Lake Erie Yellow Perch Task Group – Executive Summary Report
March 17, 2008

This is a condensed version of the YPTG annual report,
for the full report please visit http://www.glfc.org/lakecom/lec/YPTG.htm

2007 Fisheries Review

The lakewide total allowable catch (TAC) in 2007 was 11.389 million pounds. This allocation represented a 31% decrease from the 2006 TAC of 16.480 million pounds. For yellow perch assessment and allocation, Lake Erie is partitioned into four Management Units (Units, or MUs; Figure 1). The 2007 allocation by management unit was 1.679, 4.206, 5.229 and 0.275 million pounds for Units 1 through 4, respectively. The lakewide harvest of yellow perch in 2007 was 9.684 million pounds; this was a 12.8% decrease from the 2006 harvest of 11.104 million pounds. Harvest by management unit was 1.8, 4.1, 3.6 and 0.2 million pounds for Units 1 through 4, respectively (Table 1, Figure 2). The portion of TAC harvested was 106%, 97%, 69% and 87% in MUs 1 through 4, respectively. In 2007, Ontario harvested 5.8 million pounds, followed by Ohio (3.6 million lbs.), Pennsylvania (219 thousand lbs.), Michigan (63 thousand lbs.) and New York (26 thousand lbs.).

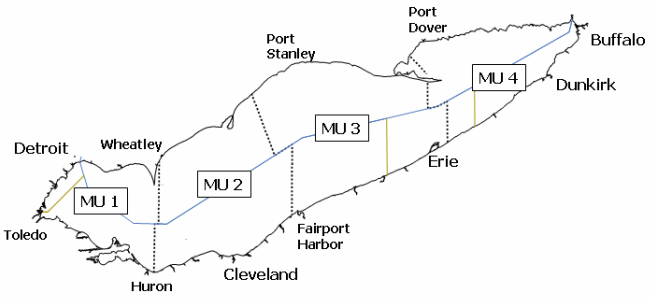

Figure 1. Yellow Perch management units (MUs) of Lake Erie

Targeted gill net effort decreased 57% in MU1, 75% in MU2, 45% in MU3 and 45% in MU4 from 2006. Gill net effort remained lower in 2007 compared to the 1990's and earlier decades. U.S. angling effort increased in 2007 from 2006 in MU1 (25%) and MU3 (77%), and decreased in MU4 (34%). Effort remained approximately the same in MU2 in 2007. U.S. trap net effort (lifts) in 2007 decreased in MU1 (16%), MU3 (20%), and MU4 (30%), but increased 22% in MU2 compared to 2006. Fishing effort by jurisdiction and gear type is presented in Table 2.

Targeted gill net harvest rates increased in 2007 compared to 2006 in all Management Units. Targeted gill net harvest rates increased 24%, 106%, 61% and 44% in MU1-4 respectively. Sport harvest rates decreased in MU1, MU2, and MU4 from 2006 in kg/hr by 24%, 16%, and 33% respectively. The sport harvest rate remained approximately the same in MU3 from 2006 to 2007. Trap net harvest rates increased in MU2 (88%) and MU4 (46%), but remained approximately the same in MU1 and MU3 from 2006. Harvest rates for 2007 are presented in Table 3.

Table 1. Lake Erie yellow perch harvest by jurisdiction and gear type for 2007

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	62,815	727,678	781,859	200,818					1,773,170
2		1,847,139	543,104	1,701,552					4,091,795
3		2,997,101	342,999	48,286	169,594	23,471			3,581,451
4		185,954			25,859	0	16,424	9,511	237,748
Total	62,815	5,757,872	1,667,962	1,950,656	195,453	23,471	16,424	9,511	9,684,164

*small mesh gill net, large mesh gill net and incidental trawl harvest combined

Table 2. Lake Erie yellow perch fishing effort by jurisdiction and gear type for 2007

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	181,698	2,230	823,624	2,951				
2		2,966	498,843	9,158				
3		6,115	218,683	713	135,611	88		
4		550			31,545	0	29,999	144
Total	181,698	11,861	1,541,150	12,822	167,156	88	29,999	144

*targeted small mesh gill net effort only

Table 3. Lake Erie yellow perch harvest per unit effort by gear type and jurisdiction in 2007

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	1.0	136.6	3.4	30.9				
2		238.7	2.8	84.3				
3		218.2	3.4	30.7	3.8	121.0		
4		148.1			1.5	--	1.0	30.0

*small mesh gill net harvest per unit effort only

ADMB Catch-at-Age Analysis and Recruitment Estimate for 2008

Population size for each management unit was estimated by catch-at-age analysis using the Auto Differentiation Model Builder computer program (ADMB; Figure 3). Age-2 yellow perch recruitment in 2008 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 2008 was calculated using the mean of values predicted from the indices that correlate well ($p<0.01$, $r^2>0.50$) with age-2 abundance estimates. Estimates of age-2 yellow perch recruitment for 2008 (the 2006 year class) were below average in Management Units 1, 2, slightly above average in MU3, and near average in MU4. The 2006 year class is expected to contribute minimally to fisheries in 2008.

Stock size estimates for 2008 (ages 3 and older) were projected from catch-at-age analysis estimates of 2007 population size and age-specific survival rates in 2007. Projected age-2 yellow perch recruitment from the 2006 year class (method described above) was added to the 2008 population estimate for older fish in each unit, producing the total standing stock in 2008 (Table 4). Stock size estimates projected for 2008 were lower due primarily to mortality exerted on the 2003 year class. Due to the weaker 2006 year class, which was preceded by weak 2004 and 2005 year classes, estimated abundances of ages 2+ yellow perch in 2008 are 19%, 37%, and 10% lower than the 2007 abundances across management units 1-3, respectively. Estimated abundance of ages 2+ yellow perch in MU4 increased 5% in 2008 from 2007 due to a moderate age-2 year class. Abundance projections for 2008 were 25, 51, 55 and 11 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 2008 have declined for the third consecutive year in MU1, MU2 and MU3, biomass has declined slightly from 2007 in MU4. Total biomass in 2008 is estimated to decrease from 2007 values in MU1 (26%), MU2 (32%), MU3 (15%) and MU4 (13%). The biomass estimates for 2008 are below the historic (1975-2007) mean in MU1 (58% of the mean value), and above historic means in MU2 (11%), MU3 (69%), and MU4 (103%). The strong 2003 year class (at age 5) is expected to represent the largest fraction of total biomass in 2008 in MU2 (55%), MU3 (38%), and MU4 (34%); however, the 2005 year class (at age 3) is expected to represent the largest fractions of total biomass in MU1 (35%) with the 2003 year class representing 32% of the MU1 biomass.

Estimates of yellow perch survival for ages 3 and older in 2006 were 39%, 54%, 51% and 58% in MU1, 2, 3 and 4, respectively. In 2007, estimated survival rates (ages 3+) were 45%, 47%, 52% and 64% 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 2006 were 35%, 16%, 20% and 11% in Management Units 1–4, respectively, for ages 3 and older. Exploitation rates for 2007 were estimated at 28%, 25%, 18% and 4% for yellow perch ages 3 and older across the MUs.

Recommended Allowable Harvest (RAH) for 2008

Target fishing rates used for TACs in 2007 (F_{2007}) are proposed for 2008 TACs, and are presented for Management Units 1 through 4 in Table 5. In 2005, an exercise was completed to update the allocation area shares using geographical information systems (GIS) mapping. In 2008, updated area percentages will be implemented as allocation shares among jurisdictions. Allocation shares by management unit and jurisdiction are:

Allocation by Management Unit and Jurisdiction, 2008:

MU 1:	MI	9.10%	OH	50.31%	ONT	40.58%
MU 2:	OH	54.42%	ONT	45.58%		
MU 3:	OH	32.85%	PA	15.46%	ONT	51.69%
MU 4:	NY	30.27%	PA	10.76%	ONT	58.97%

Table 4. Projection of the 2008 Lake Erie yellow perch population. Stock size estimates are derived from ADMB and age-2 estimates for 2008 are derived from ADMB age-2 abundance against YOY and yearling trawl indices.

		2007 Parameters	Rate Functions		2008 Parameters	Stock Biomass			
		Stock Size (numbers millions)	Fishing Mortality Rate	Survival Rate	Stock Size (numbers millions)	Mean Weight in Pop. (kg)	millions kg		millions lbs.
	Age	**Mean**	**(F)**	**(S)**	**Mean**		**2007**	**2008**	**2008**
Unit 1	2	15.411	0.088	0.614	8.927	0.065	1.356	0.580	1.279
	3	1.623	0.168	0.567	9.460	0.099	0.183	0.937	2.065
	4	12.153	0.437	0.433	0.920	0.122	1.665	0.112	0.247
	5	0.416	0.445	0.430	5.262	0.161	0.074	0.847	1.868
	6+	1.633	0.482	0.414	0.855	0.217	0.328	0.185	0.409
	Total	31.235	0.238	0.528	25.423	0.105	3.607	2.662	5.869
	(3+)	15.825	0.410	0.445	16.496	0.126	2.251	2.081	4.589
Unit 2	2	22.905	0.033	0.649	8.584	0.070	1.993	0.601	1.325
	3	2.918	0.129	0.589	14.855	0.106	0.350	1.575	3.472
	4	47.556	0.361	0.467	1.719	0.141	7.276	0.242	0.534
	5	1.157	0.365	0.465	22.218	0.193	0.146	4.288	9.455
	6+	6.117	0.375	0.461	3.357	0.316	1.682	1.061	2.339
	Total	80.652	0.249	0.523	50.733	0.153	11.447	7.767	17.126
	(3+)	57.748	0.349	0.473	42.149	0.170	9.454	7.166	15.801
Unit 3	2	20.039	0.103	0.605	21.310	0.056	1.603	1.193	2.631
	3	3.297	0.141	0.582	12.118	0.099	0.326	1.200	2.645
	4	30.979	0.253	0.520	1.919	0.139	4.647	0.267	0.588
	5	0.720	0.285	0.504	16.124	0.207	0.131	3.338	7.360
	6+	5.265	0.272	0.511	3.052	0.327	1.537	0.998	2.200
	Total	60.300	0.196	0.551	54.523	0.128	8.245	6.995	15.425
	(3+)	40.261	0.246	0.524	33.213	0.175	6.642	5.802	12.793
Unit 4	2	3.489	0.013	0.662	4.174	0.077	0.412	0.321	0.709
	3	0.759	0.036	0.647	2.308	0.169	0.143	0.390	0.860
	4	3.736	0.054	0.635	0.491	0.247	0.975	0.121	0.267
	5	0.322	0.065	0.628	2.373	0.286	0.099	0.679	1.496
	6+	1.979	0.059	0.632	1.453	0.336	0.679	0.488	1.076
	Total	10.285	0.040	0.644	10.798	0.185	2.308	1.999	4.409
	(3+)	6.796	0.054	0.635	6.625	0.253	1.897	1.678	3.700

Table 5. Lake Erie yellow perch fishing rates and the Recommended Allowable Harvest (RAH; in millions of pounds) for 2008 by management unit.

MU	Fishing Rate	Recommended Allowable Harvest (millions lbs.)
1	0.720	1.408
2	0.661	4.227
3	0.703	3.710
4	0.230	0.325
Total		9.670

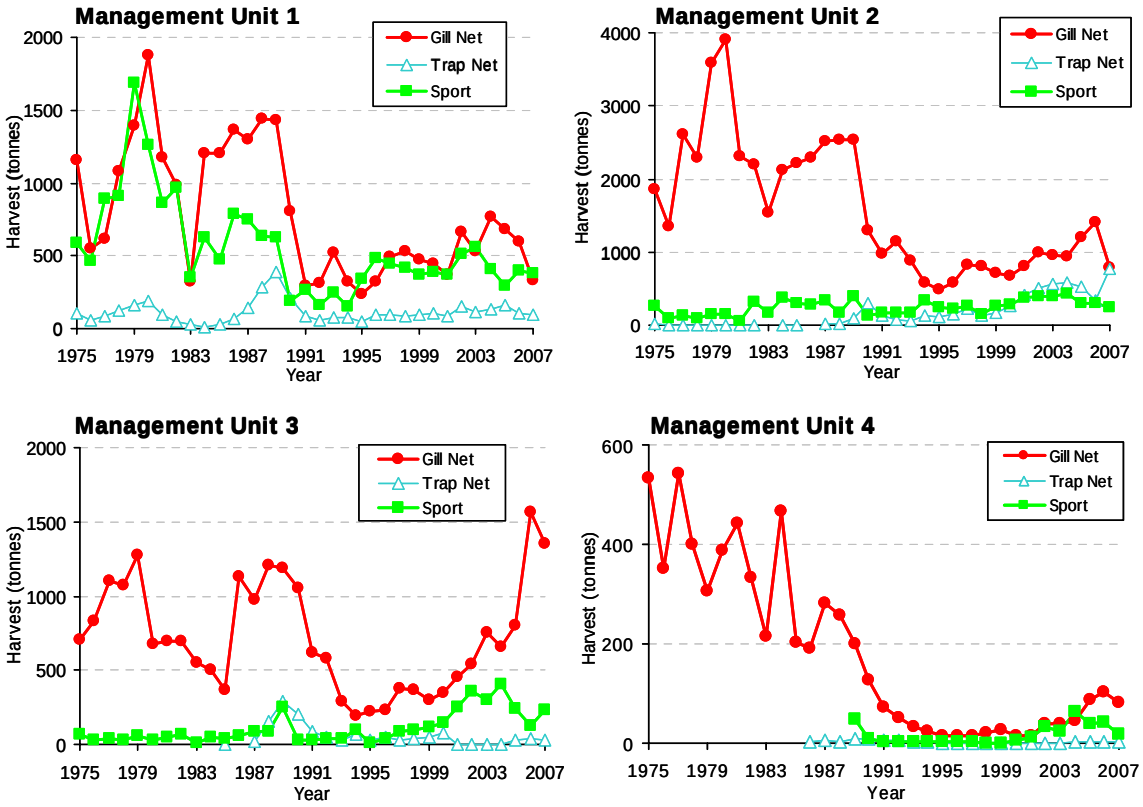

Figure 2. Lake Erie yellow perch harvest by management unit and gear type.

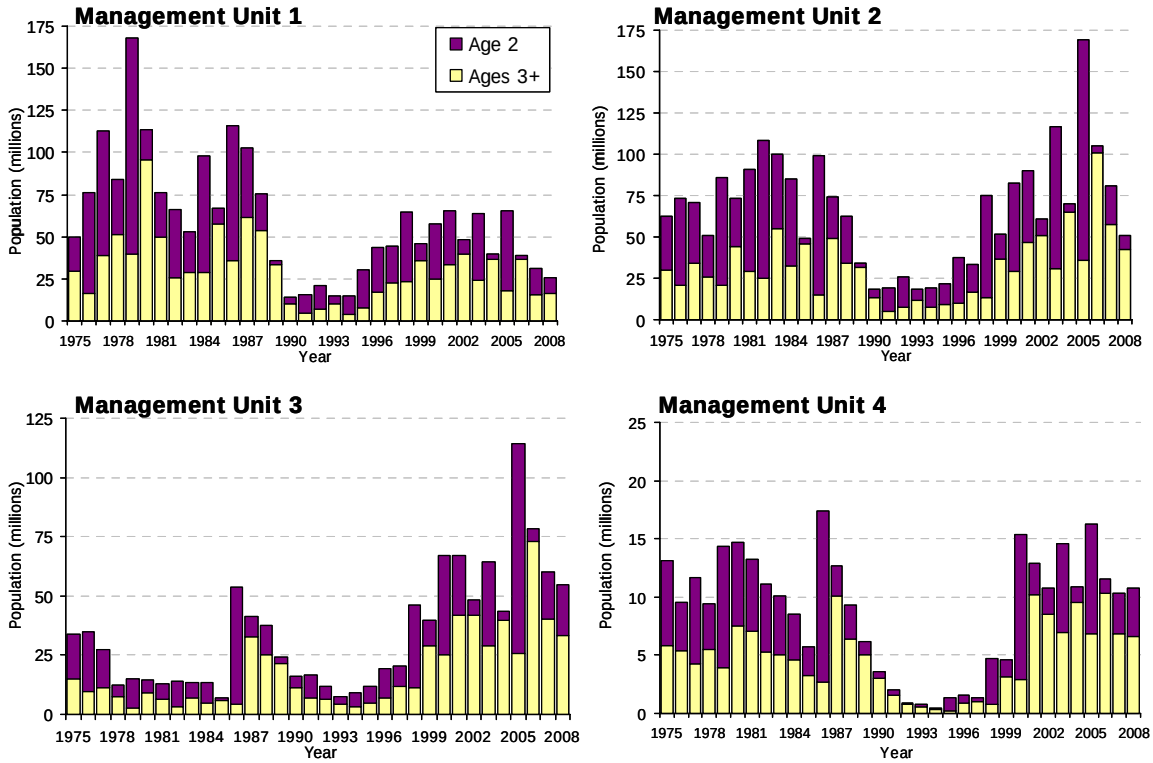

Figure 3. Lake Erie yellow perch population estimates by management unit for age 2 (dark bars) and ages 3+ (light bars). Estimates for 2007 are from ADMB and regressions for age 2 from survey gears.