing rates are reduced when the probability of the projected spawning stock biomass being equal to or less than the limit reference point (B_{msy}) 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. Parameters used in the harvest control rule 2023. F actual may be reduced from F target if $P(SSB<B_{msy})\geq P^*$.

MU	Spawning Stock Biomass			Limit Reference Point		Fishing Rate			
	SSB_0	2023	2024 [a]	B_{msy}	P	F_{msy}	% F_{msy}	F_{target}	F_{actual} [b]
MU1	6,491,579	2,902,510	4,527,930	1,812,720	0.00	1.93	28%	0.540	0.540
MU2	13,901,030	4,083,770	3,917,690	3,871,245	0.49	1.68	35%	0.588	0.106
MU3	13,179,037	6,906,140	5,779,340	3,713,957	0.03	2.00	32%	0.640	0.640
MU4	1,695,040	1,394,620	1,188,450	483,010	0.00	1.64	34%	0.558	0.558

(a) Spawning stock biomass (kg) when population is fished at target fishing rate.
(b) In MU2 fishing at F_{target} exceeds a 0.20 probability (P^*) that the projected spawning stock biomass will be equal to or less than the limit reference point (B_{msy}), therefore the fishing rate was reduced until the probability was less than 0.20.

Table 4. Lake Erie Yellow Perch fishing rates and RAH (in millions of pounds) for 2023 by management unit.

MU	Fishing Rate	Recommended Allowable Harvest (millions lbs.)		
		MIN	MEAN	MAX
1	0.540	1.439	1.936	2.430
2	0.106	0.397	0.477	0.557
3	0.640	2.886	3.543	4.195
4	0.558	0.450	0.584	0.718
Total		5.172	6.540	7.899

The complete YPTG report is available from the GLFC's Lake Erie Committee Yellow Perch Task Group website at: http://www.glfc.org/lake-erie-committee.php, or upon request from an LEC, Standing Technical Committee (STC), or YPTG representative.