

Lake Erie Yellow Perch Task Group – Executive Summary Report

March 23, 2009

This is a condensed version of the YPTG annual report.

For the full report, please visit <http://www.glfc.org/lakecom/lec/YPTG.htm>.

2008 Fisheries Review

The lakewide total allowable catch (TAC) in 2008 was 10.160 million pounds. This allocation represented a 10.8% decrease from a TAC of 11.389 million pounds in 2007. For yellow perch assessment and allocation, Lake Erie is partitioned into four Management Units (Units, or MUs; Figure 1). The 2008 allocation by Management Unit was 1.408, 4.227, 4.200, and 0.325 million pounds for Units 1 through 4, respectively. The lakewide harvest of yellow perch in 2008 was 8.330 million pounds; this was a 14.0% decrease from the 2007 harvest of 9.684 million pounds. Harvest by Lake Erie Management Unit was 1.038, 3.995, 2.985, and 0.312 million pounds for Units 1 through 4, respectively (Table 1, Figure 2). The portion of TAC harvested was 73.7%, 94.5%, 71.1%, and 96.1% in MUs 1 through 4, respectively. In 2008, Ontario harvested 5.011 million pounds, followed by Ohio (3.044 million lbs), Pennsylvania (186 thousand lbs), Michigan (48 thousand lbs), and New York (41 thousand lbs).



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

Targeted gill net effort in Ontario waters decreased 25.9% in MU1 and 45.4% in MU3, while it increased 5.3% in MU2 and 3.5% in MU4 from 2007. Gill net effort remained lower in 2008 compared to the 1990s and earlier decades. U.S. angling effort decreased in 2008 from 2007 in MU1 (38.8%), MU2 (9.8%), and MU3 (2.7%), but remained approximately the same in MU4. U.S. trap net effort (lifts) in 2008 decreased in MU2 (56.5%) and MU4 (4.9%), but increased 70.5% in MU3 compared to 2007. In 2008, Ohio trap nets were restricted to the Central Basin, and thus there was no trap net effort in the Ohio waters of MU1. Fishing effort by jurisdiction and gear type is presented in Table 2.

Targeted gill net harvest rates increased in 2008 compared to 2007 in all Management Units except MU1. Targeted gill net harvest rates decreased 2.7% in MU1, and increased 1.6%, 34.6%, and 26.1% in MU2 through MU4, respectively. In 2008, U.S. sport harvest rates (in kg/hr) decreased in MU1 by 11.3%, and increased in MU2, MU3, and MU4 by 28.1%, 24.2%, and 45.2%, respectively, relative to 2007. U.S. trap net harvest rates increased in MU2 (85.9%), MU3 (32.5%), and MU4 (23.0%). Harvest rates for 2008 are presented in Table 3.

Table 1. Lake Erie yellow perch harvest by jurisdiction and gear type for 2008.

MU	Harvest by jurisdiction (lbs)								Total (lbs)
	Michigan	Ontario	Ohio		Pennsylvania		New York		
	sport	commercial*	sport	commercial trap net	sport	commercial trap net	sport	commercial trap net	
1	47,934	580,050	409,705	0					1,037,689
2		1,990,237	628,412	1,376,588					3,995,237
3		2,200,168	490,343	139,023	132,087	22,927			2,984,548
4		240,270			31,325	0	29,673	11,136	312,404
Total	47,934	5,010,725	1,528,460	1,515,611	163,412	22,927	29,673	11,136	8,329,878

*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 2008.

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	95,925	1,653	519,050	0				
2		3,124	450,060	3,983				
3		3,336	234,179	1,288	110,403	78		
4		569			27,041	0	34,511	137
Total	95,925	8,682	1,203,289	5,271	137,444	78	34,511	137

*Targeted small mesh gill net effort only.

Table 3. Lake Erie yellow perch harvest per unit effort by gear type and jurisdiction in 2008.

MU	Harvest per unit effort by jurisdiction							
	Michigan	Ontario	Ohio		Pennsylvania		New York	
	sport (fish/hr)	commercial (kg/km)*	sport (fish/hr)	commercial (kg/lift)	sport (fish/hr)	commercial (kg/lift)	sport (fish/hr)	commercial (kg/lift)
1	1.5	132.9	2.7	--				
2		242.4	3.5	156.7				
3		293.6	4.6	49.0	4.5	133.3		
4		186.8			6.4	--	1.7	36.9

*Small mesh gill net harvest per unit effort only.

ADMB Catch-at-Age Analysis and Recruitment Estimate for 2009

Population size for each Management Unit was estimated by catch-at-age analysis using modeling software Auto Differentiation Model Builder (ADMB; Figure 3). Age 2 yellow perch recruitment in 2009 was predicted by linear regression of juvenile yellow perch trawl indices against catch-at-age analysis estimates of two-year-old abundance in each Management Unit. Age 2 yellow perch recruitment in 2009 was calculated using the mean of values predicted from the indices that correlate well ($F < 0.01$, $r^2 > 0.50$) with age 2 abundance estimates. Estimates of age 2 yellow perch recruitment for 2009 (the 2007 year class) were well above average across all MUs. The 2007 year class is expected to begin to contribute to the fisheries in 2009.

Stock size estimates for 2009 (ages 3 and older) were projected from catch-at-age analysis estimates of 2008 population size and age-specific survival rates in 2008. Projected age 2 yellow perch recruitment from the 2007 year class (method described above) was added to the 2009 population estimate for older fish in each Unit, producing the total standing stock in 2009 (Table 4). Stock size estimates projected for 2009 were higher due primarily to higher recruitment in all Management Units. Estimated abundances of ages 2 and older yellow perch in 2009 are 41.8%, 40.5%, 43.7%, and 5.4% higher than the 2008 abundances across Management Units 1 to 4, respectively. Abundance projections for 2009 were 49.6, 100.3, 79.7, and 14.8 million age 2 and older yellow perch in Management Units 1 through 4, respectively (Table 4).

Total biomass estimates of age 2 and older yellow perch for 2009 are expected to increase from 2008 values across all Management Units: MU1 (14.9%), MU2 (15.4%), MU3 (20.4%), and MU4 (4.9%). The biomass estimates for 2009 are above the historic long-term (1975-2008) mean in MU1 (110.0% of the mean value), MU2 (179.9%), MU3 (214.3%), and MU4 (270.7%). Yellow perch ages 6 and older (2003 year class and older) are expected to represent the largest fraction of total biomass in 2009 in Management Units 2 (39.0%), 3 (39.5%), and 4 (27.6%). The 2007 year class (at age 2) is expected to comprise the most biomass in 2009 in MU1 (41.0%), surpassed only by fish ages 6 and older in MU2 and MU3. The 2006 year class (at age 3) is also expected to represent a large fraction of total biomass in MU1 (27.4%), MU3 (17.4%), and MU4 (27.2%).

Estimates of yellow perch survival for ages 3 and older in 2007 were 44.9%, 48.8%, 51.1%, and 63.6% in MU1 to 4, respectively. In 2008, estimated survival rates (ages 3+) were 56.0%, 54.5%, 57.2% and 63.3% in Units 1 through 4. As expected, survival rates were higher for fish ages 2 and older than ages 3 and older, since new recruits are less vulnerable to fishing mortality. Estimated exploitation rates in 2007 were 27.6%, 22.7%, 19.8%, and 4.2% in Management Units 1 to 4, respectively, for ages 3 and older. Exploitation rates for 2008 were estimated at 13.7%, 15.5%, 12.2% and 4.6% for yellow perch ages 3 and older across the MUs.

Recommended Allowable Harvest (RAH) for 2009

Target fishing rates used for TACs in 2008 (F_{2008}) in Management Units 1 and 2 are proposed for 2009 TACs, and are presented in Table 5. In Management Unit 3, the RAH was derived from the F-value determined in the 2007 risk model (F_{2007}). In Management Unit 4, stronger abundance and recruitment trends have allowed the task group to suggest that more aggressive fishing rates may be considered. As in 2008, we will again be employing updated area percentages for allocation of shares among jurisdictions in 2009. Allocation shares by Management Unit and jurisdiction are:

Allocation of TAC within Management Unit and Jurisdiction, 2009:

<u>MU1:</u>	MI	9.1%	OH	50.3%	ONT	40.6%
<u>MU2:</u>	OH	54.4%	ONT	45.6%		
<u>MU3:</u>	OH	32.4%	PA	15.3%	ONT	52.3%
<u>MU4:</u>	NY	31.0%	PA	11.0%	ONT	58.0%



Table 4. Projection of the 2009 Lake Erie yellow perch population. Stock size estimates are derived from ADMB and age 2 estimates for 2009 are derived from ADMB age 2 abundance against YOY and yearling trawl indices.

Age	2008			2009		Stock Biomass			
	Parameters	Rate Functions		Parameters	3-yr Mean Weight in Pop'n (kg)	Stock Biomass			
	Stock Size (numbers in mils)	Fishing Mortality Rate (F)	Survival Rate (S)	Stock Size (numbers in mils)		2008	2009	2009	
Unit 1	2	17.993	0.054	0.635	28.634	0.073	1.511	2.090	4.609
	3	8.969	0.160	0.571	11.427	0.122	1.354	1.394	3.074
	4	0.803	0.150	0.577	5.123	0.121	0.107	0.620	1.367
	5	6.285	0.210	0.543	0.463	0.176	1.232	0.082	0.180
	6+	0.902	0.211	0.543	3.905	0.231	0.224	0.902	1.989
	Total	34.953	0.113	0.598	49.552	0.103	4.428	5.088	11.219
	(3+)	16.959	0.180	0.560	20.918	0.143	2.917	2.998	6.610
Unit 2	2	20.587	0.018	0.658	59.049	0.073	1.523	4.311	9.505
	3	15.664	0.108	0.602	13.554	0.124	2.287	1.681	3.706
	4	2.079	0.261	0.516	9.425	0.150	0.397	1.414	3.117
	5	29.512	0.253	0.520	1.074	0.172	5.696	0.185	0.407
	6+	3.542	0.265	0.514	17.182	0.282	0.871	4.845	10.684
	Total	71.384	0.149	0.578	100.283	0.124	10.775	12.435	27.419
	(3+)	50.797	0.207	0.545	41.234	0.197	9.251	8.124	17.914
Unit 3	2	21.391	0.014	0.661	46.047	0.058	1.198	2.671	5.889
	3	12.321	0.108	0.602	14.139	0.110	1.700	1.555	3.429
	4	1.474	0.190	0.554	7.413	0.137	0.246	1.016	2.239
	5	17.486	0.189	0.555	0.817	0.197	3.445	0.161	0.355
	6+	2.776	0.195	0.552	11.234	0.313	0.822	3.516	7.753
	Total	55.448	0.101	0.606	79.650	0.112	7.411	8.919	19.666
	(3+)	34.057	0.159	0.572	33.604	0.186	6.213	6.248	13.777
Unit 4	2	5.853	0.009	0.664	5.713	0.091	0.615	0.520	1.146
	3	4.082	0.037	0.646	3.888	0.185	0.833	0.719	1.586
	4	0.415	0.053	0.636	2.637	0.230	0.087	0.606	1.337
	5	2.335	0.081	0.618	0.264	0.280	0.588	0.074	0.163
	6+	1.334	0.081	0.618	2.268	0.322	0.403	0.730	1.610
	Total	14.019	0.037	0.646	14.770	0.179	2.525	2.650	5.843
	(3+)	8.166	0.057	0.633	9.057	0.235	1.911	2.130	4.697

Table 5. Lake Erie yellow perch fishing rates, the Recommended Allowable Harvest (RAH; in millions of pounds), and the yield method for 2009 by Management Unit.

MU	Fishing Rate	Recommended Allowable Harvest (millions lbs.)	Yield Methods
1	0.720	2.272	F ₂₀₀₈
2	0.661	5.313	F ₂₀₀₈
3	0.703	3.933	F ₂₀₀₇
4	0.280	0.459	F ₂₀₀₉
Total		11.978	

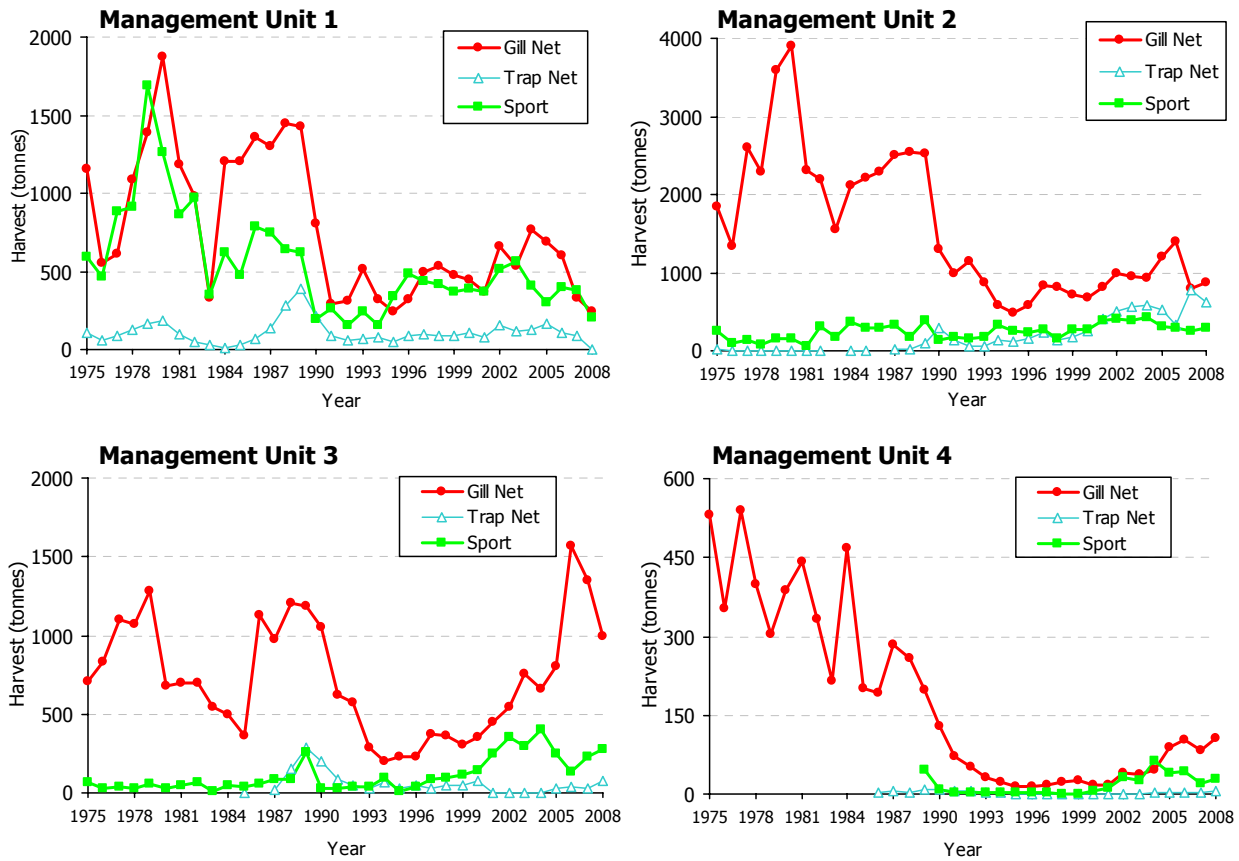


Figure 2. Lake Erie yellow perch harvest by Management Unit and gear type.

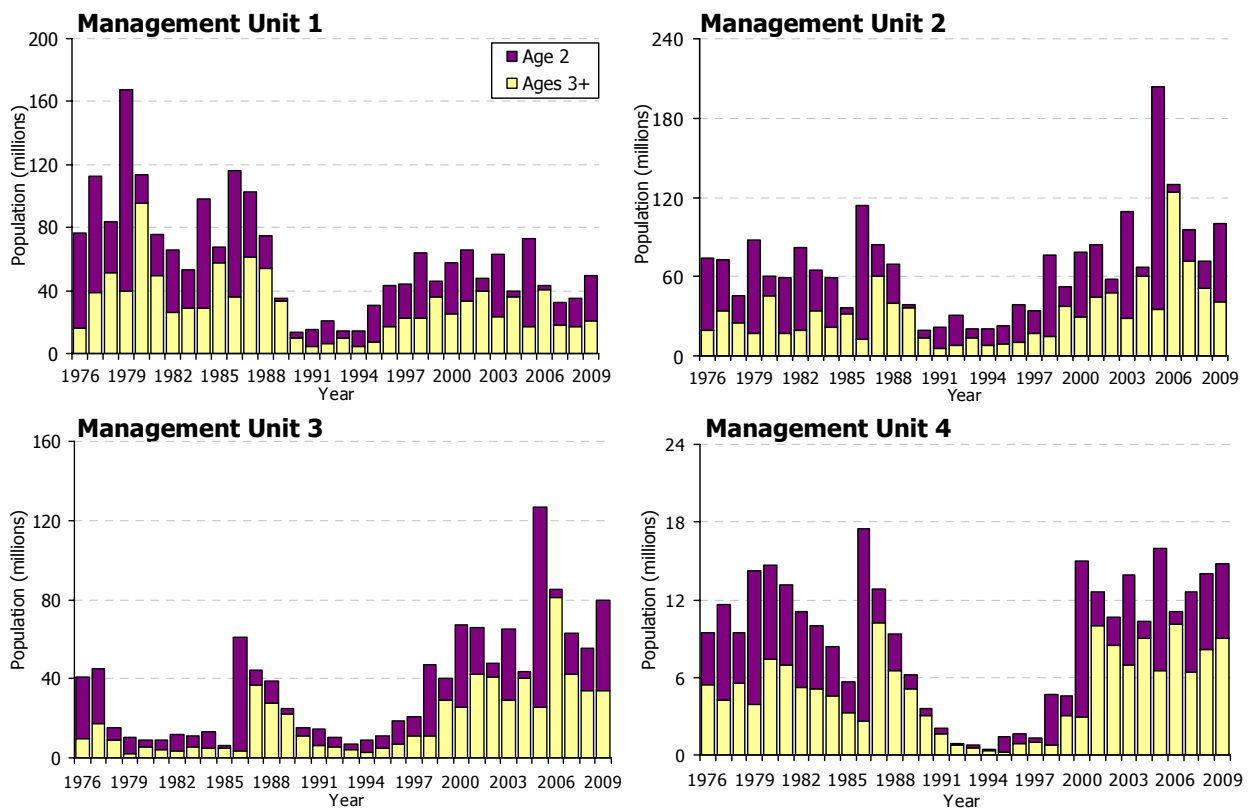


Figure 3. Lake Erie yellow perch population estimates by Management Unit for age 2 (dark bars) and ages 3+ (light bars). Estimates for 2009 are from ADMB and parametric regressions for age 2 from survey gear indices.