YELLOW PERCH TASK GROUP
EXECUTIVE SUMMARY REPORT
JUNE 2022

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

Please note that an error in Ohio's sport effort data was discovered after the 2022 Total Allowable Catch was finalized. Numbers presented below have been amended to reflect changes to Ohio sport effort in MU1 and MU3, and updated ADMB model results. A brief description of changes can be found in the YPTG annual report.

2021 Fisheries Review

The lakewide total allowable catch (TAC) of Yellow Perch in 2021 was 6.238 million pounds. This allocation represented a 20% decrease from a TAC of 7.805 million pounds in 2020. For Yellow Perch assessment and allocation, Lake Erie is partitioned into four management units (MUs; Figure 1). The 2021 TAC allocation was 2.532, 0.615, 2.568, and 0.523 million pounds for MUs 1 through 4, respectively. The lakewide harvest of Yellow Perch in 2021 was 3.296 million pounds, or 53% of the total 2021 TAC. This was a 6% increase from the 2020 harvest of 3.105 million pounds. Harvest from MUs 1 through 4 was 1.655, 0.327, 0.944, and 0.371 million pounds, respectively (Table 1). The portion of TAC harvested was 65%, 53%, 37%, and 71%, in MUs 1 through 4, respectively. In 2021, Ontario harvested 2.181 million pounds, followed by Ohio (0.967 million lbs.), Michigan (0.070 million lbs.), New York (0.058 million lbs.), and Pennsylvania (0.021 million lbs.).

Figure 1. Yellow Perch Management Units (MUs) of Lake Erie
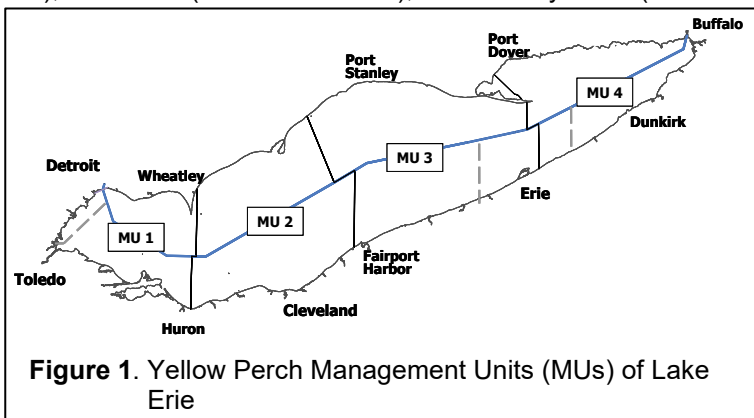
In 2021, targeted (i.e., small mesh) commercial gill net effort in Canadian waters increased from 2020 in MU1 (+14%), MU3 (+31%), and MU4 (+40%), but decreased in MU2 (-55%). Angling effort in U.S. waters increased in 2021 from 2020, in MU1 (+14%), MU3 (+93%), and MU4 (+54%), and decreased in MU2 (-93%). In 2021, angling effort in U.S. waters was at its lowest in the time series in MU2. Compared to 2020, commercial trap net effort (lifts) in U.S. waters increased by 12% in MU1, 6% in MU3, and 1% in MU4, and decreased by 61% in MU2. Fishing effort by jurisdiction and gear type is presented in Table 2.

Ontario targeted commercial gill net harvest rates in 2021 decreased relative to 2020 rates by 4%, 11%, and 43% in MU1, MU2, and MU4, respectively, while increasing by 18% in MU3. Trends in angling harvest rates (fish harvested per angler hour) for 2021 compared to 2020 were not consistent across states within MUs. In MU1, angler harvest rate increased in Ohio waters by 23% while decreasing in Michigan waters by 6%. In MU2, angler harvest rate decreased in Ohio waters by 93%. In MU3, angler harvest rates decreased in Ohio waters by 15% and decreased in Pennsylvania waters by 29%. And in MU4, angler harvest rates decreased in Pennsylvania waters by 69% while increasing in New York waters by 32%. In 2021, trap net harvest rates in U.S. waters increased by 19% in MU1, 21% in MU2, 14% in MU3, and decreased by 24% in MU4.

Table 1. Lake Erie Yellow Perch harvest by jurisdiction and gear type for 2021.

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	69,575	959,259	443,266	182,521					1,654,621
2		205,377	5,091	116,109					326,577
3		704,636	13,743	206,384	1,635	17,303			943,701
4		311,866			1,677	0	46,213	11,354	371,110
Total	69,575	2,181,138	462,100	505,014	3,312	17,303	46,213	11,354	3,296,009

*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 2021.

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	113,935	10,489	628,491	3,741				
2		1,951	1,898	839				
3		5,191	9,688	2,075	3,301	92		
4		2,081			1,598	0	29,237	137
Total	113,935	19,713	640,077	6,655	4,898	92	29,237	137

*Targeted small mesh gill net effort only.

Abundance Estimate for 2022

Population size for 1975 to 2021 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 2022. Using the PR model, 2022 age-2-and-older Yellow Perch abundances are projected to decrease by 17% in MU1, 16% in MU3, and 6% in MU4, and to increase by 3% in MU2, relative to the 2021 abundance estimates. The 2022 Age-2-and-older Yellow Perch abundance projections are 65.791, 34.329, 63.290, and 10.204 million fish in management units 1 through 4, respectively. Using mean weight-at-age information from assessment surveys, 2022 age-2-and-older biomasses are projected to increase in MU2 (+19%), MU3 (+3%), and MU4 (+7%), while decreasing in MU1 (-9%), compared to 2021 estimates.

Recommended Allowable Harvest (RAH) for 2022

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 2022. F actual may be reduced from F target if $P(SSB<Bmsy)\geq P^*$.

MU	Spawning Stock Biomass			Limit Reference Point		Fishing Rate			
	SSB_0	2021	2022 [a]	B_{msy}	P	F_{msy}	% F_{msy}	F_{target}	F_{actual} [b]
MU1	5,972,010	5,650,690	5,882,750	1,706,173	0.00	2.53	28%	0.708	0.708
MU2	13,433,400	4,088,550	3,680,850	3,755,618	0.54	1.90	35%	0.665	0.120
MU3	13,046,100	6,564,430	6,054,890	3,653,532	0.02	2.14	32%	0.685	0.685
MU4	1,698,720	1,264,080	1,262,840	483,998	0.00	1.62	34%	0.551	0.551

(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.

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.

Table 4. Lake Erie Yellow Perch fishing rates and RAH (in millions of pounds) for 2022 by management unit.

MU	Fishing Rate	Recommended Allowable Harvest (millions lbs.)		
		MIN	MEAN	MAX
1	0.708	3.287	4.256	5.219
2	0.120	0.449	0.537	0.623
3	0.685	2.607	3.247	3.882
4	0.551	0.399	0.528	0.656
Total		6.742	8.568	10.381