Report of the

LAKE ERIE YELLOW PERCH TASK GROUP

March 1993

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Presented to:

Standing Technical Committee of the Lake Erie Committee
Great Lakes Fishery Commission

The Yellow Perch Task Group (YPTG) was charged with describing the status of yellow perch, producing population size estimates and recommending allowable harvest (RAH) for 1993 in each of the four Lake Erie management units (Figure 1). The results of these charges are presented in this report. The task group was also charged with two additional tasks: a review of factors affecting recruitment of yellow perch into the fisheries, and the completion of the Joint YPTG/Statistics and Modelling Task Group (SAM) report, documenting the procedures used to develop a recommended allowable harvest. Work was done on both of the additional charges in 1992 and reports will be completed in 1993.

Fisheries Review

The reported harvest of yellow perch from Lake Erie in 1992 totalled 2,617 tonnes (5.8 million pounds) (Table 1), which was 5% less than the 1991 harvest. Perch catches declined in all agencies except Ontario, which showed a slight overall increase of 8%. Pennsylvania harvest showed the greatest decline (-49%), followed by Ohio (-33%), Michigan (-30%) and New York (-18%). Ontario harvested 78% of the lakewide reported catch, while Ohio harvest accounted for 19%, and Michigan, Pennsylvania and New York caught the remaining 3%.

The recommended allowable harvest level for 1992 was 6.1 million pounds lakewide. Based on current information, the revised recommendation for 1992 was 7.7 million pounds (Described later in this report). Reported harvest relative to these recommendations is summarized in Table 2.

Harvest, fishing effort, and catch rate are summarized by Unit, year, agency, and gear type in Tables 3a-d. The trends over time (1975-1992) in harvest, fishing effort and catch rate are described in Figures 2, 3 and 4 by Unit and gear type. Commercial gillnet harvest increased in Units 1 (+6%) and 2 (+16%), and decreased in Units 3 (-7%) and 4 (-29%), compared to 1991 harvest. Harvest from commercial trapnets was down in all units. The greatest decrease in trapnet harvest was in the central basin of Lake Erie, Units 2 (-52%) and 3 (-45%), followed by Units 1 (-37%) and 4 (-29%). Sport harvest decreased in Units 1 (-40%) and 2 (-7%), increased in Unit 3 (+23%) and stayed the same in Unit 4.

Commercial gillnet effort in 1992 declined in Units 1 (-32%), and 4 (-29%), stayed the same in Unit 2 (+2%), and increased in Unit 3 (+11%), as compared to 1991. Trapnet effort decreased in all units. Unit 4 showed the greatest decrease (-31%), followed by Units 2 (-27%), 3 (-26%), and 1 (-6%).

Sport fish effort declined in Units 1 (-46%) and 2 (-25%) in 1992 but increased substantially in Units 3 (+56%) and 4 (+137%).

Catch rates for commercial gillnet fisheries increased in Units 1 (+57%) and 2 (+14%) but continued to decrease in Units 3 (-20%) and 4 (-18%), compared to 1991 levels. Commercial trapnet catch rates decreased in all Units (Unit 1: -33%, Unit 2: -34%, Unit 3: -26%) except Unit 4, which remained approximately the same as that of 1991 (+4%). Catch rates from the sport fisheries increased in Units 1 (+8%) and 2 (+24%), and declined in Units 3 (-21%) and 4 (-56%). Catch rates in 1992 remained at levels similar to or lower than catch rates observed in the early 1980's, prior to the entry of the 1984 year class into the fisheries.

The 1992 harvest of yellow perch was comprised mainly of the 1989 and 1990 year classes in Units 1, 2 and 3. Unit 4 is the only management unit in which the 1986, 1987 and 1988 year classes make up a major portion of the fishery (Table 4). The 1989 year class was a strong contributor to the gillnet and trapnet fisheries throughout the year in all units except Unit 4. The 1990 year class began contributing to the fisheries in the second half of the year in Units 1, 2 and 3.

Stock Assessment

Catch-at-Age-Analysis (CAGEAN) and the Estimation of 1992 Population

A three gear (gillnet, trapnet and sport harvest and effort) version of the CAGEAN model was used to estimate the 1992 population size. The three gear version allows factors such as catchabilities and selectivities to be gear specific. Population size estimates were based on a natural mortality rate of 0.4 (M=0.4).

In all units except Unit 4, the current CAGEAN estimate of the 1992 population size was larger than the population size projected last year (Table 5). CAGEAN estimates of both the 1989 (age 3) and 1990 year classes (age 2) were higher than those which had been projected last year in Units 1, 2 and 3, but lower than projected in Unit 4. The abundance of age 3 and older fish was underestimated in all units except Unit 4, in which abundance was overestimated for all age groups.

Results from CAGEAN and the Ontario partnership index fishing surveys agree that the 1990 year class was very abundant as 2 year old fish in 1992. Age 2 fish were the most abundant cohort in Units 1, 2 and 3. The 1989 year class is not as strong as that of 1990 but continues to be more abundant than older aged fish in the population.

Since age 2 yellow perch are not fully recruited to the gillnet, trapnet and sport fishing gears, results from Ontario's fall partnership index fishing surveys were used to estimate the abundance of the 1990 year class as age 2 fish, and an 'adjusted' 1992 population size estimate of age 2 and older fish was produced (Table 5). The adjustment was made in the following way. For each management unit, the ratio of geometric mean catch rates of the 1989 and 1990 year classes as 2-year-old fish in 1991 and 1992, respectively, from the partnership index nets, and the CAGEAN estimate of the 1989 year class as age 2 were used to estimate the abundance of the 1990 year class as age 2 fish in 1992, i.e. $Abundance_{1990}$ (millions of fish) = $Abundance_{1989}$ X ($Index_{1990}$ / $Index_{1989}$). Because the 1989 year class has 2 year's worth of harvest data associated with it by 1992, CAGEAN will be able to provide a more reliable estimate of the 1989 year class as age 2 fish than it would for the 1990 year class, with only one year of harvest data available in 1992. The partnership index fishing surveys, done in cooperation with the Ontario commercial fishing industry, are considered to provide the most representative index information currently available due to the broad coverage of the surveys, standardized methods and large sample sizes.

In conjunction with the adjustment of age 2 stock size estimates, it was believed that a concomitant adjustment of the CAGEAN-derived F (instantaneous fishing mortality) value was required for each of the 4 management units. In order to scale the age 2 F, the rate of exploitation (u) was estimated using the ratio of the actual number of age 2 fish harvested in 1992 to the adjusted age 2 stock size. It was assumed that the actual total mortality rate (A), calculated from the CAGEAN estimates, would not change significantly, and could be used without adjustment. The expectation of natural death (v) can be calculated (v = A - u), and using the instantaneous natural mortality rate of 0.4, F was calculated as follows: F = (M*u)/v. (Ricker, 1975). This adjustment of age 2 specific F rates

does not have a significant effect on the overall population stock size estimate, i.e. less than 1% decrease in the yield using the F adjustment. Appendix E compares the results of age 2 F adjusted method with the results of the age 2 F from CAGEAN, used previously by the YPTG, in tabular form. Appendix F shows the estimated harvest of yellow perch for 1992 using the adjusted age 2 F method.

Population size, in numbers and biomass, and population parameters such as survival and exploitation rates are presented for two stock size estimates; one that consists of age 2 and older fish, and one that consists of age 3 and older fish (Table 6). Because of the relatively low exploitation rate on age 2 fish related to their low vulnerability to the gear, the yield from age 2 fish is low relative to their total abundance in the population. Results associated with age 3 and older fish are believed to be more representative of the available fishable stock. Age 2 fish do contribute to the harvest, as illustrated in 1992, but a cohort contributes more significantly at age 3 and older, when it is more vulnerable to the gear.

In 1992, stock size estimates of age 3 and older fish increased in all management units, except Unit 4, as compared to 1991 (Table 6, Figure 5). Stock size estimates for Units 2, 3, and 4 were at levels typical of the early 1980's, prior to the 1984 year class. Stock size estimates for Unit 1 in 1992 were better than those of 1991 but still lower than typical historical levels. Biomass estimates for age 3 and older fish in 1992 were lower than 1991 in all units, except Unit 1. (Figure 6). The 1992 population consisted primarily of age 2 fish in units 1, 2 and 3. Unit 4 was the only unit in which the age 6 and older fish made up the largest component of the population estimate (Figure 7).

Survival rates for age 3 and older fish were higher in all Units in 1992, as compared to 1991. Survival rates for Units 1 to 4 are 56%, 52%, 44% and 64%, respectively (Table 6, Figure 7). Exploitation rates have decreased as survival rates have improved. Age 3 and older fish in 1992 experienced exploitation rates of 14%, 19%, 28%, and 4%, respectively, down in all units as compared to 1991.

Recruitment

The same methods used in the last two year's reports were used to estimate age 2 population size from index trawling values. This method includes: an expanded data series (more years and more

trawling projects), the use of geometric mean index values (number per trawl-hour), regressing CAGEAN age 2 population size estimates of age 2 abundance (Table 8).

Since 1986, there has been poor to fair recruitment of yellow perch in all Units (Figure 9). Two years of poor year class strength in 1987 and 1988 were followed by two fair year classes, 1989 and 1990. The index gillnetting results indicate that the 1990 year class is stronger than anticipated. Index young-of-the-year (YOY) and yearling trawling suggested that the 1991 year class will be poorer than the previous 2 years and the 1992 year classes will be better than 1991. Based on the index gillnetting results, the 1991 year class is greater than the 1989 year class in Unit 1, similar in Unit 2, and less in Units 3 and 4.

1993 Population Size Projection

Stock size estimates for 1993 (age 3 and older) were projected from the adjusted 1992 population size estimates and age specific survival rates in 1992. Recruitment of the 1991 year class in 1993 (age 2 fish) was estimated from various agency trawling indices of age 0 and age 1 yellow perch (Figure 8).

Projections of stock size for 1993 indicate a decline in the abundance of age 2 and older fish in all units (Table 9, for unadjusted population sizes see Appendix A). However, estimates of age 3 and older fish in 1993 were higher in Units 1 (+56%), 2 (+61%) and 3 (+58%) than in 1992. In Unit 4, the number of age 3 and older fish continued to decline (-24%) in 1992. Although Unit 1 population abundance remains slightly lower than historical levels, most of the Units appear to have returned to population size levels seen prior to the entry of the 1984 year class. The composition of the populations projected in all management units consist primarily of age 2, 3 and 4-year-old fish, but with fewer 2-year-olds than in 1992 and few fish older than 5.

Biomass of age 3 and older fish is probably the most representative indicator of fishable stock available in 1993 (Table 9). In the 1993 projection, there was a 67% increase in the biomass of age 3 and older fish in Unit 1, a 69% increase in Unit 2, and a 57% increase in Unit 3, as compared to 1992. Unit 4 showed a 25% decrease in biomass between 1992 and 1993. Biomass was generated from the

number of fish estimated by CAGEAN (for 1992) and the yield-per-recruit model (for 1993), multiplied by the mean weight-at-age from the 1992 Ontario partnership index fishing survey data. The 1992 index values are considered to provide the best estimation of biomass in the current population.

Yield per Recruit

The yield per recruit model used to determine a recommended harvest in 1993 is the same as that used in 1992. The basic assumption of the yield per recruit model is that the desired harvest strategy is to optimize the return in weight per recruit. The optimum harvest rate F_{opt}, is determined by growth rate versus natural mortality rate. For temperate waters, F_{opt} is modified to $F_{0.1}$, which corresponds to 10% of the rate of increase in yield per recruit which can be obtained by increasing F (fishing mortality) at low levels of fishing. A full description of the model inputs, as well as the steps required to determine a scaled $F_{0.1}$, are given in last year's report (YPTG, 1992).

The 1993 harvest estimates of age 2 and older fish is the sum of the estimates of harvest from each age, derived from scaling $F_{0.1}$ by the selectivity at that age. Catch in weight is calculated by multiplying the age specific catch in millions of fish by the mean weight in the harvest (5 year average, 1988 - 1992). The harvest estimate is the sum of the harvest for age 2 and older fish (Table 10, Appendix B, C and D).

Recommended Allowable Harvest

Four harvest scenarios were generated for 1993 (Table 11). The first 3 are the same as those presented for 1992. The first was using the unadjusted CAGEAN estimates of population size and a scaled $F_{0.1}$ exploitation strategy; the second was to use the adjusted CAGEAN population size estimate and a scaled $F_{0.1}$ exploitation strategy; and the third was to use the adjusted population size and the same level of fishing effort as in 1992.

The fourth scenario, presented for the first time this year, was based on the use of the 1992 harvest and Ontario partnership index fishing results, with the products adjusted in accord with an optimum exploitation strategy (Table 13a,13b). The fall index gillnetting conducted in the Ontario waters of each management unit provides a source of information on relative biomass of yellow perch present

in each management unit. The gillnet mesh sizes (ranging from 1.25" - 5.00") encompass the range of fish sizes available to the fisheries as well as smaller fish which are not yet recruited to the fisheries. Yellow perch caught in mesh sizes of 1.75" and greater in the fall are used as an indicator of the availability of yellow perch which will represent the fishable stock the following year. Knowing the number of yellow perch caught in a standard amount of fishing effort and their lengths, a length/weight regression was used to estimate the weight of perch caught and this value was used as an index of fishable biomass of the stock in the upcoming fishing year (1993).

Assuming that the biomass indicator calculated is directly proportional to fishable stock and that fishing effort is constant from one year to the next, two successive years of index data, coupled with recent harvest weight, can be used to project harvest in the upcoming year. Given that the effort used to harvest yellow perch in the most recent harvest year may be different than the effort needed to optimize harvest, a second calculation is required. A harvest projection is made assuming that effort (fishing mortality rate) does not change in the upcoming year. The ratio of the projected harvest at $F_{0.1}$ to the projected harvest, using the previous year's fishing effort, provides a factor which can be used to adjust the harvest projection, which was based on the index fishing biomass change.

Recommendations and Conclusions

A lakewide harvest of 6.1 million pounds of yellow perch was recommended in 1992 and the harvest was virtually the same at 5.8 million pounds. Using the current 1992 information, the recommended allowable harvest would have been 7.7 million pounds (Table 12, Appendix D). Last year's recommended allowable harvest and actual harvest were within the range associated with the revised recommendation for 1992.

In 1993, the fishable stock size (age 3 and older) has continued to improve, but not to the population levels experienced in the late 1980's. Stock size in numbers and biomass continue to decline in Unit 4. We are recommending a harvest level within the range presented in the adjusted CAGEAN 1993 population estimate and the $F_{0.1}$ exploitation strategy. The midpoint level is 10.9 millions pounds, ranging from 7.2 to 14.7 million pounds.

Because of the importance of the inputs from the index fishing program, the YPTG continues to urge agencies to adopt a standard index assessment program which includes yellow perch. As the data series grows, the index fishing results can be used directly in the CAGEAN population estimation exercise as an input to calibrate harvest information.

References

RICKER, W.E. 1975. Computation and Interpretation of Biological Statistics of Fish Populations. Bulletin of Fisheries Research Board of Canada, Bull. 191. 382 p.

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Table 1. Summary of total catch[a] of yellow perch by management unit and agency, Lake Erie 1980 - 92.

Unit	Year	Ontario Catch	(%)	Ohio Catch	(%)	Michigan Catch	(%)	Pennsylvania Catch	(%)	New York Catch	(%)	TOTAL
1	1980	1,873	(56)	1,326	(41)	74	(02)	–	–	–	–	3,323
	1981	1,180	(55)	924	(43)	34	(02)	–	–	–	–	2,138
	1982	983	(49)	972	(49)	46	(02)	–	–	–	–	2,001
	1983	326	(47)	358	(51)	17	(02)	–	–	–	–	701
	1984	1,208	(65)	608	(33)	30	(02)	–	–	–	–	1,846
	1985	1,347	(73)	476	(26)	22	(01)	–	–	–	–	1,845
	1986	1,360	(61)	775	(35)	82	(04)	–	–	–	–	2,217
	1987	1,298	(59)	785	(36)	102	(05)	–	–	–	–	2,185
	1988	1,445	(61)	846	(36)	76	(03)	–	–	–	–	2,367
	1989	1,432	(59)	862	(35)	151	(06)	–	–	–	–	2,445
	1990	808	(67)	296	(24)	105	(09)	–	–	–	–	1,209
	1991	294	(46)	309	(48)	43	(07)	–	–	–	–	646
	1992	312	(59)	184	(35)	30	(06)	–	–	–	–	526
2	1980	2,877	(71)	1,175	(29)	–	–	–	–	–	–	4,052
	1981	1,603	(67)	784	(33)	–	–	–	–	–	–	2,387
	1982	2,162	(86)	356	(14)	–	–	–	–	–	–	2,518
	1983	1,466	(85)	258	(15)	–	–	–	–	–	–	1,724
	1984	2,117	(85)	378	(15)	–	–	–	–	–	–	2.495
	1985	2,127	(87)	308	(13)	–	–	–	–	–	–	2.435
	1986	2,289	(89)	289	(11)	–	–	–	–	–	–	2,578
	1987	2,512	(88)	344	(12)	–	–	–	–	–	–	2,856
	1988	2,538	(93)	191	(07)	–	–	–	–	–	–	2,729
	1989	2,530	(84)	486	(16)	–	–	–	–	–	–	3,016
	1990	1,303	(75)	432	(25)	–	–	–	–	–	–	1,735
	1991	985	(76)	310	(24)	–	–	–	–	–	–	1,295
	1992	1,144	(83)	227	(17)	–	–	–	–	–	–	1,371
3	1980	478	(68)	144	(20)	–	–	86	(12)	–	–	708
	1981	505	(68)	131	(18)	–	–	103	(14)	–	–	739
	1982	615	(80)	89	(12)	–	–	64	(08)	–	–	768
	1983	519	(94)	21	(04)	–	–	15	(03)	–	–	555
	1984	466	(86)	44	(08)	–	–	32	(06)	–	–	542
	1985	370	(81)	43	(09)	–	–	43	(09)	–	–	456
	1986	1,101	(92)	60	(05)	–	–	30	(03)	–	–	1,191
	1987	908	(84)	108	(10)	–	–	64	(06)	–	–	1,080
	1988	1,128	(78)	239	(17)	–	–	81	(06)	–	–	1,448
	1989	1,095	(63)	544	(31)	–	–	96	(06)	–	–	1,735
	1990	965	(76)	229	(18)	–	–	84	(06)	–	–	1,278
	1991	550	(75)	115	(16)	–	–	69	(09)	–	–	734
	1992	540	(82)	84	(13)	–	–	35	(05)	–	–	659
4	1980	303	(78)	–	–	–	–	42	(11)	42	(11)	387
	1981	355	(80)	–	–	–	–	33	(07)	53	(12)	441
	1982	253	(76)	–	–	–	–	29	(09)	52	(16)	334
	1983	175	(81)	–	–	–	–	13	(06)	28	(13)	216
	1984	365	(78)	–	–	–	–	35	(07)	67	(14)	467
	1985	190	(75)	–	–	–	–	14	(05)	51	(20)	255
	1986	143	(88)	–	–	–	–	16	(11)	2	(01)	161
	1987	260	(90)	–	–	–	–	23	(08)	6	(02)	289
	1988	258	(98)	–	–	–	–	1	(<1)	4	(02)	263
	1989	199	(78)	–	–	–	–	0	(00)	55	(22)	254
	1990	128	(88)	–	–	–	–	0	(00)	17	(12)	145
	1991	73	(87)	–	–	–	–	0	(00)	11	(13)	84
	1992	52	(85)	–	–	–	–	0	(00)	9	(15)	61

[a]Catch is in metric tonnes.
Values in parentheses represent each agency's percentage of management unit catch.

Table 2. Lake Erie 1992 recommended allowable harvest (RAH) levels and reported harvest of yellow perch by management unit and by agency, using surface area as the allocation formula. Two 1992 RAH levels are shown; those based on last year's information (ORIGINAL) and those based on current information (UPDATE) in 1992. RAH, harvest and difference between the two values are reported in millions kilograms.

UNIT	AGENCY	RAH – MILLIONS KG		HARVEST MILLIONS	DIFF. – ORIGINAL		DIFF. – UPDATE	
		ORIGINAL	UPDATE	KG	KG x 10**6	%	KG X 10**6	%
1	Ontario			0.312				
	Ohio			0.184				
	Michigan			0.030				
	TOTAL	0.608	0.754	0.526	−0.082	−13.5	−0.228	−30.2
2	Ontario			1.144				
	Ohio			0.227				
	TOTAL	1.611	1.869	1.371	−0.240	−14.9	−0.498	−26.6
3	Ontario			0.540				
	Ohio			0.084				
	Pennsylvania			0.035				
	TOTAL	0.434	0.616	0.659	0.225	51.8	0.043	7.0
4	Ontario			0.052				
	Pennsylvania			0.000				
	New York			0.009				
	TOTAL	0.130	0.265	0.061	−0.069	−53.1	−0.204	−77.0

Table 3a. Catch and effort summaries for Lake Erie yellow perch fisheries in Management Unit 1, 1981 - 92.

	Year	Ohio		Michigan	Ontario	
		Trap	Sport	Sport	Gill Net	Sport
CATCH (tonnes)	1981	93	831	34	1180	–[a]
	1982	50	922	46	983	–
	1983	26	332	17	327	–
	1984	14	594	30	1208	–
	1985	27	449	23	1206	–
	1986	71	704	82	1361	–
	1987	139	646	102	1298	–
	1988	284	562	76	1445	–
	1989	392	470	151	1432	–
	1990	210	86	105	808	–
	1991	89	220	43	294	–
	1992	56	128	30	312	–
EFFORT[b]	1981	9,830	2,676,326	271,000	24,908	–
	1982	5,272	3,036,979	151,900	27,627	–
	1983	5,086	1,498,289	74,914	11,456	–
	1984	3,451	1,159,599	57,980	28,746	–
	1985	4,141	935,645	46,782	16,139	–
	1986	5,279	1,404,286	404,514	20,909	–
	1987	7,078	1,046,115	452,460	14,730	–
	1988	6,900	1,153,182	494,158	9,616	–
	1989	8,418	1,028,551	696,973	12,716	–
	1990	6,299	350,000	634,255	18,305	–
	1991	7,259	700,719	164,517	13,629	–
	1992	6,795	350,433	120,979	9,221	–
CATCH RATES[c]	1981	9.46	0.31	0.13	47.37	–
	1982	9.48	0.30	0.30	35.58	–
	1983	5.11	0.22	0.23	28.54	–
	1984	4.06	0.51	0.52	42.02	–
	1985	6.52	0.48	0.49	74.73	–
	1986	13.45	0.50	0.20	65.09	–
	1987	19.64	0.62	0.23	88.12	–
	1988	41.16	0.49	0.15	150.27	–
	1989	46.57	0.46	0.22	112.61	–
	1990	33.34	0.26	0.17	44.14	–
	1991	12.26	0.31	0.26	21.57	–
	1992	8.24	0.37	0.25	33.84	–

[a] Not measured.

[b] Sport effort in angler-hours; gill net effort in km; trap net effort in lifts.

[c] Sport (kg/hour), gill net (kg/km), trap net (kgs/lift).

Table 3b. Catch and effort summaries for Lake Erie yellow perch fisheries in Management Unit 2, 1981 - 92.

	Year	Ohio			Ontario	
		Gill Net	Trap Net	Sport	Gill Net	Sport
CATCH (tonnes)	1981	711	8	65	1,603	--[a]
	1982	34	8	314	2,162	--
	1983	82	0	176	1,466	--
	1984	0	5	373	2,117	--
	1985	0	8	300	2,208	--
	1986	0	0	289	2,290	--
	1987	0	10	334	2,512	--
	1988	0	21	170	2,538	--
	1989	0	91	395	2,530	--
	1990	0	295	137	1,303	--
	1991	0	137	173	985	--
	1992	0	66	161	1,144	--
EFFORT[b]	1981	17,810	713	437,816	27,782	--
	1982	1,400	801	1,277,417	41,868	--
	1983	3,632	0	739,325	44,692	--
	1984	0	466	894,109	44,524	--
	1985	0	212	728,763	34,187	--
	1986	0	0	461,273	30,920	--
	1987	0	630	429,239	20,940	--
	1988	0	448	402,180	17,315	--
	1989	0	1,403	572,612	25,679	--
	1990	0	6,238	400,676	31,613	--
	1991	0	6,480	452,277	34,739	--
	1992	0	4,753	340,917	35,348	--
CATCH RATE[c]	1981	39.92	11.22	0.15	57.70	--
	1982	24.29	9.99	0.25	51.64	--
	1983	22.58	0	0.24	32.80	--
	1984	--	10.73	0.42	47.55	--
	1985	--	37.74	0.41	64.59	--
	1986	--	0	0.63	74.06	--
	1987	--	15.87	0.78	119.96	--
	1988	--	46.88	0.42	146.58	--
	1989	--	64.86	0.69	98.52	--
	1990	--	47.29	0.34	41.22	--
	1991	--	21.14	0.38	28.35	--
	1992	--	13.89	0.47	32.36	--

[a] Not measured.

[b] Sport effort in angler-hours; gill net effort in km; trap net effort in lifts.

[c] Sport (kg/hour), gill net (kgs/km), trap net (kgs/lift).

Table 3c. Catch and effort summaries for Lake Erie yellow perch fisheries in Management Unit 3, 1981 - 92.

	Year	Ohio			Ontario		Pennsylvania	
		Gill Net	Trap Net	Sport	Gill Net	Sport	Gill Net	Sport
CATCH (tonnes)	1981	86	0	45	505	–[a]	103	–[a]
	1982	18	0	71	615	–	64	–
	1983	14	0	7	519	–	15	–
	1984	0	0	44	466	–	32	–
	1985	0	2	41	325	–	43	–
	1986	0	0	60	1,101	–	30	–
	1987	0	21	87	908	–	64	–
	1988	0	150	89	1,128	–	81	–
	1989	0	288	256	1,095	–	96	–
	1990	0	203	26	965	–	84	–
	1991	0	84	31	550	–	69	–
	1992	0	46	38	540	–	35	–
EFFORT[b]	1981	2,377	0	237,691	12,685	–	2,735	–
	1982	710	0	308,826	16,438	–	2,737	–
	1983	802	0	181,030	18,199	–	1,521	–
	1984	0	0	149,602	14,153	–	1,197	–
	1985	0	136	144,309	10,635	–	2,175	–
	1986	0	0	122,007	12,440	–	2,185	–
	1987	0	668	129,316	6,667	–	1,538	–
	1988	0	4,781	172,490	6,203	–	1,418	–
	1989	0	7,281	248,530	7,098	–	1,037	–
	1990	0	7,376	31,881	12,472	–	1,978	–
	1991	0	4,516	54,607	12,247	–	2,018	–
	1992	0	3,361	84,445	14,540	–	1,321	–
CATCH RATE[c]	1981	36.18	0	0.19	39.81	–	37.66	–
	1982	25.35	0	0.23	37.41	–	23.38	–
	1983	17.46	0	0.04	28.52	–	9.86	–
	1984	–	0	0.29	32.93	–	26.73	–
	1985	–	14.71	0.28	30.56	–	19.77	–
	1986	–	0	0.49	88.50	–	13.73	–
	1987	–	31.44	0.67	136.19	–	41.61	–
	1988	–	31.37	0.52	181.85	–	57.12	–
	1989	–	39.56	1.03	154.27	–	92.57	–
	1990	–	27.52	0.82	77.37	–	42.47	–
	1991	–	18.60	0.57	44.91	–	34.19	–
	1992	–	13.69	0.45	37.14	–	26.50	–

[a] Not measured.

[b] Sport effort in angler-hours; gill net effort in km; trap net effort in lifts.

[c] Sport (kg/hour), gill net (kgs/km), trap net (kgs/lift).