

2013 Status of Major Stocks

Lake Erie Management Unit
March 2014



The Lake Erie Management Unit of the Ontario Ministry of Natural Resources is responsible for managing the fishery resources of the Ontario waters of Lake Erie as well as the upper Niagara River, the Detroit River, Lake St. Clair, and the St. Clair River.

Ontario has been responsible for managing the fishery resources of these waters since 1898. In 1992, the Lake Erie Management Unit was created to improve Ontario's ability to manage these important resources. The Unit is based in London with field offices in Port Dover and Wheatley.

VISION: The Lake Erie Management Unit will contribute to the environmental, social, and economic well-being of the people of Ontario through the sustainable development of fishery resources within the Lake Erie basin.

MISSION: To ensure the long-term health of the Lake Erie ecosystem and to promote the sustainable harvest and development of its fishery resource through sound science, assessment, regulation, and advocacy.

GOAL: To foster and encourage the understanding of all users and partners on the complexity of managing the fishery resource of Lake Erie, to minimize conflict, and to endorse sound fishery management practices.

Under the Joint Strategic Plan for Management of Great Lakes Fisheries, the fisheries resources of Lake Erie and Lake St Clair are managed cooperatively by Ontario and the four U.S. states – New York, Pennsylvania, Ohio and Michigan.

Cover Photo (top to bottom):

- Port Dover Assessment Biologist, Larry Witzel (large photo), working on the Eastern Basin Lake Trout Stocking Program
- Wheatley Fisheries Technicians Christine Benoit and Joey Battaglia electrofishing for the Sydenham River Walleye Tagging Program
- Port Dover Fisheries Technician, Duncan Norrie and Operations Coordinator, Dixie Greenwood, working on the Long Point Bay Adult Index Gill Netting Program
- Wheatley Fisheries Technicians Chris Gignac and Lindsay Bennett working on trap nets from the Lake St. Clair Fall Index Program

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FORWARD

The mission of the Lake Erie Management Unit (LEMU) is to provide leadership and direction on sustainable resource management for Lake Erie, by maintaining and, where possible enhancing the social, economic, cultural and environmental benefits of the lake's rich aquatic resources. The LEMU works to achieve this through its annual fisheries assessment, Port Observer program and management activities on the Canadian waters of Lake Erie, Lake St. Clair and connecting waters. Presently the LEMU maintains facilities in Wheatley, Port Dover, and London. The Unit also provides a coordination function for commercial fish management across the province of Ontario.

The Province of Ontario and four U.S. States share the responsibility for managing Lake Erie's fishery resource. Since fish populations do not recognize borders, international cooperation is essential to the sustainable management of Lake Erie's fisheries. This cooperation is achieved via the Lake Erie Committee (LEC), which is comprised of representatives from state and provincial fisheries management agencies under the auspices of the Great Lakes Fishery Commission (GLFC). On a rotational basis, Ontario's Lake Erie Manager either chairs or vice-chairs this committee. Lake Erie Management Unit staff make key contributions to all of the LEC Task Groups, which jointly pursue scientific objectives, evaluate international fisheries management strategies, and sets harvest levels for the lake.

The Lake Erie Management Unit consults regularly with resource management partners, namely Ontario sport and commercial fish interests on Lake Erie and Lake St. Clair. The principal venue for this consultation process is the Fisheries Management Zone 19 Council. Within this group, representatives from the sport and commercial bait and food fisheries discuss emergent and long-term fisheries issues, with the Lake Erie Manager acting as chair and facilitator. In addition, the Lake Erie Management Unit participates in the Lake Erie Percid Management Advisory Group (LEPMAG), which was established to help guide future Walleye and Yellow Perch management in Lake Erie. This group consists of LEC members, agency staff, and stakeholders from all jurisdictions bordering Lake Erie, and is facilitated by staff from the Quantitative Fisheries Centre of Michigan State University.

The purpose of the LEMU Status of Stocks report is to summarize and present Ontario's assessment and fishery data for Lake Erie and Lake St. Clair. This data is incorporated with similar information from the U.S. jurisdictions and analyses are performed by various task groups to determine population status, and recommend harvest levels that are consistent with LEC objectives.

The LEMU Team is pleased to present this report to our stakeholders and colleagues, and welcome any questions or comments you may have on its content.

For further information please contact one of our leadership team representatives:

London - Headquarters

Lake Manager
659 Exeter Road
London, Ontario
N6E 1L3
519-873-4610

Wheatley Fisheries Station

Fisheries Assessment Supervisor
320 Milo Road
Wheatley, Ontario
N0P 2P0
519-825-7711

Port Dover Fisheries Station

Fisheries Ecology Supervisor
49 Passmore Ave, Unit#7, Box 429
Port Dover, Ontario
N0A 1N0
519-583-3082

1. STATUS OF MAJOR SPECIES

The following is an overview of the status of major species in Ontario waters of Lake Erie for 2013. International lakewide perspectives are available in the following reports of the Lake Erie Committee (LEC) of the Great Lakes Fishery Commission:

Walleye Task Group Report
 Yellow Perch Task Group Report
 Forage Task Group Report
 Cold Water Task Group Report
 Habitat Task Group Report

Walleye

The lakewide commercial Walleye harvest (4.6 million pounds) in 2013 approximated the mean harvest from 2000 to present (4.8 million pounds) but was below the mean harvest from the inception of individual transferable quotas (ITQs) (1984) to present (6.5 million pounds). In 2013, the commercial Walleye fishery was composed mainly of the 2010 (age 3), 2003 (age 10), 2011 (age 2), and 2007 (age 6) year classes. Lakewide fall surveys also indicated a strong presence of age 10 and age 6, and a moderate presence of age 2 and age 3 Walleye. These year classes will be the main contributors to the fishery and to spawner biomass in 2014. Interagency trawling to assess year class strength indicated a smaller than average 2012 year class which will recruit to the fishery in 2014, and a moderate 2013 year class which will recruit to the fishery in 2015. Overall, the abundance of Walleye in the west and central basins is at a moderate to below average level.

In 2010, the LEC formed the Lake Erie Percid Management Advisory Group (LEPMAG), consisting of Lake Erie managers, scientists and stakeholders, with facilitation from Michigan State University's Quantitative Fisheries Center. The purpose of this group is to advise on objectives and management options for Lake Erie percid. In 2011, LEPMAG outlined objectives for the Lake Erie Walleye population, suggested modifications to the Walleye assessment model and outlined a range of possible management options. In 2012, LEPMAG developed an updated Walleye assessment model and evaluated potential exploitation strategies. In 2013, the LEC implemented a draft Walleye exploitation policy developed through LEPMAG. In 2014, the LEC is expected to adopt a Walleye exploitation policy created by LEPMAG. This in turn will form the basis of an updated Walleye Management Plan through the next five years.

The Walleye population in eastern Lake Erie consists of mixed stocks including those originating from east basin shoals, the Grand River (Ontario), United States tributaries, and immigrants from the western portion of the lake. Representation of older Walleye is typically greater in eastern Lake Erie compared to other regions of the lake. The greater average age of Walleye in the eastern basin is due in part to the contribution of older migratory individuals originating from the western basin. In 2013, the strong 2003 year class at age 10 represented 27% of the commercial harvest in Ontario statistical districts 4 and 5 (Figure 2.1.1) combined. Age 10 Walleye also comprised a large fraction of the Walleye caught in the east basin Partnership gill net survey in 2013. Age 3 fish were the largest fraction of Walleye caught in eastern basin Partnership surveys, indicating a strong 2010 year class in the eastern basin which will contribute to the fishery in 2014.

Yellow Perch

Lakewide Yellow Perch harvest in 2013 (5.9 million pounds) exceeded the mean harvest from 2000 to present (5.6 million pounds) and was close to the long term mean harvest from when ITQs were introduced in 1984 (6.0 million pounds). In 2013, the lakewide commercial Yellow Perch fishery was mainly comprised of age 5 fish (2008 year class) and age 3 fish (2010 year class), as well as age 6 fish (2007 year class) in the west and central basins. In addition, the eastern basin fishery harvested a high proportion of age 2 Yellow Perch, indicating a moderate 2011 year class in the eastern basin. Fisheries in 2014 will continue to benefit from the 2010, 2008 and 2007 year classes.

Combined interagency assessment across multiple decades indicate that age 2 and older Yellow Perch abundance in 2013 remained below average in the west and west-central basins and above average in the east-central and east basins. In Ontario waters, Partnership survey indices in 2013 for age 2 and older Yellow Perch were moderate compared to recent decades in the west-central and east basins, and poor in the western and east-central basins. The 2012 year class, recruiting to the fishery in 2014, was moderate in the west, west-central basins and eastern basins, but strong in the east-central basin. The 2013 year class, recruiting to the fishery in 2015, was moderate in the western basin trawl survey and poor in the eastern basin Long Point Bay trawl assessment.

In 2012, LEPMAG consulted agencies and stakeholders regarding Yellow Perch fishery objectives and management options to be utilized in a management plan for Yellow Perch fisheries. In 2013, LEPMAG began work on updating Yellow Perch assessment models. In 2014, LEPMAG will continue to update the Yellow Perch assessment models and begin evaluating alternate exploitation strategies for Yellow Perch.

Lake Whitefish

Harvest trends help to describe the status of Lake Whitefish stocks; however, fishery effort is of marginal assessment value since a significant portion of the harvest is incidental from Walleye or White Bass effort. Targeted effort varies considerably between years but is typically quite low in comparison to recent years. General measures of year class strength come from fishery harvest and the Partnership gill net survey. In 2013, only three (3) Lake Whitefish were caught during the Partnership gill net surveys, with only one (1) caught in standard index gear.

Lake Whitefish harvest in 2013 (94 thousand pounds) was well below the mean harvest for the recent time period (2000-2013; 675 thousand pounds), and was the lowest harvest since 1986. In 2013, the majority of the commercial Lake Whitefish harvest came from the 2003, 2005, and 2001 year classes. Lake Whitefish recruit to the commercial harvest gear between ages 4 - 5. Recent Lake Whitefish recruitment appears to be poor; very few age 4 through age 7 fish were harvested in the commercial fishery. The 2003 and 2005 year classes will continue to contribute to fisheries in 2014. Older Lake Whitefish were observed in the 2013 Ontario fisheries (up to age 26).

Due to the current poor status of Lake Erie's Lake Whitefish population, quotas are expected to remain low until recruitment improves significantly.

2. COMMERCIAL FISHERY

2.1 Lake Erie Fishery

In 2013, commercial landings from Ontario waters of Lake Erie totalled 24.8 million pounds, a decrease of over 1 million pounds (-4%) from 2012 (Table 2.1.1). The value of the total commercial landings in 2013 was \$25.8 million, a decrease of almost \$6.0 million (-19%) from 2012 (Table 2.1.1). The decrease in harvest and value of landings is due in part to the lower allocated quota for Walleye and Yellow Perch in 2013. Harvest and landed value in 2013 are presented for each species by statistical district (Ontario Erie or OE, Figure 2.1.1) in Table 2.1.2.

Rainbow Smelt

The total landings of Rainbow Smelt decreased 7% to 6.9 million pounds in 2013 (Tables 2.1.2 and 2.1.3, Figure 2.1.4). The harvest was taken from OE-4 (78%) and OE-5 (22%). Summer harvest in OE-4 was primarily age 1 (54%) and age 3 (18%) fish. Age 1 fish comprised over 83% of OE-5 harvest throughout the year. The commercial fishery harvested 45% of the Rainbow Smelt quota allocated for 2013. Of the 74 Rainbow Smelt licences, 46 were not fished in 2013, while only 5 attained more than 90% of their individual quota. The landed value of Rainbow Smelt was \$1.6 million down 7% from 2012 (Tables 2.1.2 and 2.1.3).

Yellow Perch

In 2013 Yellow Perch landings decreased 14% to 5.9 million pounds (Tables 2.1.2 and 2.1.3, Figure 2.1.4). The commercial fishery harvested 96% of allocated quota in 2013. Spring fisheries were characterized by harvest from a broad range of ages with Ages 5 and 6, making a significant contribution to the harvest in OE-1 to OE-4 (56 to 70% combined). In the summer and fall harvest in OE-1, OE-2 and OE-3 ages 3 and 5 were the major contributors (>70% combined). Age 3 fish contributed over 55% and 65% respectively to OE-4 and OE-5's summer and fall harvests respectively. The landed value of Yellow Perch decreased 29%, from 2012 to \$11.4 million in 2013 (Tables 2.1.2 and 2.1.3).

Walleye

Walleye landings decreased 10% to 4.6 million pounds in 2013 (Tables 2.1.2 and 2.1.3, Figure 2.1.4). Ninety-one percent of the 2013 quota was harvested. Lakewide harvest by Walleye size category was: Jumbo (56%), and Number 1 (41%) (see Table 2.1.6 for description of size categories). In the Number 1 category the 2010 year class, age 3, was a significant portion of the harvest in OE-1 to OE-5 (18 to 55%). Age 2 fish of the Number 1 category became a significant part of the summer and fall harvest in OE-1 and OE-2 (16 to 45%). The 2003 year class at age 10 was one of the major contributors to the jumbo harvest throughout the year (Table 2.1.6). The landed value of Walleye decreased 13% from 2012 to \$9 million in 2013 (Tables 2.1.2 and 2.1.3).

White Bass

The total landings of White Bass increased 1.7 million pounds (49%) to 5.3 million pounds in 2013 (Tables 2.1.2 and 2.1.3, Figure 2.1.4). The majority of harvest occurred in statistical districts OE-2 (49%) and OE-1 (29%). Age 3 fish dominated the spring harvest in OE-1 (71%) and OE-2 (75%). Age 3 fish were also the significant contributors to OE-1 and OE-2 summer and fall harvests (70 to 78%) (Table 2.1.7). White Bass have not been regulated by quota since 1993. The landed value of White Bass increased 31% to \$2.8 million in 2013 (Tables 2.1.2 and 2.1.3).

White Perch

The total landings of White Perch decreased 26% to 1.8 million pounds in 2013 (Tables 2.1.2 and 2.1.3, Figure 2.1.4). The majority of harvest occurred in statistical districts OE-2 44% and OE-3 28%. In OE-1, a combined total of 81% of the large mesh spring harvest was from ages 6, 7 and 8, with age 6 the major contributor in OE-1 (40%) (Table 2.1.8a). The fall harvests in OE-1 and OE-2

were dominated by younger age groups (3 to 5 year olds), (81% to 91% combined respectively). Harvest from mesh sizes less than 3" (76 mm) generally consisted of younger White Perch (Table 2.1.8b). White Perch are not regulated by quota. The total landed value of White Perch decreased 36% to \$0.9 million in 2013 (Tables 2.1.2 and 2.1.3).

Lake Whitefish

The total landings of Lake Whitefish decreased 121 thousand pounds (56%) to 94 thousand pounds in 2013 (Tables 2.1.2 and 2.1.3, Figure 2.1.4). The commercial fishery harvested 12% of the quota allocated for 2013. Seventy-nine percent of the total harvest came from OE-1, while sixteen percent was harvested from OE-2. The majority (85%) of Lake Whitefish were harvested in fisheries targeting other species; Walleye and White Bass primarily. The harvest during the fall was dominated by age 10 and older fish (76%) and age 8 fish (17%) (Table 2.1.9). The landed value of Lake Whitefish decreased \$140,000 (51%) to \$133,000 in 2013 (Tables 2.1.2 and 2.1.3).

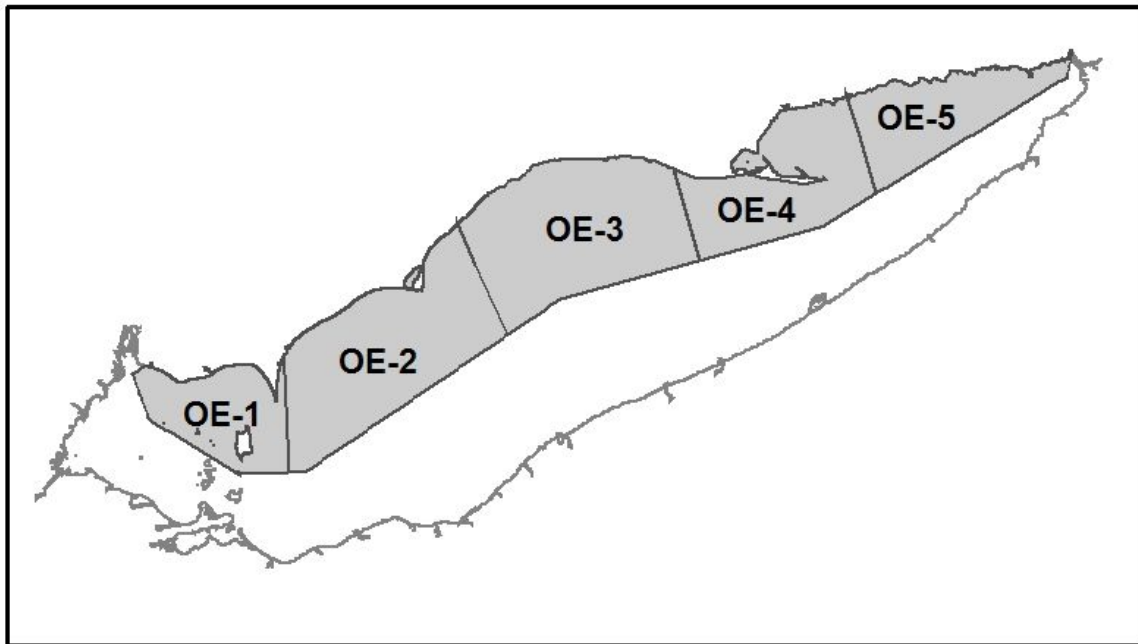


Figure 2.1.1 Spatial location of statistical districts in the Canadian waters of Lake Erie.

Table 2.1.1 Total annual commercial fishery landings (pounds) and value (\$ CDN) from the Canadian waters of Lake Erie, 1960-2013.

Year	Total Pounds	Total Value	Year	Total Pounds	Total Value
1960	28,181,000	2,033,000	1987	47,542,123	36,458,014
1961	36,350,000	2,516,000	1988	45,333,210	42,069,940
1962	43,296,419	2,296,635	1989	42,225,415	36,642,716
1963	34,069,000	2,523,635	1990	42,533,681	31,191,417
1964	25,391,428	2,377,284	1991	42,447,098	28,198,998
1965	35,096,120	3,319,307	1992	32,814,073	28,888,799
1966	41,435,283	3,104,813	1993	35,524,282	27,545,957
1967	37,775,009	3,339,460	1994	28,306,102	29,957,675
1968	39,415,250	2,973,814	1995	27,788,500	32,158,827
1969	48,025,996	4,244,149	1996	27,566,700	31,406,644
1970	31,755,446	3,770,281	1997	32,912,134	33,640,390
1971	29,075,559	4,254,692	1998	34,731,109	38,144,985
1972	29,978,000	5,324,000	1999	30,540,383	34,114,272
1973	39,829,000	7,038,000	2000	22,871,377	30,872,107
1974	38,686,000	5,634,000	2001	22,096,515	26,612,420
1975	30,548,620	6,009,093	2002	25,237,063	30,349,232
1976	25,729,080	6,000,970	2003	21,702,507	25,414,340
1977	35,853,556	7,736,701	2004	27,106,068	23,688,955
1978	40,159,610	9,883,626	2005	25,065,670	30,237,098
1979	40,839,668	17,555,598	2006	22,847,529	30,750,957
1980	42,849,000	14,207,000	2007	28,224,615	27,584,280
1981	44,711,277	20,279,830	2008	25,824,134	21,698,647
1982	59,500,000	26,183,000	2009	23,969,575	21,373,889
1983	45,682,046	17,613,206	2010	19,789,394	25,617,325
1984	36,305,219	26,349,853	2011	21,648,261	27,774,266
1985	43,367,069	20,255,403	2012	25,816,359	31,800,755
1986	39,112,618	34,961,819	2013	24,812,164	25,819,801

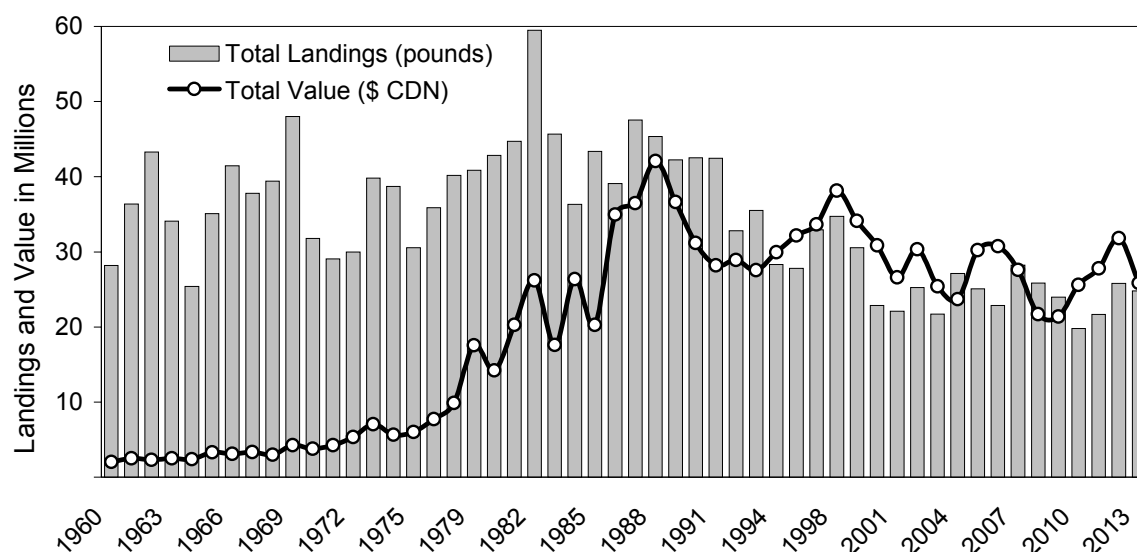


Figure 2.1.2 Commercial fishery landings (pounds) and value (\$ CDN) from the Canadian waters of Lake Erie, 1960-2013.

Table 2.1.2 Total annual commercial fishery landings (landed weight in pounds) and value dollars by fish species and statistical district for the Canadian waters of Lake Erie, 2013.

Species	Landings by Statistical District					Total Landing	Total Value
	OE-1	OE-2	OE-3	OE-4 ^a	OE-5		
Brown Bullhead						0	\$0
Burbot		91	19	104	29	243	\$7
Carp	940	126	44			1,110	\$221
Catfish	17,926	4,170	1,645	22	70	23,833	\$6,248
Freshwater Drum	33,872	44,531	10,044			88,447	\$7,567
Gizzard Shad	2,105	141	3	4		2,253	\$176
Lake Whitefish	73,742	15,380	1,348	564	2,945	93,979	\$133,707
Rainbow Smelt		13,977	19,272	5,382,622	1,519,450	6,935,321	\$1,595,036
Rock Bass	34	3		1		38	\$8
Suckers	18,462	15,774	170		45	34,451	\$5,745
Walleye	2,431,709	995,428	972,081	15,055	139,047	4,553,320	\$8,997,621
White Bass	1,526,784	2,624,628	1,192,589	3,633	5,140	5,352,774	\$2,783,365
White Perch	460,981	786,012	498,936	18,000	29,506	1,793,435	\$856,425
Yellow Perch	648,884	1,803,684	2,917,100	130,469	432,683	5,932,820	\$11,433,593
Mixed ^b	117	23				140	\$83
Total Landing (lbs.)	5,215,556	6,303,968	5,613,251	5,550,474	2,128,915	24,812,164	
Total Value (\$)	\$7,208,323	\$7,211,031	\$8,426,982	\$1,526,138	\$1,447,327		\$25,819,801

^a Excludes Inner Long Point Bay.

^b A variety of incidentally caught species of little or no value.

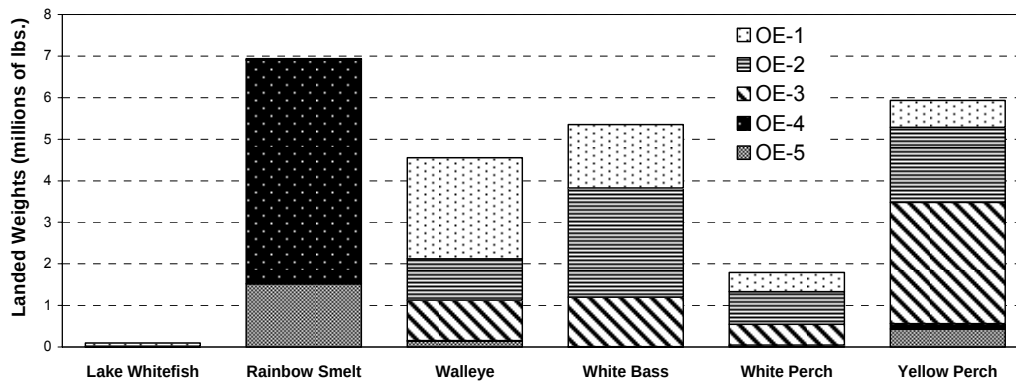


Figure 2.1.3 Total annual commercial fishery landed weights (millions of lbs.) for principle species by statistical district, Lake Erie 2013.

Table 2.1.3 Change in weight of the annual commercial fishery landed weight (pounds) from 2012 to 2013 by fish species and statistical district for the Canadian waters of Lake Erie.

Species	Landings by Statistical District					Total Landing	Total Value
	OE-1	OE-2	OE-3	OE-4 ^a	OE-5		
Brown Bullhead	-125	0	0	0	0	-125	-34
Burbot	0	83	19	40	-71	71	7
Carp	-509	-1	15	0	0	-495	-50
Catfish	-5,639	201	-159	0	-156	-5,753	-1,802
Freshwater Drum	13,538	-4,276	-7,809	-200	-41	1,212	156
Gizzard Shad	-15,460	-7,035	3	4	0	-22,488	-752
Lake Whitefish	-91,517	-29,085	234	-2,300	1,596	-121,072	-140,716
Rainbow Smelt	0	-1,301,725	7,204	347,836	430,051	-516,634	-121,024
Rock Bass	-69	2	0	1	0	-66	-14
Suckers	-9,289	229	5	0	-43	-9,098	-5,093
Walleye	-440,183	-92,014	24,518	-17,234	28,313	-496,600	-1,292,604
White Bass	-29,663	901,173	885,774	118	1,565	1,758,967	653,967
White Perch	200,065	-457,592	-393,117	7,768	19,321	-623,555	-475,161
Yellow Perch	-103,988	-73,931	-771,097	141	-19,753	-968,628	-4,597,860
Mixed ^b	55	17	-3	0	0	69	26
Total Landing (lbs.)	-482,784	-1,063,954	-254,413	336,174	460,782	-1,004,195	
Total Value (\$)	-1,662,954	-1,148,223	-3,027,793	-10,016	-131,968		-5,980,954

^a Excludes Inner Long Point Bay.

^b A variety of incidentally caught species of little or no value, plus species with total landings less than 50 pounds.



Figure 2.1.4 Change in weight of the annual commercial fishery landings (1000's of lbs.) from 2012 to 2013 for principle species by statistical district, Lake Erie.

Table 2.1.4 Rainbow Smelt year class composition, average total length (mm) and weight (g) from Lake Erie commercial catch samples taken from trawl nets by statistical district and season, 2013. n is sample size, sexes combined.

Stat. Dist.	Season*	Year Class and Age										All Ages	
		2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	Average	n
		0	1	2	3	4	5	6	7	8	9		
Age Group Composition (%) **													
OE-4	Spring	-	5	50	27	15	2	0	-	-	-	2.6	290
	Summer	-	54	14	18	10	3	0	-	-	-	2.0	665
	Fall	-	79	11	8	2	-	0	-	-	-	1.3	232
OE-5	Summer	0	83	8	4	5	0	-	-	-	-	1.3	253
Mean Total Length (mm)													
OE-4	Spring	-	88	128	164	171	191	160	-	-	-	144	290
	Summer	-	109	150	174	182	191	200	-	-	-	137	665
	Fall	-	118	141	172	186	-	177	-	-	-	126	232
OE-5	Summer	99	115	139	170	182	163	-	-	-	-	123	253
Mean Round Weight (g)													
OE-4	Spring	-	4	11	28	34	47	24	-	-	-	19	290
	Summer	-	7	19	30	35	41	46	-	-	-	17	665
	Fall	-	9	16	28	40	-	29	-	-	-	12	232
OE-5	Summer	5	9	15	25	34	26	-	-	-	-	11	253

* Season: Winter = January - March Spring = April - June Summer = July - September Fall = October - December

** A hyphen (-) indicates no fish of that age, a zero (0) indicates less than 0.5% fish of that age.

Table 2.1.5 Yellow Perch year class composition, average total length (mm) and weight (g) from Lake Erie commercial catch samples from small mesh (<76mm) gill nets by statistical district and season, 2013. n is sample size, sexes combined.

Stat. Dist.	Season*	Year Class and Age										All Ages	
		2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	Average	n
		1	2	3	4	5	6	7	8	9	10+		
Age Group Composition (%) **													
OE-1	Spring	-	-	19	18	33	23	6	1	-	0	4.8	319
	Summer	-	1	17	24	33	20	5	0	1	0	4.7	399
	Fall	-	5	38	15	30	9	2	-	-	-	4.1	237
OE-2	Spring	-	0	14	6	43	23	11	1	2	2	5.3	955
	Summer	-	1	25	7	43	19	5	1	0	1	4.8	953
	Fall	-	2	38	10	31	14	3	0	0	-	4.3	320
OE-3	Spring	-	-	7	3	40	30	15	2	0	4	5.7	1420
	Summer	-	0	12	5	46	24	12	1	-	1	5.2	1035
	Fall	-	1	27	4	33	20	15	1	-	-	4.9	159
OE-4	Spring	-	-	35	5	23	35	-	-	-	3	4.7	40
	Summer	-	-	55	3	25	13	5	-	-	-	4.1	40
OE-5	Spring	-	-	70	4	14	7	4	1	-	0	3.8	280
	Summer	-	13	63	2	17	3	1	1	0	-	3.4	514
	Fall	-	21	65	1	9	2	1	1	1	-	3.1	160
Mean Total Length (mm)													
OE-1	Spring	-	-	211	217	222	223	223	230	-	282	219	319
	Summer	-	215	220	222	227	230	239	230	272	219	226	399
	Fall	-	206	221	222	222	227	227	-	-	-	221	237
OE-2	Spring	-	198	213	220	224	224	230	239	254	236	224	955
	Summer	-	205	218	221	227	228	222	241	228	234	224	953
	Fall	-	214	228	234	238	241	220	259	325	-	234	320
OE-3	Spring	-	-	216	225	227	231	232	230	243	249	229	1420
	Summer	-	208	216	221	225	226	227	230	-	259	224	1035
	Fall	-	223	221	216	229	230	230	236	-	-	227	159
OE-4	Spring	-	-	225	231	226	236	-	-	-	244	230	40
	Summer	-	-	228	207	233	232	218	-	-	-	229	40
OE-5	Spring	-	-	222	223	235	227	233	213	-	249	225	280
	Summer	-	215	222	234	238	248	252	304	259	-	226	514
	Fall	-	220	232	209	242	273	350	287	292	-	232	160
Mean Round Weight (g)													
OE-1	Spring	-	-	121	128	133	141	137	158	-	329	133	319
	Summer	-	127	133	140	150	154	184	161	270	140	148	399
	Fall	-	110	133	137	138	150	136	-	-	-	135	237
OE-2	Spring	-	96	123	135	140	140	151	172	195	171	140	955
	Summer	-	110	135	143	153	161	147	195	140	178	149	953
	Fall	-	133	160	171	193	198	156	217	466	-	177	320
OE-3	Spring	-	-	131	145	145	153	158	150	167	193	150	1420
	Summer	-	126	133	142	148	153	156	157	-	262	149	1035
	Fall	-	137	143	132	164	161	170	194	-	-	157	159
OE-4	Spring	-	-	140	147	154	174	-	-	-	175	156	40
	Summer	-	-	164	112	191	168	149	-	-	-	169	40
OE-5	Spring	-	-	147	143	164	146	155	123	-	216	150	280
	Summer	-	137	149	170	187	243	234	394	259	-	160	514
	Fall	-	143	173	111	206	296	625	326	352	-	176	160

* Season: Winter = January-March Spring = April-June Summer = July-September Fall = October-December

** A hyphen (-) indicates no fish of that age, a zero (0) indicates less than 0.5% fish of that age.

Table 2.1.6 Walleye year class composition, average total length (mm) and weight (g) from Lake Erie commercial catch samples from large mesh ($\geq 76\text{mm}$) gill nets by statistical district and season, 2013. n is sample size, sexes combined.

Stat. Dist.	Season*	Category**	Year Class and Age										All Ages	
			2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	Average	n
			1	2	3	4	5	6	7	8	9	10+		
Age Group Composition (%)***														
OE-1	Spring	Number 1	-	2	54	20	6	8	0	1	0	9	4.2	481
		Jumbo	-	-	-	8	6	28	-	5	3	49	8.2	99
		Number 2	-	100	-	-	-	-	-	-	-	-	2.0	20
	Summer	Number 1	-	40	40	-	-	15	-	-	-	5	3.4	20
	Fall	Number 1	1	39	31	11	4	6	1	1	-	7	3.5	402
		Jumbo	-	-	24	12	12	24	6	-	6	18	5.9	17
OE-2	Spring	Number 1	-	18	52	14	5	4	1	0	0	6	3.6	336
		Jumbo	-	2	9	10	12	10	1	4	2	49	7.8	98
	Summer	Number 1	-	16	33	14	5	14	2	-	-	15	4.7	99
	Fall	Number 1	3	45	34	6	3	6	-	-	-	3	3.0	192
		Jumbo	-	-	30	10	10	20	-	-	-	30	6.1	20
		Whitegill	-	45	25	20	-	-	-	-	-	10	3.5	20
OE-3	Spring	Number 1	-	-	21	18	8	9	-	5	-	38	6.7	76
		Jumbo	-	-	3	14	8	24	-	1	1	50	7.9	80
		Whitegill	-	-	-	10	-	15	5	5	10	55	8.9	20
	Summer	Number 1	-	10	18	12	2	20	-	-	7	32	6.4	60
		Jumbo	-	1	10	8	10	22	1	4	3	41	7.3	156
	Fall	Jumbo	-	-	28	21	21	18	-	-	2	11	5.0	57
OE-4	Summer	Jumbo	-	-	-	17	-	50	-	-	-	33	7.0	6
OE-5	Spring	Jumbo	-	-	-	-	33	10	23	10	3	23	7.3	40
	Summer	Jumbo	-	-	2	2	12	17	3	12	2	52	8.5	60
	Fall	Number 1	-	-	55	5	20	5	5	-	-	10	4.5	20
Mean Total Length (mm)														
OE-1	Spring	Number 1	-	394	471	516	534	536	513	511	549	547	494	481
		Jumbo	-	-	-	562	588	601	-	661	656	630	616	99
		Number 2	-	363	-	-	-	-	-	-	-	-	363	20
	Summer	Number 1	-	420	477	-	-	513	-	-	-	537	462	20
	Fall	Number 1	364	443	481	501	531	544	532	525	-	557	478	402
		Jumbo	-	-	533	581	554	633	578	-	597	634	589	17
OE-2	Spring	Number 1	-	392	481	529	544	542	552	657	579	556	482	336
		Jumbo	-	403	492	554	579	618	560	645	665	679	622	98
	Summer	Number 1	-	423	493	505	527	548	558	-	-	551	503	99
	Fall	Number 1	376	446	486	492	518	533	-	-	-	571	472	192
		Jumbo	-	-	525	494	539	579	-	-	-	623	563	20
		Whitegill	-	442	496	528	-	-	-	-	-	570	486	20

Continued ...

Table 2.1.6 continued...

Stat. Dist.	Season*	Category**	Year Class and Age										All Ages	
			2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	Average	n
			1	2	3	4	5	6	7	8	9	10+		
Mean Total Length (mm) continued...														
OE-3	Spring	Number 1	-	-	487	540	557	545	-	584	-	573	546	76
		Jumbo	-	-	530	566	579	613	-	628	680	667	630	80
		Whitegill	-	-	-	541	-	574	561	582	594	641	609	20
	Summer	Number 1	-	442	509	524	566	574	-	-	578	607	554	60
		Jumbo	-	470	526	561	582	604	583	625	656	640	607	156
	Fall	Jumbo	-	-	547	555	583	598	-	-	674	656	579	57
OE-4	Summer	Jumbo	-	-	-	575	-	617	-	-	-	627	613	6
OE-5	Spring	Jumbo	-	-	-	-	577	595	599	572	568	625	594	40
	Summer	Jumbo	-	-	565	599	582	605	614	645	625	656	633	60
	Fall	Number 1	-	-	529	545	525	578	570	-	-	546	535	20
Mean Round Weight (g)														
OE-1	Spring	Number 1	-	623	1076	1380	1459	1496	1359	1386	1551	1578	1228	481
		Jumbo	-	-	-	1774	1973	2183	-	2871	2839	2523	2360	99
		Number 2	-	460	-	-	-	-	-	-	-	-	460	20
	Summer	Number 1	-	673	1015	-	-	1258	-	-	-	1413	934	20
	Fall	Number 1	454	866	1122	1263	1517	1684	1512	1324	-	1723	1124	402
		Jumbo	-	-	1710	2113	1943	2648	2057	-	2294	2765	2246	17
OE-2	Spring	Number 1	-	647	1228	1505	1551	1558	1636	3907	1777	1732	1228	336
		Jumbo	-	694	1404	1810	2055	2359	2037	2479	3287	3169	2561	98
	Summer	Number 1	-	704	1135	1220	1396	1539	1832	-	-	1572	1228	99
	Fall	Number 1	508	900	1168	1231	1440	1507	-	-	-	1906	1084	192
		Jumbo	-	-	1388	1238	1540	1948	-	-	-	2666	1883	20
		Whitegill	-	910	1211	1541	-	-	-	-	-	2061	1227	20
OE-3	Spring	Number 1	-	-	1333	1589	1678	1556	-	1964	-	1851	1659	76
		Jumbo	-	-	1643	1905	2079	2336	-	2667	3159	3149	2661	80
		Whitegill	-	-	-	1476	-	1815	1789	1896	1951	2655	2260	20
	Summer	Number 1	-	944	1365	1472	1850	1825	-	-	1789	2240	1741	60
		Jumbo	-	1023	1555	1984	2101	2365	2130	2727	2700	2732	2395	156
	Fall	Jumbo	-	-	1783	1824	2171	2260	-	-	3487	3004	2115	57
OE-4	Summer	Jumbo	-	-	-	2189	-	2361	-	-	-	2566	2401	6
OE-5	Spring	Jumbo	-	-	-	-	2032	2262	2389	2122	1706	2542	2251	40
	Summer	Jumbo	-	-	1670	2244	2016	2440	2268	2981	2345	2955	2696	60
	Fall	Number 1	-	-	1684	1755	1557	2002	1758	-	-	1759	1689	20

* Season: Winter = January - March Spring = April - June Summer = July - September Fall = October - December

** Category: Number 1 (Category 1) = generally between 381 - 533 mm in total length

Jumbo (Category 2) = generally greater than 533 mm in total length

Number 2 (Category 3) = generally less than 381 mm in total length

*** A hyphen (-) indicates no fish of that age, a zero (0) indicates less than 0.5% fish of that age.

Table 2.1.7 White Bass year class composition and average total length (mm) from Lake Erie commercial catch samples from large mesh (≥ 76 mm) gill nets for marketable fish by statistical district and season, 2013. n is sample size, sexes combined.

Stat. Dist.	Season*	Year Class and Age										All Ages	
		2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	Average	n
		1	2	3	4	5	6	7	8	9	10+		
Age Group Composition (%) **													
OE-1	Spring	-	3	71	6	7	4	5	3	2	-	3.7	200
	Summer	-	23	78	-	-	-	-	-	-	-	2.8	40
	Fall	2	21	71	4	2	-	-	1	-	-	2.9	160
OE-2	Spring	-	18	75	5	-	-	3	-	-	-	3.0	40
	Fall	1	21	70	3	3	1	1	-	-	-	2.9	80
Mean Total Length (mm)													
OE-1	Spring	-	320	327	342	365	366	386	391	365	-	337	200
	Summer	-	317	326	-	-	-	-	-	-	-	324	40
	Fall	272	314	333	351	373	-	-	375	-	-	330	160
OE-2	Spring	-	309	326	350	-	-	371	-	-	-	325	40
	Fall	282	319	339	362	376	371	393	-	-	-	336	80

* Season: Winter = January - March Spring = April - June Summer = July - September Fall = October - December

** A hyphen (-) indicates no fish of that age, a zero (0) indicates less than 0.5% fish of that age.

Table 2.1.8a White Perch year class composition and average total length (mm) from Lake Erie commercial catch samples from large mesh (≥ 76 mm) gill nets for marketable fish by statistical district and season, 2013. n is sample size, sexes combined.

Stat. Dist.	Season*	Year Class and Age										All Ages	
		2012 1	2011 2	2010 3	2009 4	2008 5	2007 6	2006 7	2005 8	2004 9	2003 10+	Average	n
Age Group Composition (%)**													
OE-1	Spring	-	-	-	1	10	40	20	21	5	3	6.8	80
	Fall	-	2	35	22	24	15	2	-	1	-	4.3	118
OE-2	Fall	-	5	48	25	18	3	3	-	-	-	3.7	40
Mean Total Length (mm)													
OE-1	Spring	-	-	-	261	270	284	297	296	307	297	289	80
	Fall	-	235	249	260	269	276	298	-	302	-	261	118
OE-2	Fall	-	227	255	269	276	262	316	-	-	-	263	40

* Season: Winter = January - March Spring = April - June Summer = July - September Fall = October - December

** A hyphen (-) indicates no fish of that age, a zero (0) indicates less than 0.5% fish of that age.

Table 2.1.8b White Perch year class composition and average total length (mm) from Lake Erie commercial catch samples from small mesh (< 76 mm) gill nets for marketable fish by statistical district and season, 2013. n is sample size, sexes combined.

Stat. Dist.	Season*	Year Class and Age										All Ages	
		2012 1	2011 2	2010 3	2009 4	2008 5	2007 6	2006 7	2005 8	2004 9	2003 10+	Average	n
Age Group Composition (%)**													
OE-1	Summer	-	5	40	30	23	3	-	-	-	-	3.8	40
OE-2	Summer	-	50	38	13	-	-	-	-	-	-	2.6	40
	Fall	12	44	27	13	5	-	-	-	-	-	2.6	78
Mean Total Length (mm)													
OE-1	Summer	-	206	233	246	260	281	-	-	-	-	243	40
OE-2	Summer	-	208	231	240	-	-	-	-	-	-	221	40
	Fall	167	213	238	255	265	-	-	-	-	-	223	78

* Season: Winter = January - March Spring = April - June Summer = July - September Fall = October - December

** A hyphen (-) indicates no fish of that age, a zero (0) indicates less than 0.5% fish of that age.

Table 2.1.9 Lake Whitefish year class composition, average total length (mm) and weight (g) from Lake Erie commercial catch samples from large mesh (≥ 76 mm) gill nets by statistical district and season, 2013. n is sample size, sexes combined.

Stat. Dist.	Season*	Year Class and Age										All Ages	
		2012 1	2011 2	2010 3	2009 4	2008 5	2007 6	2006 7	2005 8	2004 9	2003 10+	Average	n
Age Group Composition (%)**													
OE-1	Fall	-	-	1	1	-	1	1	17	4	76	10.7	139
Mean Total Length (mm)													
OE-1	Fall	-	-	479	509	-	516	562	550	556	578	571	139
Mean Round Weight (g)													
OE-1	Fall	-	-	1070	1303	-	1381	1802	1556	1619	1925	1833	139

* Season: Spring = April - June Summer = July - September Fall = October - December

** A hyphen (-) indicates no fish of that age, a zero (0) indicates less than 0.5% fish of that age.

2.2 Inner Long Point Bay Fishery

The hoop and seine net fishery of Inner Long Point Bay contributes less than one percent (0.42%) by weight of the total annual commercial harvest landed in Ontario waters of Lake Erie. In 2013, total commercial landings were 105,386 pounds (Table 2.2.1) an increase of 16% from 2012. Of this harvest, live fish accounted for 73%. The value of the total commercial landings in 2013 was \$107,721, an increase of 17% from 2012, and 0.42% of the total value of the Commercial fishery in Ontario waters of Lake Erie (Table 2.2.1).

Yellow Perch

In 2013, the total landings of Yellow Perch was 8,564 pounds, an increase of 2% from 2012. The Inner Bay commercial fishery harvested 32% of their allocated quota in 2013. The majority of Yellow Perch (89%) were caught in the spring (March and April combined). The landed value of Yellow Perch in 2013 was \$16,391, a decrease of 17% from 2012.

Northern Pike

In 2013, the total landings of Northern Pike was 14,937 pounds, an increase of 34% from 2012. The Inner Bay commercial fishery harvested 55% of their allocated quota in 2013. The majority of Northern Pike (91%) were caught in the spring (March and April combined). The landed value of Northern Pike in 2013 was \$3,658, a decrease of 31% from 2012.

Table 2.2.1 Total annual commercial fishery landings (landed weight in pounds) and value dollars by fish species for Inner Long Point Bay, 2013.

Species	Total Landing^a	Total Value
Bowfin	17,771	\$20,979
Brown Bullhead	21,786	\$9,358
Carp	5,000	\$1,800
Freshwater Drum	49	\$11
Lepomis spp.	25,070	\$40,859
Mudpuppy	4,483	\$4,322
Northern Pike	14,937	\$3,658
Pomoxis spp.	1,174	\$3,927
Rock Bass	4,690	\$5,412
White Perch	1,862	\$1,004
Yellow Perch	8,564	\$16,391
Total Landing (lbs.)	105,386	
Total Value (\$)		\$107,721

^a Only Inner Long Point Bay.

3. LAKE ERIE SPORT FISHERY DIARY PROGRAM

The Lake Erie Sport Fishery Diary Program is an ongoing survey that allows the Lake Erie Management Unit to track general trends in catch rates and angler activity targeting a variety of fish species. The Lake Erie Sport Fishery Diary Program entered its 30th year in 2013. The survey area covered is illustrated in Figure 3.1. In this program, volunteer anglers complete a page in a diary for each trip taken. Fishing location, fishing duration, numbers of fish kept and released and biological information are also recorded. Other information such as fish health or unusual sightings of exotic species or fish disease is also recorded in the diary. The participants receive a summary of personal fishing activities with the number of fish caught and harvested by species and area, personal catch rate, a summary of biological information from their catch, a certificate of appreciation, and a summary of all data from Lake Erie and Lake St. Clair anglers.

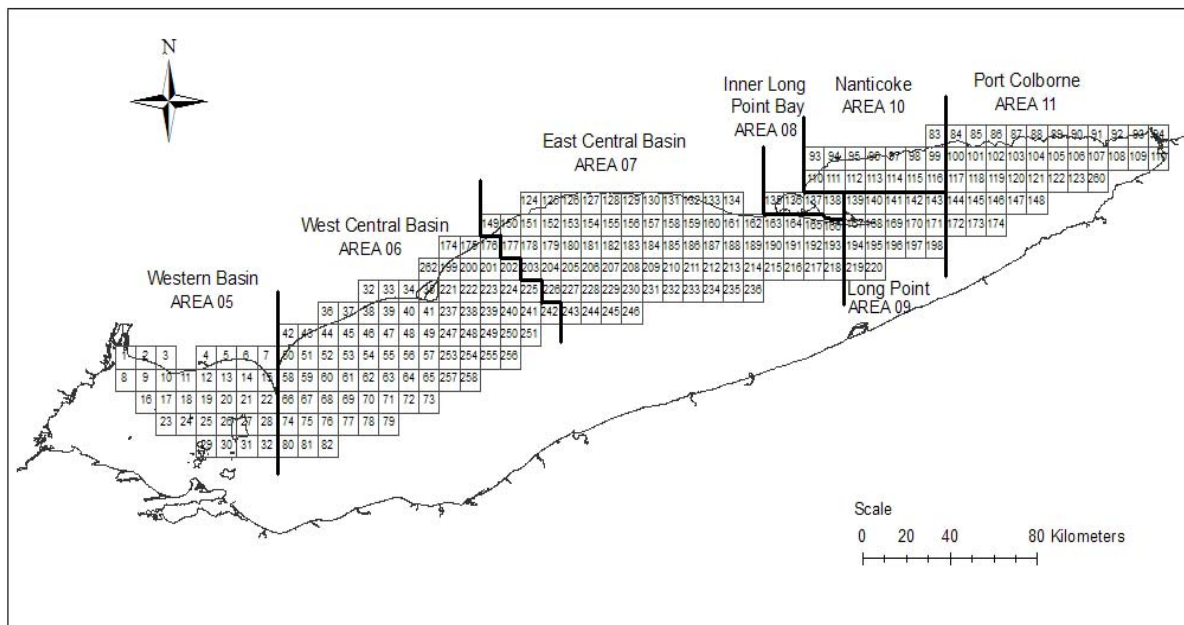


Figure 3.1 Lake Erie Sport Fishery Diary Survey Areas, 2013.

In 2013, 60 volunteers from Ontario completed angler diaries in Lake Erie. This was up slightly from 59 participants in 2012. Of these volunteers, 44 (73%) have been participating in the program for three years or more. Thirty-four participants (57%) have been involved in the program for twelve years or more and 23 participants (38%) have been involved in the program for twenty or more years.

In the Sport Fishery Diary Program, Lake Erie is divided into seven areas, Western Basin (Area 05), West-Central Basin (Area 06), East-Central Basin (Area 07), Inner Long Point Bay (Area 08), Long Point Bay (Area 09), Nanticoke (Area 10) and Port Colborne (Area 11). Angler catches are reported by 5 minute grid location within these areas (Figure 3.1).

Total diarist effort and catch for each area is presented in Tables 3.1, 3.2 and 3.3. Observed catch rates of selected preferred species by area, for the years 1990 to 2013, are presented in Tables 3.4, 3.5, 3.6 and 3.7. Effort may be directed at multiple species simultaneously, therefore, the percentages of annual effort directed at species may total more than 100% in Figures 3.2 to 3.4.

Western Basin (Area 05)

Fifteen participants completed diaries with western basin fishing effort. Western basin diarists fished 1,576 rod hours of effort over 81 fishing trips (Table 3.1). The majority of angling effort recorded by diarists in the western basin was directed towards Walleye (79%) and Yellow Perch (23%) (Table 3.4, Figure 3.2). Other species targeted with greater than 1% of effort include Smallmouth Bass with 4% of the effort. Six hundred and forty-four Walleye were caught, and 2,347 Yellow Perch were caught in the western basin (Table 3.3).

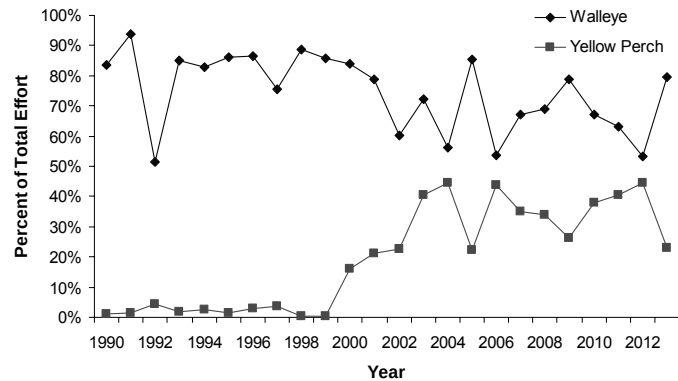


Figure 3.2 Western basin angler percent of area effort, Lake Erie Sport Diary Program, 1990-2013.

The Walleye catch per unit effort (CPUE) was 0.510 fish per rod hour; this was an increase of 19% from the 2012 CPUE. The CPUE for Walleye was higher in the western basin (0.510 fish per rod hour) than in the central (0.165 fish per rod hour) and eastern basins (0.345 fish per rod hour) (Figure 3.5). The Yellow Perch CPUE was 6.427 fish per rod hour; this was a decrease of 17% from 2012 CPUE. The CPUE for Yellow Perch was the highest in the western (6.427 fish per rod hour) and central basins (6.265 fish per rod hour) compared to the eastern basin (4.499 fish per rod hour) (Figure 3.6).

Central Basin (Areas 06 and 07)

Thirty-four participants completed diaries with central basin fishing effort. Central basin diarists fished 5,030 rod hours of effort over 213 fishing trips (Table 3.1). The majority of angling effort recorded by diarists in the central basin was directed towards Walleye (81%), Rainbow Trout (62%) and Yellow Perch (18%) (Figure 3.3). Rainbow Trout and Walleye are often targeted simultaneously. Other species targeted with at least 1% of effort include: Largemouth Bass (1%), Smallmouth Bass (1%) and White Bass (1%). Two hundred and eight (208) Rainbow Trout were caught, 680 Walleye were caught, and 5,775 Yellow Perch were caught in the central basin (Table 3.3).

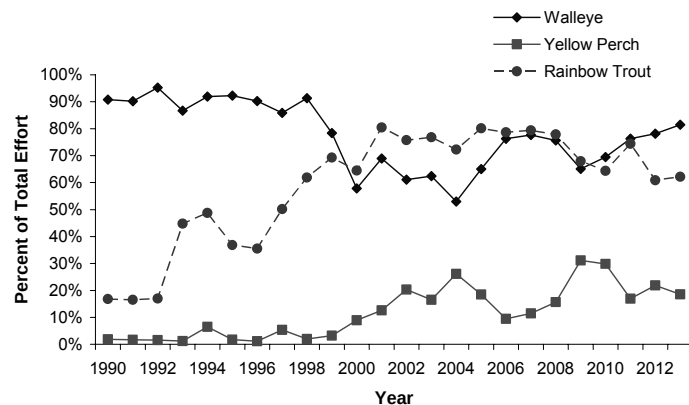


Figure 3.3 Central basin angler percent of area effort, Lake Erie Sport Diary Program, 1990-2013.

The overall central basin Walleye CPUE was 0.165 fish per rod hour; this was a decrease of 7% from 2012 CPUE (Figure 3.5). Walleye CPUE was higher in the east-central basin (0.176 fish per rod hour) than the west-central basin (0.155 fish per rod hour) (Table 3.5). The overall central basin Rainbow Trout CPUE was 0.060 fish per rod hour; this was a decrease of 36% from the 2012 CPUE. Rainbow Trout CPUE was higher in the west-central basin (0.068 fish per rod hour) than the east-central basin (0.046 fish per rod hour) (Table 3.5). The overall central basin Yellow Perch CPUE was 6.203 fish per rod hour; this was a decrease of 22% from the 2012 CPUE. Yellow Perch CPUE was higher in the east-central basin (6.817 fish per rod hour) than the west-central basin (0.679 fish per rod hour), but there were only 6 trips for Yellow Perch in the west-central area.

Eastern Basin (Areas 08, 09, 10 and 11)

Thirty-three participants completed diaries with eastern basin fishing effort. Eastern basin diarists fished 2,824 rod hours of effort over 321 fishing trips (Table 3.1). The majority of angling effort recorded by diarists in the eastern basin was directed towards Yellow Perch (43%), Smallmouth Bass (37%) and Walleye (15%) (Figure 3.4). Other fish species targeted in the eastern basin included: Northern Pike (8%), Largemouth Bass (7%), Rainbow Trout (2%) and Rock Bass (1%). One hundred and fifty-one (151) Walleye were caught, 1,475 Smallmouth Bass were caught, and 5,589 Yellow Perch were caught in the eastern basin (Table 3.3).

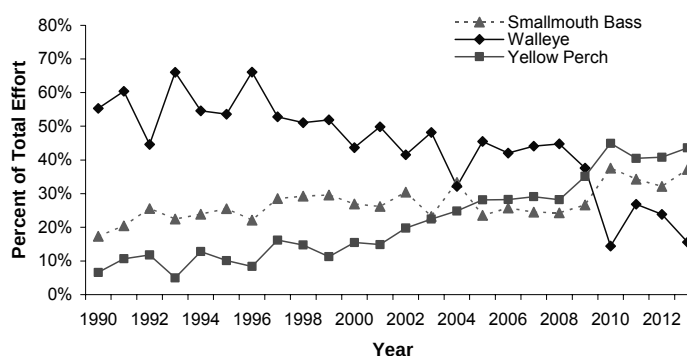


Figure 3.4 Eastern basin angler percent of area effort, Lake Erie Sport Diary Program, 1990-2013.

The overall eastern basin Yellow Perch CPUE was 4.499 fish per rod hour; this was a decrease of 8% from the 2012 CPUE (Figure 3.6). Within the east basin, Yellow Perch CPUE was highest in the Port Colborne area (6.520 fish per rod hour) (Table 3.7). The overall eastern basin Smallmouth Bass CPUE was 1.291 fish per rod hour; this was an increase of 22% from the 2012 CPUE. Smallmouth Bass CPUE was highest in the Long Point Bay area (1.551 fish per rod hour) (Table 3.6). The overall eastern basin Walleye CPUE was 0.345 fish per rod hour; this was an increase of 105% from the 2012 CPUE (Figure 3.5). Although diarist effort was low, Walleye CPUE was highest in the Long Point Bay area (0.393 fish per rod hour) (Table 3.6).

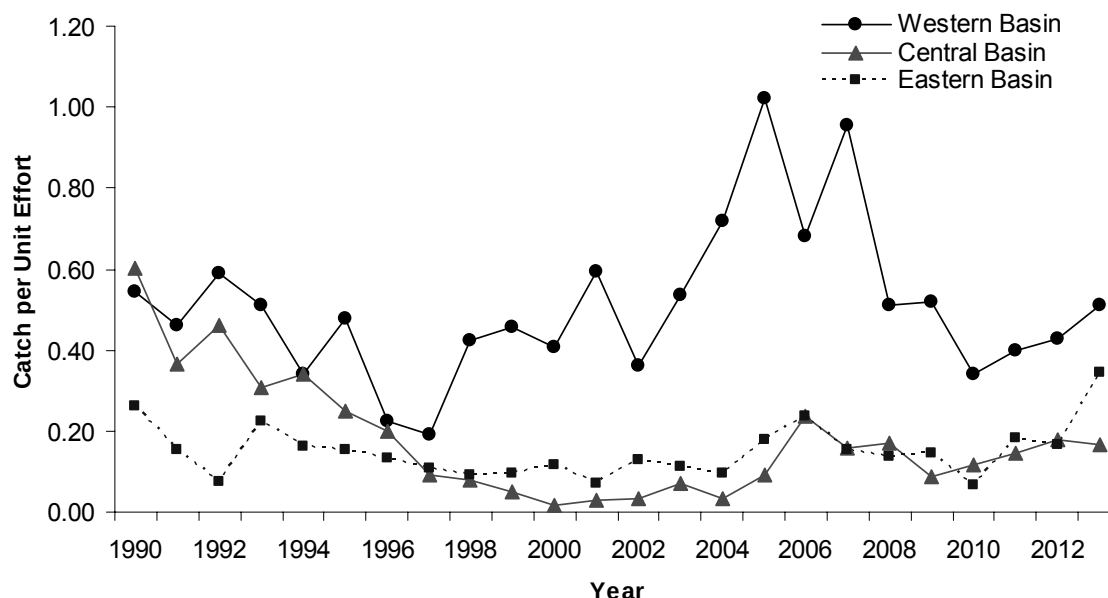


Figure 3.5 Walleye catch per unit effort (fish per rod hour) by basin, Lake Erie Sport Diary Program, 1990-2013.

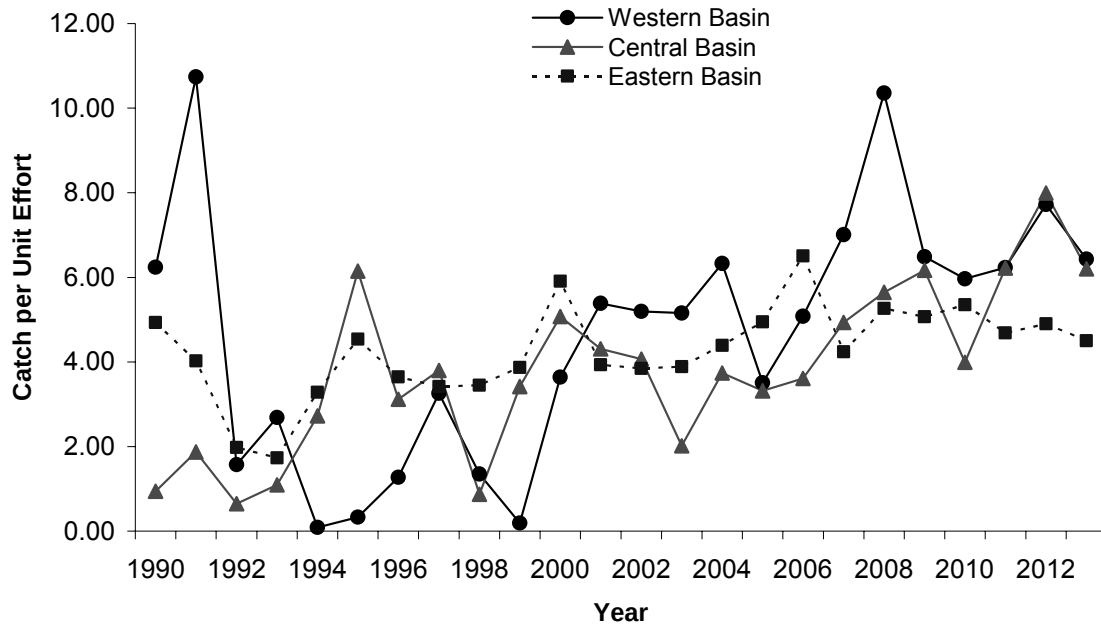


Figure 3.6 Yellow Perch catch per unit effort (fish per rod hour) by basin, Lake Erie Sport Diary Program 1990-2013.

Table 3.1 Total effort by survey area, reported by Sport Fishery Diary Program non-charter boat participants, 2013.

Survey Area	Number of Diarists	Number of Trips	Number of Rods per Trip	Total Rod Hours
Western Basin	15	81	4.1	1,576
West-Central Basin	14	87	5.5	2,378
East-Central Basin	21	126	4.3	2,652
Inner Long Point Bay	23	155	2.6	1,371
Long Point Bay	6	17	2.8	161
Nanticoke	13	101	2.1	695
Port Colborne	7	48	2.8	596
Total	60^a	615	3.5	9,429

^aDiarist may fish more than one survey area in a year.

Table 3.2 Total effort by survey area, reported by Sport Fishery Diary Program non-charter boat participants, 1986-2013.

Year	Western Basin			West-Central			East-Central			Inner Long Point Bay		
	No. of Diarists	Total Effort		No. of Diarists	Total Effort		No. of Diarists	Total Effort		No. of Diarists	Total Effort	
		Trips	Rod Hours		Trips	Rod Hours		Trips	Rod Hours		Trips	Rod Hours
1986	13	123	1,234	18	228	3,176	20	306	4,078	14	97	864
1987	10	118	1,272	30	392	5,323	34	355	4,794	18	150	1,462
1988	26	280	2,886	36	422	7,100	58	748	10,781	33	226	2,439
1989	33	244	2,175	33	421	4,883	45	444	4,412	49	229	2,139
1990	38	231	2,068	45	388	5,020	51	404	4,195	59	265	2,445
1991	34	234	2,538	38	318	3,841	60	474	5,719	50	311	2,917
1992	34	254	2,220	59	435	6,104	73	383	5,070	60	286	4,068
1993	39	306	4,428	48	428	6,537	51	407	4,995	56	331	3,347
1994	14	152	885	41	308	4,190	43	322	3,583	58	373	4,047
1995	35	157	1,209	58	382	6,248	47	267	2,762	61	442	4,798
1996	43	254	2,436	45	305	6,200	43	214	3,100	55	324	3,354
1997	29	145	1,499	40	265	6,691	37	224	3,573	80	564	5,881
1998	39	210	2,016	41	265	5,879	26	163	2,953	61	508	4,821
1999	22	112	1,066	37	208	4,826	29	176	2,767	65	383	3,809
2000	24	78	732	31	240	5,175	21	173	3,672	52	312	2,899
2001	24	88	833	28	147	3,769	20	142	2,457	53	236	2,449
2002	14	74	809	25	138	2,594	19	154	2,108	45	255	2,429
2003	20	147	1,508	26	191	3,690	21	142	2,190	45	203	1,882
2004	31	199	2,663	24	157	3,322	19	112	1,556	42	277	2,740
2005	26	204	2,638	27	174	4,351	25	186	3,669	45	200	2,121
2006	17	109	1,375	22	142	4,207	27	182	3,803	37	179	1,857
2007	12	95	929	25	158	4,374	20	166	3,960	34	176	1,932
2008	12	79	768	21	168	3,799	27	115	2,697	29	177	1,677
2009	22	150	2,618	24	138	3,322	19	107	2,198	24	174	1,803
2010	11	74	955	14	121	2,990	19	116	2,561	25	149	1,475
2011	18	99	1,506	29	148	3,937	20	120	2,479	23	152	1,538
2012	18	127	1,516	20	108	2,927	18	109	2,171	18	121	988
2013	15	81	1,576	14	87	2,378	21	126	2,652	23	155	1,371
90-13 Avg.	25	152	1,700	33	226	4,432	32	208	3,204	46	273	2,777

Year	Long Point Bay			Nanticoke			Port Colborne			Total Lake Effort		
	No. of Diarists	Total Effort		No. of Diarists	Total Effort		No. of Diarists	Total Effort		No. of Diarists	Total Effort	
		Trips	Rod Hours		Trips	Rod Hours		Trips	Rod Hours		Trips	Rod Hours
1986	15	125	1,636	16	152	834	6	97	608	50	1,128	12,430
1987	15	65	781	15	150	572	9	172	1,499	66	1,402	15,703
1988	21	95	3,601	28	211	1,506	13	267	1,818	131	2,249	30,131
1989	45	289	3,607	46	371	3,318	12	271	2,060	146	2,269	22,594
1990	57	360	4,658	58	450	4,312	19	243	2,320	166	2,341	25,018
1991	51	239	2,961	53	377	3,787	33	392	3,966	189	2,345	25,729
1992	57	287	3,767	56	334	2,728	28	342	4,009	207	2,321	27,966
1993	54	285	3,685	55	364	3,698	24	262	3,242	185	2,383	29,933
1994	37	157	2,005	49	290	3,201	24	243	2,825	157	1,845	20,736
1995	35	132	1,949	34	177	1,737	39	361	4,849	198	1,918	23,551
1996	28	124	1,713	35	241	3,164	33	318	5,868	181	1,780	25,834
1997	30	102	1,690	38	219	2,683	56	518	9,129	203	2,037	31,145
1998	35	171	2,776	29	204	1,846	42	486	7,540	176	2,007	27,831
1999	29	138	2,488	34	203	1,765	44	397	7,319	174	1,617	24,041
2000	30	159	2,313	29	183	1,534	29	270	4,459	142	1,415	20,785
2001	29	136	1,791	27	156	1,195	27	213	4,418	132	1,118	16,913
2002	29	124	1,531	26	162	1,329	24	228	4,265	106	1,135	15,063
2003	21	78	979	26	166	1,603	24	169	3,273	113	1,096	15,125
2004	19	68	818	22	155	1,298	22	147	2,608	114	1,115	15,005
2005	21	82	1,030	23	187	1,634	19	175	3,143	113	1,208	18,585
2006	13	55	644	19	126	1,020	15	144	2,328	93	937	15,234
2007	9	33	363	19	128	1,080	17	132	2,757	82	888	15,394
2008	10	33	463	16	92	834	15	99	1,921	72	763	12,159
2009	7	33	390	14	138	1,070	18	107	1,986	84	847	13,388
2010	6	22	265	15	106	757	8	35	526	60	623	9,529
2011	4	17	139	11	84	659	12	76	1,202	74	696	11,459
2012	6	15	121	9	97	687	7	48	824	59	625	9,234
2013	6	17	161	13	101	695	7	48	596	60	615	9,429
90-13 Avg.	26	119	1613	30	198	1846	24	227	3557	131	1403	19129

Table 3.3 Total catch and harvest reported by sport fishery diary non-charter boat participants, Lake Erie Sport Fishery Diary Program, 2013.

Species	Western Basin		West-Central Basin		East-Central Basin		Inner Long Point Bay		Long Point Bay		Nanticoke		Port Colborne		Total	
	Caught	Harvested	Caught	Harvested	Caught	Harvested	Caught	Harvested	Caught	Harvested	Caught	Harvested	Caught	Harvested	Caught	Harvested
Bowfin															1	-
Gizzard Shad													6	6	6	6
Chinook Salmon					1	1									1	1
Rainbow Trout			130	121	78	74			2	2	2	2			212	199
Brown Trout					1	1									1	1
Rainbow Smelt					2								1	1	3	1
Northern Pike							77	6	166	44					243	50
Muskellunge	1						2								3	-
Brown Bullhead			1								3				4	-
Channel Catfish	4				4		9						3		20	-
White Perch	78	4	13	4	59	1					13	4	34	2	197	15
White Bass	127	5	242	29	141	24	1				20	5	70		601	63
Rock Bass			3				318	46	1		47	10	8		377	56
Pumpkinseed							10				18				28	-
Bluegill											11	2			11	2
Smallmouth Bass	76	35	31				1,024	676	84	66	325	111	42	11	1,582	899
Largemouth Bass	4		53	3			152	29	3						212	32
Yellow Perch	2,347	1,904	63	47	5,712	4,399	2,137	1,018	3	1	2,259	1,691	1,190	1,062	13,711	10,122
Walleye	644	520	339	318	341	336			7	6			144	140	1,475	1,320
Round Goby	1	1	5		71	25	14	5			45	5	14	3	150	39
Freshwater Drum	177	35	41	1	131	4	50	2	2		22		31		454	42
Total	3,459	2,504	921	523	6,541	4,865	3,795	1,782	268	119	2,765	1,830	1,543	1,225	19,292	12,848

Table 3.4 Angler success rates (CPUE) of non-charter boat anglers targeting particular species, western basin survey area, Lake Erie, 1990-2013^a. Effort may be directed at more than one species simultaneously.

Western Basin (Area 05)									
Year	Total	Walleye				Yellow Perch			
	Rod Hours	Trips	Rod Hours	CPUE	% Total Effort	Trips	Rod Hours	CPUE	% Total Effort
1990	2,304	212	1,924	0.542	84%	5	25	6.240	1%
1991	2,405	211	2,259	0.459	94%	2	33	10.738	1%
1992	3,087	203	1,591	0.591	52%	15	135	1.574	4%
1993	2,220	279	1,887	0.510	85%	9	44	2.689	2%
1994	885	126	734	0.339	83%	4	22	0.090	2%
1995	1,204	136	1,036	0.479	86%	3	18	0.333	1%
1996	2,428	213	2,097	0.223	86%	12	71	1.275	3%
1997	1,499	91	1,131	0.189	75%	10	54	3.258	4%
1998	2,016	171	1,791	0.423	89%	2	9	1.347	0%
1999	1,071	91	919	0.457	86%	1	5	0.188	0%
2000	729	64	613	0.405	84%	8	117	3.641	16%
2001	833	66	657	0.594	79%	24	175	5.383	21%
2002	809	54	486	0.362	60%	13	183	5.197	23%
2003	1,508	102	1,087	0.534	72%	60	609	5.158	40%
2004	2,663	114	1,499	0.717	56%	93	1,187	6.325	45%
2005	2,638	173	2,254	1.020	85%	42	588	3.505	22%
2006	1,375	68	735	0.679	53%	44	604	5.082	44%
2007	929	56	624	0.954	67%	39	326	7.012	35%
2008	768	39	529	0.512	69%	42	260	10.360	34%
2009	2,618	93	2,068	0.519	79%	64	687	6.490	26%
2010	955	33	642	0.340	67%	44	362	5.963	38%
2011	1,506	36	950	0.397	63%	65	608	6.230	40%
2012	1,516	42	808	0.428	53%	82	675	7.721	45%
2013	1,576	52	1,251	0.510	79%	31	364	6.427	23%
90-13 Avg.	1,648	114	1,232	0.508	74%	30	298	4.676	12%

^aCPUE represents observed catch divided by observed angling effort in rod-hours directed at that particular species.

Table 3.5 Angler success rates (CPUE) of non-charter boat anglers targeting particular species, west-central and east-central basins survey areas, Lake Erie, 1990-2013^a. Effort may be directed at more than one species simultaneously.

West-Central Basin (Area 06)													
Year	Total Rod Hours	Walleye				Rainbow Trout				Yellow Perch			
		Trips	Rod Hours	CPUE	% Total Effort	Trips	Rod Hours	CPUE	% Total Effort	Trips	Rod Hours	CPUE	% Total Effort
1990	5,020	328	4,326	0.642	86%	54	1,031	0.010	21%	11	59	0.659	1%
1991	3,841	287	3,488	0.366	91%	26	441	0.032	11%	4	27	0.679	1%
1992	6,104	410	5,886	0.501	96%	54	733	0.056	12%	10	96	0.385	2%
1993	6,537	395	5,081	0.308	78%	231	3,217	0.118	49%	14	94	1.521	1%
1994	4,190	279	3,670	0.373	88%	172	2,271	0.086	54%	20	466	2.923	11%
1995	6,248	348	5,768	0.215	92%	150	2,893	0.055	46%	11	130	6.243	2%
1996	6,200	244	5,543	0.213	89%	89	2,070	0.049	33%	6	50	5.500	1%
1997	6,691	201	5,912	0.077	88%	122	3,909	0.083	58%	4	36	9.103	1%
1998	5,879	224	5,298	0.076	90%	138	3,191	0.117	54%	4	18	3.611	0%
1999	4,826	146	3,865	0.033	80%	140	3,611	0.110	75%	2	20	11.150	0%
2000	4,251	124	2,498	0.011	59%	154	3,013	0.308	71%	5	46	2.863	1%
2001	3,769	82	2,596	0.016	69%	131	3,554	0.136	94%	9	99	5.088	3%
2002	2,594	75	1,656	0.013	64%	121	2,402	0.275	93%	14	126	3.852	5%
2003	3,690	126	2,343	0.046	63%	161	3,288	0.234	89%	16	186	4.047	5%
2004	3,322	74	1,951	0.037	59%	118	2,827	0.187	85%	37	442	6.117	13%
2005	4,351	86	2,525	0.069	58%	132	3,812	0.185	88%	38	520	4.215	12%
2006	4,207	91	3,058	0.215	73%	118	3,733	0.200	89%	9	145	5.253	3%
2007	4,374	95	3,220	0.149	74%	106	3,578	0.220	82%	30	274	7.935	6%
2008	3,799	98	2,814	0.160	74%	110	3,149	0.254	83%	48	433	7.277	11%
2009	3,322	74	2,553	0.071	77%	85	2,841	0.132	86%	46	466	2.088	14%
2010	2,990	74	2,451	0.053	82%	75	2,528	0.243	85%	40	370	4.464	12%
2011	3,937	98	3,163	0.121	80%	100	3,337	0.132	85%	33	347	5.202	9%
2012	2,927	87	2,637	0.169	90%	74	2,284	0.122	78%	20	296	7.299	10%
2013	2,378	69	2,152	0.155	90%	57	1,898	0.068	80%	6	93	0.679	4%
90-13 Avg.	4,394	171	3,519	0.170	79%	113	2,734	0.142	67%	18	202	4.506	5%

East-Central Basin (Area 07)													
Year	Total Rod Hours	Walleye				Rainbow Trout				Yellow Perch			
		Trips	Rod Hours	CPUE	% Total Effort	Trips	Rod Hours	CPUE	% Total Effort	Trips	Rod Hours	CPUE	% Total Effort
1990	4,195	385	4,045	0.559	96%	40	517	0.006	12%	11	110	1.091	3%
1991	5,719	415	5,133	0.367	90%	88	1,138	0.090	20%	8	134	2.111	2%
1992	5,070	358	4,757	0.410	94%	70	1,169	0.023	23%	12	77	0.978	2%
1993	4,995	396	4,912	0.304	98%	153	1,945	0.055	39%	7	44	0.182	1%
1994	3,583	310	3,475	0.309	97%	131	1,521	0.007	42%	2	37	0.270	1%
1995	2,762	249	2,547	0.326	92%	39	426	0.068	15%	5	27	5.704	1%
1996	3,100	190	2,853	0.176	92%	72	1,231	0.059	40%	9	57	1.035	2%
1997	3,573	143	2,902	0.115	81%	54	1,241	0.088	35%	69	514	3.426	14%
1998	2,953	138	2,767	0.088	94%	103	2,278	0.119	77%	24	161	0.567	5%
1999	3,708	133	2,825	0.069	76%	97	2,302	0.135	62%	38	252	2.803	7%
2000	1,522	52	840	0.037	55%	41	708	0.072	47%	61	470	5.291	31%
2001	2,457	67	1,697	0.048	69%	58	1,455	0.056	59%	70	684	4.199	28%
2002	2,108	55	1,217	0.061	58%	52	1,160	0.109	55%	91	828	4.101	39%
2003	2,190	65	1,329	0.110	61%	55	1,231	0.068	56%	71	784	1.534	36%
2004	1,556	38	632	0.019	41%	40	698	0.119	45%	66	831	2.475	53%
2005	3,669	109	2,688	0.116	73%	101	2,617	0.123	71%	76	957	2.829	26%
2006	3,803	124	3,054	0.262	80%	100	2,571	0.072	68%	47	615	3.221	16%
2007	3,960	115	3,255	0.170	82%	107	3,040	0.116	77%	48	680	3.722	17%
2008	2,697	81	2,102	0.186	78%	72	1,913	0.056	71%	33	583	4.431	22%
2009	2,198	40	1,041	0.123	47%	34	912	0.115	41%	69	1,253	7.683	57%
2010	2,561	53	1,406	0.228	55%	40	1,044	0.083	41%	66	1,287	3.856	50%
2011	2,479	64	1,731	0.195	70%	52	1,438	0.063	58%	54	740	6.699	30%
2012	2,171	53	1,348	0.194	62%	30	819	0.029	38%	54	818	8.249	38%
2013	2,652	74	1,923	0.176	73%	41	1,209	0.046	46%	54	835	6.817	31%
90-13 Avg.	3,153	154	2,520	0.194	76%	70	1,441	0.074	47%	44	532	3.470	21%

^aCPUE represents observed catch divided by observed angling effort in rod-hours directed at that particular species.

Table 3.6 Angler success rates (CPUE) of non-charter boat anglers targeting particular species, Inner Long Point Bay and Long Point Bay survey areas, Lake Erie, 1990-2013^a. Effort may be directed at more than one species simultaneously.

Inner Long Point Bay (Area 08)																	
Year	Total Rod Hours	Smallmouth Bass				Yellow Perch				Largemouth Bass				Northern Pike			
		Trips	Rod Hours	CPUE	% Total Effort	Trips	Rod Hours	CPUE	% Total Effort	Trips	Rod Hours	CPUE	% Total Effort	Trips	Rod Hours	CPUE	% Total Effort
1990	3,409	169	1,735	0.718	51%	21	167	5.886	5%	16	554	0.806	16%	22	191	0.272	6%
1991	2,614	161	1,633	0.838	62%	46	492	5.301	19%	16	717	0.958	27%	26	312	0.183	12%
1992	4,658	214	2,304	0.708	49%	47	438	2.172	9%	17	1,534	0.633	33%	38	550	0.167	12%
1993	3,347	196	2,008	0.626	60%	27	209	1.937	6%	19	1,430	0.774	43%	28	239	0.301	7%
1994	4,047	171	2,030	0.656	50%	80	933	3.911	23%	16	1,305	0.850	32%	47	418	0.256	10%
1995	4,798	203	2,298	0.657	48%	69	859	4.714	18%	22	2,233	0.740	47%	59	626	0.241	13%
1996	3,354	156	1,735	0.788	52%	53	601	3.825	18%	11	1,111	0.678	33%	29	291	0.179	9%
1997	5,881	282	3,145	0.870	53%	176	1,903	4.045	32%	24	1,551	0.661	26%	54	542	0.266	9%
1998	4,821	235	2,391	0.858	50%	150	1,519	3.829	32%	19	1,111	0.781	23%	76	742	0.259	15%
1999	3,811	188	2,097	0.643	55%	110	1,034	4.080	27%	15	734	0.917	19%	56	517	0.330	14%
2000	2,899	148	1,563	0.826	54%	87	887	6.263	31%	14	640	0.879	22%	32	312	0.514	11%
2001	2,449	121	1,363	0.747	56%	65	698	4.081	29%	13	592	0.994	24%	24	191	0.419	8%
2002	2,429	136	1,463	0.896	60%	64	615	3.777	25%	14	676	1.241	28%	16	114	0.167	5%
2003	1,882	116	1,191	1.112	63%	40	478	3.812	25%	12	437	1.183	23%	13	85	0.495	5%
2004	2,740	125	1,528	0.624	56%	78	712	4.015	26%	83	617	1.276	23%	23	236	0.246	9%
2005	2,121	83	1,084	0.720	51%	70	779	7.923	37%	55	489	2.022	23%	12	135	1.049	6%
2006	1,857	87	1,063	1.004	57%	66	572	9.042	31%	25	255	1.838	14%	24	210	0.694	11%
2007	1,932	81	1,024	0.845	53%	75	806	4.905	42%	30	351	1.621	18%	18	191	0.470	10%
2008	1,677	85	995	1.033	59%	77	672	5.938	40%	28	260	1.468	16%	22	121	0.818	7%
2009	1,803	81	1,013	0.869	56%	71	745	5.836	41%	16	142	1.837	8%	18	158	0.501	9%
2010	1,475	62	753	0.873	51%	74	672	7.752	46%	22	200	1.464	14%	8	72	0.294	5%
2011	1,538	88	986	1.147	64%	54	581	6.204	38%	29	258	1.084	17%	3	33	0.452	2%
2012	988	62	574	1.207	58%	43	289	5.784	29%	23	207	0.975	21%	8	61	0.836	6%
2013	1,371	82	771	1.294	56%	56	495	4.147	36%	23	184	0.728	13%	17	149	0.404	11%
90-13 Avg.	2,829	139	1,531	0.857	55%	71	715	4.966	28%	23	733	1.100	23%	28	271	0.409	9%

Long Point Bay (Area 09)																	
Year	Total Rod Hours	Rainbow Trout				Walleye				Northern Pike				Smallmouth Bass			
		Trips	Rod Hours	CPUE	% Total Effort	Trips	Rod Hours	CPUE	% Total Effort	Trips	Rod Hours	CPUE	% Total Effort	Trips	Rod Hours	CPUE	% Total Effort
1990	4,304	22	397	0.048	9%	265	3,456	0.205	80%	9	101	0.446	2%	32	381	0.855	9%
1991	2,793	22	266	0.098	10%	160	2,005	0.125	72%	13	174	0.189	6%	28	330	1.074	12%
1992	3,829	89	1,170	0.143	31%	141	1,909	0.046	50%	2	9	0.000	0%	28	380	0.708	10%
1993	3,685	113	1,631	0.072	44%	222	3,006	0.164	82%	6	76	0.132	2%	47	450	1.044	12%
1994	2,005	70	997	0.022	50%	112	1,581	0.089	79%	0	0	0.000	0%	29	293	1.453	15%
1995	1,949	24	390	0.067	20%	87	1,389	0.086	71%	0	0	0.000	0%	31	345	1.216	18%
1996	1,713	20	321	0.044	19%	78	1,316	0.105	77%	0	0	0.000	0%	43	361	1.528	21%
1997	1,642	24	536	0.030	33%	49	998	0.028	61%	11	116	0.586	7%	39	492	1.229	30%
1998	2,776	61	1,114	0.069	40%	101	1,849	0.051	67%	9	83	0.545	3%	40	586	0.843	21%
1999	2,008	65	1,021	0.094	51%	56	974	0.024	49%	16	224	0.869	11%	28	357	1.150	18%
2000	2,313	100	1,647	0.241	71%	73	1,148	0.017	50%	16	144	3.395	6%	8	70	0.892	3%
2001	1,791	82	1,196	0.135	67%	56	903	0.050	50%	22	182	2.764	10%	11	128	0.476	7%
2002	1,531	87	1,157	0.079	76%	35	424	0.012	28%	20	217	0.661	14%	20	200	0.802	13%
2003	979	50	729	0.064	74%	34	509	0.016	52%	16	130	0.559	13%	12	118	0.834	12%
2004	818	40	583	0.067	71%	24	338	0.012	41%	10	82	0.540	10%	8	53	1.258	7%
2005	1,030	50	658	0.059	64%	41	548	0.055	53%	8	77	0.506	7%	20	244	0.775	24%
2006	644	18	306	0.095	47%	17	310	0.132	48%	8	74	0.952	11%	16	136	1.547	21%
2007	363	8	117	0.232	32%	6	112	0.099	31%	8	84	1.485	23%	9	86	1.291	24%
2008	463	17	290	0.007	62%	15	298	0.024	64%	26	157	0.712	34%	4	29	0.655	6%
2009	390	6	115	0.000	29%	6	115	0.000	29%	11	133	0.278	34%	16	181	0.838	46%
2010	265	0	0	0.000	0%	0	0	0.000	0%	10	106	1.349	40%	12	159	1.279	60%
2011	139	0	0	0.000	0%	0	0	0.000	0%	9	94	0.786	68%	7	42	2.583	30%
2012	121	1	9	0.000	7%	1	9	0.000	7%	6	53	1.415	44%	8	57	0.792	47%
2013	161	2	3	0.131	2%	2	15	0.393	9%	8	92	1.803	57%	7	54	1.551	34%
90-13 Avg.	1,571	40	610	0.075	38%	66	967	0.072	48%	10	100	0.832	17%	21	230	1.111	21%

^aCPUE represents observed catch divided by observed angling effort in rod-hours directed at that particular species.

Table 3.7 Angler success rates (CPUE) of non-charter boat anglers targeting particular species, Nanticoke and Port Colborne survey areas, Lake Erie, 1990-2013^a. Effort may be directed at more than one species simultaneously.

Nanticoke (Area 10)																	
Year	Total Rod Hours	Yellow Perch				Walleye				Rainbow Trout				Smallmouth Bass			
		Trips	Rod Hours	CPUE	% Total Effort	Trips	Rod Hours	CPUE	% Total Effort	Trips	Rod Hours	CPUE	% Total Effort	Trips	Rod Hours	CPUE	% Total Effort
1990	4,123	101	548	6.812	13%	292	3,412	0.336	83%	42	534	0.021	13%	49	357	0.745	9%
1991	3,424	62	491	4.792	14%	213	2,301	0.169	67%	11	106	0.095	3%	55	330	1.011	10%
1992	2,769	98	824	2.445	30%	155	1,359	0.098	49%	24	225	0.111	8%	116	863	1.242	31%
1993	3,698	34	232	2.660	6%	270	3,062	0.229	83%	61	720	0.071	19%	54	455	1.019	12%
1994	3,201	48	288	3.824	9%	196	2,585	0.170	81%	51	476	0.013	15%	46	348	0.844	11%
1995	1,737	57	338	5.546	19%	118	1,395	0.166	80%	7	123	0.016	7%	27	221	0.862	13%
1996	3,164	71	405	4.581	13%	155	2,513	0.144	79%	28	288	0.076	9%	32	366	0.604	12%
1997	2,683	96	778	3.082	29%	91	1,476	0.041	55%	29	405	0.027	15%	55	552	1.052	21%
1998	1,846	93	571	3.641	31%	68	836	0.059	45%	34	367	0.037	20%	54	465	1.273	25%
1999	1,765	70	354	5.601	20%	62	760	0.043	43%	35	488	0.044	28%	73	696	1.495	39%
2000	1,534	91	593	6.945	39%	27	337	0.012	22%	30	339	0.121	22%	54	458	2.900	30%
2001	1,195	67	469	4.584	39%	33	269	0.007	23%	39	368	0.076	31%	49	413	2.091	35%
2002	1,329	116	901	4.849	68%	20	152	0.000	11%	23	176	0.079	13%	24	345	1.115	26%
2003	1,603	118	1,032	4.247	64%	18	257	0.047	16%	19	251	0.064	16%	22	245	1.806	15%
2004	1,298	129	1,041	4.714	80%	4	64	0.016	5%	7	80	0.075	6%	29	273	1.504	21%
2005	1,634	140	1,107	4.093	68%	21	296	0.034	18%	26	313	0.086	19%	18	165	1.706	10%
2006	1,020	108	804	4.959	79%	14	188	0.069	18%	11	156	0.019	15%	6	44	1.545	4%
2007	1,080	90	644	3.893	60%	20	272	0.048	25%	23	287	0.153	27%	12	114	1.982	11%
2008	834	68	507	4.467	61%	13	223	0.130	27%	11	187	0.048	22%	7	53	2.110	6%
2009	1,070	119	847	5.074	79%	9	163	0.012	15%	5	74	0.054	7%	10	72	1.437	7%
2010	757	87	582	3.235	77%	3	34	0.059	4%	0	0	0.000	0%	15	113	1.113	15%
2011	659	77	584	3.361	89%	1	12	0.083	2%	1	12	0.000	2%	12	110	0.444	17%
2012	687	83	566	4.346	82%	1	12	0.083	2%	1	12	0.083	2%	14	116	0.879	17%
2013	695	84	539	4.166	77%	2	4	0.000	1%	2	30	0.067	4%	21	174	1.270	25%
90-1 Avg.	1,825	88	627	4.413	48%	75	916	0.086	36%	22	251	0.060	13%	36	306	1.335	18%

Port Colborne (Area 11)													
Year	Total Rod Hours	Walleye				Smallmouth Bass				Yellow Perch			
		Trips	Rod Hours	CPUE	% Total Effort	Trips	Rod Hours	CPUE	% Total Effort	Trips	Rod Hours	CPUE	% Total Effort
1990	3,889	165	1,763	0.229	45%	30	250	0.556	6%	47	228	1.142	6%
1991	3,965	290	3,357	0.163	85%	48	322	0.848	8%	52	283	0.993	7%
1992	4,009	91	3,449	0.085	86%	52	352	0.727	9%	63	429	0.876	11%
1993	3,242	220	3,085	0.273	95%	24	221	0.647	7%	32	214	0.829	7%
1994	2,825	184	2,388	0.202	85%	33	217	0.852	8%	33	261	1.091	9%
1995	4,849	294	4,229	0.174	87%	60	537	1.354	11%	12	113	0.585	2%
1996	5,868	256	5,286	0.138	90%	55	658	1.072	11%	15	134	0.427	2%
1997	9,129	356	7,443	0.135	82%	135	1,329	1.311	15%	47	411	0.481	5%
1998	7,540	310	5,900	0.112	78%	150	1,526	1.361	20%	54	307	0.695	4%
1999	7,231	250	5,790	0.113	80%	117	1,232	1.365	17%	28	201	0.801	3%
2000	4,459	165	3,383	0.159	76%	91	924	1.943	21%	13	143	0.491	3%
2001	4,418	150	3,678	0.082	83%	46	675	0.911	15%	18	141	0.817	3%
2002	4,265	138	3,316	0.151	78%	78	897	0.880	21%	23	267	1.815	6%
2003	3,273	121	2,859	0.141	87%	34	243	0.944	7%	17	160	2.307	5%
2004	2,608	87	1,991	0.113	76%	61	632	1.357	24%	3	34	2.537	1%
2005	3,143	134	2,749	0.222	87%	36	373	0.981	12%	13	248	0.275	8%
2006	2,328	103	1,948	0.272	84%	25	264	1.770	11%	16	156	4.450	7%
2007	2,756	98	2,306	0.167	84%	19	277	0.766	10%	23	248	2.101	9%
2008	1,921	71	1,655	0.162	86%	13	111	0.840	6%	17	143	2.646	7%
2009	1,986	77	1,688	0.168	85%	10	133	0.211	7%	25	228	2.860	11%
2010	526	24	387	0.067	73%	9	111	0.378	21%	4	38	3.893	7%
2011	1,202	50	938	0.185	78%	8	74	1.389	6%	26	261	4.279	22%
2012	824	20	604	0.172	73%	10	95	0.537	12%	21	203	5.107	25%
2013	596	22	390	0.370	65%	4	39	0.961	6%	24	182	6.520	30%
90-13 Avg.	3,619	153	2,941	0.169	80%	48	479	0.998	12%	26	210	2.001	8%

^aCPUE represents observed catch divided by observed angling effort in rod-hours directed at that particular species.

4. INDEX FISHING PROJECTS

4.1 Partnership Index Fishing: Gill Netting

The Partnership Index Fishing Gill Netting Program is a cooperative fisheries assessment program with the Ontario Commercial Fisheries' Association (OCFA). Field work and laboratory sampling are funded through the Commercial Fish Business Relationship (CFBR) between the province of Ontario and the OCFA. Prior to 1998, the program relied on volunteer participation from the fishing industry to complete the field component. This program has monitored abundance, age structure, size, and species composition throughout Lake Erie since 1989. Data from this community index are applied in catch-at-age analyses to estimate population abundance of Yellow Perch and Walleye. These population estimates are critical for to the international allocation process for these species.

The lakewide survey was partitioned spatially into projects defined as the west, west-central, east-central, and eastern basins. In 2013, a total of 122 sites were fished across Lake Erie (Figure 4.1.1). Due to funding constraints, sites within the Pennsylvania Ridge and extra sites within the Walleye Cap Area (east of 79° 40') were excluded in 2013. In addition, the number of sites in the west-central and east-central basin surveys were reduced each by one site. The vessel conducting the field work in 2013 was equipped with a GPS transponder allowing verification of coordinates fished. Since 2003, gill nets 110 feet in length with a mesh size of 4.75" (121 mm), 50 meshes deep were fished canned (suspended) at the same depths as canned index nets to examine the effectiveness of index gear catching suspended Walleye. These nets were approximately 17 feet deep with 3.1 times the area of the 50' index nets. Mean Walleye catch and size distributions in 2013 are presented for index and auxiliary gear. Also in 2013, additional 1 fathom canned index nets were fished at 12 random sites in both the west-central and east-central basin surveys. These shallow suspended gangs were intended to provide additional information describing the vertical distribution of Walleye in the central basin.

In 2013, three types of index gill nets were fished by OMNR in order to contribute to the standardization of interagency assessment gill nets. Multifilament and monofilament index gill nets identical to those fished by Ohio Department of Natural Resources (ODNR) were fished adjacent to canned Partnership index monofilament nets at 7 locations across the west and central basins. Methods and results are reported following results of the Partnership surveys.

Partnership index gill nets consisted of 1,250 feet (0.38 km) panels of graded monofilament mesh including 1.25", 1.5", 1.75", 2.0", 2.25", 2.5", 2.75", 3.0", 3.5", 4.0", 4.5", 5.0", 5.5", and 6.0" (32 mm to 152 mm). Mesh sizes 2 inches (57 mm) and greater were composed of two 50 foot panels, and those less than 2 inches were single panels 50 feet (15.25 m) in length. Sets were approximately 24 hours in duration.

Nets were set at randomly selected sites within the designated depth strata. The number of sites within each stratum was proportional to lake area. Depth strata for the western basin included 0 to 10 m and greater than 10 m. In the west-central and east-central basins, depths were grouped as 0 to 15 m, 15 to 20 m, and greater than 20 m. The eastern basin depth strata were partitioned as 0 to 15 m, 15 to 30 m and depths greater than 30 m. The number of locations fished in the west, west-central, east-central, and east basin surveys were 22, 35, 35, and 30 respectively.

At each site, nets were fished on the bottom and suspended (canned) at depths determined partly by the depth stratum and by random selection. In the western basin, nets were canned at 1 fathom (1.8 m). In the west-central and east-central basins, gill nets were canned at 2.7 fathoms (5 m) or 6.0 fathoms (11 m) or 9.2 fathoms (17 m). The central basin surveys were fished following fall turnover, when the water temperature was uniform throughout the water column. Twelve additional gangs of 1 fathom index nets were fished in addition to the standard complement of canned nets in the west-central and east-central basins, as described above.

In the deeper east basin, index gear was fished during thermal stratification. The gear was fished in the standard manner with gill nets set on bottom and canned at 2 fathoms (3.7 m) or 4 fathoms (7.3 m), or 8 fathoms (14.6 m) at all sites. Additional canned nets were fished in the thermocline in 2013 at sites with depths sufficient for a hypolimnion (cold bottom layer) to exist.

All Walleye and Yellow Perch were scanned for passive integrated transponder (PIT) tags using a Biomark reader with a racket style antenna as bags of fish caught in index gear were removed from totes. All fish were identified, counted and weighed “in bulk” by species and mesh size. Biological sampling for selected species included determination of length, weight, sex, maturity, gonad weight and age. In addition to standard scale sample collection, sagittal otoliths were collected from Yellow Perch, Walleye, Burbot, Lake Whitefish and Smallmouth Bass greater than 30 cm in length. Otoliths were collected from Yellow Perch 15 cm and greater in total length caught in bottom nets, while scales were used to age smaller Yellow Perch. For Yellow Perch caught in canned nets, scales were used for aging, but otoliths were also collected and aged for fish longer than 250 mm. Otoliths were collected from all Walleye 38 cm and larger, and from subsamples of catches of smaller Walleye (minimum of 6 per site). Lake Trout heads were retained to recover coded wire tags present in stocked Lake Trout. In 2013, all species were examined for Lamprey scars and wounds. Salmonids were examined for the presence of fin clips. Results from surveys include total catches, mean species biomass and age specific information for Yellow Perch, Walleye and Lake Whitefish. Catch rates presented have not been adjusted for selectivity bias associated with the gang configuration of mesh sizes.

The Partnership Index Fishing began September 3, 2013 in eastern Lake Erie and was completed by September 11, 2013. Fishing began in the western basin on September 13, 2013 and was completed by September 19, 2013. Fall turnover was delayed until the middle of October, pushing the start of the west-central basin survey to October 18. Windy weather delayed completion of the east-central basin survey until November 23, 2013. Index fishing was conducted lakewide aboard the L. R. Jackson.

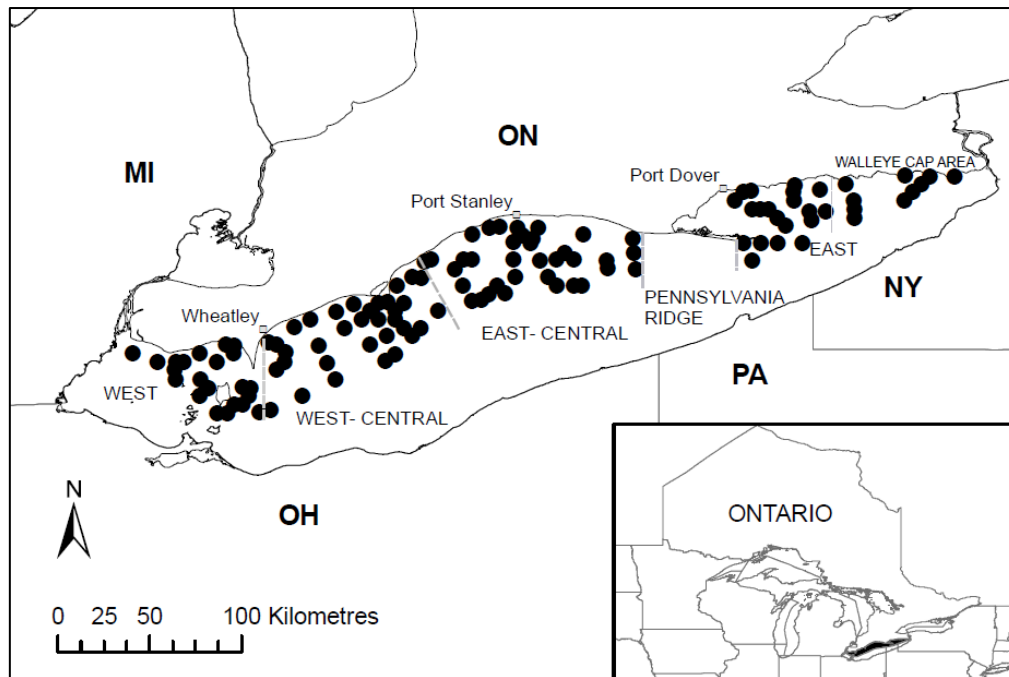


Figure 4.1.1 Lake Erie Partnership Index Fishing gill netting locations fished in 2013. Note Pennsylvania Ridge survey was not done in 2013.

Results

Fish Community

Catch in numbers by species over the time series is presented for the west, west-central, east-central, and east basin in Tables 4.1.1 to 4.1.4 respectively. Catches were standardized to an equal number of gangs as specified in Tables 4.1.1 to 4.1.4. The reference number of gangs in this report reflects the target number of gangs as targets have usually been met since the lakewide index fishing tender process began in 1999. Tables 4.1.1 to 4.1.4 include only catches in standard bottom and canned monofilament nets. Observed lakewide catches in monofilament index gill nets fished at all depths are presented in Table 4.1.5a (1989-1999) and Table 4.1.5b (2000-2013) with corresponding sampling effort by gear.

Alewife indices of abundance in Lake Erie were generally depressed since 2003, but showed signs of increase in 2012. Catches of Alewives increased yet again in all 2013 surveys and rose to above average levels in the eastern half of Lake Erie (Tables 4.1.1 – 4.1.5). Based on length distributions, young-of-the-year Alewife dominated west (97%), west-central (96%) and east-central (90%) basin surveys, but represented 24% of Alewife caught in the east basin survey. Gizzard Shad abundance indices in all surveys declined from 2012 and were below survey means (Tables 4.1.1-4.1.5). Length distributions indicated young-of-the-year represented 32% and 30% of Gizzard Shad caught in the west and west-central basin surveys, respectively. In the east-central basin, 44% of Gizzard Shad caught were YOY whereas no YOY were caught in the east basin survey.

White Perch 2013 catch rates decreased in number from 2012 in the west and east-central basin surveys, but increased in west-central and east basin surveys (Tables 4.1.1 – 4.1.4). White Perch catches in 2013 were comparable to long term averages in west and east basin indices but were above average in both the west-central and east-central basin surveys (Tables 4.1.1 – 4.1.4). Yearling White Perch accounted for approximately 23-35% of the White Perch caught in the west and central basin surveys but represented only 12% of White Perch in the east basin survey. White Bass catch rates in 2013 were the highest in both the west-central and east basin time series, were above average in the west basin index but more so in the east-central basin survey (Tables 4.1.1 - 4.1.4). Yearling White Bass dominated catches in the central and east basin surveys (>70%) but age 1 comprised approximately half of the White Bass caught in the west basin survey.

In Ontario waters of Lake Erie, the majority of Smallmouth Bass are caught primarily in the east and west basins. Most Partnership survey locations in eastern Lake Erie were situated outside of Long Point Bay which is recognized as excellent habitat for Smallmouth Bass (Figure 4.1.1). Partnership index catch rates in 2013 were down from 2012 and below the long term means for both the west and east basin (Table 4.1.1 and Table 4.1.4). The majority of Smallmouth Bass caught in the west basin survey were yearling (50%), followed by ages 0 (22%), 3 (11%), 6 (6%) and 9 (6%). West basin Smallmouth Bass age composition ranged from 0 to 9. In the east basin survey, ages ranged from 0 – 16 with ages 3 (27%), 2 (22%), and 8 (15%) being most common.

Invasive Round Gobies first appeared in the Partnership index in the west-central basin during 1997 (Tables 4.1.2 and 4.1.5). In the following year, 1998, Round Gobies appeared in the west basin and east-central basin survey (Tables 4.1.1, 4.1.3). By 2000, they were present in the east basin survey (Table 4.1.4). Catches of Round Gobies in 2013 were comparable to average levels in the west and east basin surveys (Tables 4.1.1, 4.1.4) but lower than average in both central basin indices (Tables 4.1.2 and 4.1.3). Due to their smaller size and body shape, Round Gobies are not typically vulnerable to capture in index gill nets.

Freshwater Drum abundance indices in 2013 were near average levels in the west-central and east-central basin surveys, but below time series means in the west and east basin (Tables 4.1.1 – 4.1.5). Catches in 2013 consisted mainly of adult Freshwater Drum lakewide.

Burbot catch (5) in the 2013 east basin survey was the lowest in the time series, but equal to 2012 and 1989 indices (Tables 4.1.4 - 4.1.5). Two (2) Burbot were caught in the east-central basin (Table 4.1.3) while 5 were caught in the east basin survey in 2013. Of the 7 Burbot caught lakewide in

index gear, 2 were mature females and 5 were mature males. One female caught in the east basin had an A4 Lamprey wound. No Burbot were caught in auxiliary 121 mm gear in 2013. Burbot abundance peaked in 1998 and has continued to decline since then due to poor recruitment.

Lake Trout are stocked in Lake Erie by U.S. agencies and OMNR as part of an effort to rehabilitate this native species. Many stocked fish are fin clipped with coded wire tags implanted in the nares. In 2013, Lake Trout were caught only in the eastern Partnership survey in nets fished on bottom. Depths at which Lake Trout were caught ranged from 9 to 61 m (mean=20 m). Temperatures in which Lake Trout were caught ranged from 5.6 °C to 19.6 °C (mean=10.7 °C). Typically inhabiting the cold, deep hypolimnion, exceptions occurred in 2013 where 22 Lake Trout were caught on bottom in 9 m of water at 11.4 °C and one was caught on bottom at a 19 m depth where the water temperature was 19.6 °C. In 2013, 45 Lake Trout were caught in monofilament index gill nets, with none caught in auxiliary gear. Although the east basin Lake Trout index dropped from 2012, the 2013 index was almost double the time series mean (Table 4.1.4). Of the 45 Lake Trout caught in index nets, 44 had fin clips. The Lake Trout lacking a fin clip had a coded wire tag, indicating a stocked origin. Fin clips included adipose (42), left ventral-adipose (1), and left pectoral-right pectoral (1). Twenty eight (28) coded wire tags were detected, revealing the strains of Lake Trout stocked. The number of Lake Trout by strain in 2013 was Slate Island (20), Lake Champlain (3), Klondike (3), Finger Lakes (1), and Apostle Island (1). Lake Trout caught in 2013 had total lengths ranging from 387-736 mm with a mean length of 632 mm. The fraction of Lake Trout observed with wounds was 0.09 and the fraction with scars was also 0.09. The wounding rate (wounded Lake Trout per 100 examined) of type A1, A2 or A3 was observed to be 4/43 or (0.09) on adult Lake Trout with total lengths greater than or equal to 532 mm. Three of twenty (3/20) Slate Island strain Lake Trout had A1-A3 wounds (0.15). One of 17 (1/17) Lake Trout of unknown strains had an A1-A3 wound (rate 0.06). Lamprey scars were observed on Klondike (1/3 or 0.33) and unknown (3/17 or 0.18) strains of Lake Trout.

Four Lake Sturgeon were caught in the west basin survey during 2013. None of the Lake Sturgeon had been previously tagged. The Lake Sturgeons were 330, 460, 560 and 590 mm in total length. The left pectoral rays were collected for aging before releasing all Lake Sturgeon alive. Lake Sturgeon in the Great Lakes is currently listed as *Threatened* under the Endangered Species Act of Ontario.

Silver Chub occur throughout Lake Erie, with the greatest densities observed in the west basin (Tables 4.1.1 - 4.1.4). The peak catch of Silver Chub occurred in 1993. Since then, another spike in abundance occurred in 1999, after which catches of Silver Chub declined. In 2013, six (6) Silver Chub were caught in the west basin Partnership survey (Tables 4.1.1, 4.1.5b). The Silver Chub ranged from 151 to 219 mm total length with a mean length of 188 mm. Lake Erie is in the northern part of the geographic range of Silver Chub. The status of Silver Chub is currently listed as *Threatened* under the Endangered Species Act of Ontario.

Moderate numbers of Rainbow Trout (20) were caught lakewide during Partnership index gill netting in 2013 (Table 4.1.5b). The majority of Rainbow Trout (12) were caught in gangs fished in the thermocline which are not reported in the east basin survey Table 4.1.4 due to periodic use of this gear over time. Table 4.1.4 reports only catches in standard canned and bottom index gill nets (8 Rainbow Trout in 2013). Four Rainbow Trout were also caught in auxiliary 50 mesh 121 mm nets fished within the thermocline. None of the Rainbow Trout examined had Lamprey wounds or scars. Rainbow Trout represent the majority of more than 2 million Salmonids stocked annually by Lake Erie agencies. Naturalized populations of Rainbow Trout also occur in Lake Erie.

Although they are no longer stocked in Lake Erie, a Coho Salmon (1) was caught during 2013 surveys in a net fished suspended at 5.5 m in water 20.7 °C in the east basin (Tables 4.1.4 and 4.1.5b). The mature female with a total length of 669 mm was free of Lamprey scars and wounds. The weight of ovaries represented 11% of the Coho's round weight.

Biomass trends for dominant species are presented for the west, west-central, east-central and east basins in Figure 4.1.2. Species with average biomass equaling at least 3% of basin averages are represented graphically. Remaining species are presented in the “other” species category. In Lake Erie, productivity and thermal gradients exist, varying from west to east, promoting differences in fish community structure. Since the west basin is considerably smaller in surface area and volume than other basins assessed, absolute numbers and biomass may be comparatively less than other basins. Trends in mean biomass per gang of all species differed among Lake Erie surveys. West basin species biomass in 2013 (49 kg / gang) was ranked 30th percentile in the time series, below the average (60 kg / gang). In contrast, west-central biomass in 2013 (70 kg / gang, 65th percentile) was above the time series average (56 kg / gang). East-central (35 kg / gang, 48th percentile) and east basin (19 kg / gang, 45th percentile) biomass catch rates were both near their respective time series means (39, 20 kg / gang). Mean biomass per gang of all fish species caught was greatest in the west-central basin, followed by the west, east-central and east basins.

The smallest mesh size in the index gear configuration is 32 mm which excludes most small bodied forage fish such as Rainbow Smelt, Emerald Shiners, and juvenile fish of most species. Round Gobies are caught in index gill nets when they are larger, but due to their body shape and benthic behaviour, they are under represented in gill net assessments and accounted for less than 1% of biomass in all 2013 surveys.

Fish biomass in the 2013 west basin survey decreased 49% from 2012, and consisted of Gizzard Shad (27%), Walleye (18%), Yellow Perch (16%), White Perch (15%), White Bass (7%), Freshwater Drum (7%), Channel Catfish (6%) and other species (4%). White Suckers (1%) and Shorthead Redhorse Suckers (1%) also contributed significantly to biomass in 2013. White Bass, Channel Catfish and White Perch catches in 2013 represented 91, 74, and 70th percentiles in their respective time series. Longnose Gar, Lake Sturgeon, and Round Goby biomass catch rates in 2013 exceeded the 66th percentiles. Walleye, Yellow Perch and Freshwater Drum biomass levels in 2013 all represented the 35th percentile of their time series while Gizzard Shad and Alewife biomass ranked at the 48th and 57th percentiles in 2013 respectively. Smallmouth Bass historically accounted for more than 1% of all biomass but represented less than 1% in 2013 and ranked 17th percentile over the 1990-2013 west basin time series.

West-central basin total biomass per gang in 2013 was 12% lower than 2012. Mean biomass per gang in 2013 was dominated by White Perch (30%), Yellow Perch (22%), Freshwater Drum (16%), Gizzard Shad (12%), White Bass (8%), Walleye (7%), and Alewife (2%) with 4% attributed to other species. White Bass and White Perch biomass in 2013 were the highest in their time series (100th percentiles) while Freshwater Drum biomass ranked 78th percentile in 2013. Species with moderate biomass catch rates in 2013 relative to the west-central basin time series include Alewife (61st percentile), Gizzard Shad (57th percentile), Yellow Perch (43rd percentile) and Walleye (39th percentile). White Suckers (2% of total biomass) and Channel Catfish (2% of total biomass) represented 100th and 96th percentiles in their time series respectively. Common species caught in this survey during 2013 ranked from 39th to 100th percentile over the 1990-2013 time series.

In the east-central basin survey, mean biomass per gang of all species in 2013 decreased 42 % from 2012. East-central basin biomass in 2013 consisted of White Perch (28%), Freshwater Drum (22%), Yellow Perch (20%), White Bass (11%), Alewife (8%), Walleye (6%), Gizzard Shad (3%) and other species (2%). White Bass biomass dropped slightly from 2012 but was 91st percentile in the time series. Alewife (83rd percentile) and White Perch (74th percentile) biomass catch rates were also high relative to their respective time series. Surveys during the last two years indicate an increase in Lake Erie's Alewife population, depressed since 2003. Freshwater Drum (57th percentile) and Walleye (43rd percentile) biomass levels were moderate in 2013 relative to 1989-2013. Yellow Perch (30th percentile) and Gizzard Shad (17th percentile) biomass indices in 2013 decreased by 46% and 91% respectively from 2012.

In the east basin survey, mean biomass per gang of all species in 2013 was almost unchanged from 2012 (increased 1%). The species composition of eastern Lake Erie consists of warm, cool, and cold water fish communities. Eleven (11) species represented 94% of the fish biomass in 2013 including Alewife (25%), Yellow Perch (16%), Lake Trout (10%), Walleye (10%), Freshwater Drum (7%), White

Bass (7%), Smallmouth Bass (6%), Gizzard Shad (5%), White Perch (4%), White Sucker (2%) and Burbot (1%) with other species accounting for the remaining 6%. Other species that contributed significantly to total biomass in 2013 were Channel Catfish (2%), Rainbow Trout (1%) and Rainbow Smelt (1%). Species with moderate biomass rankings for the time series included Walleye (55th percentile) and Yellow Perch, Freshwater Drum and Gizzard Shad, each ranked at the 41st percentile. Low biomass per gang of Smallmouth Bass (27th percentile), White Suckers (9th percentile), and Burbot (5th percentile) were observed in 2013. Average Lake Whitefish biomass over the 1989-2013 time series represented 2% of all species caught. However, in 2013 no Lake Whitefish were caught in the east basin survey. Numbers were rounded to the nearest percentage.

Yellow Perch

In 2013, Yellow Perch catch rates (all ages) decreased lakewide from 2012 surveys (Figure 4.1.3). Decreases amounted to: west (38%), west-central (18%), east-central basin (25%) and east basin (57%). Relative to each survey time series, 2013 catch rates ranked as 17th, 39th, 42nd, and 50th percentiles for the west, west-central, east-central and east basin surveys respectively.

Age composition and catch rates of Yellow Perch are influenced by the mesh size configuration of the index gear. Although catches were standardized to equal effort among mesh sizes, the following results are otherwise not adjusted for any bias due to mesh size configuration. Generally, catch rates reported here underestimate the abundance of yearling Yellow Perch relative to older Yellow Perch.

Age 3 (2010 year class; 33%) and age 1 (2012 year class; 30%) were the most abundant cohorts in the 2013 west basin survey (Figure 4.1.3). In the 2013 west-central basin survey, age 3 (2010 year class 30%) age 1 (2012 year class 23%) and age 5 (2008 year class 18%) were the most common age groups. In contrast, age 1 (39%), age 2 (21%) and age 3 (13%) collectively accounted for 73% of Yellow Perch caught in the 2013 east-central basin survey. In the 2013 east basin survey, ages 3 (44%), 2 (27%) and 1 (17%) were most abundant.

Relative to each respective time series, 2013 yearling Yellow Perch catch rates were moderate in the west (52nd percentile) and west-central (65th percentile) surveys, but were stronger in the east-central (96th percentile) and east basin (77th percentile) surveys (Figure 4.1.3). Abundance indices of Yellow Perch ages 6 and older in 2013 were generally high lakewide, ranked at 74th, 91st, 78th, 68th percentiles in the west, west-central, east-central and east basin surveys respectively.

The mean age of Yellow Perch caught reflects differences in age composition between surveys with the lowest value in the east-central basin survey (2.8) and the highest in the west-central basin (3.3)(Figure 4.1.4). Yellow Perch sex ratios remained relatively stable over the time series to 2013, during which females represented 45% to 58% of Yellow Perch ages 2 and older (Figure 4.1.5).

Mean total length (mm) and weight (g) for each sex was plotted by basin for Yellow Perch collected in 2013 with 95% confidence limits to compare with the time series average up to 2012 (Figure 4.1.6). Length and weight of Yellow Perch may be influenced by factors such as temperature, forage abundance, competition, and survival. A transition in 2005 to aging older Yellow Perch using otoliths may have contributed to observations that trends in annual mean size of older fish are falling below the time series mean. Mean length and weight at age in 2013 was above or near average for ages 1, 2 and 3 in all basins. In both central basin surveys however, mean size of age 4 and older Yellow Perch were generally below time series means in both length and weight. Mean length trends at ages 1, 2 and 3 by sex of Yellow Perch caught in surveys are presented in Figure 4.1.7. Oscillations in mean length at age were evident for both sexes with recent upward trends evident in west, west-central and east-central basin surveys (Figure 4.1.7). In east basin surveys, gradual increases in mean size across years were apparent, but mean length has leveled off or decreased slightly in recent years (Figure 4.1.7).

All Yellow Perch caught during the 2013 fall Partnership gill net survey in 2013 were scanned for passive integrated transponder tags (PIT) which have been applied by Ontario MNR since 2009 and by Ohio DNR in 2013. Of Yellow Perch 17 cm and larger, 11,078 Yellow Perch (1,662 kg) were

scanned for PIT tags as sample bags were removed from totes in the lab. No PIT tags were detected in Yellow Perch scanned in 2013.

Walleye

Abundance of all Walleye age groups combined was low in the west (9th percentile) and west-central (22nd percentile) basin surveys and moderate in the east-central (43rd percentile) and east basin (59th percentile) surveys (Figure 4.1.8). Indices of Walleye abundance for ages 2 and older were moderate across all basins during 2013 relative to each survey's time series, with percentiles ranging from 43 to 63.

Walleye catch rates in 2013 decreased from 2012 in the west (30%), west-central (49%) and east-central basin surveys (16%) but with minimal decrease (1%) observed in the east basin survey (Figure 4.1.8). The decline in the west and east-central basin survey catch rates was attributed mostly to fewer yearlings caught in 2013, whereas the decline in west-central basin survey was associated with fewer age 1, 2 and older age groups. Yearling Walleye (2012 year class) represented the largest proportion of the catch (39%) in the west basin, followed by age 2 (33%) and age 3 (12%), (Figure 4.1.8). In the west-central basin, age 2 (28%), age 1 (25%), and age 3 (15%) were most abundant. The east-central basin survey was composed of ages 2 (30%) and 3 (19%) with moderate representation of ages 4, 6 and 1. In the 2013 east basin survey, ages 3 (29%) and 1 (16%) were the most common age groups. Older Walleye (ages 7 plus) represented large fractions of Walleye caught in the east basin (33%), west-central (22%), and east-central (16%) surveys but were less prevalent in the west basin (4%) survey. The strong 2003 year class at age 10 comprised 4%, 14%, 4% and 13% of Walleye caught in the west, west-central, east-central and east-basin surveys during 2013 respectively.

Young-of-the-year (YOY) catch rates were moderate in the west (48th percentile) and west-central basin (61st percentile) surveys and absent in east-central and east basin surveys. Age 1 Walleye indices were moderate in the west (39th percentile) and both central basin (48th, 30th percentiles) surveys, but were strong (82nd percentile) in the 2013 east basin survey. Age 2 Walleye catch rates in 2013 were moderate in the west (52nd percentile) and central basin surveys (52nd, 57th percentiles) but were relatively weak in the east basin (23rd percentile). Age 3 catch rates were relatively high in the west (74th percentile), the east-central (74th percentile) and the east basin (86th percentile) surveys but were moderate in the west-central basin (52nd percentile) survey during 2013. Catch rates of Walleye ages 4 and 5 varied between moderate and weak across surveys. Age 6 abundance was assessed as relatively strong in the west (78th percentile) and east-central (70th percentile) basin surveys but 2013 catches were moderate in the west-central (61st percentile) and east basin (59th percentile) surveys. Walleye ages 7 and older were relatively abundant in 2013 across all surveys, ranging from 74th to 91st percentile of each survey's time series.

The mean age of Walleye caught in 2013 was lowest in the west (2.1), followed by the west-central (3.6) and east-central basins (4.3) and the east basin (5.8) survey (Figure 4.1.9). With some exceptions during recent years, Walleye mean age increased over the time series, indicating combinations of increased survival and decreased recruitment.

The percentage of age 2 and older Walleye caught that were female in 2013 surveys ranged from 43% to 57% in surveys except the east-central basin survey where females accounted for 73%. In 2013, the proportion of age 2 and older Walleye that were female was slightly below average in the west and west-central basin surveys but was equal to average in the east basin survey. In the east-central basin, the fraction that was female exceeded the mean by 9%.

Mean total length (mm) and weight (g) with 95% confidence limits for each sex was plotted by basin for Walleye collected in 2013. The average size at age for each sex across years pooled to 2012 was plotted for comparison (Figure 4.1.11). Both sexes of Walleye were generally above average in length and weight for ages 1 to 5 with some exceptions for older fish (Figure 4.1.11). Figure 4.1.12 illustrates that in 2013 and recent years, Walleye mean lengths for ages 1 to 3, were high relative to the time series in west and central basin surveys.

Walleye index gill net catch rates were greater in standard canned index nets compared to bottom index gill nets in all basins (Figure 4.1.13). Catch rates in auxiliary index nets fished at 1 fathom (1.8 m) depths in the central basin were more than double standard canned net values in the west-central basin and 88% higher than standard canned nets in the east-central basin. In the east basin survey the Walleye catch rate in nets fished within the thermocline (1.1 Walleye / gang) exceeded the catch rate of nets fished on bottom (1.0) but was less than standard canned nets (1.5).

Walleye catch rates in commercial style 50 mesh 121 mm (4¾") nets fished adjacent to all index canned nets were highest in the west-central basin (3.2 Walleye per gang), followed by the east-central basin (2.9), nets fished in the thermocline in the eastern surveys (1.7), west basin (1.2) and in the eastern basin at standard canned depths (1.0) (Figure 4.1.13). In Figure 4.1.13, central basin catch rates combined nets fished at standard depths along with canned nets fished at 1 fathom (2 m). Total lengths of Walleye caught in index nets ranged from 16 to 76 cm whereas commercial style 4¾" nets caught Walleye 34 cm to 75 cm in length and were generally composed of larger Walleye (Figure 4.1.13).

Walleye catch rates in 4¾" (121 mm) nets are presented for the west, west-central, and east-central basins pooled (Figure 4.1.14) and for the east basin (Figure 4.1.15). Walleye catch rates in 2013 represented the 20th and 40th percentiles for the west-central and east basin series respectively since 2003 (Figures 4.1.15 and 4.1.16). Ages in the west and central areas ranged from 2 to 14 with ages 3 (26%), 10 (23%) and 2 (10%) most common. In the east basin, ages ranged from 3 to 20 with ages 10 (22%), 5 (16%) and 3 (14%) most abundant. Walleye age 7 and older accounted for 30% of Walleye caught in the west and central areas compared to 51% of Walleye caught in the east basin (Figures 4.1.14 and 4.1.15).

All 1,571 Walleye caught and sampled during Partnership surveys were scanned for PIT tags in 2013. No PIT tags were detected.

Lake Whitefish

Lake Whitefish are a migratory cold water species caught typically in central basin surveys following fall turnover and in the hypolimnetic waters of the eastern basin while the water is thermally stratified. The west basin survey occurs in September when the water is warm, preceding the Lake Whitefish migration into the west basin to spawn. Lake Whitefish catch rates in 2013 were zero in standard index gear in all surveys except the west-central basin where one Lake Whitefish was caught (Table 4.1.2, Figure 4.1.16). Two other Lake Whitefish were caught in non standard gear. One was caught in 1 fathom canned index nets while another was caught in auxiliary 121 mm nets fished in the west-central basin. The two (2) Lake Whitefish caught in index nets were ages 11 and 12. The Lake Whitefish caught in auxiliary 121 mm net was age 10.

The increasing mean age in the Lake Whitefish population reflects the continued dominance of the older fish without recruitment (Figure 4.1.17). The lengths and weight of two male Lake Whitefish caught in index gill nets during 2013 are presented in Figure 4.1.18 along with mean size at age over the time series. No female Lake Whitefish were caught for comparison.

Lake Erie Whitefish indicators from the Partnership index have become limited in value with the exception that the status is apparently poor based on their rare presence. Exclusion of the Pennsylvania Ridge survey negatively influenced Lake Whitefish assessment in 2013, as this survey takes place in habitat conducive for Lake Whitefish.

Index Gill Net Comparison

In 2012, multifilament index gill nets were fished adjacent to Partnership monofilament canned index gill nets in order to develop methods for standardizing Walleye catches between agency assessment gears. In 2013, this exercise expanded to include an additional monofilament gill net configuration fished by Ohio DNR and the US Geological Survey. Gill nets were fished adjacent to one another overnight suspended (canned) at 1.8 m (4 sites), 5.0 m (2 sites) and 11.0 m (1 site) from the surface

at 7 locations in the west and central basin (Figure 4.1.19). The order of gangs was assigned randomly and changed during each subsequent fishing event.

The Partnership monofilament index gear configuration is described earlier in the *Methods* of this section (4.1). The multifilament nylon nets were 1300 feet in length with double salvaged white 7 pound twine consisting of mesh sizes ranging from 2 inches to 5 inches in $\frac{1}{4}$ " increments. The additional monofilament gill nets were constructed 1200' in length and 6' high with 12 individual 100' panels ranging from 1.5" to 7" (stretch measure) by $\frac{1}{2}$ " increments. Monofilament diameter for 1.5" mesh was 0.20 mm; for mesh sizes 2.0" - 5.0" 0.28 mm diameter, and for mesh sizes greater than 5", 0.33 mm diameter. In contrast, Partnership twine has a constant diameter of 0.23 mm. Float line and lead line are constructed with a foam core and lead core respectively, rather than external corks and leads used in Partnership gear.

Mean Walleye catch per canned gang by mesh size and gear type is presented in Table 4.1.6 and Figure 4.1.20. Walleye catch rate was highest in multifilament nets (37), followed by Partnership (21) and other monofilament (B) (13) nets. For mesh sizes common to all 3 gears (51, 64, 76, 89, 102, 114 and 127 mm), multifilament nets caught more Walleye in all meshes except for 114 mm, where monofilament B nets caught more (Table 4.1.6, Figure 4.1.20). Partnership monofilament and monofilament B nets performed similarly overall for Walleye catches in common mesh sizes. Mean catch per gang of all species combined was highest in multifilament nets (107) compared to monofilament B (55) and Partnership nets (104) (Table 4.1.7). With the exception of Alewife, Gizzard Shad and White Bass for which catches were greatest in Partnership nets, maximum catches of all other species occurred in multifilament gill nets (Table 4.1.7). The length frequency distributions of Walleye in different net types are presented in Figure 4.1.21. Multifilament gear caught more small and large Walleye than the two monofilament gears. When expressed in relative terms, Partnership gear catches had a higher proportion of smaller Walleye than the other two gears. This was also evident from the age composition of Walleye (Figure 4.1.22). Some differences in size and age distributions between gears may be attributed in part to sample size (7 locations fished).

Table 4.1.1 Total numbers of each species caught during western basin Partnership Index Fishing, Lake Erie, 1990-2013. Numbers are standardized to 44 gangs. Average catch from 1990-2013 is presented for each species.

Species	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Average	
Silver Lamprey	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0	0	
Lake Sturgeon	0	0	1	1	1	1	2	0	1	0	3	0	2	5	8	0	1	9	2	0	2	1	1	4	1.9	
Longnose Gar	0	0	1	0	1	0	0	0	0	1	7	4	1	0	0	0	0	0	0	1	1	0	2	2	0.9	
Alewife	87	2,272	309	196	349	1,384	105	54	1,159	1,239	1,939	154	721	0	103	2	80	1	0	0	0	14	7	249	434.3	
Gizzard Shad	718	7,729	2,856	4,103	5,844	6,624	1,118	1,416	2,873	8,542	2,838	4,056	8,561	7,043	5,294	14,185	8,329	2,887	3,283	1,544	1,846	7,927	7,082	1,993	4,945.4	
Pink Salmon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.0	
Chinook Salmon	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	
Rainbow Trout	3	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1	0	0	0	0.3	
Brown Trout	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	
Lake Whitefish	10	1	0	1	0	5	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	
Rainbow Smelt	8	1	0	37	0	1	0	1	1	0	1	95	1	0	1	1	2	2	34	1	1	1	0	2	7.9	
Muskellunge	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	
Quillback	0	1	6	3	5	4	12	5	4	12	7	34	24	25	13	12	9	9	11	8	1	12	11	4	9.7	
White Sucker	59	43	130	46	94	46	73	71	30	39	42	101	90	77	127	133	69	61	71	91	29	201	78	44	76.9	
Silver Redhorse	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	
Golden Redhorse	0	0	0	0	0	0	0	19	0	1	6	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	
Shorthead Redhorse	1	4	22	7	15	13	14	50	17	19	23	31	6	28	33	15	10	41	34	84	31	54	37	26	25.6	
Redhorse sp.	0	0	0	0	0	0	0	0	1	0	0	0	19	0	0	0	0	0	0	0	0	0	0	0	0.8	
Goldfish	0	0	0	0	0	1	0	0	0	2	4	0	0	0	0	2	0	0	5	2	0	0	0	0	0.7	
Common Carp	25	29	4	7	3	2	7	3	1	3	16	22	6	1	4	1	8	3	3	3	5	1	3	9	1	7.0
Silver Chub	25	35	147	320	59	96	89	73	67	185	133	61	48	44	84	21	38	9	2	1	2	8	3	6	64.8	
Honeyhead Chub	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	
Emerald Shiner	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	0	0	0.1	
Spottail Shiner	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	1	0	0	0	0	0	0	0.3	
Brown Bullhead	0	0	1	0	0	0	0	0	0	0	3	1	1	0	0	2	0	1	0	0	0	0	0	0	0.0	
Channel Catfish	62	112	45	83	48	55	59	37	35	62	38	86	89	139	97	244	167	218	106	140	106	268	263	149	112.8	
Stoneroller	1	1	0	1	0	0	1	0	2	2	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0.4	
Tadpole Madtom	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	
Brindled Madtom	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	
Burbot	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.1	
Trout-perch	0	0	0	0	0	0	0	1	4	0	1	3	0	1	0	0	0	0	0	0	0	0	0	0	0.4	
White Perch	462	713	3,155	2,217	1,194	971	972	382	309	1,795	2,053	1,710	1,195	3,090	2,998	3,613	5,360	3,462	1,852	2,108	973	5,167	2,989	2,474	2,133.9	
White Bass	158	110	65	67	288	89	135	271	102	174	225	308	460	367	218	285	277	275	357	435	134	804	2,041	524	340.4	
Rock Bass	6	27	20	1	18	5	12	9	8	5	8	23	7	13	8	3	5	21	1	9	10	0	3	6	9.5	
Pumpkinseed	0	0	0	0	0	0	2	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0.2	
Bluegill	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.0	
Smallmouth Bass	41	83	149	231	231	108	248	162	166	93	116	12	59	12	17	2	32	15	19	78	17	13	34	16	81.4	
Largemouth Bass	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.0	
Black Crappie	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	1	0	0	0.2	
Yellow Perch	822	1,324	2,737	2,211	3,291	4,612	5,102	3,468	3,292	4,415	3,445	10,701	5,774	5,566	7,396	6,843	3,616	5,057	8,472	4,981	2,326	5,448	4,360	2,648	4,496.1	
Walleye	602	1,648	1,356	1,886	1,002	1,503	821	1,148	648	769	1,143	691	714	1,297	1,408	1,365	914	483	837	831	326	2,178	848	588	1,041.9	
Round Goby	0	0	0	0	0	0	0	0	5	3	5	4	4	4	10	2	0	0	0	12	5	1	1	0	3	2.5
Freshwater Drum	460	378	377	405	398	308	459	314	238	572	445	873	864	536	578	1,196	433	459	317	407	101	1,019	545	273	498.1	
Goldfish-Carp Hybrid	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	1	1	0.3	
Total	3,551	14,517	11,383	11,823	12,842	15,829	9,231	7,484	8,965	17,939	12,505	18,968	18,646	18,249	18,407	27,927	19,354	13,016	15,422	10,731	5,914	23,120	18,319	9,011	14,298	
Number of Sites	21	22	21	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	
Number of Gangs	40	38	40	42	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	43	

Note: Values are continually corrected for errors and may be different from previous reports.

Table 4.1.2 Total numbers of each species caught during west-central basin Partnership Index Fishing, Lake Erie, 1990-2013. Numbers are standardized to 72 gangs. Average catch from 1990-2013 is presented for each species. Only standard gear was included.

Species	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Average
Lake Sturgeon	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0.1
Longnose Gar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0.1
Alewife	3,113	12,712	1,578	1,746	2,821	3,437	785	27	2,616	5,532	3,082	432	7,928	0	1	0	64	0	0	0	0	0	45	1,274	1,966.4
Gizzard Shad	1,011	4,481	1,619	2,575	1,555	2,381	1,814	812	1,873	4,506	6,522	2,496	13,739	2,552	3,053	4,985	2,010	3,165	435	1,492	11,074	2,608	6,981	1,807	3,564.4
Coho Salmon	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1
Chinook Salmon	0	4	0	1	0	3	0	3	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0.5
Rainbow Trout	2	0	1	0	0	2	0	0	0	3	1	0	3	2	0	0	0	0	0	1	0	1	0	0	0.8
Lake Whitefish	5	0	5	4	10	29	15	62	31	47	49	11	17	36	15	82	40	29	50	21	5	9	1	1	23.9
Rainbow Smelt	47	386	230	155	332	1,382	435	331	89	336	124	33	85	49	71	251	102	365	560	314	444	315	34	203	278.0
Quillback	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2	0	1	1	1	0	0	0	0	0	0.3
White Sucker	71	79	80	9	25	26	25	29	42	19	63	15	29	57	98	60	67	77	64	97	121	26	109	101	57.9
Spotted Sucker	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Silver Redhorse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0.2
Golden Redhorse	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1
Shorthead Redhorse	1	6	2	0	0	1	1	0	0	4	0	1	0	3	2	0	2	1	5	10	1	4	2	1	2.0
Goldfish	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0.1
Common Carp	3	0	0	0	0	2	1	1	0	0	2	0	2	1	0	0	3	5	1	0	1	4	0	3	1.2
Silver Chub	2	5	15	0	0	1	0	0	3	4	3	0	2	0	0	1	0	1	5	3	0	0	1	0	1.9
Emerald Shiner	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	3	0	0	0	0.3
Spottail Shiner	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Brown Bullhead	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Channel Catfish	17	28	25	15	6	25	27	5	6	3	13	1	9	7	7	11	49	65	13	44	70	63	92	127	28.7
Storecat	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Burbot	3	7	5	3	5	3	2	8	9	0	2	1	0	4	0	0	0	0	0	0	0	0	0	0	2.2
Trout-perch	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
White Perch	3,898	2,055	5,184	2,881	1,141	1,221	552	865	881	2,177	3,431	1,269	2,896	2,978	6,473	6,438	9,077	6,237	6,923	5,880	6,037	5,386	5,080	8,891	4,077.1
White Bass	212	184	70	26	347	232	304	678	287	296	481	125	248	217	383	582	654	474	511	367	854	1,072	926	1,338	452.8
Rock Bass	0	1	0	0	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	0	0.0
Pumpkinseed	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.0
Bluegill	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.0
Smallmouth Bass	0	3	2	0	1	1	1	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0.5
Largemouth Bass	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.1
Yellow Perch	1,810	2,315	2,105	1,165	2,020	2,280	3,813	5,002	3,070	5,034	11,823	9,604	10,941	12,950	24,743	13,156	11,161	15,409	12,276	9,516	7,616	7,538	8,658	6,706	7,945.5
Walleye	479	591	740	483	282	783	527	486	183	98	462	56	197	317	1,765	1,022	629	428	211	318	632	309	512	257	490.3
Round Goby	0	0	0	0	0	0	0	1	8	37	19	13	10	24	15	9	17	4	49	11	7	8	1	4	9.9
Freshwater Drum	3,306	1,395	2,696	1,330	1,740	1,192	1,441	1,534	840	1,231	1,752	809	3,249	1,883	1,736	2,076	2,281	1,360	1,475	1,587	1,374	1,238	1,395	1,735	1,693.9
Goldfish-Carp Hybrid	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0.2
Total	13,981	24,253	14,357	10,393	10,286	12,983	9,744	9,845	9,939	19,330	27,834	14,866	39,359	21,084	38,368	28,676	26,161	27,624	22,579	19,664	28,240	18,582	23,800	22,452	20,600
Number of Sites	34	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36
Number of Gangs	68	72	72	72	72	72	72	72	56	72	72	72	72	72	72	72	72	72	72	72	72	72	72	70	71

Note: Values are continually corrected for errors and may be different from previous reports.

Table 4.1.3 Total numbers of each species caught during east-central basin Partnership Index Fishing, Lake Erie, 1989-2013. Numbers are standardized to an effort of 72 gangs. Average catch from 1989-2013 presented for each species. Study was not done in 1996. Only standard gear was included.

Species	1989	1990	1991	1992	1993	1994	1995	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Average	
Lake Sturgeon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	
Alewife	677	3,567	12,878	1,894	682	578	1,556	143	1,350	7,108	5,033	793	8,380	4	4	48	153	18	4	0	0	1	35	1,058	3,497	2,060.8
Gizzard Shad	860	285	2,633	522	1,003	637	1,971	426	1,250	3,197	2,281	462	5,753	127	351	1,822	892	608	53	247	503	520	5,788	254	1,351.8	
Coho Salmon	1	2	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.2	
Chinook Salmon	0	0	0	0	0	2	0	9	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0.5	
Rainbow Trout	3	0	1	2	1	0	2	2	1	1	0	2	0	1	0	0	1	0	1	1	0	0	0	0	0.8	
Lake Trout	1	0	1	2	0	2	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	2	0	0	0.5	
Lake Whitefish	5	2	2	4	41	21	24	142	46	33	21	11	21	27	14	43	36	13	6	13	9	2	1	0	22.4	
Rainbow Smelt	320	118	525	322	375	324	1,418	309	1,329	589	248	1,450	920	307	835	423	438	758	1,083	1,088	142	834	191	958	637.6	
Northern Pike	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	
Quillback	0	0	0	0	0	24	9	3	0	1	0	5	0	0	2	2	0	0	0	0	1	0	5	0	2.1	
White Sucker	72	52	63	72	129	78	126	46	60	56	71	30	135	13	60	78	83	35	35	73	52	62	30	28	64.1	
Silver Redhorse	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.0	
Golden Redhorse	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	
Shorthead Redhorse	0	15	0	4	12	0	2	2	1	2	18	0	1	0	0	0	1	1	1	3	1	3	0	0	2.8	
Goldfish	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0.1	
Lake Chub	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	
Common Carp	0	0	0	1	5	0	0	0	1	0	7	4	0	0	0	1	0	0	0	0	0	0	0	0	0.8	
Silver Chub	0	0	0	1	0	0	0	0	0	14	18	7	2	0	1	4	2	2	0	0	2	0	2	0	3.3	
Emerald Shiner	0	0	0	0	15	2	5	0	0	0	0	0	0	2	2	0	1	0	0	0	0	0	2	0	1.4	
Common Shiner	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0.1	
Spottail Shiner	0	2	1	1	3	0	0	2	0	18	0	0	10	0	2	0	2	0	0	0	0	0	0	0	0.8	
Notropis sp.	9	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	
Channel Catfish	12	3	11	10	43	19	12	7	6	6	26	9	23	2	17	8	11	18	0	0	8	12	19	12	12.6	
Stoner Cat	0	0	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	
Tadpole Madtom	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	
Burbot	31	13	9	19	20	19	14	25	36	15	2	12	9	0	1	3	2	1	2	0	2	1	0	2	9.9	
Trout-perch	0	7	1	19	12	4	0	2	2	1	0	15	4	12	7	1	3	0	4	0	0	0	0	0	4.0	
White Perch	7,621	4,449	1,929	3,480	809	392	203	268	179	529	1,066	1,225	4,046	1,967	1,777	6,905	3,674	2,364	2,688	1,713	2,440	3,009	6,230	3,705	2,612.0	
White Bass	636	88	170	91	67	203	176	734	167	419	316	101	261	276	232	329	765	330	161	201	143	1,451	952	1,040	387.9	
Rock Bass	0	0	0	3	0	0	3	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0	0	0.4	
Bluegill	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	
Smallmouth Bass	0	0	0	0	0	0	8	0	6	2	0	0	1	0	0	1	0	0	0	2	0	0	0	0	0.8	
Largemouth Bass	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.0	
Black Crappie	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.0	
Yellow Perch	3,332	1,121	1,174	1,295	726	2,179	1,944	4,681	2,347	7,149	9,229	4,613	8,458	5,744	6,956	8,578	8,132	9,367	9,967	12,384	7,153	12,186	5,732	3,790	5,759.9	
Walleye	465	118	207	276	367	366	237	82	70	17	29	27	99	68	639	473	310	63	45	81	33	152	108	92	184.3	
Round Goby	0	0	0	0	0	0	0	0	2	40	61	34	157	76	70	148	39	41	41	34	91	68	22	4	38.7	
Freshwater Drum	3,612	2,443	1,876	2,380	1,323	1,184	548	956	669	985	1,304	1,304	2,399	1,077	1,890	1,123	1,227	670	799	1,156	311	907	1,575	1,182	1,370.8	
Total	17,659	12,296	21,482	10,398	5,662	6,023	8,247	7,836	7,549	20,181	19,758	10,099	30,682	9,706	12,860	19,992	15,774	14,290	14,892	17,012	10,892	19,253	21,708	14,565	14,534	
Number of Sites	27	22	31	30	29	17	24	33	32	36	36	36	36	36	36	36	36	36	36	36	36	36	36	35	33	
Number of Gangs	54	44	62	60	58	34	48	66	64	72	72	72	72	72	72	72	72	72	72	72	72	72	72	70	65	

Note: Values are continually corrected for errors and may be different from previous reports.

Table 4.1.4 Total numbers for each species caught during eastern basin Partnership Index Fishing surveys, Lake Erie, 1989-2013. Numbers are standardized to an effort of 60 gangs. Average catch from 1989-2013 presented for each species. Study was not done in 1996 and 1997. Low sample size in 1995 limits the value of information. Only standard gear included. Thermocline gangs and 2 m above thermocline sets were excluded.

Species	1989	1990	1991	1992	1993	1994	1995	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Average	
Sea Lamprey	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.0	
Longnose Gar	1	0	0	0	0	0	0	0	1	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0.2	
Alewife	2,257	111	1,628	1,248	193	118	1,046	1,697	599	2,296	29	2,597	2	12	14	1,214	7	3	2	102	15	701	1,691	764.4	
Gizzard Shad	325	75	73	18	76	52	266	382	335	514	190	1,001	99	14	714	845	36	111	151	490	90	409	161	279.4	
Pink Salmon	0	0	4	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0.3	
Coho Salmon	0	0	4	2	2	0	0	0	1	0	2	1	0	0	1	1	0	0	1	0	0	1	0	0.6	
Chinook Salmon	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	1	0	0	0.2	
Rainbow Trout	1	3	5	8	0	0	2	4	6	2	0	4	6	6	1	15	1	1	2	7	4	1	1	8	3.8
Brown Trout	1	0	0	0	0	0	0	0	3	0	0	21	2	2	2	1	0	0	0	1	0	3	0	1	1.5
Lake Trout	15	5	8	3	26	24	4	11	11	18	9	15	30	8	18	24	21	15	17	58	57	95	45	23.3	
Lake Whitefish	15	43	35	14	0	10	8	133	6	6	2	18	2	2	3	45	16	39	4	45	0	4	0	19.2	0.1
Cisco	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	
Rainbow Smelt	669	577	94	26	2	81	79	5	13	32	58	223	61	220	128	88	179	365	643	148	68	229	501	195.1	
Northern Pike	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	
Mooneye	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	
Quillback	4	0	0	0	0	5	0	0	2	4	3	0	1	0	0	4	4	0	3	2	0	4	4	1.7	
White Sucker	260	168	88	57	148	63	26	66	116	107	122	152	54	26	35	107	39	45	87	32	66	30	30	83.6	
Silver Redhorse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.0	
Golden Redhorse	0	0	0	0	0	0	0	0	0	1	6	4	0	0	0	0	0	0	0	0	0	0	0	0.5	
Shorthead Redhorse	40	99	16	44	86	17	8	21	18	47	39	5	20	6	1	4	39	0	5	6	0	6	2	23.0	
Redhorse sp.	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	1	0	0	0	0	0.2	
Common Carp	22	3	0	2	0	0	4	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1.4	
Silver Chub	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.0	
Emerald Shiner	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	
Brown Bullhead	0	1	0	0	0	2	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0.3	
Channel Catfish	5	3	0	2	2	0	4	7	6	7	28	3	2	7	3	6	14	10	26	3	3	20	8	7.3	
Storecat	12	3	6	3	7	0	0	0	10	2	3	0	0	0	0	0	0	0	0	0	1	0	0	2.0	
Burbot	5	11	20	11	29	49	53	238	185	212	108	143	171	113	101	31	64	25	24	9	21	5	5	71.0	
Trout-perch	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	1	0	0.2	
White Perch	3,339	1,421	481	129	104	36	56	22	49	35	76	181	19	10	45	1,117	117	224	123	262	183	200	348	373.0	
White Bass	174	28	187	23	15	10	64	34	24	61	19	45	8	6	23	172	60	45	49	23	128	31	482	74.3	
Rock Bass	209	76	30	96	152	122	71	56	299	480	109	11	20	43	7	14	117	7	64	41	2	28	4	89.5	
Pumpkinseed	0	1	0	0	11	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0.6	
Bluegill	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0.1	
Smallmouth Bass	137	333	64	239	300	370	270	284	242	890	341	111	156	195	150	413	854	298	201	166	48	109	90	272.1	
Largemouth Bass	0	0	0	0	0	0	0	0	0	1	0	0	0	3	0	0	0	0	0	0	0	0	0	0.2	
Black Crappie	6	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	
Yellow Perch	1,180	464	382	228	135	47	146	211	679	1,306	3,160	1,321	3,608	1,983	1,643	4,650	3,796	2,936	3,948	5,524	2,131	3,085	1,306	1,907.3	
Walleye	140	79	31	57	63	46	34	29	41	62	41	42	31	38	345	109	199	98	162	65	173	70	74	28.0	
Round Goby	0	0	0	0	0	0	0	0	0	9	19	178	93	54	23	55	27	25	26	45	11	44	34	28.0	
Freshwater Drum	1,063	335	178	207	404	172	266	374	142	145	303	151	183	257	319	343	74	168	270	162	173	69	128	255.9	
Total	9,879	3,840	3,332	2,415	1,753	1,225	2,408	3,580	2,786	6,233	4,674	6,229	4,575	2,999	3,590	9,243	4,417	4,417	5,818	7,191	3,175	5,143	4,923	4,481	
Number of Sites	27	26	26	20	19	19	8	30	30	29	30	30	30	30	30	30	21	30	30	29	30	30	30	27	
Number of Gangs	49	45	52	40	37	38	16	60	60	58	60	60	60	60	60	60	42	60	60	58	60	60	60	53	

Note: Values are continually corrected for errors and may be different from previous reports.

Table 4.1.5a Observed total numbers of each species caught fishing monofilament index gill nets in all basins during Partnership Index Fishing surveys, Lake Erie, 1989-1999.

Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Silver Lamprey	-	-	-	-	-	-	-	-	-	-	-
Sea Lamprey	-	-	-	-	-	-	-	-	-	-	-
Lake Sturgeon	-	-	-	1	1	1	1	2	1	2	-
Longnose Gar	1	-	-	1	-	1	-	-	-	2	9
Alewife	2,498	5,322	27,914	5,799	2,601	3,534	6,270	890	212	6,696	15,805
Gizzard Shad	945	1,871	13,502	4,682	7,382	8,264	10,485	2,932	2,618	5,919	16,717
Pink Salmon	-	-	4	1	1	-	-	-	-	-	1
Coho Salmon	8	1	6	1	4	-	-	-	-	-	7
Chinook Salmon	-	-	4	1	1	2	3	-	11	1	2
Rainbow Trout	4	7	6	8	4	1	5	-	2	9	101
Atlantic Salmon	-	-	-	-	-	-	-	-	-	-	-
Brown Trout	1	-	-	1	-	-	-	-	-	3	-
Lake Trout	14	7	9	6	24	21	10	-	-	15	13
Lake Whitefish	21	47	46	34	71	41	105	15	192	258	89
Cisco	-	1	-	-	-	-	-	-	-	-	-
Rainbow Smelt	1,005	1,027	1,099	537	531	574	2,409	435	615	1,296	1,021
Northern Pike	-	8	1	-	-	-	-	-	-	-	-
Muskellunge	-	-	-	-	-	-	1	-	-	-	-
Mooneye	-	-	-	1	-	-	-	-	-	-	-
Quillback	3	-	1	5	22	12	6	12	5	5	16
White Sucker	271	284	264	316	260	211	178	98	142	244	261
Spotted Sucker	-	-	-	-	-	-	-	-	-	-	-
Silver Redhorse	-	-	-	-	-	-	-	-	-	2	-
Golden Redhorse	-	-	-	-	-	-	-	-	19	-	2
Shorthead Redhorse	33	86	23	57	73	27	19	15	52	63	45
Redhorse sp.	-	-	-	-	-	-	-	-	-	1	-
Goldfish	-	-	-	-	-	-	2	-	-	-	2
Lake Chub	-	-	-	2	-	-	-	-	-	-	-
Common Carp	18	28	25	6	11	3	5	8	4	2	4
Silver Chub	-	25	35	150	305	59	97	89	73	90	203
Hornyhead Chub	-	1	-	-	-	-	-	-	-	-	-
Emerald Shiner	-	-	-	-	12	1	3	1	-	-	-
Common Shiner	-	-	-	-	-	-	-	-	-	-	-
Spottail Shiner	-	1	1	4	2	-	-	-	2	-	19
Notropis sp.	7	-	2	-	-	-	-	-	-	-	-
Brown Bullhead	-	1	-	1	-	1	-	-	-	-	2
Channel Catfish	13	76	134	79	132	66	89	86	48	56	79
Stonecat	10	4	6	2	5	1	1	1	-	3	12
Tadpole Madtom	-	-	6	1	-	-	-	-	-	-	-
Brindled Madtom	-	-	-	-	-	1	-	-	-	-	-
Burbot	47	25	40	36	46	57	41	2	31	348	266
Trout-perch	2	4	1	16	10	2	1	-	3	6	1
White Perch	9,084	8,138	5,195	11,233	5,806	2,577	2,388	1,524	1,493	1,245	4,613
White Bass	710	483	642	283	160	741	539	439	1,622	542	941
Rock Bass	171	63	51	83	97	97	27	12	9	77	323
Pumpkinseed	-	1	-	-	7	-	-	2	-	-	-
Bluegill	-	-	-	-	-	-	-	-	-	-	-
Smallmouth Bass	112	288	130	296	405	466	187	249	163	457	338
Largemouth Bass	-	1	-	-	-	-	-	-	-	-	-
Black Crappie	5	-	-	-	-	1	-	-	-	-	-
Yellow Perch	3,749	3,694	5,514	5,844	4,133	6,474	8,690	8,915	12,761	9,720	19,361
Walleye	519	1,168	2,232	2,275	2,641	1,513	2,500	1,348	1,709	900	990
Round Goby	-	-	-	-	-	-	-	-	1	13	82
Freshwater Drum	3,809	5,442	3,775	5,278	3,075	2,948	2,024	1,900	2,724	1,963	3,090
Goldfish-Carp Hybrid	-	-	-	-	-	-	-	-	-	-	-
Total Number of Fish	23,060	28,104	60,668	37,040	27,822	27,697	36,086	18,975	24,512	29,938	64,415
Sites	60	107	124	116	115	103	99	58	91	121	133
Canned Gangs	54	98	118	114	112	103	99	58	91	121	133
Bottom Gangs	60	107	124	116	115	103	99	58	91	121	133
Thermocline Gangs	10	4	-	-	-	-	-	-	-	-	25
Aux Central 1 fa Canned Gangs	-	-	-	-	-	-	-	-	-	-	-
2m Above Thermocline Gangs	-	-	-	-	-	-	-	-	-	-	25
Total Gangs	124	209	242	230	227	206	198	116	182	242	316

Table 4.1.5b (cont'd) Observed total numbers of each species caught fishing monofilament index gill nets in all basins during Partnership Index Fishing surveys, Lake Erie, 2000-2013.

Species	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Silver Lamprey	-	1	-	-	1	-	-	-	-	-	1	-	-	-
Sea Lamprey	-	-	-	-	-	-	-	-	-	-	1	1	1	-
Lake Sturgeon	3	-	2	5	8	1	1	10	2	-	2	2	1	4
Longnose Gar	4	1	-	1	-	-	1	-	-	1	2	-	4	2
Alewife	16,499	1,477	25,749	9	127	81	2,482	34	13	5	199	135	2,954	10,703
Gizzard Shad	12,686	7,520	29,523	9,866	9,131	22,246	12,510	7,790	4,211	3,685	16,607	12,524	23,350	4,783
Pink Salmon	-	-	-	-	1	-	-	-	-	1	2	-	3	-
Coho Salmon	3	5	9	1	-	1	1	-	1	1	-	1	2	1
Chinook Salmon	1	1	4	-	1	2	-	-	-	1	2	1	-	-
Rainbow Trout	65	60	96	49	22	111	58	4	14	42	39	34	15	20
Atlantic Salmon	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Brown Trout	1	1	23	2	3	3	-	-	2	4	1	5	-	1
Lake Trout	21	43	23	38	32	23	44	16	23	39	68	115	108	45
Lake Whitefish	74	39	58	82	35	153	168	104	170	99	85	11	14	2
Cisco	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rainbow Smelt	483	1,770	1,262	489	1,629	910	745	1,688	2,556	2,766	1,023	1,464	1,184	1,924
Northern Pike	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Muskellunge	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Mooneye	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Quillback	19	43	26	27	19	14	16	13	14	14	3	29	16	8
White Sucker	324	356	439	255	354	380	368	203	228	453	343	539	268	199
Spotted Sucker	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver Redhorse	5	-	2	-	5	-	-	-	-	-	-	3	1	-
Golden Redhorse	23	6	-	-	-	-	-	-	-	-	1	-	-	-
Shorthead Redhorse	116	90	22	55	51	17	20	70	48	146	41	111	45	29
Redhorse sp.	-	-	25	-	-	-	-	-	-	1	-	-	-	-
Goldfish	4	-	-	-	-	6	-	-	5	2	-	-	-	-
Lake Chub	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Common Carp	28	28	8	2	5	2	11	8	4	5	2	7	9	4
Silver Chub	154	72	52	52	85	26	41	12	9	8	2	11	4	6
Hornyhead Chub	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Emerald Shiner	1	-	1	4	3	-	3	-	2	5	5	4	3	1
Common Shiner	-	-	-	2	-	-	-	-	-	-	-	-	-	-
Spottail Shiner	-	-	10	-	10	-	3	1	-	-	2	2	-	-
Notropis sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brown Bullhead	4	2	1	-	-	2	-	1	1	-	-	-	3	1
Channel Catfish	88	129	126	156	131	271	234	313	131	221	190	356	357	294
Stonecat	2	3	-	-	-	-	-	1	-	-	1	-	1	-
Tadpole Madtom	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brindled Madtom	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Burbot	277	222	223	284	176	148	105	70	56	54	19	48	12	7
Trout-perch	2	22	6	14	7	1	3	1	5	2	1	2	1	-
White Perch	6,684	4,489	8,472	8,212	11,504	17,150	19,774	12,492	11,996	9,940	10,212	14,762	14,622	15,127
White Bass	1,135	617	1,036	889	1,287	1,362	2,668	1,762	1,339	1,291	1,448	4,080	4,792	3,991
Rock Bass	553	174	30	39	51	31	21	103	11	76	54	6	32	10
Pumpkinseed	1	1	-	-	3	-	1	-	-	-	1	-	-	-
Bluegill	-	-	-	3	-	-	1	-	1	-	-	2	-	-
Smallmouth Bass	1,100	442	234	267	232	320	445	614	332	289	178	64	143	106
Largemouth Bass	1	-	-	4	1	-	-	2	-	-	-	1	-	-
Black Crappie	1	-	-	-	1	-	2	-	-	-	-	1	-	1
Yellow Perch	31,933	31,305	30,226	30,870	42,626	33,730	32,913	34,412	40,323	37,662	28,524	30,750	26,779	14,166
Walleye	1,745	909	1,118	1,804	4,469	4,052	2,316	1,303	1,443	1,743	1,429	3,168	1,842	1,202
Round Goby	113	101	399	247	161	196	260	106	200	205	173	140	81	45
Freshwater Drum	3,841	3,509	6,804	3,800	4,631	4,789	4,315	2,554	2,858	3,610	2,038	3,562	3,613	3,240
Goldfish-Carp Hybrid	-	-	-	-	-	-	-	1	1	2	2	-	1	3
Total Number of Fish	77,995	53,438	106,009	57,528	76,802	86,029	79,530	63,688	65,999	62,374	62,701	71,941	80,261	55,925
Sites	142	142	144	144	143	144	140	119	143	143	141	144	142	122
Canned Gangs	142	142	144	144	143	144	140	119	143	143	141	144	142	122
Bottom Gangs	142	142	144	144	143	144	140	119	143	143	141	144	142	122
Thermocline Gangs	23	26	34	29	26	13	20	-	26	24	19	24	21	12
Aux Central 1 fa Canned Gangs	-	-	-	-	24	24	24	24	25	24	24	24	24	24
2m Above Thermocline Gangs	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Gangs	307	310	322	317	336	325	324	262	337	334	325	336	329	280

Table 4.1.6 Mean Walleye catch per gang by mesh size among index gill nets fished adjacently. Note mesh size configurations differ.

Mesh Size (mm)	Inches	Multifilament	Monofilament B	Partnership Monofilament
32	1.25	no mesh	no mesh	0.43
38	1.50	no mesh	0.14	0.14
44	1.75	no mesh	no mesh	0.29
51	2.00	2.29	0.43	0.86
57	2.25	2.71	no mesh	1.71
64	2.50	5.00	2.43	3.29
70	2.75	5.29	no mesh	4.71
76	3.00	4.14	3.00	3.71
83	3.25	2.43	no mesh	no mesh
89	3.50	4.00	3.29	3.00
95	3.75	4.00	no mesh	no mesh
102	4.00	3.14	0.86	1.29
108	4.25	1.43	no mesh	no mesh
114	4.50	0.43	1.71	0.71
121	4.75	0.57	no mesh	no mesh
127	5.00	1.57	0.43	0.29
140	5.50	no mesh	0.14	0.14
152	6.00	no mesh	0.14	0.00
165	6.50	no mesh	0.00	no mesh
178	7.00	no mesh	0.00	no mesh
Mean Walleye Catch (All Meshes)		37.00	12.57	20.57
Samples		7	7	7
Gang Length m (ft.)		396 (1300)	366 (1200)	381 (1250)

Table 4.1.7 Mean catch of each species (number per gang) by gill net configuration.

Species	Multifilament	Monofilament B	Partnership Monofilament
Alewife	0.71	4.14	21.00
Gizzard Shad	16.57	6.71	16.86
Lake Whitefish	0.29	0.14	-
Rainbow Smelt	0.86	-	-
Channel Catfish	0.43	0.29	0.29
White Perch	19.57	11.86	11.29
White Bass	22.43	14.14	29.86
Black Crappie	0.14	-	-
Yellow Perch	1.86	0.86	1.00
Walleye	37.00	12.57	20.57
Round Goby	0.14	-	-
Freshwater Drum	7.29	4.57	3.29
All	107.29	55.29	104.14

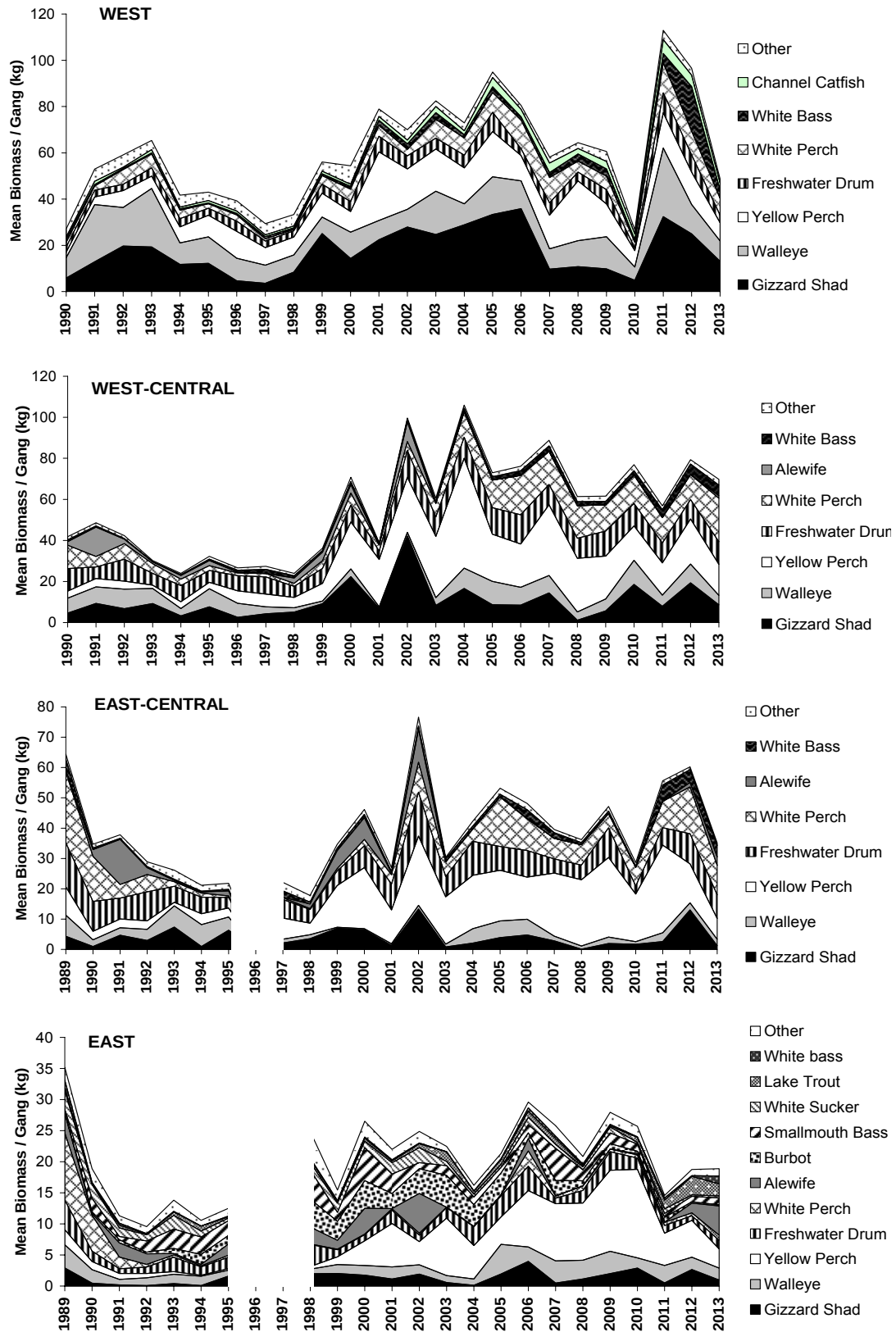


Figure 4.1.2

Mean species biomass (kg / gang) by basin, Partnership Index Fishing, 1989-2013. Species with an average biomass representing less than 3% of the average of all species combined were included in "Other" group. Thermocline gangs (1989, 1990, 1999-2013) were included for the east basin. Studies were not done in the east-central basin in 1996 or in the east basin from 1996-1997. Axes differ between basins. Effort was standardized across mesh sizes.

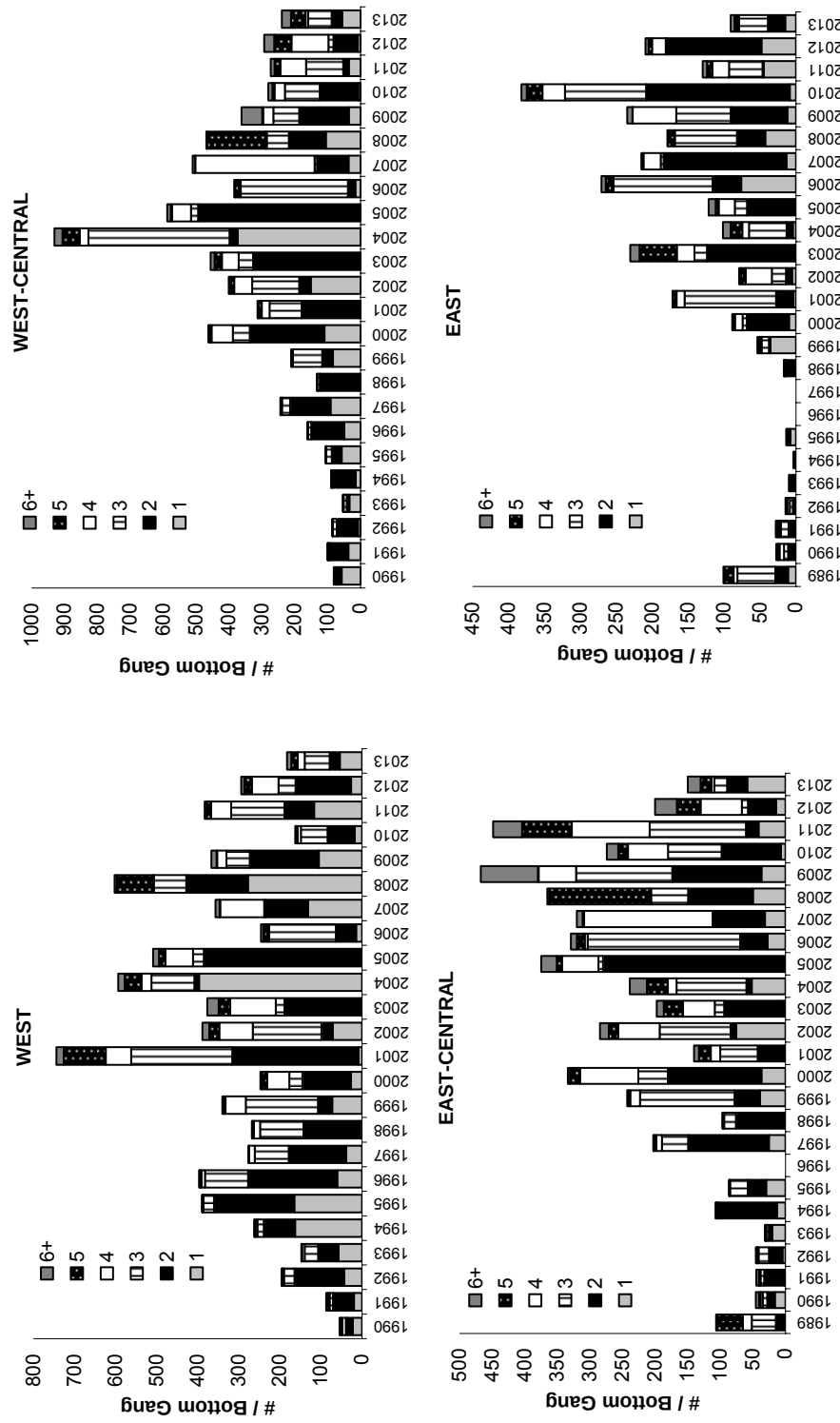


Figure 4.1.3 Yellow Perch catch at age (number) per bottom gang of Partnership Index Fishing gill nets, by basin. Time frames and axes differ among basins. Absent bars indicate when studies were not done. Ages 6 and older pooled. East basin results include depths 30 m or less. Pennsylvania Ridge and Walleye Cap Areas surveys were not done in 2013. Surveys were not done in east-central 1996, and east in 1996,1997. Survey in east basin 1995 had low sample size.

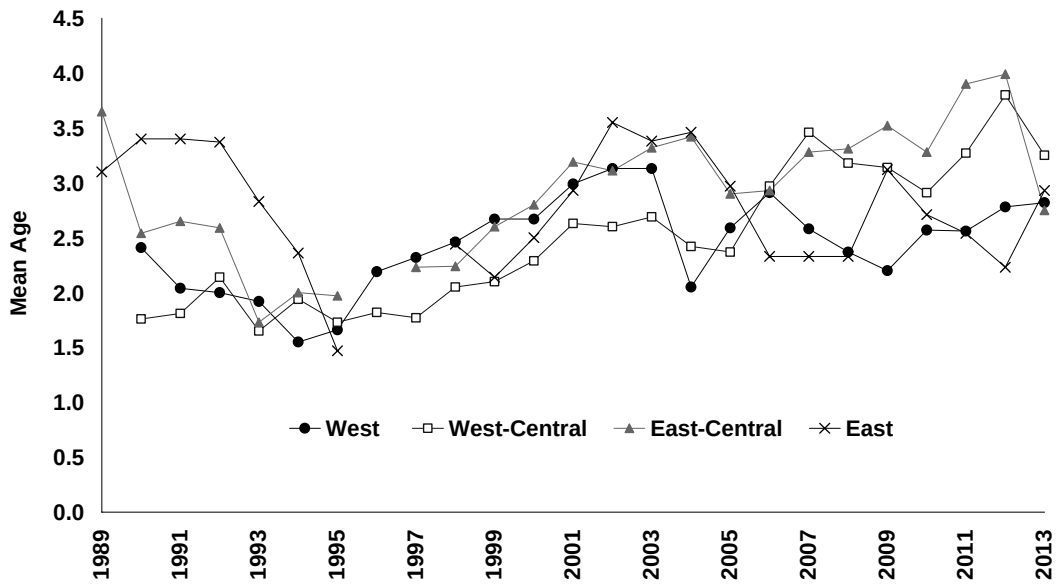


Figure 4.1.4 Mean age of Yellow Perch caught in Partnership Index Fishing gill nets by basin, 1989-2013. All age groups included in calculations. Ages based on scales and otoliths since 2005. Pennsylvania Ridge not fished in 2013.

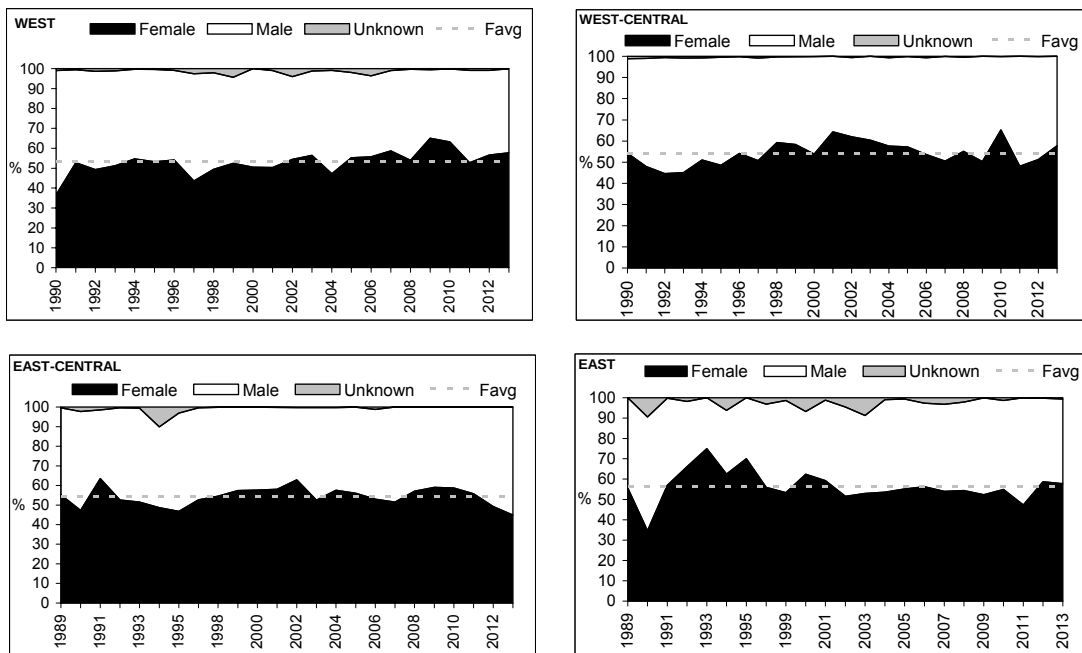


Figure 4.1.5 Proportion of Yellow Perch ages 2 and older represented by each sex caught in fall. Partnership Index Fishing gill netting, 1989-2013. Note absent years in east-central, and east basin time series. Dashed line represents average fraction of females over the time series. Pennsylvania Ridge not fished in 2013.

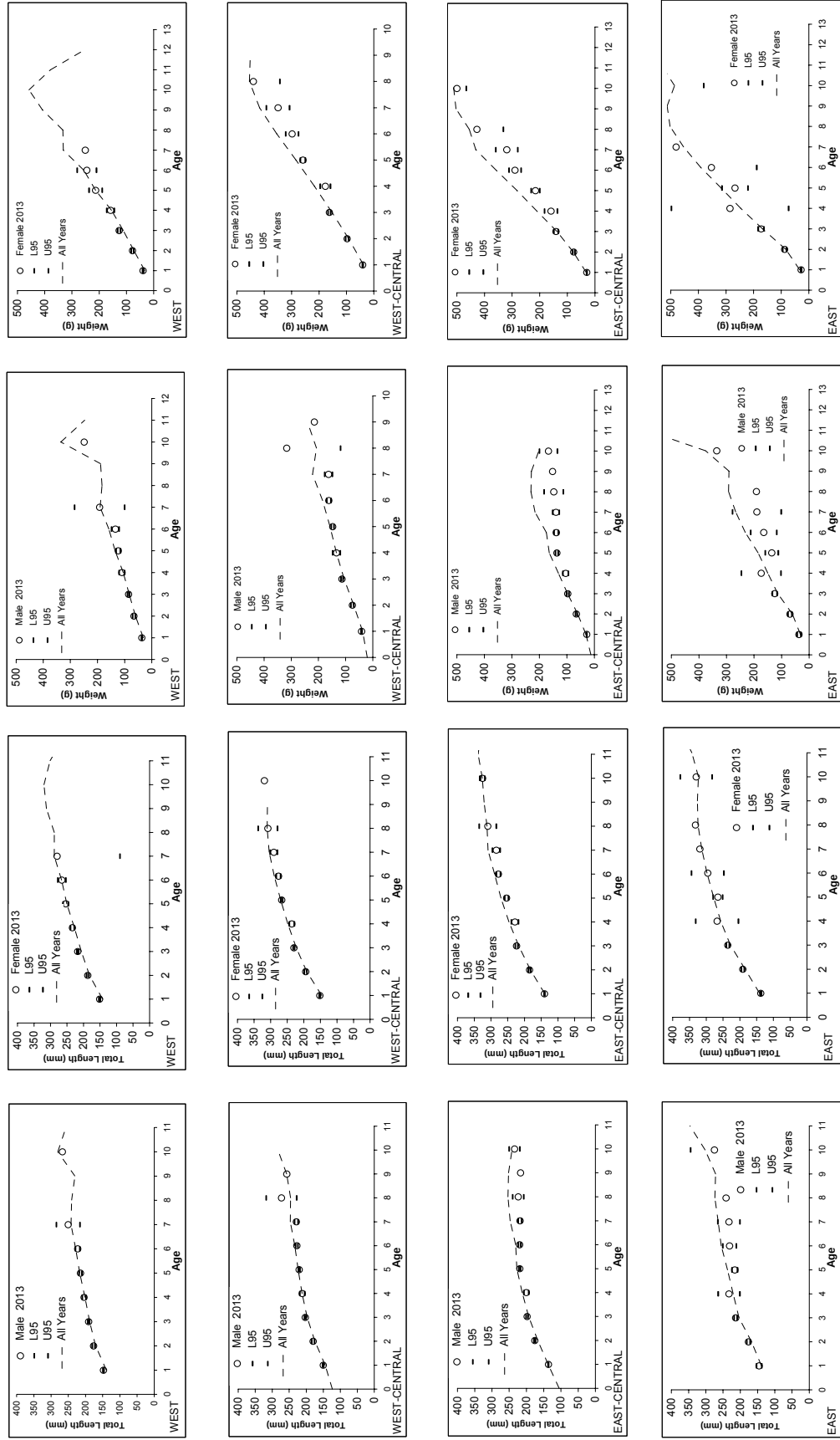


Figure 4.1.6 Yellow Perch mean total length (mm) and weight (g) of males and females at age for the west (top row), west-central, east-central and east (bottom row) basins in 2013 (circles). Dotted line represents mean size at age for all years to 2012. Partnership Index Fishing, 1989-2013.

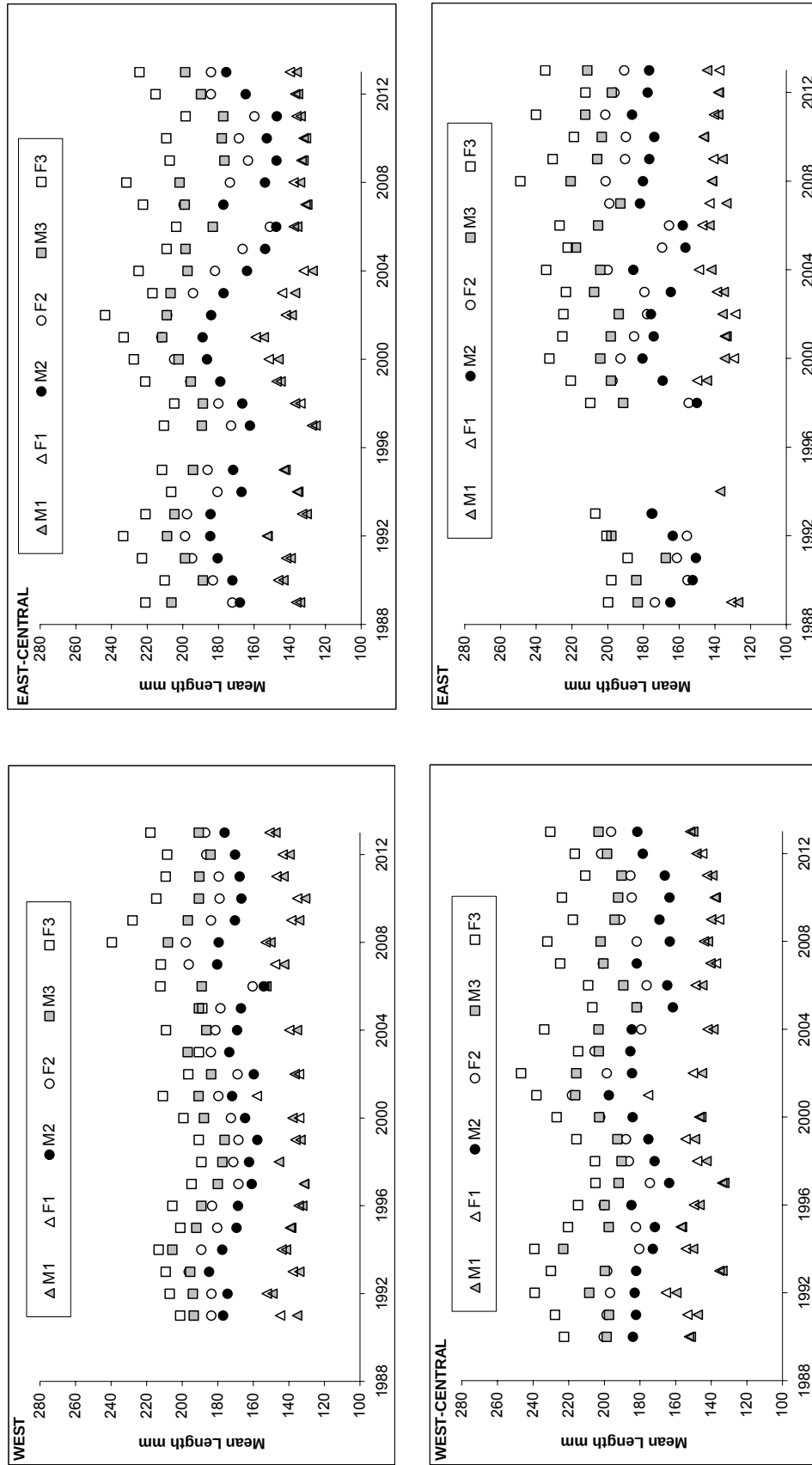


Figure 4.1.7 Mean total length (mm) of Yellow Perch ages 1, 2, and 3 by sex in the west, west-central, east-central and east basin surveys. East includes the Walleye Cap Area sites. M=male F=female. Samples with less than 6 fish were excluded. Mean is weighted by relative effort among mesh sizes. Samples restricted temporally for west (September), west-central ($\geq$ October) and east-central ($\geq$ October) and east basin ($\leq$ September) surveys to negate bias due to interannual differences between sampling periods.

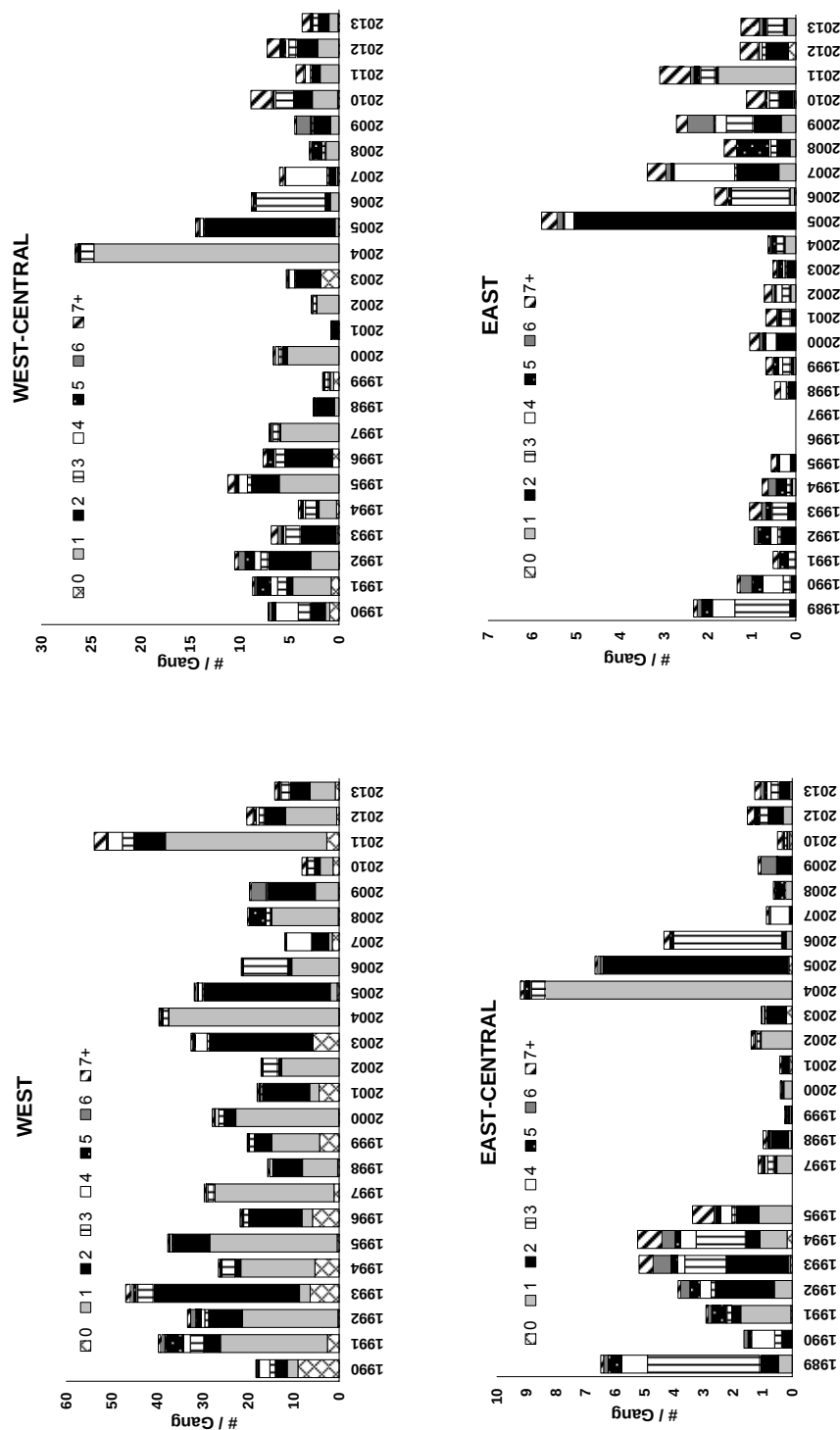


Figure 4.1.8 Walleye catch at age (numbers) per gang of Partnership Index Fishing gill nets (canned and bottom), in the west, west-central, east-central and east basin. Only standard canned sets are included in east basin graphs. Note that catch rate and time axes differ among basins. Catch rates have been adjusted for Walleye lacking age data. Absent bars indicate years when study was not done. Pennsylvania Ridge and Walleye Cap Area surveys were not done in 2013. East basin survey in 1995 had low sample size.

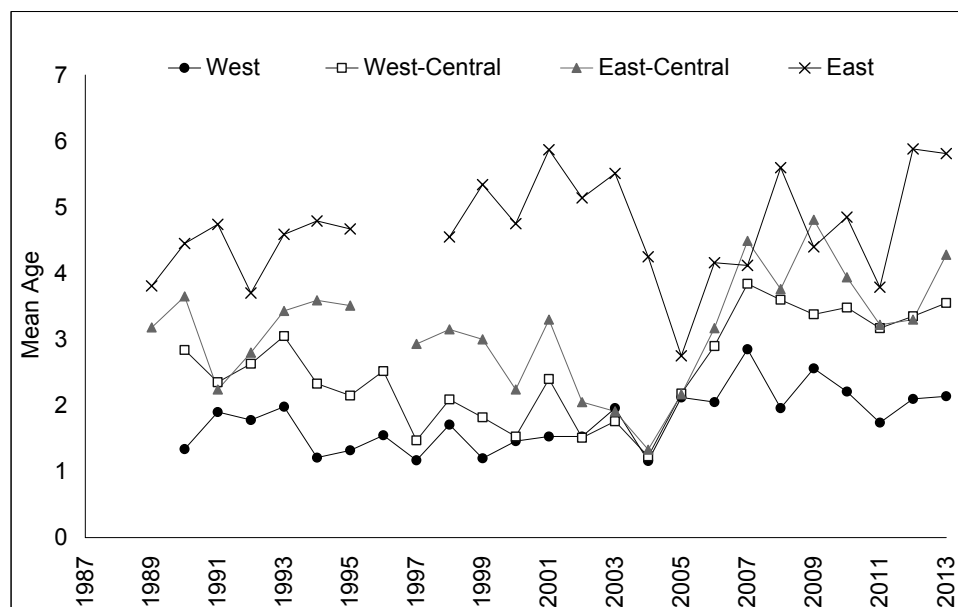


Figure 4.1.9 Mean age of Walleye caught in Partnership Index Fishing gill nets by basin, 1989-2013.

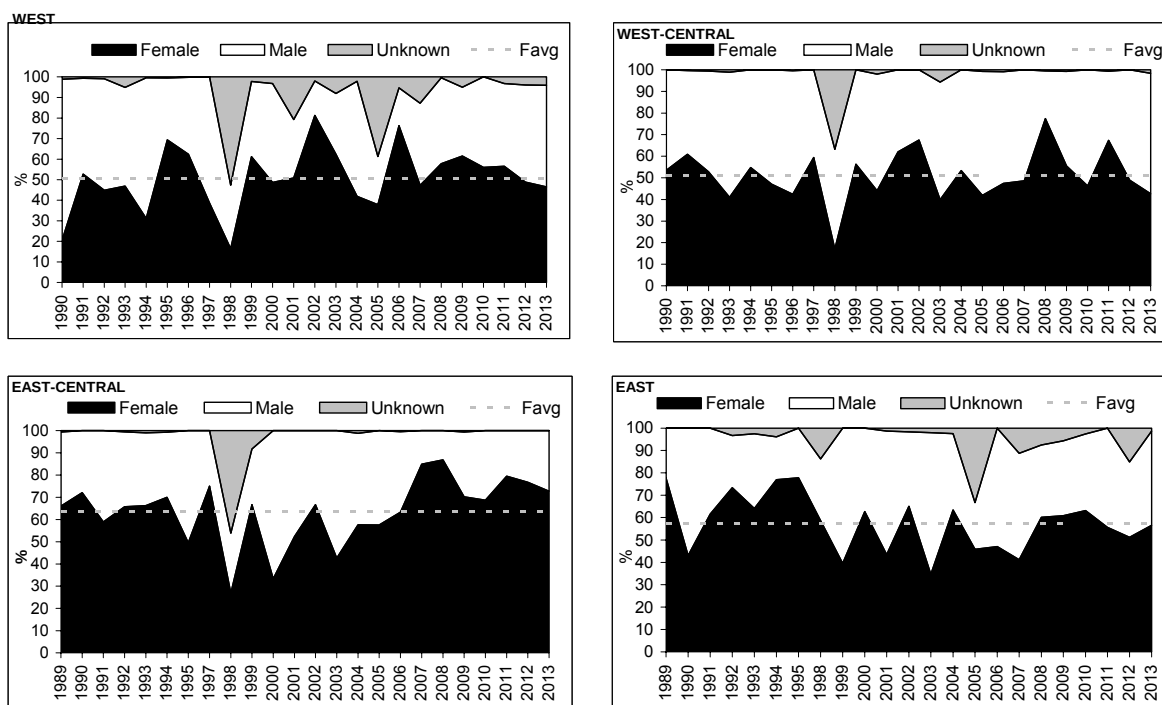


Figure 4.1.10 Proportion of Walleye ages 2 and older represented by each sex caught in fall Partnership Index Fishing gill netting, 1989-2013. Note absent years in east-central and east basin time series. Dashed line represents average proportion of females over the time series. Pennsylvania Ridge not fished in 2013.

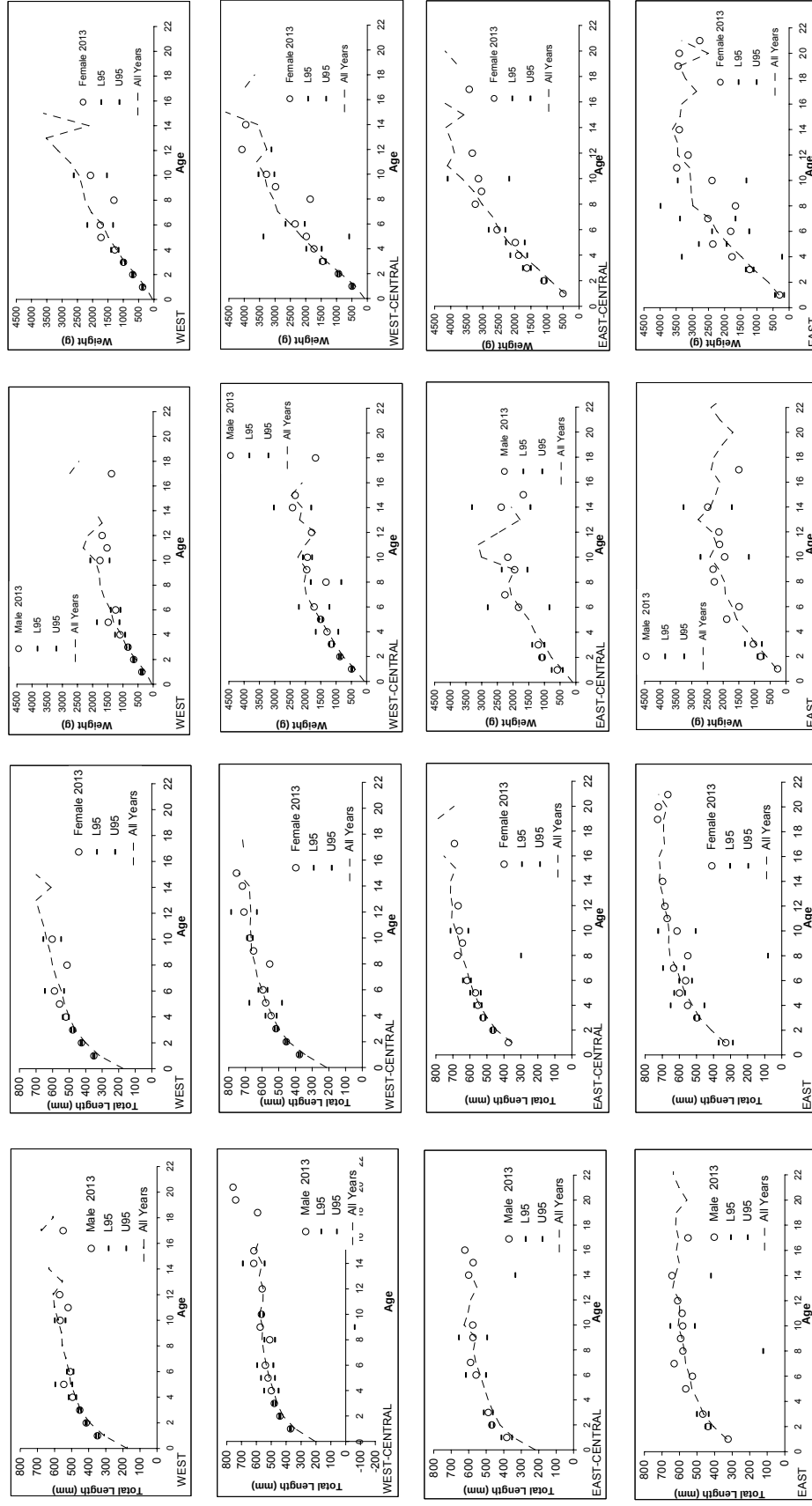


Figure 4.1.11 Walleye mean total length (mm) and weight (g) of males and females at age for the west (top row), west-central, east-central and east (bottom row) basins in 2013 (circles). 95% confidence limits shown. Dotted line represents mean size at age for all years to 2012. Partnership Index Fishing, 1989-2013.

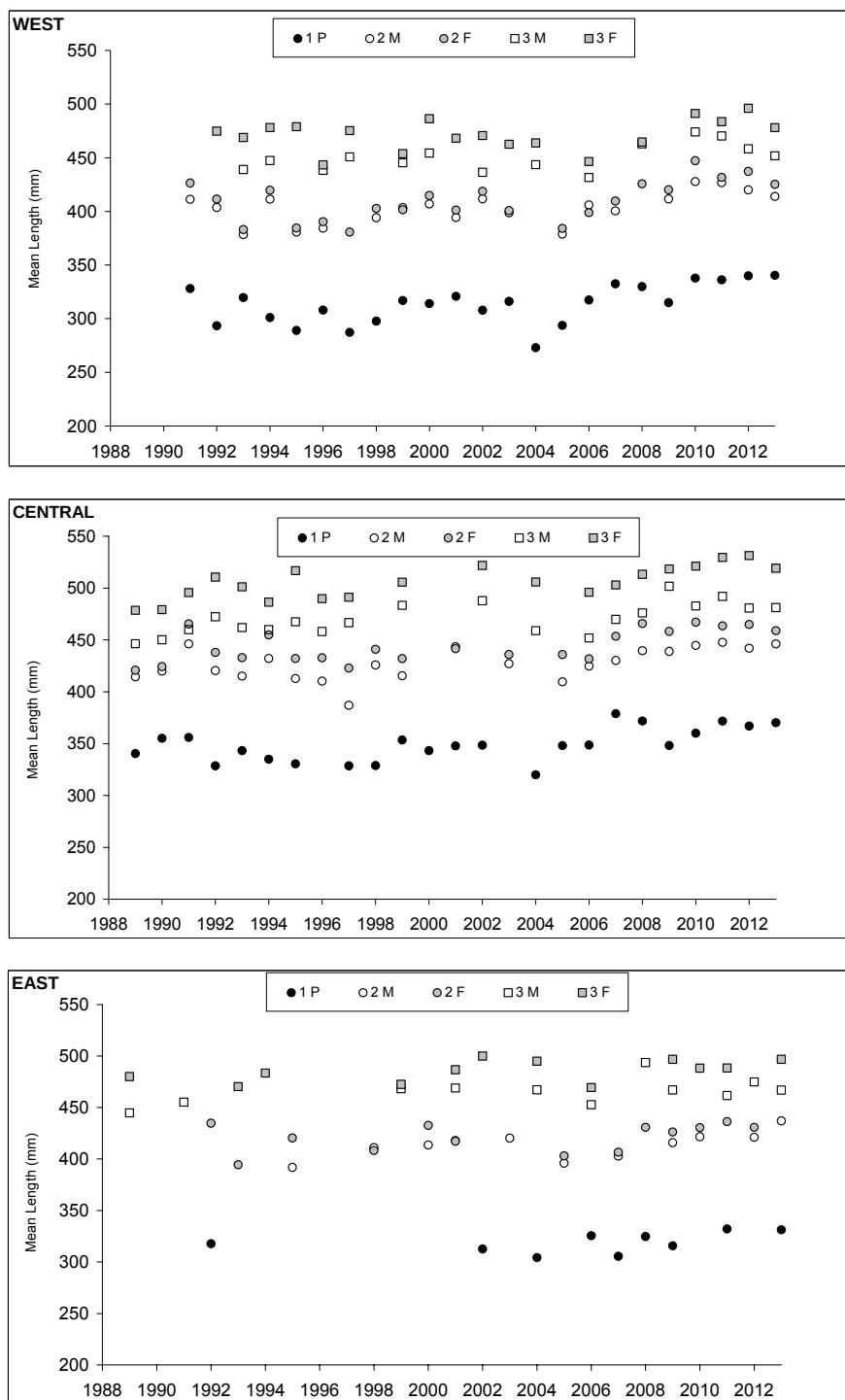


Figure 4.1.12 Mean total length (mm) of Walleye ages 1, 2, and 3 by sex in the west, central and east basin surveys. Central includes west-central and east-central basin surveys. East includes Pennsylvania Ridge, east and Walleye Cap Area surveys. M=male, F=female, P=sexes pooled. Age 1 includes both sexes due to the large fraction of yearlings with sex undetermined. Samples with less than 6 fish were excluded. Samples restricted temporally for west (September), west-central ($\geq$ October), east-central ($\geq$ October), and east basin ($\leq$ September) surveys to negate bias due to interannual differences between sampling periods.

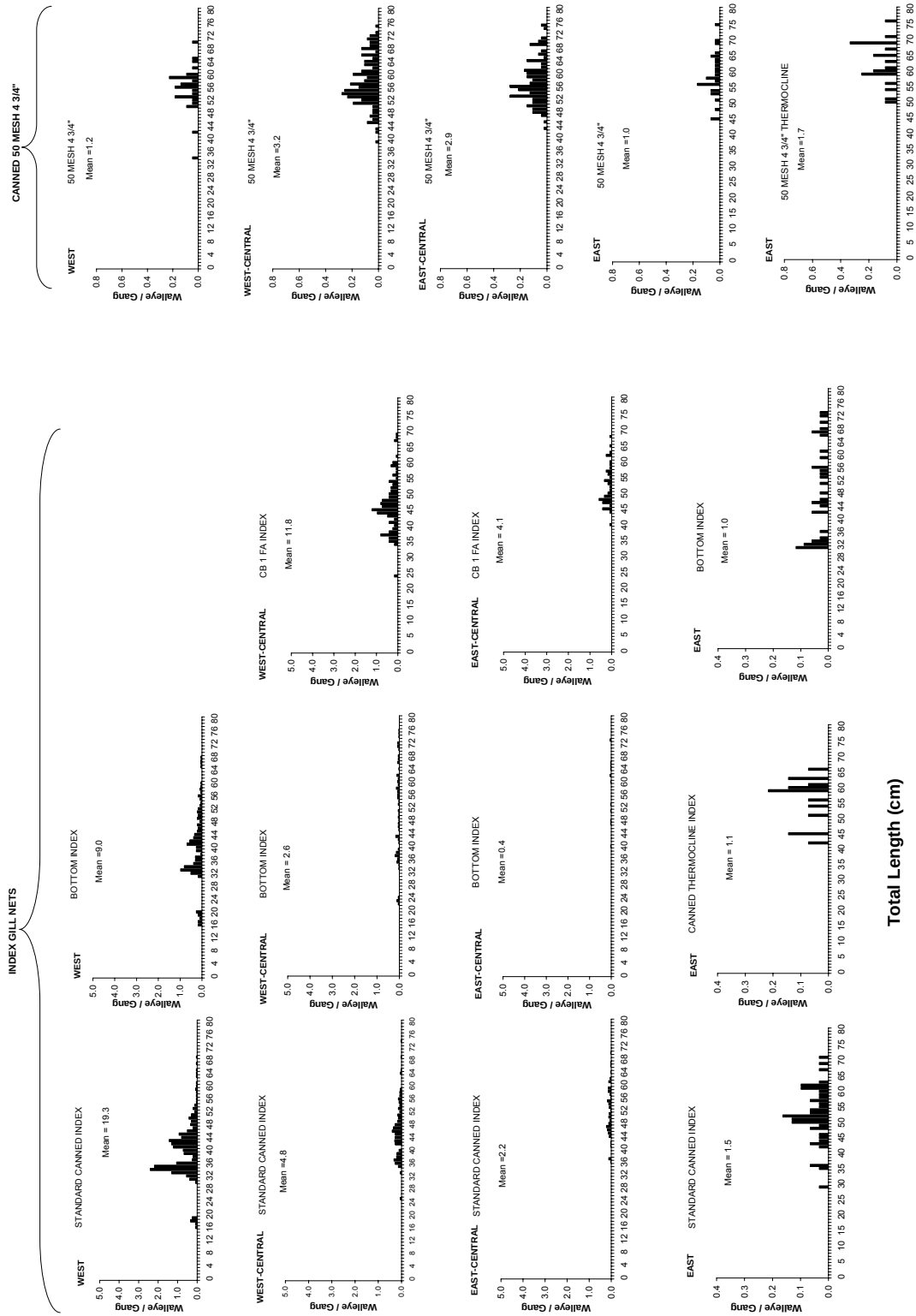


Figure 4.1.13 Walleye catch rates in 2013 by 1 cm length intervals in west basin (top row), west-central (2nd row), east-central (3rd row) and east basin (bottom row) in standard index canned gill nets, bottom nets, central basin 1 fathom canned nets, canned thermocline nets (east only) and in 50 mesh 4.75' canned nets (column on far right). All graphs have same x axes (length). East includes Pennsylvania Ridge and east basin surveys fished at all depths. Partnership Index Fishing, 2013.

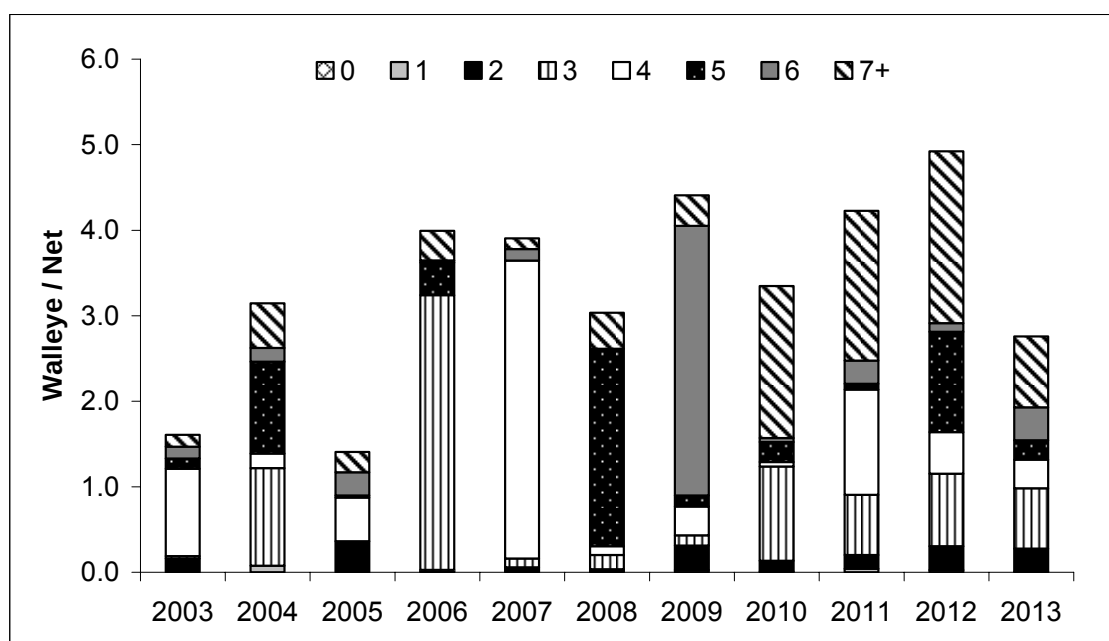


Figure 4.1.14 Walleye catch at age per 50 mesh deep 121 mm, 34 m canned gill net fished adjacent to Partnership Index Fishing gill nets in the west, west-central, and east-central basins. All canned depths were included.

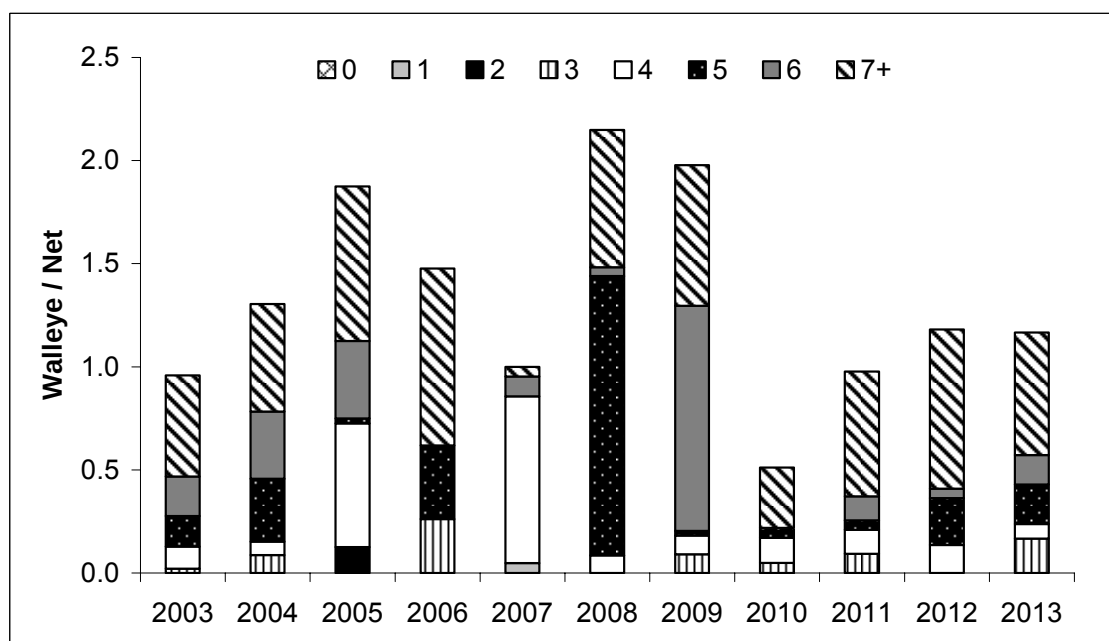


Figure 4.1.15 Walleye catch at age per 50 mesh deep 121 mm, 34 m canned gill net fished adjacent to Partnership Index Fishing gill nets in east basin surveys. This graph excludes Pennsylvania Ridge and Walleye Cap Area surveys as these projects were not completed in 2013. All canned depths included.

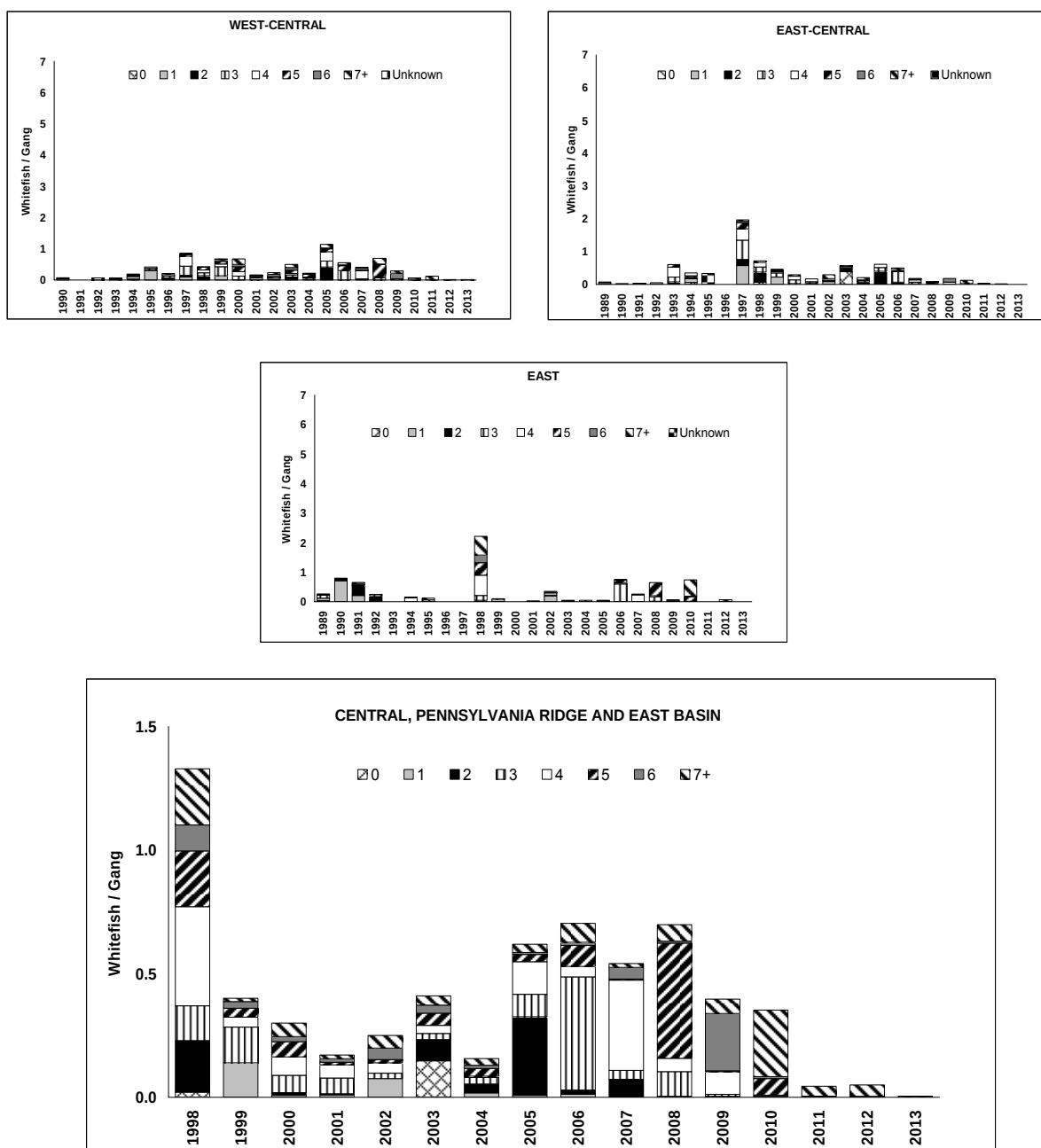


Figure 4.1.16 Lake Whitefish catch at age (numbers) per gang of Partnership Index Fishing gill nets (canned and bottom), in the west-central, east-central, Pennsylvania Ridge, east basin and with basins pooled. Only standard canned sets included in east basin and Pennsylvania Ridge graphs. Lake Whitefish samples lacking age data are represented by the "unknown" series. East basin 1995 based on few sites. East-central basin survey not completed in 1996. East basin and Pennsylvania Ridge surveys were not done in 1996, 1997. Pooled basins include extra Walleye Cap Area sites. Pennsylvania Ridge and extra Walleye Cap Area sites were not fished in 2013. Only 1 Lake Whitefish was caught in standard gill nets during 2013.

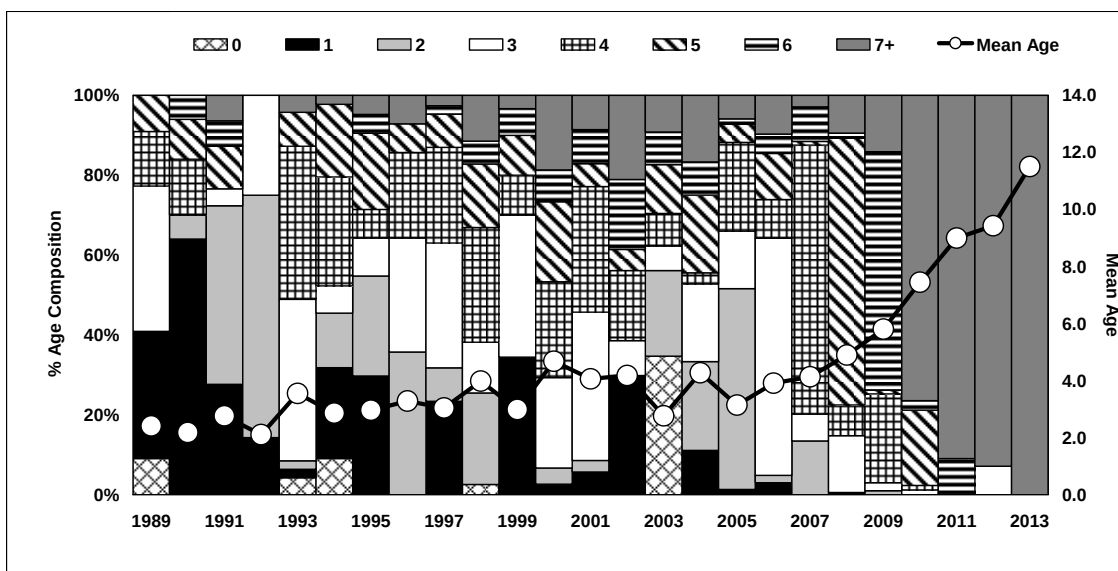


Figure 4.1.17 Lake Whitefish age composition and mean age (line) from Partnership Index Fishing, all basins combined, all index gear included. Ages 7 and older pooled in 7+ group. Otolith and scale ages were determined in 2013.

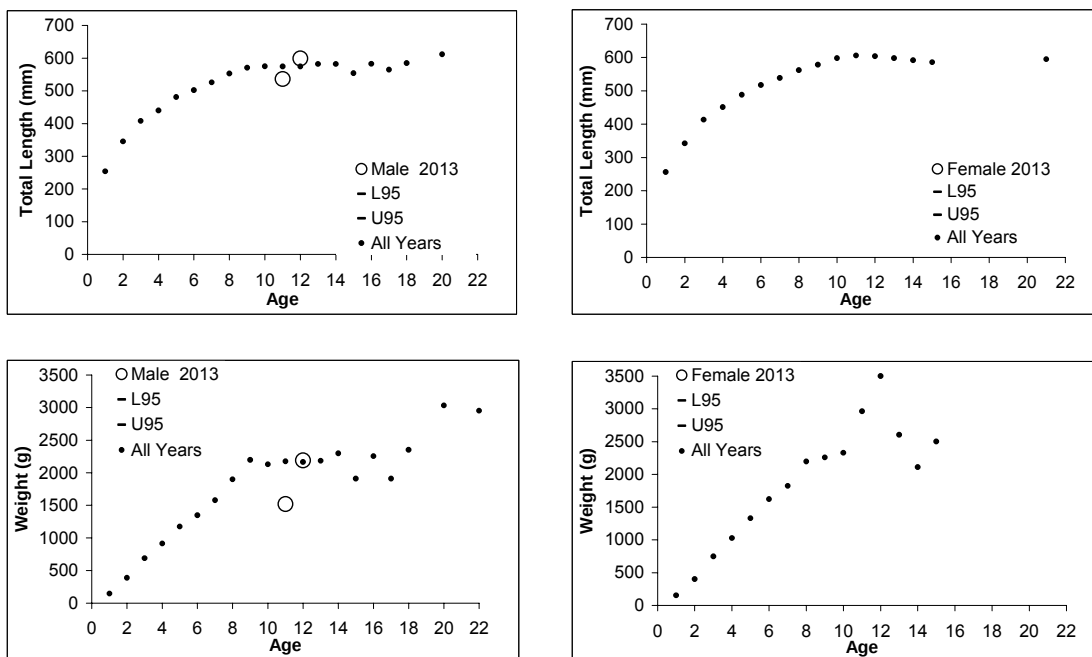


Figure 4.1.18 Mean length (top) and weight (bottom) at age for male (left) and female (right) Lake Whitefish, 2013 (circles). 95% confidence limits shown. Dotted line represents mean size at age 1989-2012, combined. Ages based on scales prior to 2006. Partnership Index Fishing 1989-2013.

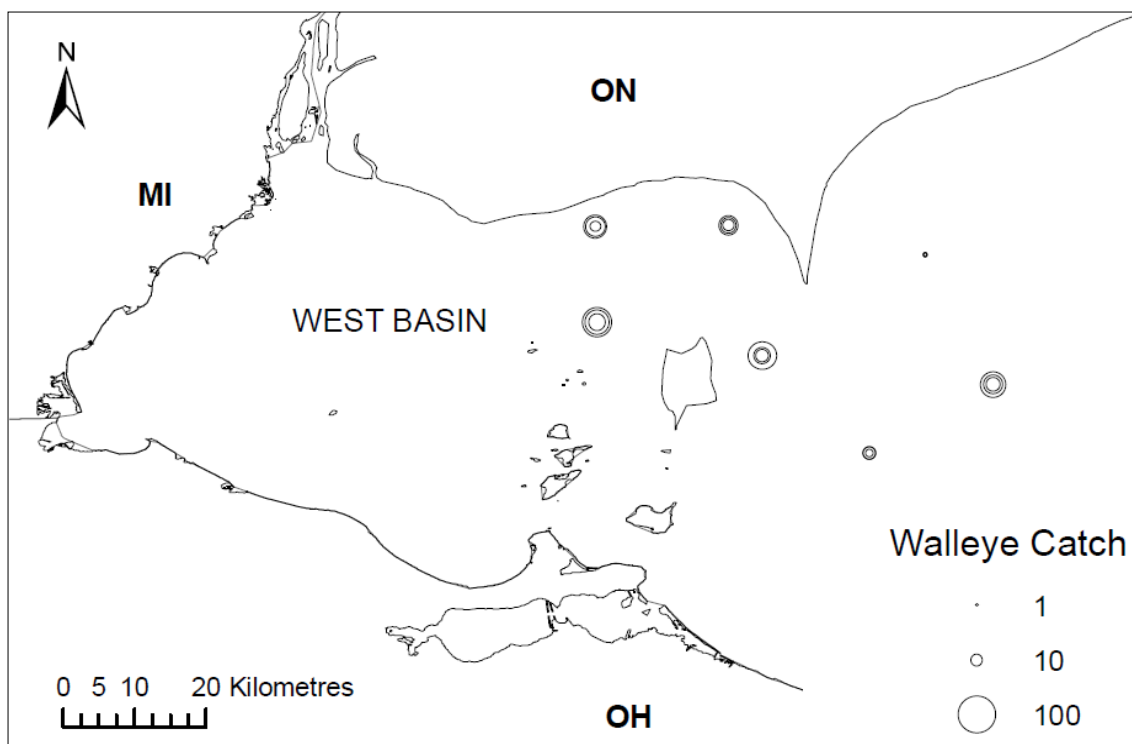


Figure 4.1.19 Walleye catches in Partnership Index Fishing monofilament, Ohio DNR monofilament and multifilament gill nets at 7 locations during 2013. Multiple circles indicate catches in more than one gear type.

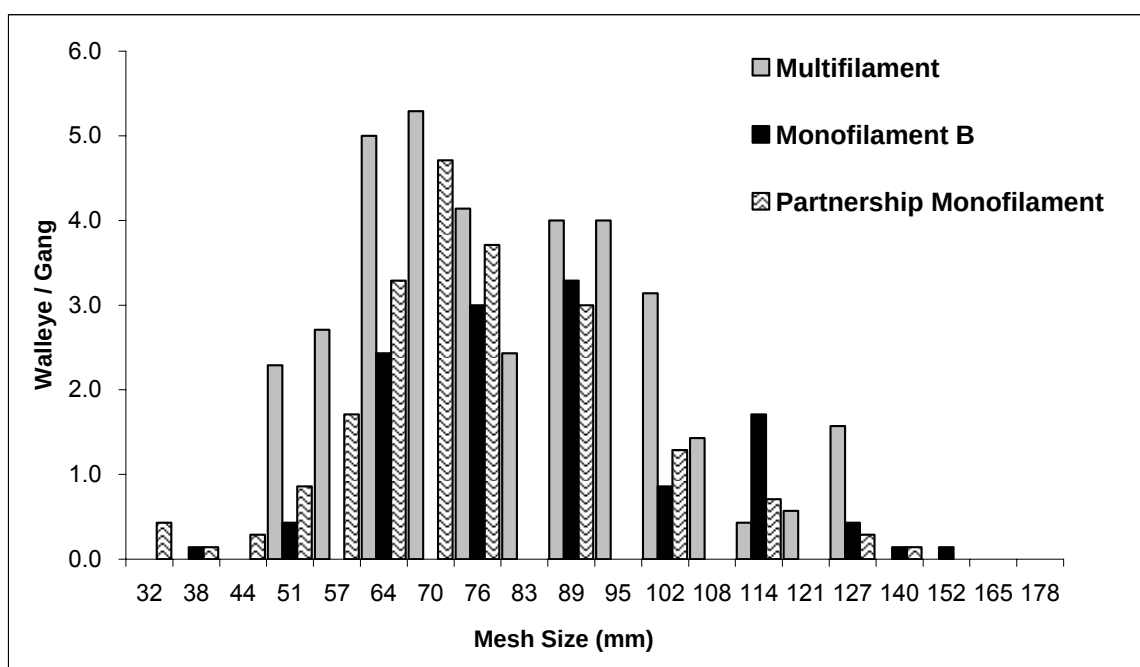


Figure 4.1.20 Mean Walleye catch per gang by mesh size (mm) for three types of index gill nets fished adjacently. Multifilament, Ohio DNR monofilament (B) and Partnership Index Fishing monofilament gill nets. See Table 4.1.6 for different mesh size configurations.

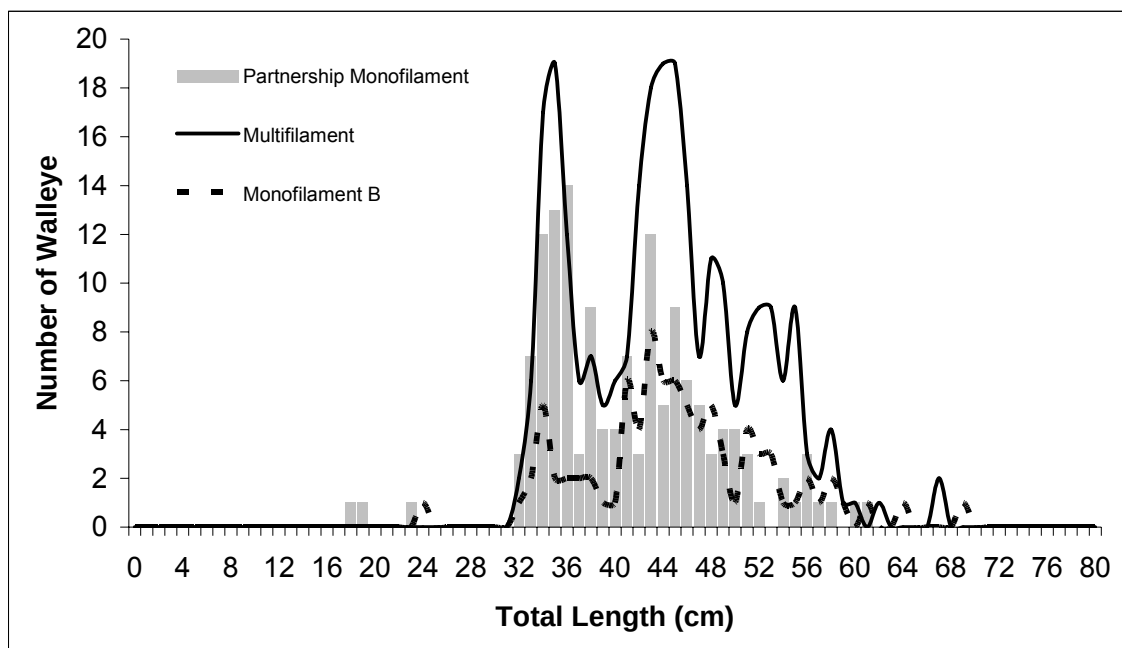


Figure 4.1.21 Walleye total length (cm) frequency distribution by index gill net configuration in 2013. Partnership Index Fishing monofilament, multifilament and Ohio DNR monofilament nets (monofilament B). See Table 4.1.6 for mesh size configurations. N=144, 259, 88 respectively.

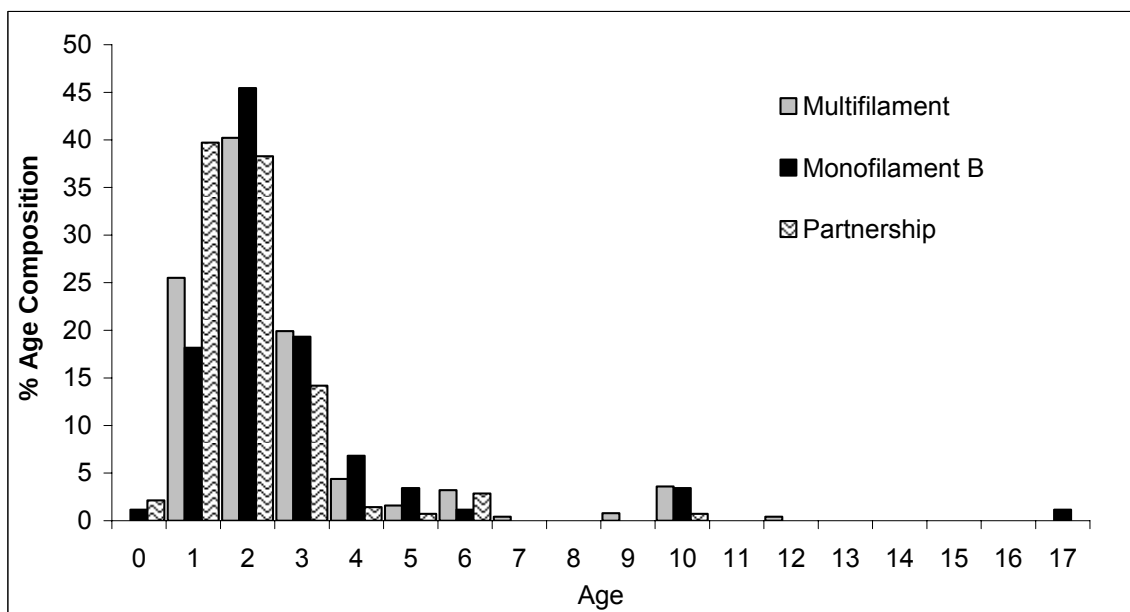


Figure 4.1.22 Walleye age composition (%) by index gill net configuration in 2013. Multifilament, Ohio DNR monofilament nets (monofilament B) and Partnership Index Fishing gear.

4.2 Index Trawling: Western Lake Erie

West Basin Bottom Trawling

The western basin interagency trawling index, conducted by Ontario and Ohio, was completed during August, 2013. The study is used to assess year class strength of species based on catches of young-of-the-year, yearling and older fish. Ontario survey results describe cohort strength by species as observed in Ontario waters. Data from Ontario and Ohio DNR are combined into a more spatially extensive survey, producing results that may differ from individual data sources. Lake Erie task groups use these values to project abundance of two-year-old Yellow Perch and Walleye in advance of recruitment to fisheries. Species composition and trends in forage abundance are also described by index trawling. Length and weight measurements were recorded to describe trends in growth. Subsamples of Yellow Perch were aged using otoliths.

The gear used was a two seam, 33' Biloxi bottom trawl (38' ground line) with a ½" cod end liner. Trawls in Ontario waters of western Lake Erie took place over two weeks from August 12 to August 21, 2013 (Figure 4.2.1). In 2013, trawl monitoring gear was used to measure dimensions of the trawl net during fishing. Measurements included bottom contact, wing spread, vertical opening, headline height, gear temperature and gear depth. This information could be used to account for variation in catches related to gear performance and fishing conditions. Some sensors on the footrope caused sediment to collect in the cod end. In some cases this may have caused the wing spread to decrease, reducing the fishing area. Despite this effect, abundance index calculations were not strongly influenced by applying measured wing spread values in place of assumed historic wing spread (5.02 m). While these trawl monitoring exercises were informative, further work needs to be completed before measurements may be incorporated directly into trawl assessment.

Due to concerns about the potential effects of hypoxia on the distribution of juvenile percids and other species, representatives from task groups, the Standing Technical Committee, researchers from the Quantitative Fisheries Center at Michigan State University and Ohio State University (OSU) developed an interim policy for the assignment of bottom trawl status. Informed by literature (Eby and Crowder 2002, Craig and Crowder 2005) and field study (Ohio DNR / OSU) concerning fish avoidance of hypoxic waters, an interim policy was agreed upon whereby bottom trawls that occurred in waters with dissolved oxygen less than or equal to 2 mg / l would be excluded from analyses applied retroactively from 2009. Hypoxic conditions (dissolved oxygen < 2 mg / l) were not a concern in the west basin during the 2013 trawl survey. Although a single low dissolved oxygen measurement was taken at the start of the trawl at site 9 (1.6 mg / l), a measurement at the end of this trawl (8.3 mg / l) and all peripheral measurements indicated wide spread high dissolved oxygen levels. The low value may have been influenced by sediment on the sensor membrane, so this trawl was included in analyses. Excluding this aberrant measurement, dissolved oxygen values ranged from 5.6 to 9.0 mg / l with a mean of 7.5 mg / l in the 2013 west basin bottom trawl survey.

To address effects on fish distribution when hypoxia prevails, OMNR continued a midwater trawl study that began in 2012. The study occurred during the last week of August 2013. Methodology and results for this study are described following the results of bottom trawls.

Bottom trawl indices of abundance expressed as number caught per hectare (CPHA) are presented for young-of-the-year (YOY) fish, yearling-and-older (YAO) and small bodied fish with age groups pooled (all ages) for the period 1988-2013 (Table 4.2.1). Decade (2004-2013) and time series (1988-2013) means are presented for comparison. Additional summaries are presented for yearling Yellow Perch and Walleye which used length and age data for age classification.

Although catches of young-of-the-year (YOY) White Perch exceeded all other species and represented 45% of all fish caught, the catch rate in 2013 (827 CPHA) was 82% lower than 2012 and was weak for the time series (Table 4.2.1). Yellow Perch YOY were assessed as moderately strong relative to the past decade but was moderate in strength over the entire time series. The Smallmouth Bass young-of-the-year index in 2013 was moderate in strength compared to both the decade and long time series. White Bass YOY abundance in 2013 appeared moderate to weak.

Young-of-the-year Walleye and YOY of other species in Table 4.2.1 were assessed as weak in Ontario waters of the west basin.

The YOY Yellow Perch index in 2013 (281 YOY / ha) was the 52nd percentile over the 1988-2013 time series, but below the long term mean (429 YOY / ha) (Figure 4.2.2). According to the YOY Yellow Perch catch rate, the 2008 year class was strongest since the 2003 year class. The YOY Walleye catch rate in 2013 (2.4 YOY / ha) was the 28th percentile in 1988-2013 time series and below the mean of 15.2 YOY/ha (Figure 4.2.3). Based on YOY indices, the 2007 Walleye cohort (10.4 YOY / ha) was the strongest observed since the 2003 cohort (117.4 YOY/ha).

Relatively strong yearling and older (YAO) indices were observed in 2013 for White Bass, White Perch, Freshwater Drum, Channel Catfish and Quillback Carpsucker (Table 4.2.1). Moderate catches of (YAO) in 2013 were observed for Yellow Perch, White Sucker, Rock Bass and Brown Bullheads. Yearling and older indices were weaker for Walleye, Smallmouth Bass, Gizzard Shad and Common Carp. Catch rates for yearling Yellow Perch were parsed from YAO catches using length frequency and age data. The yearling Yellow Perch catch rate in 2013 was 32nd percentile and below the long term mean (Figure 4.2.4). In 2013, the yearling Walleye catch rate was 24th percentile and below the 1988-2013 mean (Figure 4.2.5). During 3 early years of this survey (1988, 1992, 1993), catches of Burbot were recorded that cannot be confirmed. The code for this cold water species resembles other species common to the west basin (Trout-perch and Freshwater Drum) leaving in question the species designation.

The composition of forage species, (which remain potential prey for the duration of their life histories), was composed mostly of Trout-perch (29%), Rainbow Smelt (28%), Round Goby (18%), Emerald Shiners (15%), juvenile Cyprinids which could not be identified to species in the field (7%), Alewife (1%) and Logperch (1%) in 2013 (Table 4.2.1). Relative to the 1988-2013 times series, Rainbow Smelt, Logperch, Mimic Shiners and juvenile Cyprinids were abundant in 2013. Alewife which have been scarce or absent since 2003, were present in 2012 and increased again in 2013. Round Goby catches were moderate relative to the time series in 2013. Despite their significant contribution to catches of forage species in 2013, Trout-perch and Emerald Shiner catch rates were weak relative to the times series. Spottail Shiner and Silver Chub indices were also low in 2013 compared to the time series. Silver Chub abundance in 2013 (0.7 / ha) was below the decade mean (2.6 / ha) and the long term mean (5.3 / ha) in Ontario waters of western Lake Erie. The Silver Chub is currently listed as *Threatened* under the Endangered Species Act of Ontario. The vulnerability of some species and age groups to capture in bottom trawls may be low or variable due sometimes to changes in vertical distribution in response to abiotic conditions. For additional focus on this topic, refer to the west basin midwater trawling study later in this section.

Catch rates for species encountered infrequently (10 year average # / ha < 0.2) are presented in Table 4.2.2. One (1) yearling and older Carp-Goldfish Hybrid was caught in 2013. In addition, one (1) Brook Silverside and one (1) Goldfish were caught in west basin bottom trawls during 2013.

In 2013, the average total length of YOY Yellow Perch (62 mm) was slightly below the 1988-2013 mean (65 mm) (Figure 4.2.6). YOY Yellow Perch mean weight in 2013 was 2.4 g (STD=0.8) which was slightly less than the mean weight since 1998 (2.7g). The average total length of YOY Walleye in 2013 (134 mm) was equal to the time series average (Figure 4.2.7). The mean weight of YOY Walleye in August, 2013 was 19.6 g (STD=6.1), which was similar to the average weight since 1998 (19.0 g). The average length of yearling Yellow Perch (137 mm) continued to remain above average in 2013 (Figure 4.2.8). Similarly, the average total length of yearling Walleye (312 mm) remained above the time series average in 2013 (Figure 4.2.9).

West Basin Midwater Trawling

In recent years, some of the west basin interagency trawl locations were observed as hypoxic near the lake bottom. To address the variability of bottom trawl abundance indices associated with changing environmental conditions, a pilot midwater trawl study was conducted from August 27 to August 29, 2013.

The research vessel Keenosay fished midwater trawl gear at 7 stations with replicates on bottom, (benthic) suspended (pelagic) below surface and in the middle of the water column where depths permitted (at 4 stations: 8, 12, 18, 24 $\geq$ 9m) for a total of 18 samples (Figure 4.2.10). Locations were unchanged from those fished in the 2012 pilot study.

The mid-water trawl has a 3 m square opening, with 102, 76, 51, and 25 mm graded mesh running from the gape to 13 mm mesh in the cod-end. Trawl duration was 10 minutes at 3.0 knots. Water temperature / dissolved oxygen profiles were logged at each location at the start and end of the first trawl at each site. Catches were sorted by species and size into age groups so that all percids (Walleye and Yellow Perch) and large fish were counted in full while volumetric subsamples were taken, and then expanded for small bodied forage species.

In 2013, trawl monitoring sensors were mounted on the midwater trawl while fishing. As with the west basin bottom trawl survey, this equipment measured the dimensions of the net periodically during the trawl. Measurements were more variable for the midwater trawl configuration than was observed for the bottom trawl. Some sensors on the footrope caused sediment to collect in the cod end when fished on bottom. There was some evidence that the shape of the midwater trawl opening did not match the expected dimensions. If sensors were accurate, the net may have fished wider and more compressed vertically than expected. Verification of sensor measurements and trawl dimensions are planned to continue in 2014.

During the midwater trawl study, bottom dissolved oxygen ranged from 7.3 to 8.6 mg / l and bottom temperatures were from 23.2 and 24.1 ° C. Suitable oxygen conditions did not allow us to compare the response of species' vertical distributions to hypoxia, but did allow us to further define baseline vertical distributions under favourable environmental conditions.

Catch rates (number per hectare) by species and age group are presented for areas fished in the water column (bottom, middle, top and combined) in Table 4.2.3. Catch rates of all species and age groups combined were higher in pelagic trawls (middle of water column: 15,979 fish / ha, top of water column: 15,800 fish / ha) compared to bottom trawls (5,409 fish / ha). This was due to the dominance of Emerald Shiners in all fishing modes, but with much higher catches in suspended trawls. No YOY Walleye were caught in any trawls. All yearling Walleye were caught in bottom trawls (1.6 YRL / ha) as were Walleye ages 2 and older (1.1 / ha). All YOY Yellow Perch were caught on bottom (335 YOY / ha). Yearling and older (YAO) Yellow Perch were caught exclusively on bottom (27 YAO / ha).

The majority (98%) of fish caught in the study were Emerald Shiners (94%), YOY Gizzard Shad (2%), YOY Yellow Perch (1%) and YOY White Perch (1%) (Table 4.2.3). Emerald Shiners and Brook Silversides were the only species with greater catches in pelagic trawls than trawls on bottom. Other species present in pelagic trawls were YOY Gizzard Shad, Alewife, Rainbow Smelt, and YOY White Bass. The remaining species-age groups were caught exclusively on bottom. Emerald Shiners (ES) were abundant throughout the middle (15,892 ES / ha), top 15,672 ES / ha) and bottom (3,859 ES / ha) of the water column.

References:

- Eby, L.A. and L.B. Crowder. 2002. Hypoxia-based habitat compression in the Neuse River Estuary: context-dependent shifts in behavioral avoidance thresholds. *Can. J. Fish. Aquat. Sci.* Vol. 59, 2002
- Craig, J.K. and L.B. Crowder. 2005. Hypoxia-induced habitat shifts and energetic consequences in Atlantic croaker and brown shrimp on the Gulf of Mexico shelf *Mar Ecol Prog. Ser.* Vol. 294: 79–94.

Table 4.2.1 Mean catch per hectare (CPHA) of abundant species as young-of-the-year, yearling-and-older and all ages, collected during interagency bottom trawling in western Lake Erie 1988-2013 by the OMNR Lake Erie Management Unit. Means are presented for 2004-2013 and 1988-2013. Species with long term mean CPHA less than 0.2 were excluded. These other species appear in Table 4.2.2.

Species	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Average 04 - 13 88 - 13		
young-of-the-year																													
White Perch	4,988.7	6,046.9	7,725.0	3,978.4	1,183.6	1,063.1	1,054.4	293.5	1,009.5	118.4	124.4	232.9	898.3	1,489.9	358.0	1,312.8	4,657.0	1,762.1	3,254.0	4,285.0	1,947.0	2,477.0	1,303.2	754.9	4,504.5	826.6	2,275.1	2,212.7	
Gizzard Shad	956.4	1,197.1	1,099.6	59.0	260.4	826.4	103.9	81.6	2,409.1	33.8	413.3	214.0	1,646.5	2,224.8	47.2	436.0	23.4	152.7	174.1	340.0	2.6	793.8	47.8	22.8	291.3	12.7	186.1	533.5	
Yellow Perch	202.1	513.7	470.9	72.4	173.9	499.3	554.8	741.4	1,914.9	71.6	188.1	468.2	46.5	665.9	14.5	2,220.6	57.7	117.6	361.0	331.7	663.0	74.8	161.2	220.7	72.5	280.8	234.1	428.8	
White Bass	23.1	67.9	64.7	13.8	14.9	124.0	36.9	51.1	125.3	327.3	24.5	152.0	140.4	167.9	81.8	590.7	58.7	50.7	159.4	29.2	54.6	167.2	100.4	21.9	56.7	43.4	74.2	105.7	
Freshwater Drum	72.1	10.2	2.4	84.4	0.5	3.1	0.7	0.2	6.9	1.4	2.9	9.8	23.0	16.9	107.8	117.4	33.8	20.1	1.4	7.0	-	0.4	5.9	1.9	6.5	1.5	7.8	20.7	
Walleye	14.1	1.4	35.1	49.4	0.2	8.4	19.5	0.9	35.0	6.3	5.1	41.8	0.3	16.1	0.1	117.4	5.5	5.3	0.8	10.4	0.7	6.3	6.2	3.7	3.2	2.4	4.4	15.2	
Smallmouth Bass	0.1	0.2	2.1	-	-	0.8	1.6	6.6	4.6	2.0	1.2	1.0	0.7	1.4	8.8	0.1	-	1.7	6.1	0.9	1.7	0.6	2.5	1.6	0.3	1.5	1.7	1.8	
Rock Bass	-	-	0.1	0.5	-	0.3	0.3	0.2	0.3	-	-	0.6	0.9	1.3	0.7	0.1	0.1	-	0.3	0.3	-	0.3	0.4	0.9	3.0	0.1	0.6	0.4	
White Crappie	0.5	0.1	-	8.8	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	0.1	-	-	-	-	-	-	-	0.0	0.4	
yearling-and-older																													
Yellow Perch	169.4	7.8	52.0	89.3	70.7	99.3	68.3	137.5	374.7	74.1	98.7	187.8	328.9	131.3	120.1	470.2	402.9	294.9	83.5	84.2	536.2	416.6	154.8	139.6	75.4	123.0	231.1	184.3	
White Perch	113.1	21.4	12.1	138.8	394.4	92.9	19.3	35.2	27.3	2.7	3.8	109.6	55.8	41.3	27.3	1,142.3	193.3	70.2	126.3	24.3	288.6	99.1	95.1	76.7	78.9	175.9	120.8	131.8	
Freshwater Drum	143.9	0.1	22.2	36.6	20.2	37.5	9.5	17.2	39.6	14.3	24.4	33.3	61.4	51.2	98.7	67.5	90.9	91.3	58.0	29.5	36.6	41.2	38.6	47.0	38.7	72.4	54.4	47.0	
Walleye	15.2	2.9	3.5	6.7	24.3	3.3	3.1	11.4	2.2	4.0	6.2	5.2	20.9	2.3	4.0	3.1	72.4	12.7	4.0	1.7	4.1	4.5	2.0	4.1	2.7	3.2	11.1	8.8	
White Bass	6.0	0.1	1.0	0.2	1.8	12.3	0.1	1.9	-	0.8	-	0.5	8.2	0.2	1.9	2.1	3.7	0.4	2.3	0.7	0.8	0.9	0.6	8.7	0.2	10.5	2.9	2.5	
Gizzard Shad	1.7	-	0.2	41.2	0.1	0.2	0.1	0.7	1.2	9.7	0.1	0.7	0.4	0.1	0.7	-	-	0.1	0.2	0.1	-	-	0.2	0.2	0.4	-	0.1	2.2	
Channel Catfish	6.5	-	1.8	1.8	0.7	0.8	0.1	0.4	1.2	-	0.1	1.1	0.4	0.4	0.7	0.9	0.7	1.5	2.3	0.4	0.8	0.8	2.3	1.6	0.3	2.2	1.3	1.1	
Capr	4.1	-	2.9	2.8	1.3	0.6	0.7	1.8	0.7	0.5	0.5	0.8	0.8	0.4	1.0	0.3	1.8	1.2	0.8	0.5	0.7	0.3	0.9	0.5	0.3	0.3	0.7	1.0	
White Sucker	0.3	-	0.5	0.5	0.9	0.3	0.1	1.5	0.3	0.3	-	1.3	0.4	1.0	2.0	0.7	1.7	2.3	0.7	1.6	0.5	2.0	0.5	1.4	0.4	0.7	1.2	0.8	
Rock Bass	1.7	-	1.0	1.2	0.6	1.2	2.5	1.3	2.2	0.4	0.1	0.3	0.7	1.8	0.6	0.3	0.2	0.3	-	0.6	0.2	1.2	-	0.2	0.1	0.4	0.3	0.7	
Brown Bullhead	2.7	-	1.2	0.5	0.2	-	-	-	-	0.1	-	0.8	0.3	2.5	-	-	-	-	0.2	2.7	1.0	-	0.6	0.1	0.1	0.3	0.5	0.5	
Smallmouth Bass	0.1	-	0.9	-	3.6	1.1	0.7	1.1	0.3	0.1	0.4	1.4	0.1	0.6	-	0.3	0.2	-	0.2	0.1	0.3	-	-	0.6	0.2	-	0.2	0.5	
Burbot	0.2	-	-	-	0.6	9.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.4	-	
Quillback	-	-	0.5	0.6	-	0.1	-	0.5	0.4	0.2	-	0.2	0.2	0.2	0.9	0.1	2.0	0.1	-	-	0.1	-	0.4	0.1	-	0.3	0.3	0.3	
all ages																													
Alewife	877.9	254.0	313.7	51.3	3,188.8	2,112.9	30.4	73.2	742.4	66.4	33.8	107.0	536.7	520.6	218.4	-	-	-	0.3	0.5	-	-	0.1	-	0.2	2.3	351.2	0.3	
Troutperch	213.3	142.6	347.7	479.3	71.1	287.8	182.9	63.9	336.0	61.5	67.1	128.7	321.6	187.4	196.8	40.8	670.4	311.9	281.9	92.4	34.9	457.4	281.1	54.6	97.0	86.0	236.8	210.6	
Emerald Shiner	2.6	3.3	143.3	12.0	60.4	30.9	21.0	105.2	129.2	61.3	6.1	39.3	34.8	52.6	98.5	633.8	88.4	118.9	65.8	285.8	141.0	249.4	83.7	63.3	416.4	44.4	155.7	115.2	
Round Goby	-	-	-	-	-	-	-	-	-	2.7	83.8	92.1	111.1	111.1	84.2	117.1	59.6	207.5	59.8	170.6	71.4	172.0	199.7	16.8	43.7	41.8	51.2	103.5	61.0
Spiral Shiner	46.9	21.6	31.7	49.5	40.6	29.3	28.3	331.5	40.4	81.2	87.9	75.3	23.1	66.5	13.1	15.9	16.9	94.5	17.5	31.7	5.5	4.9	29.8	1.2	1.1	0.9	20.4	45.6	
Rainbow Smelt	1.4	3.1	10.9	0.2	64.3	18.7	0.1	2.8	1.6	2.0	6.5	-	39.7	0.2	6.4	29.2	82.1	2.0	52.6	45.9	84.8	65.8	0.5	8.0	2.3	82.6	42.7	23.6	
Cyprinidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	15.7	14.2	-	23.2	0.4	6.5	214.8	19.5	29.4	11.3	
Silver Chub	2.8	0.1	1.5	7.1	21.8	9.5	4.7	1.5	5.3	10.6	9.4	17.4	4.4	6.2	5.2	4.1	8.7	6.1	0.9	1.7	0.2	1.9	1.4	1.3	2.8	0.7	2.6	5.3	
Logperch	2.7	1.7	1.8	8.5	0.2	0.3	20.1	1.3	8.2	2.0	3.4	0.2	0.1	-	-	0.6	3.9	2.2	2.1	0.6	2.3	13.2	1.1	1.2	0.1	3.7	3.0	3.1	
Mimic Shiner	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	21.3	-	1.0	0.7	0.3	0.6	0.2	2.4	0.9	
Total	7,869	8,296	10,350	5,095	5,600	5,254	2,147	1,969	7,218	956	1,192	1,923	4,307	5,725	1,532	7,267	5,684	3,181	4,843	5,696	3,960	5,103	2,340	1,491	5,910	1,850	4,105.8	4,529.1	
# of trawls	37	45	39	42	36	27	38	34	32	32	32	30	32	36	34	35	36	36	36	36	36	29	35	33	36	36	35	35	
CPHA (catch per hectare) = Unweighted, arithmetic mean catch per hectare Samples collected since 2009 with dissolved oxygen ≥ 2 mg / l were excluded based on an interim interagency protocol adopted in 2012.																													

CPHA (catch per hectare) = Unweighted, arithmetic mean catch per hectare
 Samples collected since 2009 with dissolved oxygen ≥ 2 mg/l were excluded based on an Interim Interagency protocol adopted in 2012.

Table 4.2.2 Mean catch per hectare (CPHA) of species caught infrequently as young-of-the-year, yearling-and-older and all ages, collected during interagency bottom trawling in western Lake Erie 1988-2013 by the OMNR Lake Erie Management Unit. Means are presented for 2004-2013 and 1988-2013. Species with long term mean CPHA greater than 0.2 were excluded. These other species appear in Table 4.2.1.

Species	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Average 04 - 13 88 - 13		
young-of-the-year																													
Largemouth Bass	-	-	-	4.59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.11	-	0.11	-	-	-	0.02	0.19	
Quillback	1.29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.05	
Channel Catfish	-	-	-	0.31	-	-	0.29	-	-	-	-	-	0.11	-	-	-	-	-	-	-	-	-	-	-	0.26	-	-	0.03	0.04
Bluegill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.22	0.12	-	-	-	0.03	0.01
Morone sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.12	-	-	-	-	0.22	-	-	-	-	-	-	-	0.01	0.01
Pumpkinseed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00
Black Crappie	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.11	-	-	-	-	-	-	0.01	0.00
White Sucker	-	-	0.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00
Centrarchidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.10	-	0.01	0.00	0.00
yearling-and-older																													
Shorthead Redhorse	-	-	-	0.09	-	-	0.09	-	-	-	-	-	-	-	-	0.52	1.32	0.11	-	-	0.65	0.47	0.10	0.12	0.11	-	0.29	0.14	
Largemouth Bass	-	-	-	1.77	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.07	0.07
Lake Sturgeon	-	-	-	-	-	-	0.18	-	-	0.12	-	-	-	-	0.11	-	-	-	-	0.10	-	0.11	0.12	-	-	-	0.03	0.03	
Golden Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	0.10	-	-	-	-	-	-	-	-	0.51	-	-	-	-	0.05	0.02	0.02
Silver Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	0.10	-	-	-	0.11	-	-	-	-	0.13	-	0.12	0.11	-	0.05	0.02	0.02
Silver Lamprey	-	-	-	-	-	-	-	-	-	0.12	-	-	-	-	-	-	-	-	-	-	-	-	0.21	-	-	-	0.03	0.02	0.03
Black Crappie	0.10	-	-	-	-	-	-	-	0.09	-	-	-	-	-	-	-	-	-	-	0.25	-	-	-	-	-	-	0.03	0.02	0.01
Moxostoma sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.23	-	-	0.02	0.01	0.01
Yellow Bullhead	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.11	-	-	-	-	0.11	-	0.02	0.01	0.01
Carp-Goldfish Hybrid	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.11	0.02	0.01	0.01
Lake Whitefish	-	-	-	-	-	-	-	-	-	-	-	-	0.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00	0.00
Muskellunge	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00	0.00
White Crappie	0.11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.11	-	-	-	-	-	-	0.01	0.00	0.00
Northern Pike	-	-	-	-	-	-	0.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00	0.00
Longnose Sucker	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.10	-	-	-	0.01	0.00	0.00
all ages																													
Johnny Darter	-	-	-	-	-	-	2.08	-	1.27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.13	0.10
Brook Silverside	-	-	-	-	-	0.77	-	0.10	-	-	-	-	-	-	-	-	-	0.11	-	-	0.76	-	-	0.48	0.21	0.10	0.17	0.03	0.03
Goldfish	0.11	-	0.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.11	-	-	-	-	-	0.29	0.10	0.05	0.01	0.01
Nocomis sp.	0.21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.12	-	-	-	-	-
Tubenose Goby	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00	0.00
Blacknose Dace	-	-	-	-	-	-	-	0.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00
Common Shiner	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.09	-	-	-	-	-	-	-	-	-	-	-	-	0.00
Spotfin Shiner	-	0.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00
Notropis sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.09	-	-	-	-	-	-	-	-	-	0.01	0.00	0.00
Total	1.82	0.09	0.20	6.76	-	0.77	2.45	0.49	1.36	0.24	-	-	0.12	0.31	0.12	0.72	1.52	0.33	0.47	1.41	0.76	1.11	0.85	1.31	1.19	0.31	0.93	0.95	0.95
# of trawls	37	45	39	42	36	27	38	34	32	32	32	30	32	36	34	35	36	36	36	36	36	29	35	33	36	36	35	35	35

CPHA (catch per hectare) = Unweighted, arithmetic mean catch per hectare

Samples collected since 2009 with dissolved oxygen ≥ 2 mg / l were excluded based on an interim interagency protocol adopted in 2012.

Table 4.2.3 Mean catch per hectare in mid-water trawl gear fished on bottom and suspended in the middle and top of the water column at 7 sites. Depths were adequate at 4 sites to fish at 3 depths, 2013.

Species and Age Group	Area in Water Column			
	Bottom	Middle	Top	All
Young of the Year Yellow Perch	335.3	-	-	130.4
Young of the Year White Perch	209.9	-	-	81.6
Young of the Year White Bass	5.8	-	0.5	2.5
Young of the Year Walleye	-	-	-	-
Yearling and Older Yellow Perch	27.4	-	-	10.7
Yearling and Older White Perch	115.9	-	-	45.1
Yearling and Older White Bass	5.3	-	-	2.0
Yearling and Older Freshwater Drum	10.5	-	-	4.1
Yearling Walleye	1.6	-	-	0.6
Walleye Ages 2 and Older	1.1	-	-	0.4
Yearling and Older Channel Catfish	0.5	-	-	0.2
Young of the Year Gizzard Shad	591.3	67.0	108.4	287.0
Yearling and Older Gizzard Shad	-	-	-	-
Common Carp	2.6	-	-	1.0
Lake Sturgeon	1.1	-	-	0.4
Alewife	62.1	19.2	10.8	32.6
Rainbow Smelt	106.4	0.9	5.1	43.6
Emerald Shiner	3,859.4	15,892.3	15,672.4	11,127.3
Silver Chub	6.3	-	-	2.5
Logperch	0.5	-	-	0.2
Trout-perch	55.7	-	-	21.7
Cyprinid	7.4	-	-	2.9
Brook Silverside	2.7	-	3.2	2.3
Total	5,408.7	15,979.4	15,800.4	11,799.0
Samples	7	4	7	18

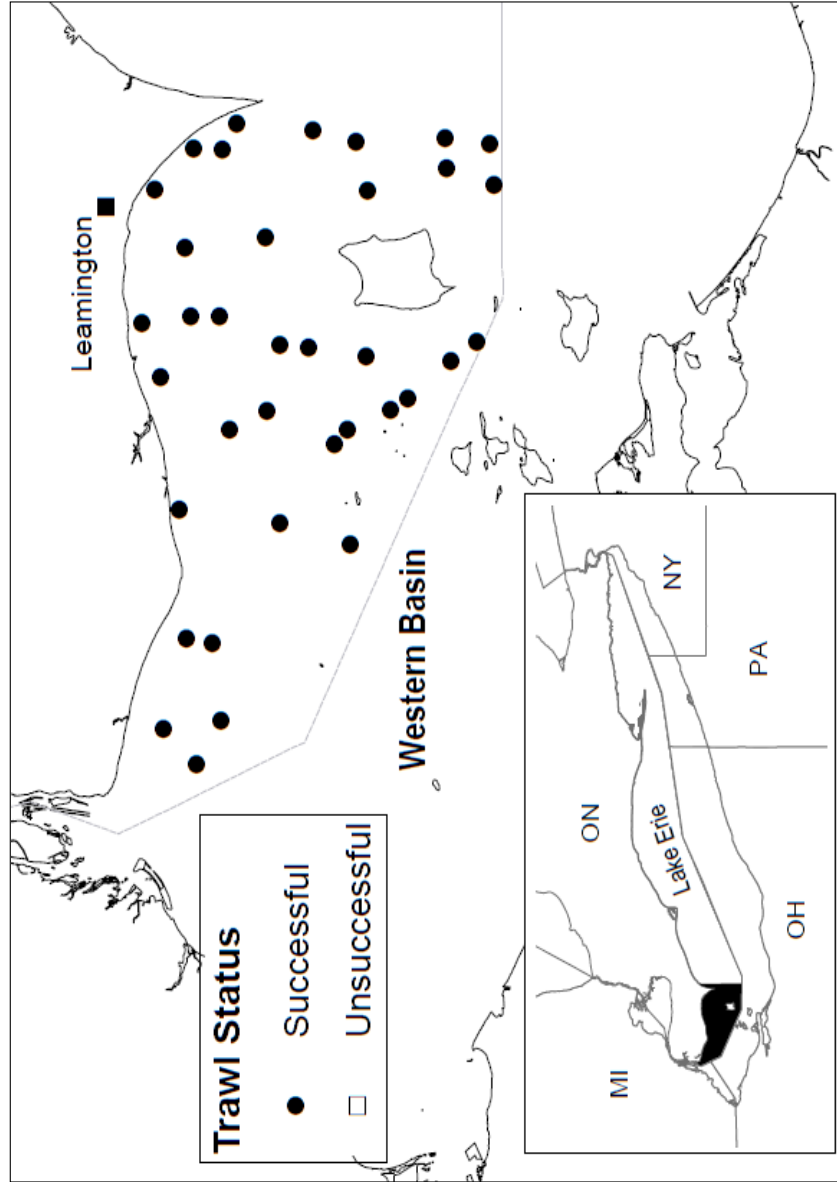


Figure 4.2.1 Ontario bottom trawl index locations fished in the western basin of Lake Erie during August 2013. Thirty-six (36) stations were completed. No sites were excluded in 2013 due to hypoxia.

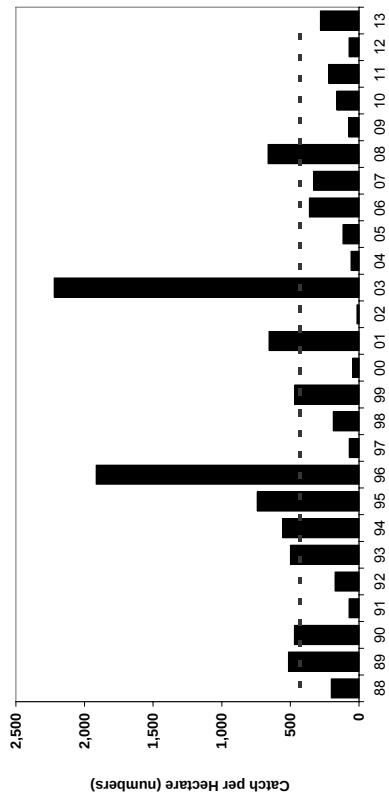


Figure 4.2.2 Number of young-of-the-year Yellow Perch caught per hectare during interagency trawling (1988-2013) in western Lake Erie. Horizontal line indicates 1988-2013 average catch per hectare.

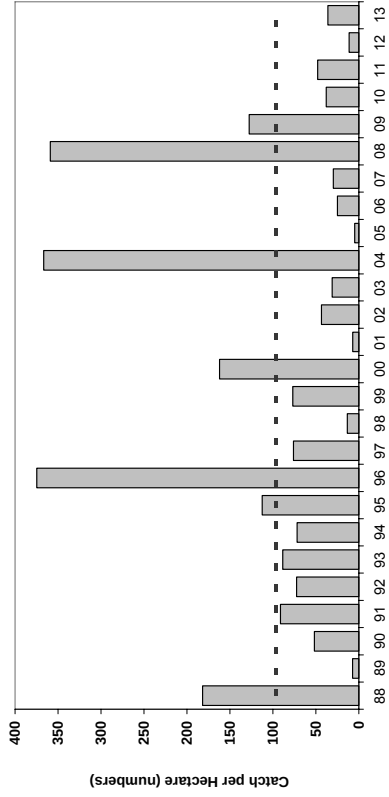


Figure 4.2.4 Number of yearling Yellow Perch caught per hectare during interagency trawling (1988-2013) in western Lake Erie. Horizontal line indicates 1988-2013 average catch per hectare.

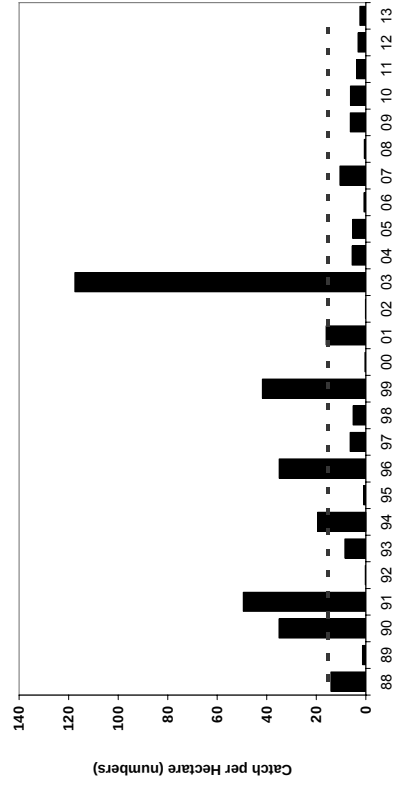


Figure 4.2.3 Number of young-of-the-year Walleye caught per hectare during interagency trawling (1988-2013) in western Lake Erie. Horizontal line indicates 1988-2013 average catch per hectare.

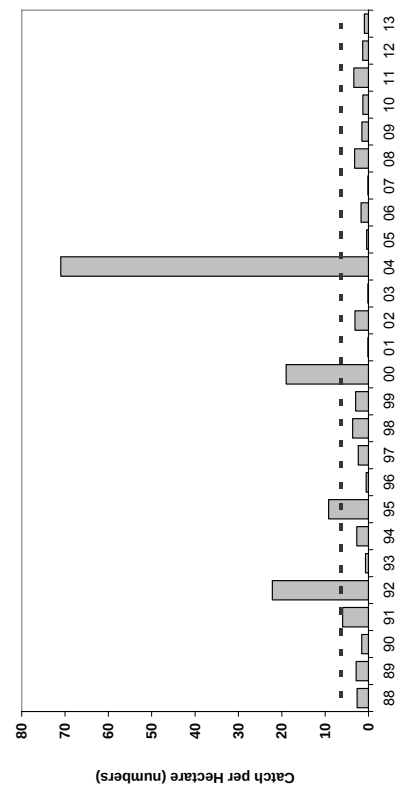


Figure 4.2.5 Number of yearling Walleye caught per hectare during interagency trawling (1988-2013) in western Lake Erie. Horizontal line indicates 1988-2013 average catch per hectare.

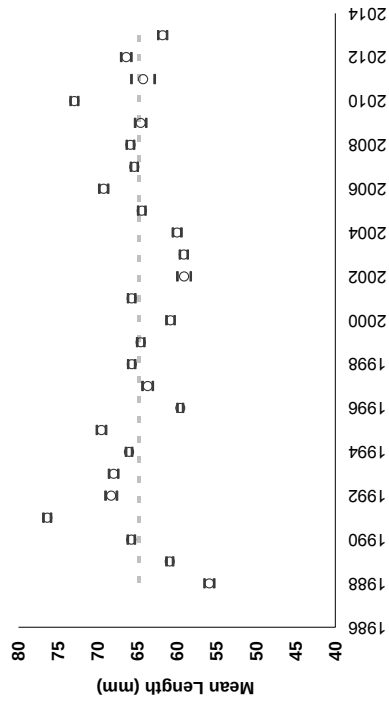


Figure 4.2.6 Mean total length of young-of-the-year (YOY) Yellow Perch with 95% confidence limits. Interagency trawling, Ontario waters of western Lake Erie, 1988-2013. Horizontal broken line indicates the average of the time series.

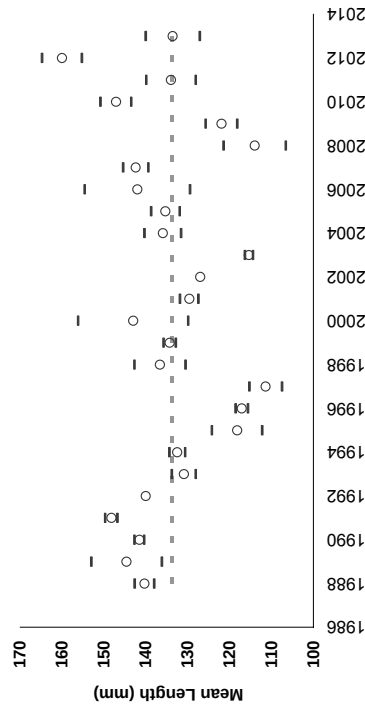


Figure 4.2.7 Mean total length of young-of-the-year (YOY) Walleye with 95% confidence limits. Interagency trawling, Ontario waters of western Lake Erie, 1988-2013. Horizontal broken line indicates the average of the time series. Two (2) YOY were caught in 1992 and one (1) in 2002.

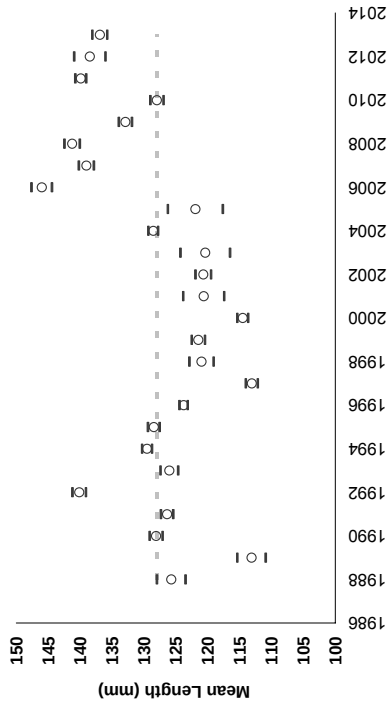


Figure 4.2.8 Mean total length of yearling Yellow Perch with 95% confidence limits. Interagency trawling, Ontario waters of western Lake Erie, 1988-2013. Horizontal broken line indicates the average of the time series.

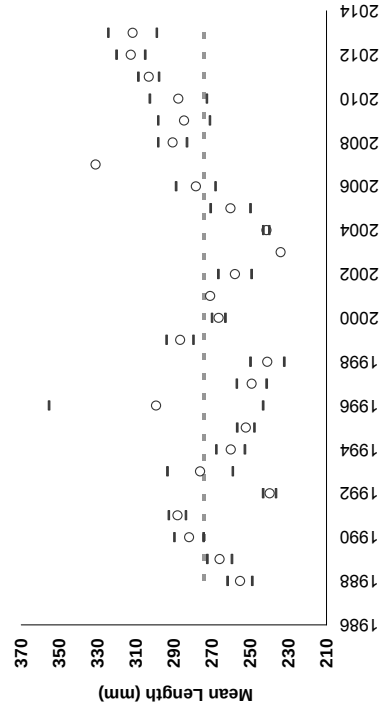


Figure 4.2.9 Mean total length of yearling Walleye with 95% confidence limits. Interagency trawling, Ontario waters of western Lake Erie, 1988-2013. Horizontal broken line indicates the average of the time series. In 2007 one (1) yearling walleye was caught.

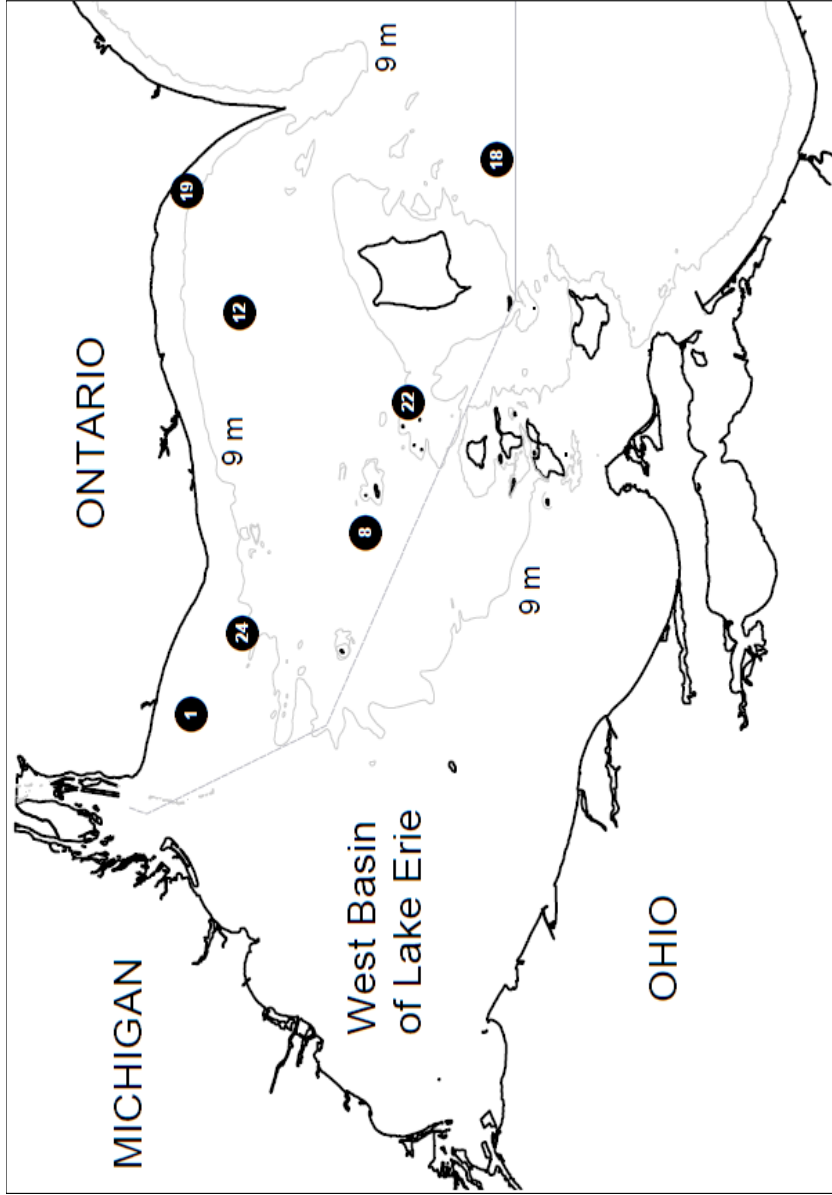


Figure 4.2.10

Ontario midwater trawl locations fished in the western basin of Lake Erie during August 2013. Seven sites were selected from the bottom trawl survey which took place during the previous 2 weeks. Site numbers are visible. Trawls were fished near the surface and on bottom at all sites. At depths 9 m or greater, trawls were also fished in the middle of the water column (sites 8, 12, 18, 24).

4.3 Long Point Bay Index Trawl Surveys

Current assessment of juvenile fish in Long Point Bay consists of three independent bottom trawl surveys conducted during early fall each year in three areas (Figure 4.3.1A). Two surveys targeting Yellow Perch have been conducted at up to four fixed locations annually since 1980 in Inner Long Point Bay (Inner Bay Trawl Assessment) and the inshore waters of outer Long Point Bay (Nearshore Outer Bay Trawl Assessment) with a 6.1 m modified Biloxi bottom trawl. A third trawl survey was initiated in 1984 to measure recruitment of Rainbow Smelt. In this survey, a 10 m Biloxi bottom trawl was fished at four fixed stations in the offshore waters of Outer Long Point Bay (Offshore Outer Bay Trawl Assessment).

Trawling at all nearshore index stations was conducted weekly during September and October from 1980 to 2010. Beginning in 2011, nearshore trawling during October was discontinued necessitating an adjustment of the standard survey period from eight to four or five weekly sample events from August 26th to October 5th across the entire time series. Total annual trawling effort for the Inner Bay and Nearshore Outer Bay assessments was approximately 640 and 480 minutes, respectively during the survey years to and including 2010. Total annual trawling effort was reduced to 400 and 300 minutes, respectively following implementation of a truncated survey period in 2011.

Trawling at the Offshore Outer Bay stations occurred weekly during September and October from 1984 to 1995. In 1996, September trawling was suspended and all future sampling at the offshore trawl stations was abbreviated to weekly sample events during October plus a few days before and after. In 2011, the standard survey period for reporting offshore trawl data was further refined to include up to five weekly sample events from September 25th to November 8th across the entire time series, resulting in an annual total trawl effort of some 400 minutes.

Trawl catches were sorted by species and age group. Species catch was classified as young-of-the-year (YOY) and yearling-and-older (YAO) based on a fork length criterion derived from examinations of size frequency distributions and age determination of representative juveniles from selected length classes. Random samples of YOY and YAO for selected species were measured for lengths and weight. Sex, maturity and age (from scale interpretations) were also recorded for YAO fish.

Relative abundance indices were expressed as arithmetic mean catch (number) per hectare (NPHa). Arithmetic means were calculated from the summed catch and effort of tows 1 and 2 at each location.

An index of age 0 Yellow Perch abundance was introduced in 2010 that combines the annual recruitment estimates from each of three Long Point Bay trawl assessments into a single composite index series. Referred to as the Yellow Perch or Long Point Bay Composite Index (LPBc), this method of reporting age 0 Yellow Perch abundance was created to better reflect the overall abundance of YOY Yellow Perch in Long Point Bay following a shift in the spatial distribution of juvenile Yellow Perch from predominately nearshore to predominately offshore habitats since about 2003. The composite index combines the annual mean abundance (NPHa) estimates from each of the three trawl assessments and assigns a 3.6 times greater weight to the Offshore Outer Bay trawl mean estimate based on the proportion of the total surface area of Long Point Bay (including Inner Bay) represented by bottom depths greater than 5 m (78.3%) and less than or equal to 5 m (21.7%) according to the following equation:

$$LPBc_i = (OOB_i \times 0.783) + \frac{(IB_i \times 0.217)}{2} + \frac{(NOB_i \times 0.217)}{2},$$

where $LPBc_i$ is the age 0 Yellow Perch composite index in year i , and OOB_i , IB_i and NOB_i are the age 0 Yellow Perch mean NPHa estimates for each of the three Long Point Bay trawl assessments in year i ; Offshore Outer Bay (OOB), Inner Bay (IB), and Nearshore Outer Bay (NOB).

Outer Long Point Bay Grid Trawl Assessment

In addition to the three long term index bottom trawl assessments described above, a spatially dispersed trawl survey was implemented in 2008 to examine the abundance and distribution of juvenile Yellow Perch and forage fish species in outer Long Point Bay. Applying a systematic design, this survey establishes potential sample locations based on a UTM (Universal Transverse Mercator) grid and as such provides a secondary benefit of evaluating the effectiveness of the existing standard trawl assessment programs that feature multiple weeks of sampling at a few fixed locations in Long Point Bay (Figure 4.3.1A).

The UTM Grid based bottom trawl survey (LPB Grid Trawl Assessment) has been completed in each of the last six years, but this is the first time featured in this report. Target sample locations were established on a UTM Grid covering the offshore waters of outer Long Point Bay deeper than 5 meters (Figure 4.3.1B). Thirty-six total sample stations were identified; 26 stations were defined by the intersection of 5 by 5 km UTM Easting and Northing grid lines. An additional 10 sites were selected at the centre of 5 x 5 km grids where bottom depth was 15 meters and deeper. A greater sampling resolution was applied in areas ≥ 15 m to enable a more detailed examination of depth dependent species distribution in a region of the bay that has the greatest bathymetric gradient and has exhibited the highest concentration of juvenile Yellow Perch during the last 10 years.

Grid trawling was completed over a three to five day period during mid to late October each year. The vessel (Erie Explorer), gear (10 m trawl), and trawl procedures used were the same as for the Offshore Outer Bay Trawl Assessment. A single 10 minute bottom tow was completed at each grid station. Under favorable conditions (water/lake), the survey crew could sample between 15 and 20 sites per day. In most years a subset of the 36 potential target trawl stations were actually sampled due to weather related interruptions. The 2013 survey was accomplished in three successive days from October 28 to 30th, and for the first time ever, all 36 target stations were sampled.

Yellow Perch

Age 0 Yellow Perch were scarce throughout all regions of Long Point Bay in 2013 and their widespread low abundance obscured a recently observed phenomenon (since about 2003) of a shift in distribution of juvenile Yellow Perch from traditional near shore habitats to offshore areas (Tables 4.3.1 to 4.3.3). Age 0 Yellow Perch densities during 2013 averaged 2.1, 1.8 and 0.1 Yellow Perch/ha in the Inner Bay, Nearshore Outer Bay and Offshore Outer Bay trawl assessment areas, respectively. The two nearshore trawl assessments rank the 2013 year class in the 18th (Inner Bay) and 9th percentiles (Outer Long Point Bay) of their respective time series, and the offshore trawl assessment ranks age 0 Yellow Perch recruitment in the 21st percentile. The Long Point Bay composite index indicates the 2013 year class was weak (NPHa=0.5) compared to the long term average (1984-2012 avg. NPHa=66.9). According to the composite index, the period since 2002 has featured four of the weakest (2002, 2004, 2009, 2013) and four of the strongest (2003, 2005, 2008, 2011) Yellow Perch year classes observed since 1984 (Figure 4.3.2).

In general, mean size of age 0 Yellow Perch has increased over the time series (combined nearshore trawl assessments, Figure 4.3.3). Maximum age 0 Yellow Perch size was observed in 2005. Although Yellow Perch size decreased for the second consecutive year, age 0 Yellow Perch in 2013 have remained larger than average during the past seven years (Figure 4.3.3).

Although few in number, one year old fish were the dominant age class represented in the 2013 YAO Yellow Perch catch from the two Long Point Bay nearshore trawl assessments (Table 4.3.4).

Rainbow Smelt

Recruitment of age 0 Rainbow Smelt decreased from 2012 (NPHa=1658); the 2013 year class (NPHa=217.9) was well below average strength (NPHa=979), ranking it the 20th highest (34th percentile) among all years surveyed since 1984 (Table 4.3.3).

YAO Rainbow Smelt abundance decreased in 2013 (NPHa=165.3) from comparatively low densities observed during 2012 (NPHa=367.8) and 2011 (NPHa=277.1). YAO Smelt densities have remained below the long term average in each of the last four years (1984-2012 avg. NPHa=446.5; Table 4.3.5). Age 1 Rainbow Smelt from the moderately strong 2012 year class (as age 0 in 2012) accounted for 85% of the October 2013 YAO Rainbow Smelt catch in number (Table 4.3.5).

Age 0 Rainbow Smelt mean length and weight decreased slightly in 2013 and both size measures were above their respective long term averages (Figure 4.3.4). Age 1 Rainbow Smelt remained above average size in 2013 (Figure 4.3.4).

Smallmouth Bass

Age 0 Smallmouth Bass abundance increased in 2013 (NPHa=7.3), but remained below the long term average density of 15.8 Smallmouth Bass / ha for the fourth consecutive year (Table 4.3.1). Mean total length of age 0 Smallmouth Bass has fluctuated between 60 and 90 mm during the 34 year time series of the Inner Bay Trawl Assessment (Figure 4.3.5). Age 0 Smallmouth Bass mean length and mean weight decreased slightly in 2013; in general, YOY Smallmouth Bass have been near or above average size during most years since 1998, including 2013.

Other YOY Species

Spottail Shiners were an important component of the nearshore forage fish community in Long Point Bay during the 1980's and 90's, but age 0 recruitment decreased sharply after 2000 (Tables 4.3.1 and 4.3.2). For instance, age 0 densities of Spottail Shiner in the Nearshore Outer Bay Trawl Assessment averaged 632/ha from 1980 to 2000 and only 28.8/ha since 2001 (Table 4.3.2). A few age 0 Spottail Shiners were captured in the Nearshore Outer Bay Trawl Assessment during 2013 (8.1/ha), but there hasn't been a single YOY Spottail Shiner captured in the Inner Bay Trawl Assessment in the last six years (Table 4.3.1).

Banded Killifish density increased in 2013 following several years of lower than average observations; the 2013 year class was the largest observed since 2002 (Table 4.3.1). YOY recruitment indices for Rock Bass, Johnny Darter and Lepomis (Sunfish) species remained low in 2013, continuing a trend that began around 2000 (Table 4.3.1).

Age 0 White Bass and White Perch were either absent or caught in very low numbers in the nearshore and offshore trawl assessments of outer Long Point Bay during 2013 (Tables 4.3.2 and 4.3.3). YOY Alewife was more abundant than YOY Gizzard Shad, but both Clupeid species were below average abundance in 2013 (Tables 4.3.2 and 4.3.3). Age 0 Emerald Shiner recruitment decreased in 2013 (Tables 4.3.2 and 4.3.3).

Round Gobies were first observed in Long Point Bay index trawl catches in 1999 (Tables 4.3.1 to 4.3.3). Abundance of this invasive species increased rapidly, reaching peak density within the first 10 years following colonization in all three Long Point Bay trawl assessments, firstly in the nearshore waters of the outer bay (2001), then in the offshore waters (2007), and lastly in Inner Bay (2009). On average, Round Goby mean densities (all ages) have been highest in the Offshore Outer Bay Trawl Assessment area (1999-2012 avg. NPHa=187.4), followed by the Inner Bay trawl Assessment area (1999-2012 avg. NPHa=109.3), and Nearshore Outer Bay Trawl Assessment area (1999-2012 avg. NPHa=79.2) (Tables 4.3.1 to 4.3.3).

Species Spatial/Depth Distribution, Grid Trawl Assessments, 2008-2013

During the six years (since 2008) of grid trawl assessments in outer Long Point Bay, all (in 2013) to as few as 25 (in 2012) of the 36 total target stations were sampled per year (Table 4.3.6, Figure 4.3.1B). A principal objective of the grid trawl survey was to examine the spatial/depth distribution of juvenile Yellow Perch. Beginning about 2003, age 0 Yellow Perch distribution shifted from predominately nearshore to predominately offshore habitat in Long Point Bay. Figure 4.3.6 combines site specific age 0 Yellow Perch abundance indices from the few fixed stations of the three standard long-term trawl sampling days that are sampled over a 4 to 5 week period in conjunction with

the spatially designed grid trawl survey. Age 0 Yellow Perch recruitment was poor in 2009 and 2013, and juvenile Yellow Perch densities were too low in these years to provide any meaningful information about Yellow Perch distribution (Table 4.3.6, Figure 4.3.6). In 2008 and 2010 to 2012, age 0 Yellow Perch abundance was moderate to high and site specific densities during these four years were always highest in the offshore waters of Outer Long Point Bay compared to nearshore areas and Inner Bay. Most of the juvenile Yellow Perch were captured offshore in bottom depths from 15 to 35 meters and a few have even been observed out to depths of 45 meters (Figure 4.3.6).

In 2013, the maximum (36) number of grid stations was sampled in the shortest time period (3 days) possible, thus achieving an ideal “snap shot” perspective of species abundance and distribution (Table 4.3.6). For example, Rainbow Smelt, a principal forage fish species of eastern Lake Erie and target species of the Offshore Outer Bay Trawl Assessment, were concentrated in the central and eastern region of the bay between 12 and 45 m depths (Figure 4.3.7). The highest Rainbow Smelt densities were observed at depths >25 m, which were situated deeper and further east than areas sampled by the Offshore Outer Bay Trawl Assessment. Despite this observation, mean density of age 0 Rainbow Smelt in 2013 was 2.5 times greater in the Offshore Outer Bay Trawl Assessment (NPHa=217.9) than in the Grid Trawl Assessment (NPHa=87.7). An opposite pattern occurred when comparing YAO Rainbow Smelt densities between the two surveys; the Grid Trawl Assessment (NPHa=327.2) average twice as many adult Rainbow Smelt as did the Offshore Outer Bay Trawl Assessment (NPHa=165.3) (compare Tables 4.3.5 and 4.3.6).

After Rainbow Smelt, Round Gobies were the most abundant species captured in the Grid Trawl Assessment, averaging 341 fish/ha during 2013 (Table 4.3.6). Gobies were concentrated in the southwest corner of Long Point Bay from 26 to 32 m bottom depth (Figure 4.3.7). Round Goby densities in 2013 were the highest observed in the 6 year history of the Grid Trawl Assessment (Table 4.3.6). In sharp contrast, the Offshore Outer Long Point Bay Trawl Assessment ranked 2013 Goby abundance (NpHa=14.5) as the 2nd lowest index since 2008 (Table 4.3.3). It is apparent from Figure 4.3.7 that the majority of Round Gobies in 2013 were concentrated in deeper more easterly and south-easterly waters than were sampled in the Offshore Outer Bay Trawl Assessment.

Table 4.3.1 Relative abundance (mean number per hectare) of selected young-of-the-year fish species caught in Inner Long Point Bay, Lake Erie during bottom trawl assessments (6.1 m trawl) , September, 1980-2013.

Year	Effort (min.)	Yellow Perch	Rock Bass	Smallmouth Bass	Largemouth Bass	Spottail Shiner	Banded Killifish	Johnny Darter	Sunfish (Lepomis spp.)	Round ^a Goby
1980	130	167.8	7.3	4.0	3.0	364.2	0.0	1.3	6.0	0.0
1981	220	534.9	2.9	0.0	0.0	2.4	0.0	0.4	11.5	0.0
1982	400	1026.8	12.1	11.8	3.4	126.9	0.3	1.3	0.0	0.0
1983	220	125.9	7.0	7.5	5.3	0.2	1.0	1.2	16.9	0.0
1984	400	761.7	41.1	2.3	6.8	37.4	1.3	0.9	108.2	0.0
1985	480	20.8	19.0	12.9	5.2	983.2	0.9	0.9	1.5	0.0
1986	400	1859.5	10.5	5.3	6.2	932.7	0.3	0.0	2.3	0.0
1987	400	3.8	6.9	5.0	6.9	195.2	0.0	0.0	6.8	0.0
1988	400	305.0	2.3	5.6	3.8	627.8	0.1	0.3	3.4	0.0
1989	400	457.7	13.2	5.3	6.9	871.9	23.2	25.6	69.3	0.0
1990	400	202.6	4.4	4.9	7.9	55.1	12.5	17.0	143.0	0.0
1991	400	144.0	4.1	13.1	7.7	382.6	10.6	23.4	8.9	0.0
1992	400	594.0	4.2	19.1	1.6	83.7	1.1	9.9	0.1	0.0
1993	400	239.8	22.3	26.4	2.9	97.5	6.1	11.1	198.7	0.0
1994	400	84.0	5.7	40.9	39.1	51.4	11.8	47.0	9.5	0.0
1995	400	5.3	82.3	19.6	74.4	116.8	52.6	57.3	68.0	0.0
1996	400	53.6	197.6	23.9	57.6	49.7	48.0	24.3	140.4	0.0
1997	400	21.5	23.9	72.0	17.2	79.6	19.3	41.9	3.1	0.0
1998	480	1005.9	17.6	13.3	11.8	171.7	226.3	16.5	14.7	0.0
1999	480	34.0	12.8	91.7	96.6	51.0	44.0	11.1	10.9	0.6
2000	400	1.2	37.8	7.9	5.1	2.4	11.8	4.3	173.0	26.5
2001	400	463.8	1.3	21.7	3.3	0.3	12.9	4.3	1.5	183.1
2002	400	8.3	11.8	14.0	24.8	0.0	74.0	7.3	52.0	56.2
2003	320	224.0	4.2	12.8	4.4	0.4	4.2	4.5	5.1	28.6
2004	480	0.1	0.2	12.0	0.8	0.2	0.3	16.2	0.1	95.4
2005	480	8.8	9.7	9.0	7.0	1.0	3.7	0.2	16.3	21.0
2006	400	0.3	0.5	5.0	3.8	0.1	0.4	12.0	0.1	34.0
2007	400	73.9	0.3	8.2	1.6	0.5	0.3	2.1	0.0	263.0
2008	400	0.3	1.3	8.4	1.2	0.0	0.5	0.1	0.4	211.8
2009	320	0.0	1.1	19.1	0.7	0.0	0.5	0.7	0.0	280.5
2010	400	5.7	0.0	11.0	5.8	0.0	0.9	1.2	0.3	135.1
2011	400	3.9	4.1	6.1	3.5	0.0	3.7	2.0	3.0	114.6
2012	400	1.6	0.3	2.2	1.0	0.0	1.4	1.0	0.0	79.8
2013	400	2.1	2.9	7.3	4.2	0.0	25.1	0.4	0.7	49.6
Avg. for 1980-2012		255.8	17.3	15.8	13.0	160.2	17.4	10.5	32.6	46.4

^a Abundance indices of Round Goby include all ages.

Table 4.3.2 Relative abundance (mean number per hectare) of selected young-of-the-year fish species caught in the nearshore waters of Outer Long Point Bay, Lake Erie during index bottom trawl assessments (6.1 m trawl), September, 1980-2013.

Year	Effort (min.)	Yellow Perch	White Perch	White Bass	Alewife	Gizzard Shad	Emerald Shiner	Spottail Shiner	Round ^b Goby
1980	209	21.1	0.0	10.6	8.4	14.7	40.8	101.8	0.0
1981	200	137.4	0.0	1.2	0.0	4.7	0.0	2.8	0.0
1982	200	69.6	0.0	1.0	214.5	2.6	1.0	103.0	0.0
1983 ^a	0								
1984	300	283.9	120.9	153.9	4.1	22.8	12.6	140.1	0.0
1985	360	2.4	0.6	29.6	27.0	7.0	65.0	858.1	0.0
1986	300	102.0	55.5	33.1	14.0	82.8	0.3	305.0	0.0
1987	300	3.4	1.4	0.5	28.5	9.3	12.4	203.5	0.0
1988	280	667.7	98.1	0.0	0.7	17.2	5.9	861.8	0.0
1989	240	296.9	3.4	12.7	31.3	7.5	0.9	1055.4	0.0
1990	300	43.3	79.2	8.8	0.2	8.3	0.0	1098.6	0.0
1991	299	15.5	0.9	0.2	6.0	0.5	26.7	571.1	0.0
1992	300	54.3	0.5	0.0	869.7	0.2	0.0	267.9	0.0
1993	240	21.6	12.5	0.4	0.2	2.6	0.0	1339.6	0.0
1994	240	159.8	40.5	0.0	6.7	31.7	1.5	409.4	0.0
1995	300	6.0	2.1	0.2	2.2	4.6	1.8	282.6	0.0
1996	300	199.1	28.3	0.3	0.0	74.1	0.3	1508.5	0.0
1997	300	18.9	12.0	0.2	0.2	2.7	1.2	1093.7	0.0
1998	300	114.9	0.1	0.0	0.0	3.7	0.0	588.1	0.0
1999	300	2.5	0.2	0.4	0.0	5.5	0.0	999.1	0.6
2000	300	10.2	3.5	0.2	8.2	9.3	0.0	851.1	37.0
2001	300	76.7	5.0	1.1	0.4	2.9	2.3	51.8	183.4
2002	300	0.6	0.0	0.0	12.2	1.6	0.2	16.6	150.9
2003	240	93.3	14.6	0.4	17.6	5.1	0.0	74.1	114.2
2004	360	0.5	0.2	0.0	1.5	1.0	258.3	43.8	94.4
2005	360	10.3	0.4	0.7	11.0	1.9	1.1	58.7	28.0
2006	300	2.8	1.2	0.3	711.8	28.7	12.4	19.8	32.7
2007	300	6.3	0.7	0.2	44.6	22.0	1.2	35.2	73.9
2008	300	4.9	2.1	0.5	11.9	4.0	0.5	37.8	63.4
2009	240	1.5	0.0	0.0	1.9	0.0	0.0	3.7	91.2
2010	300	13.2	0.0	0.3	0.0	3.8	0.0	3.0	67.6
2011	300	3.9	0.0	0.0	6.8	3.4	1.1	2.5	103.3
2012	300	11.3	0.9	0.2	6.0	20.0	23.8	19.1	68.0
2013	290	1.8	0.0	0.0	26.1	0.3	0.2	8.1	76.3
Avg. for 1980-2012		76.7	15.2	8.0	64.0	12.7	14.7	406.5	34.6

^a Index trawling discontinued during 1983.^b Abundance indices of Round Goby include all ages.

Table 4.3.3 Relative abundance (mean number per hectare) of selected young-of-the-year fish species caught in the offshore waters of Outer Long Point Bay, Lake Erie, during index bottom trawl assessments (10 m trawl), October, 1984-2013.

Year	Effort (min.)	Rainbow Smelt	White Perch	White Bass	Yellow Perch	Alewife	Gizzard Shad	Emerald Shiner	Round ^a Goby
1984	320	2206.3	13.7	166.2	7.3	22.4	14.6	0.1	0.0
1985	394	84.0	12.9	8.1	1.6	0.5	0.4	0.8	0.0
1986	380	2979.8	0.2	32.7	0.0	16.6	77.1	2.4	0.0
1987	440	267.6	0.7	0.1	0.0	19.8	0.8	46.2	0.0
1988	480	972.8	3.5	0.1	0.4	21.8	3.1	42.8	0.0
1989	400	1158.4	1.3	5.5	0.4	36.4	0.2	9.0	0.0
1990	400	1194.3	0.9	7.9	0.0	30.6	0.6	7.4	0.0
1991	400	54.4	13.3	3.8	0.7	82.0	2.1	12.0	0.0
1992	400	1468.8	0.0	0.0	0.0	4.8	0.0	5.5	0.0
1993	400	203.6	0.3	4.2	2.9	10.2	1.0	8.9	0.0
1994	400	341.9	0.8	2.1	10.6	8.3	18.6	55.3	0.0
1995	400	84.0	0.9	0.3	4.0	0.6	0.0	9.1	0.0
1996	240	353.2	0.3	0.3	7.9	0.0	0.3	390.7	0.0
1997	400	154.4	0.0	0.0	0.0	0.1	0.0	0.1	0.0
1998	400	422.5	0.5	0.1	8.1	1.4	4.9	19.6	0.0
1999	310	40.3	1.0	40.0	15.5	2174.5	65.2	15.1	0.2
2000	400	259.9	0.0	2.0	3.0	25.6	0.3	3.3	50.8
2001	400	2633.3	6.1	19.4	13.8	81.1	16.0	12.7	69.0
2002	400	142.5	0.0	0.0	0.0	35.3	3.2	9.5	127.0
2003	400	7058.1	16.2	2.0	240.6	0.5	68.6	3388.0	158.8
2004	400	132.2	0.0	0.0	0.1	0.3	0.2	20.3	323.8
2005	400	0.9	0.1	1.1	156.2	0.1	1.7	645.7	66.9
2006	400	1256.0	0.9	0.3	38.0	78.6	1.4	452.3	93.3
2007	400	991.3	0.1	0.2	70.0	1.0	34.6	29.3	973.2
2008	400	1293.0	5.4	1.3	356.0	2.3	86.5	16.0	452.6
2009	400	148.2	0.6	0.2	0.3	0.1	0.4	54.8	43.6
2010	400	326.9	1.6	0.4	63.5	0.9	13.3	117.6	9.7
2011	400	509.2	0.0	0.2	224.6	2.1	18.9	70.3	125.4
2012	400	1657.7	0.8	0.2	33.2	707.3	47.6	438.3	129.0
2013	400	217.9	0.0	0.0	0.1	17.7	0.0	58.7	14.5
Avg. for 1984-2012		979.2	2.8	10.3	43.4	116.0	16.6	202.8	90.5

^a Abundance indices of round goby include all ages.

Table 4.3.4 Relative abundance (mean number per hectare) of Yellow Perch at ages 0 to 3 caught with a 6.1 m bottom trawl in Long Point Bay, Lake Erie, September, 1980-2013.

	Year	Effort (minutes)	AGE			
			0	1	2	3
Inner Bay	1980	130	167.8	198.5	142.1	134.5
	1981	220	534.9	231.0	55.2	20.2
	1982	400	1026.8	176.2	34.7	41.3
	1983	220	125.9			
	1984	400	761.7	44.5	57.7	35.5
	1985	480	20.8	125.5	64.1	43.6
	1986	400	1859.5	61.7	192.3	39.2
	1987	400	3.8	39.7	2.6	15.5
	1988	400	305.0	2.9	41.4	1.9
	1989	400	457.7	84.6	29.4	114.3
	1990	400	202.6	21.0	46.2	4.6
	1991	400	144.0	24.5	14.5	17.3
	1992	400	594.0	32.8	6.9	1.3
	1993	400	239.8	17.9	11.9	2.2
	1994	400	84.0	29.8	10.3	13.0
	1995	400	5.3	54.3	20.5	2.1
	1996	400	53.6	6.1	22.4	9.9
	1997	400	21.5	5.4	5.0	11.9
	1998	480	1005.9	14.9	10.7	1.0
	1999	480	34.0	155.7	25.8	11.0
	2000	400	1.2	4.8	107.0	6.0
	2001	400	463.8	2.7	13.0	18.1
	2002	400	8.3	42.6	8.8	10.4
	2003	320	224.0	1.5	8.5	0.7
	2004	480	0.1	21.4	2.8	2.6
	2005	480	8.8	0.2	10.9	0.6
	2006	400	0.3	4.8	1.4	4.0
	2007	400	73.9	3.0	7.0	2.3
	2008	400	0.3	4.1	0.1	0.0
	2009	320	0.0	0.0	0.0	0.0
	2010	400	5.7	0.6	1.6	3.6
	2011	400	3.9	12.8	2.6	1.7
	2012	400	1.6	1.7	1.4	0.0
	2013	400	2.1	5.6	4.4	1.0
	Avg. for 1980-2012		255.8	44.6	30.0	17.8
Outer Bay	1980	209	21.1	61.5	23.8	22.0
	1981	200	137.4	5.0	5.1	0.8
	1982	200	69.6	22.6	6.9	5.8
	1983	0				
	1984	300	283.9	9.7	2.7	1.8
	1985	360	2.4	32.6	14.0	3.5
	1986	300	102.0	0.2	30.7	3.1
	1987	300	3.4	284.1	15.7	89.3
	1988	280	667.7	0.8	52.4	10.6
	1989	240	296.9	53.2	26.6	84.5
	1990	300	43.3	12.0	28.8	4.6
	1991	299	15.5	1.0	0.5	0.9
	1992	300	54.3	9.0	1.2	0.5
	1993	240	21.6	4.5	2.4	0.2
	1994	240	159.8	15.3	11.2	2.4
	1995	300	6.0	33.7	14.3	3.6
	1996	300	199.1	2.6	4.5	1.3
	1997	300	18.9	59.8	3.1	3.7
	1998	300	114.9	1.2	0.6	0.3
	1999	300	2.5	69.5	1.3	1.0
	2000	300	10.2	2.1	13.9	0.2
	2001	300	76.7	2.0	3.0	5.3
	2002	300	0.6	13.9	1.7	5.9
	2003	240	93.3	0.8	7.9	0.2
	2004	360	0.5	4.3	0.6	1.3
	2005	360	10.3	0.1	6.9	0.3
	2006	300	2.8	1.4	0.2	1.2
	2007	300	6.3	0.9	0.6	0.0
	2008	300	4.9	6.6	1.1	0.6
	2009	240	1.5	4.2	5.5	0.0
	2010	300	13.2	0.6	0.2	1.5
	2011	300	3.9	1.9	0.2	0.2
	2012	300	11.3	1.1	0.2	0.0
	2013	290	1.8	0.5	0.2	0.0
	Avg. for 1980-2012		76.7	22.4	9.0	8.0

Table 4.3.5 Relative abundance (mean number per hectare) of Rainbow Smelt at ages 0 to 2 and yearling-and-older (YAO) caught with a 10 m bottom trawl in the offshore waters of Outer Long Point Bay, Lake Erie, October 1984-2013.

Year	Effort (minutes)	Age Group			
		0	1	2	YAO
1984	320	2206.3	15.1	8.1	29.8
1985	394	84.0	397.8	11.8	409.6
1986	380	2979.8	32.0	356.3	398.8
1987	440	267.6	3159.0	168.8	3328.1
1988	480	972.8	25.4	72.0	99.1
1989	400	1158.4	620.1	2.6	622.6
1990	400	1194.3	437.5	191.2	633.4
1991	400	54.4	514.5	0.4	649.4
1992	400	1468.8	26.6	68.2	97.2
1993	400	203.6	1395.9	76.8	1477.9
1994	400	341.9	6.5	2.2	8.8
1995	400	84.0	272.9	42.3	347.8
1996	240	353.2	16.4	1.6	18.2
1997	400	154.4	168.4	14.1	188.5
1998	400	422.5	9.9	13.7	25.1
1999	310	40.3	137.1	33.6	140.1
2000	400	259.9	21.7	7.0	29.1
2001	400	2633.3	663.0	29.0	692.8
2002	400	142.5	3.5	1.9	5.9
2003	400	7058.1	165.7	32.5	205.8
2004	400	132.2	495.8	61.5	565.6
2005	400	0.9	3.7	2.9	7.6
2006	400	1256.0	28.9	40.8	136.2
2007	400	991.3	214.0	9.1	232.8
2008	400	1293.0	48.7	25.6	77.3
2009	400	148.2	1551.6	91.5	1654.3
2010	400	326.9	106.0	112.0	222.7
2011	400	509.2	249.4	27.1	277.1
2012	400	1657.7	302.1	61.3	367.8
2013	400	217.9	140.8	18.3	165.3
Avg. for 1984-2012		979.2	382.4	54.0	446.5

Table 4.3.6 Relative abundance (mean number per hectare) of selected fish species by age group, caught in the offshore waters of Outer Long Point Bay, Lake Erie, during index grid trawl assessments (10 m trawl), October, 2008-2013.

Species	Age Group	Survey Year						2008-2012 Avg.
		2008	2009	2010	2011	2012	2013	
No. Stations Sampled		27	26	29	30	25	36	27.4
Total Effort (min)		270	260	290	300	250	360	274.0
Yellow Perch	YOY		0.1	6.0	6.9	36.0	0.9	12.2
Yellow Perch	YAO	27.1	2.4	0.8	1.4	2.8	3.9	6.9
Yellow Perch	ALL	57.6	2.5	6.7	8.2	38.8	4.8	22.8
Rainbow Smelt	YOY	104.1	93.4	97.1	314.6	449.2	87.7	211.7
Rainbow Smelt	YAO	63.8	508.6	320.2	263.3	309.1	327.2	293.0
Rainbow Smelt	ALL	167.9	602.0	417.3	577.8	758.3	414.9	504.7
Emerald Shiner	YOY	93.7	19.7	89.8	297.0	103.5	270.8	120.7
Emerald Shiner	YAO	16.3	16.6	16.6	873.0	45.6	96.3	193.6
Emerald Shiner	ALL	110.0	36.2	106.5	1170.0	149.1	367.1	314.4
White Perch	YOY	1.6	0.1	0.1	0.1	0.8	0.4	0.5
White Perch	YAO	1.0	0.1	0.2	0.0	0.3	10.6	0.3
White Perch	ALL	2.6	0.2	0.4	0.1	1.2	11.0	0.9
White Bass	YOY	0.4	0.0	0.5	0.0	0.4	0.0	0.2
White Bass	YAO	0.1	0.0	0.0	0.0	0.1	0.2	0.0
White Bass	ALL	0.4	0.0	0.5	0.0	0.5	0.2	0.3
Alewife	YOY	9.2	0.1	0.6	3.2	29.7	10.0	8.6
Gizzard Shad	YOY	0.4	0.1	1.9	1.1	0.7	0.5	0.8
Round Goby	ALL	325.8	78.2	20.0	128.7	88.9	341.4	128.3
Trout-perch	ALL	0.4	0.6	0.1	0.1	0.3	0.4	0.3

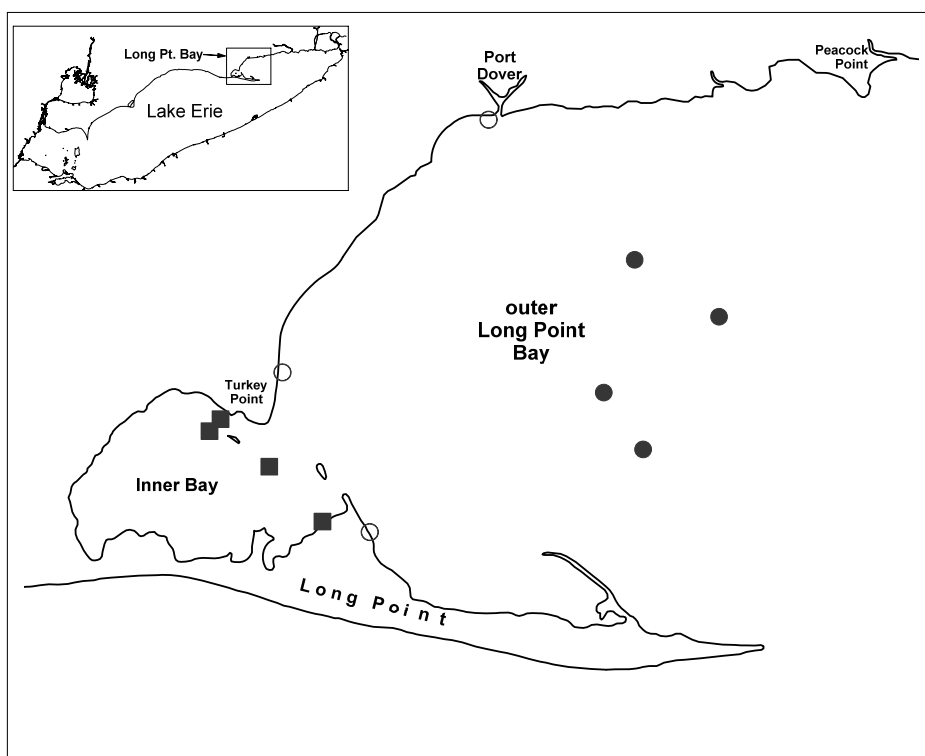


Figure 4.3.1A Location of trawl stations where bottom trawling was conducted in Inner Bay (■), and the nearshore (○) and offshore (●) waters of Long Point Bay, Lake Erie.

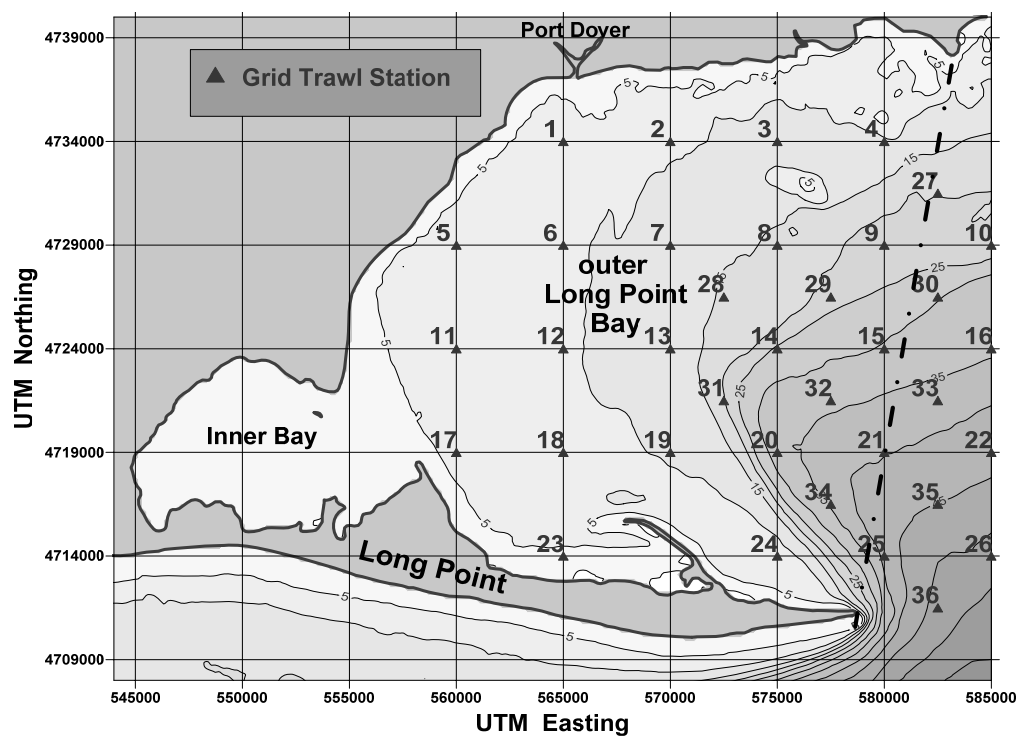


Figure 4.3.1B Target bottom trawl stations (1-36) sampled annually during October to examine the spatial distribution of juvenile Yellow Perch and forage fish species in Outer Long Point Bay, Lake Erie. Map axis are 5 km UTM grid units.

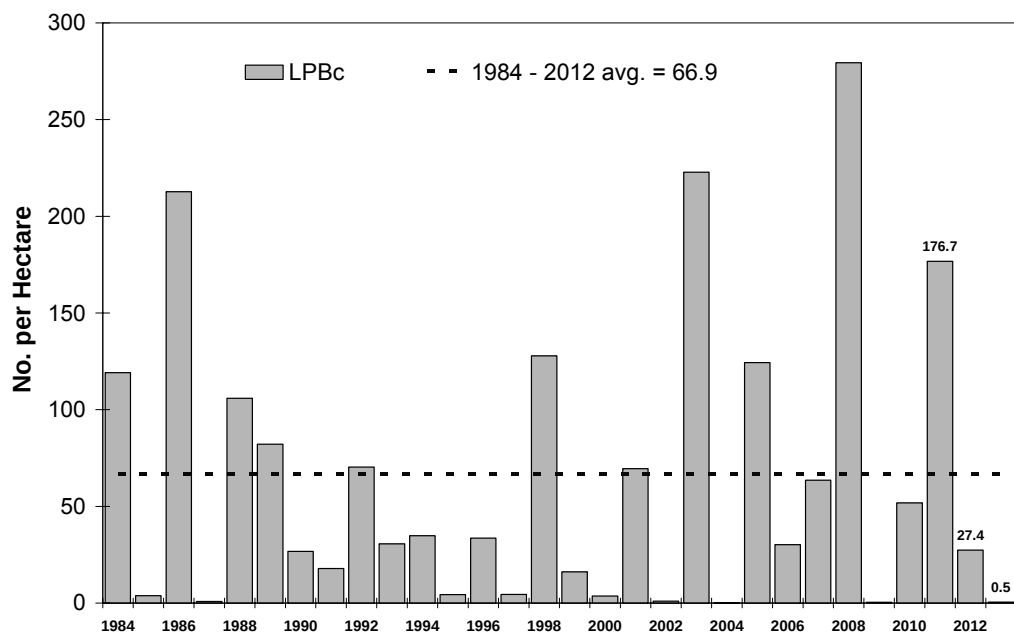


Figure 4.3.2 Relative abundance (mean number per hectare) of Age 0 Yellow Perch from a composite index (LPBc) of three bottom trawl assessments in Long Point Bay, Lake Erie, during September - October, 1984-2013.

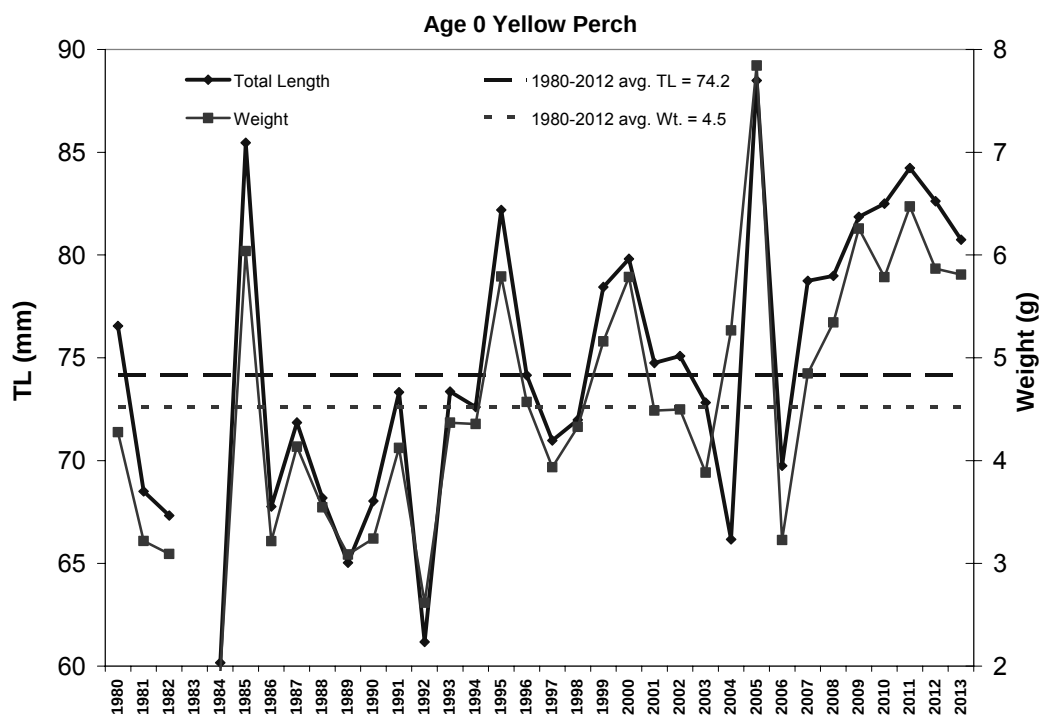
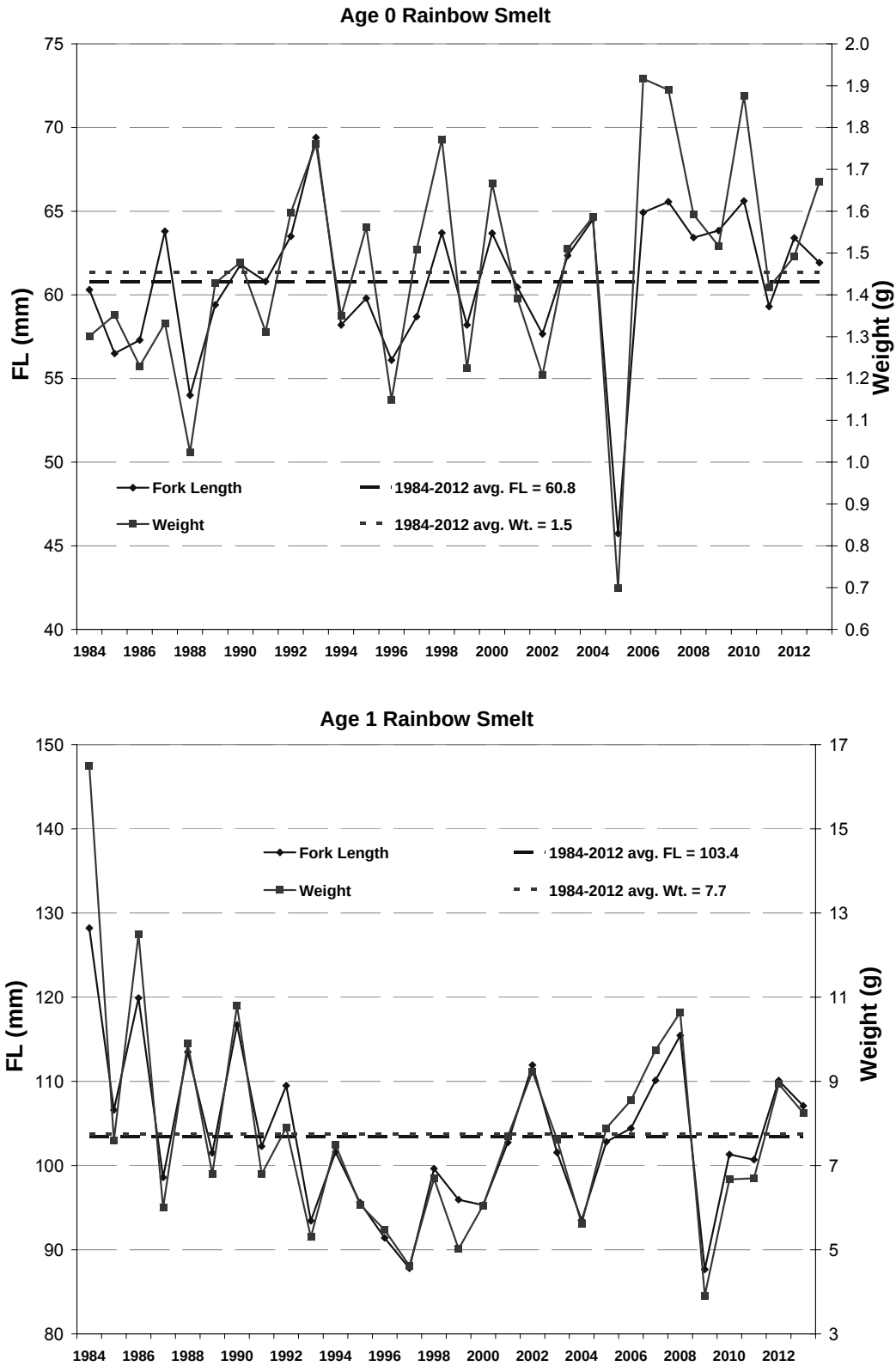


Figure 4.3.3 Mean total length (mm) and weight (g) of Age 0 Yellow Perch from 6.1 m index trawl catches in the inshore waters of Long Point Bay (Inner and Outer Bays combined), Lake Erie, 1980-2013 (September data). No fish sampled in 1983.



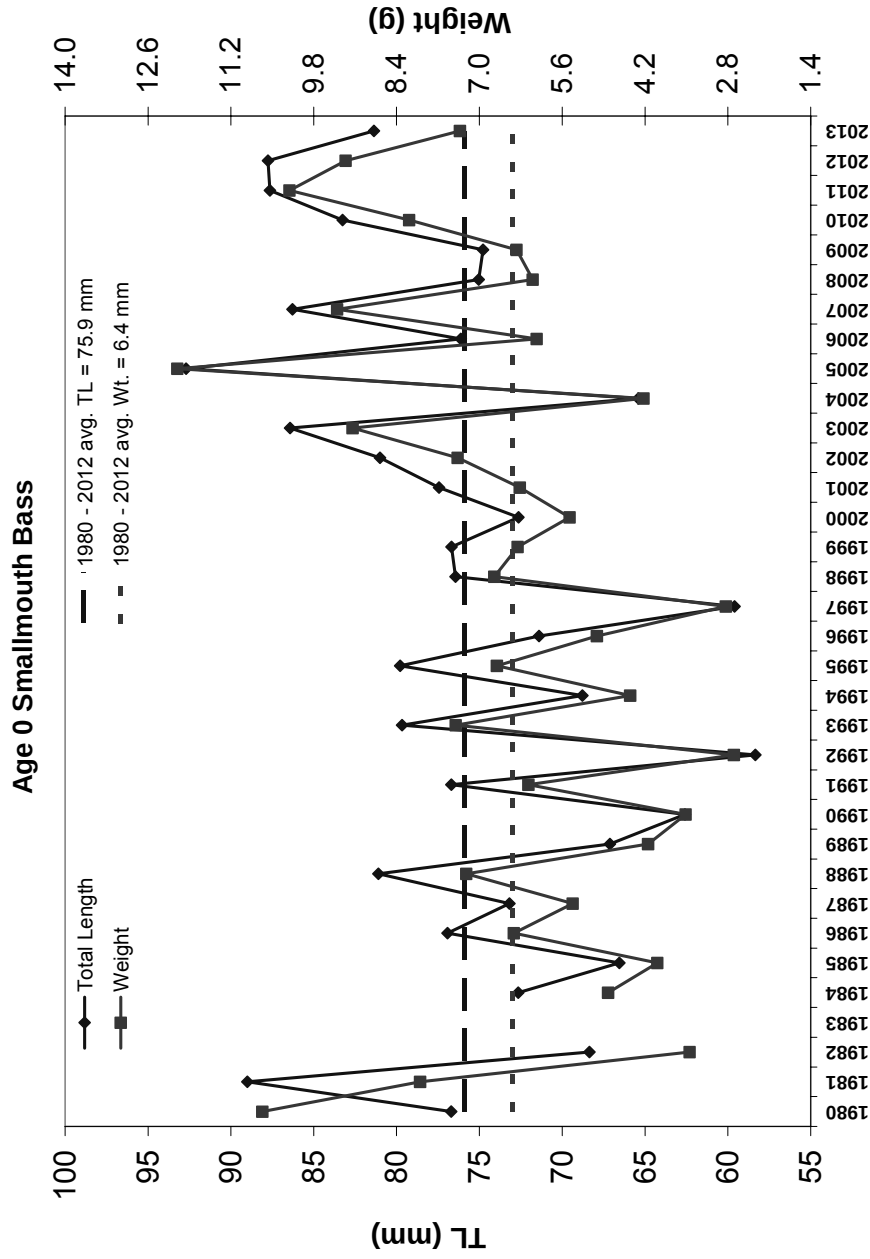


Figure 4.3.5 Mean total length (mm) and weight (g) of Age 0 Smallmouth Bass from 6.1 m index trawl catches in Inner Bay of Long Point Bay, Lake Erie, 1980-2013 (September data). No fish sampled in 1983.

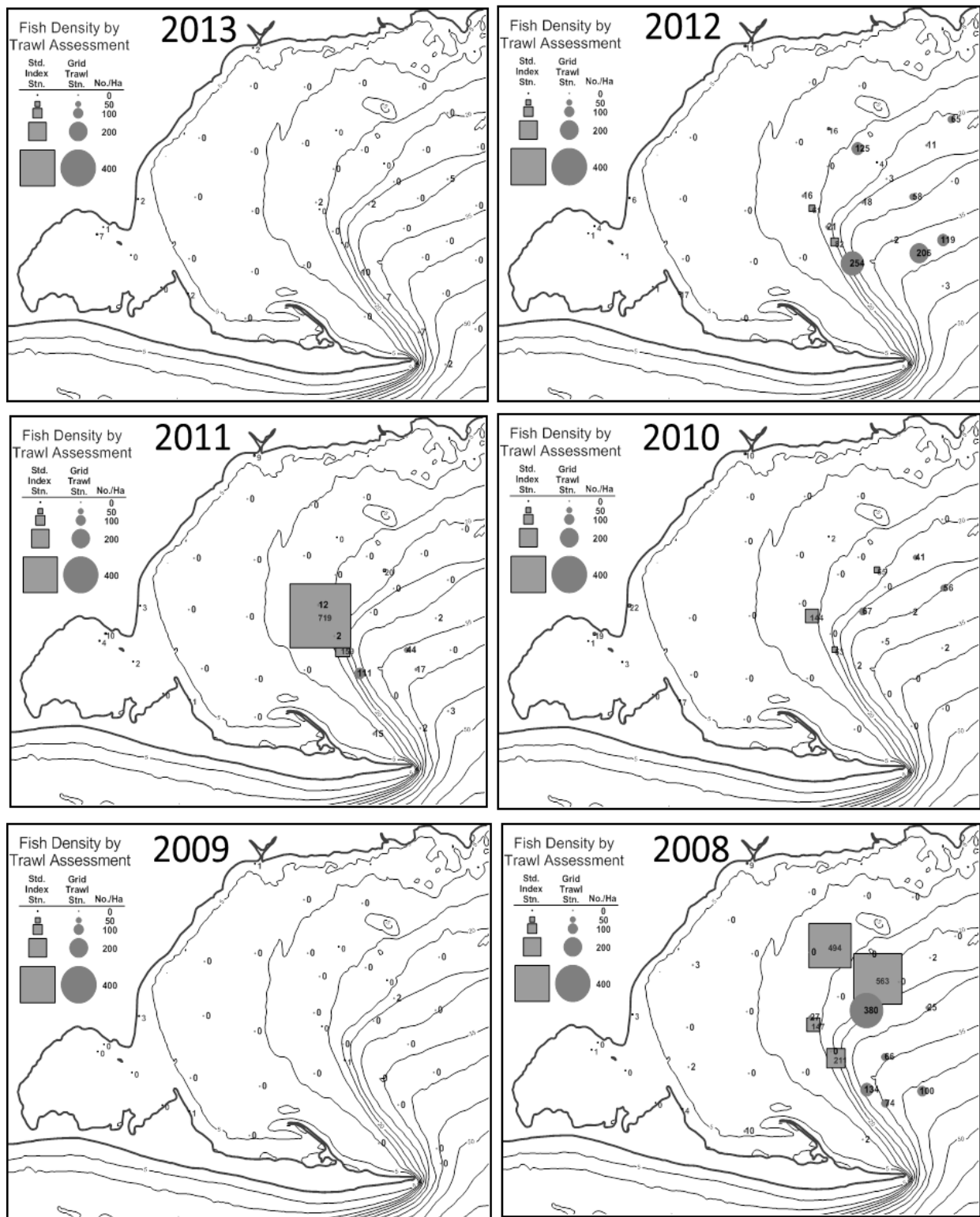


Figure 4.3.6 Relative abundance of age 0 Yellow Perch at up to 36 target bottom trawl stations established within a 5 km UTM Grid design and sampled annually over a few day period during October to examine species spatial/depth distribution in outer Long Point Bay, Lake Erie, 2008 to 2013. Size of shaded dots and associated values represent NpHa of age 0 Yellow Perch captured in a single 10 min tow at each Grid Station. Size of shaded squares and associated values represent the mean NpHa of age 0 Yellow Perch captured at standard index bottom trawl stations shown in Figure 4.3.1 (each square is an average of up to 40 10 min tows).

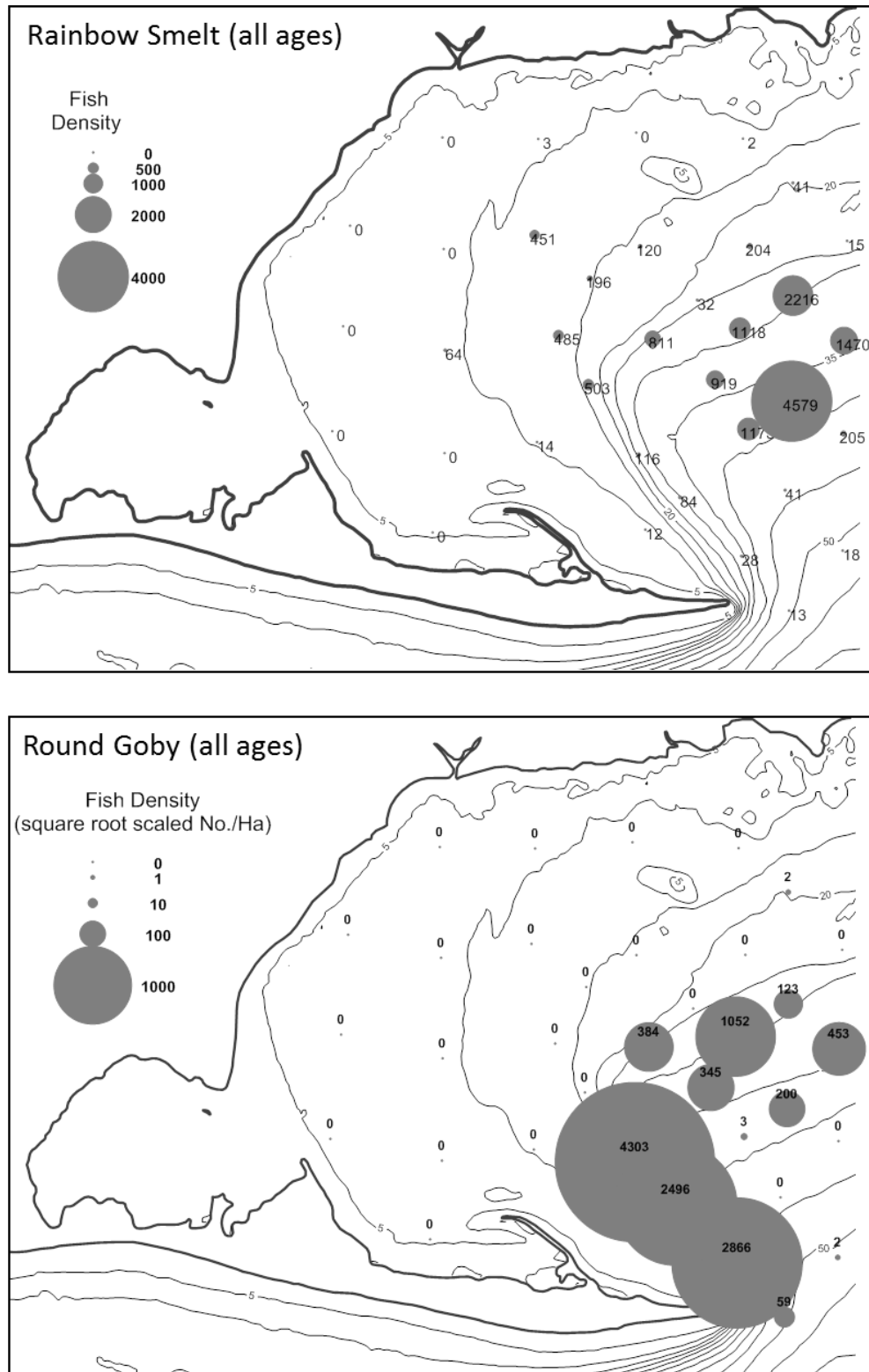


Figure 4.3.7 Relative abundance of Rainbow Smelt (top figure) and Round Goby (bottom figure) at 36 target bottom trawl stations established within a 5 km UTM Grid design and sampled during a 3 day period in October 2013 to examine fish species spatial/depth distribution in outer Long Point Bay, Lake Erie. Size of dots is linear (top) or square root (bottom) scaled and associated values represent NpHa of Rainbow Smelt (top) and Round Goby (bottom) (all ages both species) captured in a 10 min tow at each Grid Station.

4.4 Long Point Bay Nearshore Fish Community Survey

A gill net survey has been conducted annually in Long Point Bay since 1986 to monitor the composition of the fish community, and describe the abundance and biological characteristics of important sport and commercial species over time. Between 1991 and 1994, the program was expanded to include comparisons of the effectiveness of multifilament gear (used 1986-1994) and monofilament gear (used since 1991). The later gear type has been used in the commercial fishery and, more recently, in agency gill net assessment programs on Lake Erie. Comparisons of catches between monofilament and multifilament nets were completed in 1996, and species specific conversion ratios calculated. Species catches from multifilament nets (pre 1991) were adjusted to comparable efficiency of monofilament nets (by conversion ratio multipliers) to describe trends in abundance of major species across the entire time series (1986-2013). Monofilament nets have been used exclusively in this survey since 1995.

Study Area and Sampling Design

The standardized study area encompasses the nearshore waters within outer Long Point Bay, from the minimum depth (12 ft. or 3.7 m) that the gear could be set, to the 30 foot (9.1 m) depth contour (Figure 4.4.1). The bay was partitioned into three sampling areas, then further partitioned into sampling grids (0.5 X 0.5 nautical miles), and 2 depth strata, 12-18 ft. (3.7-5.5 m) and >18-30 ft. (>5.5-9.1 m). Areas 1, 2 and 4 have been sampled each year since 1986. The survey period was from spring to fall 1986 to 1993. This was reduced to June-August for the years 1994 and later. Only data from a comparable time period (June-August) for the entire time series (1986-2013) are reported below.

An additional depth stratum was sampled on an exploratory basis starting in 2011 and continued in 2012 and 2013 to examine the distribution and abundance of fish species. Yellow Perch in particular, in deeper offshore areas of Long Point Bay are not covered by the standard survey design. This extra deep stratum extended sampling from the 30 foot (9.1 m) contour to the 66 foot (20 m) contour and increased, by approximately 90%, the number of potential sample grids and the overall surface area of the Long Point Bay study area (Figure 4.4.1). An additional 20 sites were sampled with the standard index gill net gangs in the extra deep stratum, bringing the total number of gill net sets to 60 during each of the 2011 to 2013 surveys. To maintain continuity with previous year survey results, the findings from sampling of the extra deep stratum (in 2011 to 2013) are reported separately in Table 4.4.2.

Areas were sampled weekly on a rotational basis. Six grid locations (two per depth stratum) were chosen randomly within each sampling area to establish netting sites. One monofilament net composed of single 50 foot panels of mesh sizes 1.25, 1.5 and 1.75" (stretched mesh) and 2 panels each of mesh sizes 2, 2.25, 2.5, 2.75, 3, 3.5, 4, 4.5, 5, 5.5 and 6" was set at each location. The total length of a monofilament gang was 1250 feet (381 m). Observed numbers and biomass (weight in grams) of fish species catches in the 1.25, 1.5 and 1.75" mesh size panels were doubled to standardize catch to an equivalent 100 foot panel length. Species CPUE's as number per km and weight (biomass, grams) per km of net were calculated from the total catch in gangs excluding the catch in 5.5 and 6" mesh sizes.

Fish Community

Catch (all mesh sizes) by species from 1995 to 2013 are summarized in Table 4.4.1. Yellow Perch, normally the most abundant (in number) species, represented only 5.4% of all fish species caught during the 2013 survey. Alewife contributed the most number of fish of any species, accounting for 85% of the total catch in 2013. High Alewife abundance in Long Point Bay has been episodic, accounting for approximately half of the total fish species catch in some years (1995, 1998, 2002, 2006, 2013) and almost nothing in other years (1996, 1997, 2004, 2011). A record high number of Smallmouth Bass and White Perch were caught during 2013 (3.7 and 1.5 %, respectively). Freshwater Drum (1.3%) and Gizzard Shad (1.0%) were the 5th and 6th most abundant species caught (Table 4.4.1).

Table 4.4.2 summarizes species catch by depth strata and includes fish captured during supplementary sampling of the extra deep stratum (>9.1-20 m). Three depth strata were sampled equally in 2013 with 20 sets each. Total species catch and composition varied with depth strata (Table 4.4.2). Some 21 fish species totaling 27,264 individuals were caught in the shallowest stratum (3.7-5.5 m) compared to 17 species in both the >5.5-9.1 m (6,887 total fish) and >9.1-20 m (1,895 total fish) depth strata. Alewife, the most abundant species captured overall comprised 86, 83, and 18% of the total catch by depth strata from shallowest to deepest, respectively (Table 4.4.2). Several other species exhibited decreased abundance with increased depth. These included White Bass, Freshwater Drum, Rock Bass, Brown Bullhead, Channel Catfish, Walleye, Northern Pike, Quillback, and Smallmouth Bass. Longnose Gar, Bowfin, Common Carp and Pumpkinseed were only captured in the shallowest stratum. Catches of Lake Trout, Rainbow Smelt, and to some extent Round Goby increased with the depth strata fished; 11 of 21 total Lake Trout captured were taken in the >9.1-20 m stratum. Twice as many Walleye were captured in the shallowest stratum than the two deeper strata combined. Yellow Perch catches in 2013 were highest in the shallowest strata (3.7-5.5 m) and lowest in the middle depth stratum (>5.5-9.1 m; Table 4.4.2).

Trends in Abundance, Biomass and Growth of Yellow Perch 1986-2013

Yellow Perch were abundant in Long Point Bay during the late 80's (Figure 4.4.2). Population size decreased precipitously during the early 1990's and remained at low levels throughout the decade until 2000, when two year old Yellow Perch from the strong 1998 year class began to recruit into the population. The 1998 year class remained the dominant cohort of index gill net catches, contributing 88, 86, 70, and 41% of the annual survey total Yellow Perch catch (in number) in successive years from 2000 to 2003. In 2002, the year of highest Yellow Perch abundance, the 1998 year class accounted for 70 and 74% of the total Yellow Perch catch in number and biomass, respectively. In 2013, Yellow Perch abundance decreased slightly in number (-10%) to the lowest level observed since 1999 (Figure 4.4.2). Biomass however, increased some 33% from 2012 due to a large contribution of age 5 and older cohorts. Age 3 fish from the 2010 year class accounted for 34% of the total number and 27% of the total biomass of Yellow Perch caught in 2013. Age 6 fish (2007 year class) represented 21% of the total catch in number and 31% of the Yellow Perch biomass in 2013 (Figure 4.4.2).

Yellow Perch mean size at age has increased over the survey's time series (Figure 4.4.4). A more recent trend of decreasing size at age is evident in age 4 and 5 Yellow Perch after 2001 to about 2008. The 2004 year class of Yellow Perch was relatively weak (Tables 4.3.1 to 4.3.3), and surviving members appear to have experienced rapid growth to age 3 in 2007, attaining a mean size similar to age 4 Yellow Perch from the very abundant 2003 year class. In 2008, ages 3, 4 and 5 Yellow Perch cohorts from the 2005, 2004 and 2003 year classes were all similar in size with estimated mean total length of 210, 210 and 215 mm, respectively (Figure 4.4.4). In 2009, ages 4 to 7 Yellow Perch cohorts from the 2002 to 2005 year classes were all between 240 and 256 mm mean total length. In 2010, only a few millimeters separated the mean lengths of ages 5 (256 mm TL), 6 (268 mm) and 7 (271 mm) Yellow Perch. In 2011, ages 2, 4, 5, and 7 Yellow Perch exhibited small to moderate decreases in mean size (Figure 4.4.4). In 2012, ages 2, 3, 4, and 7 Yellow Perch all exhibited increased growth. In 2013 age 2 and age 4 Yellow Perch were the largest observed in the Long Point Bay time series (Figure 4.4.4).

Trends in Abundance, Biomass and Growth of Smallmouth Bass 1986-2013

Catch rates of Smallmouth Bass in Long Point Bay index gill nets has ranged between 20-50 Smallmouth Bass per km during most of the survey years between 1986 and 2003, indicating a relatively stable and healthy population during this time period (Figure 4.4.3). Comparatively low Smallmouth Bass abundance in 1998 was followed by a period of yearly increases that peaked in 2003 at 47 Smallmouth Bass / km. Abundance and biomass of Smallmouth Bass decreased sharply in 2004 and again in 2005. The abundance trend reversed again in 2006 with consecutive year increases that peaked in 2007 at near record high mean numbers and biomass with an unexpected large contribution (56%) of age 2 Smallmouth Bass (Figure 4.4.3); a surprising observation considering that full vulnerability to the gear does not occur until age 3. The 2005 year class continued to dominate the annual total Smallmouth Bass catch through 2008 (79%), 2009 (59%),

and 2010 (32%). In 2013, the 2005 year class (as 8 year olds) remained an important contributor to the total biomass of Smallmouth Bass at 17.3%, while representing only 9.2% of the total catch in number (Figure 4.4.3). Age 3 Smallmouth Bass from the 2010 year class dominated the 2013 catch in number (49% of total) and biomass (27% of total). Age 5 Smallmouth Bass from the 2008 year class was the second most abundant cohort in the 2013 catch, contributing 22% in number and 26% in biomass.

Smallmouth Bass size for ages 2 through 7 has increased since about the late 90's (Figure 4.4.5). All of these age groups remained above average size in 2013 (Figure 4.4.5).

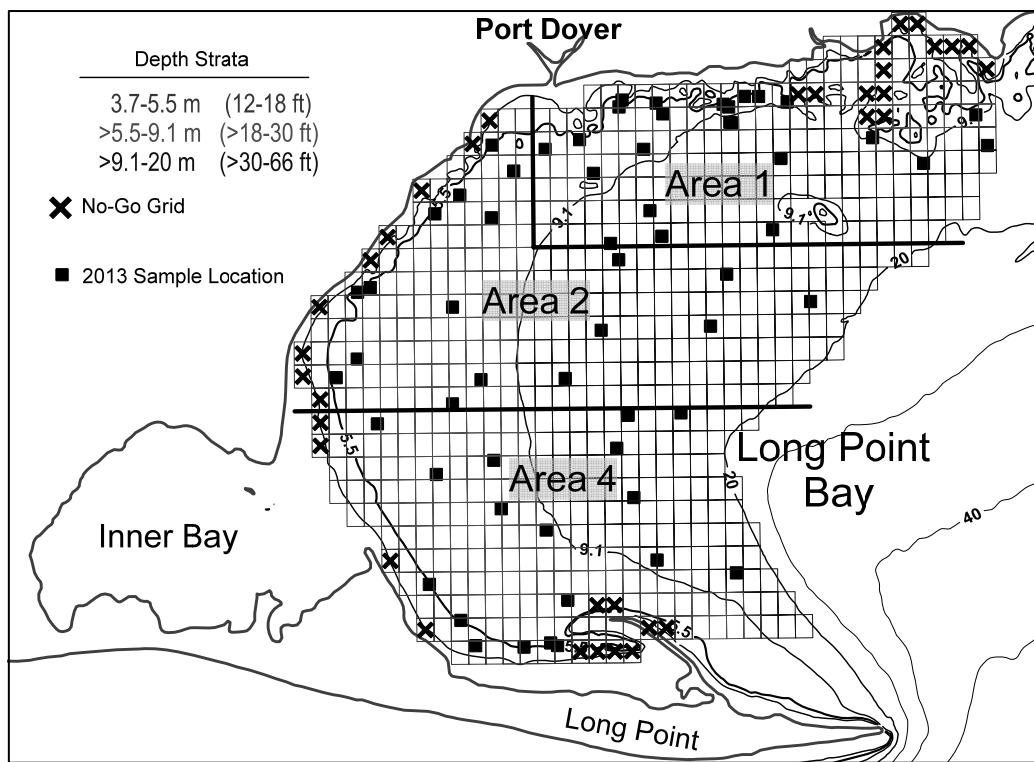


Figure 4.4.1 Long Point Bay Gill Net Assessment study area showing potential sample grids by Spatial (Areas 1, 2, and 4) and Depth Strata. Grids sampled in 2013 and grids considered unfishable are indicated. The standard study area encompass sample grids in the 12-18 ft. (3.7-5.5 m) and the >18-30 ft. (>5.5-9.1 m) depth strata. An additional deeper depth stratum extending from the >30 to 66 ft. (>9.1-20 m) depth contour was sampled on a supplementary basis since 2011.

Total numbers of each fish species caught in monofilament nets during the Long Point Bay Gillnetting Survey, 1995-2013. Numbers include catch in all mesh sizes (14 mesh sizes from 32 to 152 mm) standardized to 40 sets at 12-30 ft. (3.7-9.1 m) bottom depths for comparison.

Species	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Longnose Gar	85	31	159	5	260	30	5	0	0	28	31	161	10	6	12	61	0	33	15
Bowfin	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	3	3
Alewife	6,169	7	3	4,215	1,070	5,809	28	19,339	12	2	24	7,776	61	22	0	96	36	4,371	29,092
Gizzard Shad	56	47	114	19	185	531	81	503	227	122	60	483	447	104	53	452	80	1,788	354
Pink Salmon	0	0	0	0	2	0	0	1	0	1	0	0	0	0	0	0	0	0	0
Rainbow Trout	1	1	2	5	1	0	0	0	6	0	0	2	2	1	0	1	2	2	0
Atlantic Salmon	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brown Trout	4	3	3	7	1	0	2	2	6	1	1	0	9	5	1	5	4	2	2
Lake Trout	0	1	0	1	0	0	0	0	0	2	1	2	0	0	0	5	7	7	10
Lake Whitefish	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rainbow Smelt	1	0	9	0	0	0	12	0	0	20	13	3	20	26	72	27	7	4	5
Northern Pike	5	1	9	7	47	6	7	7	19	10	1	2	4	6	6	9	4	6	61
Mooneye	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Quillback	18	0	22	8	8	12	2	5	24	16	3	10	11	9	9	46	28	24	13
White Sucker	151	133	163	199	334	141	122	95	150	92	149	41	61	59	54	93	78	49	40
Northern Hog Sucker	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Redhorse Sucker	98	40	27	51	62	41	62	21	36	22	27	13	26	13	11	13	5	13	8
Common Carp	11	1	0	10	3	6	10	5	11	8	0	12	11	3	5	7	3	7	8
Golden Shiner	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Emerald Shiner	0	0	0	0	0	5	0	0	0	0	2	0	0	0	0	0	0	0	0
Spottail Shiner	0	0	4	0	0	2	4	2	0	2	2	2	0	0	0	0	0	0	0
Yellow Bullhead	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Brown Bullhead	4	9	1	2	36	0	1	12	24	81	35	32	50	38	53	69	75	87	89
Channel Catfish	0	0	7	5	1	5	1	0	2	2	1	3	0	2	4	0	0	5	10
Stonecat	8	6	10	4	3	19	15	3	0	0	0	0	0	0	0	0	0	0	0
Burbot	1	26	10	22	19	33	5	1	0	0	0	0	0	0	0	0	0	5	0
Trout-perch	0	0	0	0	0	2	0	2	0	2	0	0	2	0	0	2	2	0	0
White Perch	26	11	83	7	52	58	31	73	58	103	42	60	59	54	118	278	253	168	506
White Bass	21	4	37	3	26	16	2	19	42	11	4	50	34	19	19	71	38	90	226
Rock Bass	794	470	380	264	640	291	201	81	151	69	151	219	136	104	174	123	148	135	77
Pumpkinseed	85	41	52	139	62	5	16	2	7	3	9	9	25	5	2	12	1	54	8
Bluegill	11	514	2	4	1	0	1	0	0	0	0	0	3	2	0	2	0	0	0
Smallmouth Bass	910	514	742	293	427	485	509	428	702	181	132	376	1,129	791	396	1,045	934	1,209	1,273
Black Crappie	5	1	6	5	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Yellow Perch	2,316	1,320	1,404	1,577	2,083	7,134	9,633	11,134	7,233	7,625	7,359	7,183	5,389	3,145	4,989	3,120	2,698	2,033	1,830
Walleye	16	11	20	4	14	3	4	5	27	40	23	18	13	31	23	78	30	35	48
Round Goby	0	0	0	0	8	68	708	2,399	424	391	134	275	172	222	89	47	70	48	39
Freshwater Drum	569	539	577	472	412	270	225	256	537	240	150	170	495	263	282	698	254	293	434
Totals	11,369	3,736	3,847	7,328	5,764	14,973	11,688	34,395	9,698	9,074	8,355	16,902	8,169	4,930	6,373	6,360	4,757	10,471	34,151
Actual Number of Sets	32	28	36	40	40	44	40	40	36	40	40	40	40	40	40	40	40	40	40

Table 4.4.2 Total numbers of each fish species caught by depth strata in monofilament nets during the Long Point Bay Index Gillnetting Survey, 2013. Numbers include catch in all mesh sizes (14 mesh sizes from 32 to 152 mm) standardized to 20 sets per depth strata.

Species	Depth Stratum			Total
	12-18 ft. (3.7-5.5 m)	>18-30 ft. (>5.5-9.1 m)	>30-66 ft. (>9.1-20 m)	
Longnose Gar	15	0	0	15
Bowfin	3	0	0	3
Alewife	23397	5695	334	29426
Gizzard Shad	317	37	66	420
Rainbow Trout	0	0	0	0
Brown Trout	0	2	1	3
Lake Trout	2	8	11	21
Rainbow Smelt	0	5	73	78
Northern Pike	60	1	0	61
Quillback	13	0	0	13
White Sucker	25	15	11	51
Redhorse Sucker	7	1	5	13
Common Carp	8	0	0	8
Brown Bullhead	89	0	0	89
Channel Catfish	9	1	1	11
Burbot	0	0	0	0
Trout-perch	0	0	2	2
White Perch	277	229	52	558
White Bass	209	17	17	243
Rock Bass	67	10	3	80
Pumpkinseed	8	0	0	8
Smallmouth Bass	970	303	126	1399
Yellow Perch	1346	484	1109	2939
Walleye	33	15	7	55
Round Goby	28	11	40	79
Freshwater Drum	381	53	37	471
Total Catch (No.)	27264	6887	1895	36046
No. Species	21	17	17	24
No. Gill Net Sets	20	20	20	60

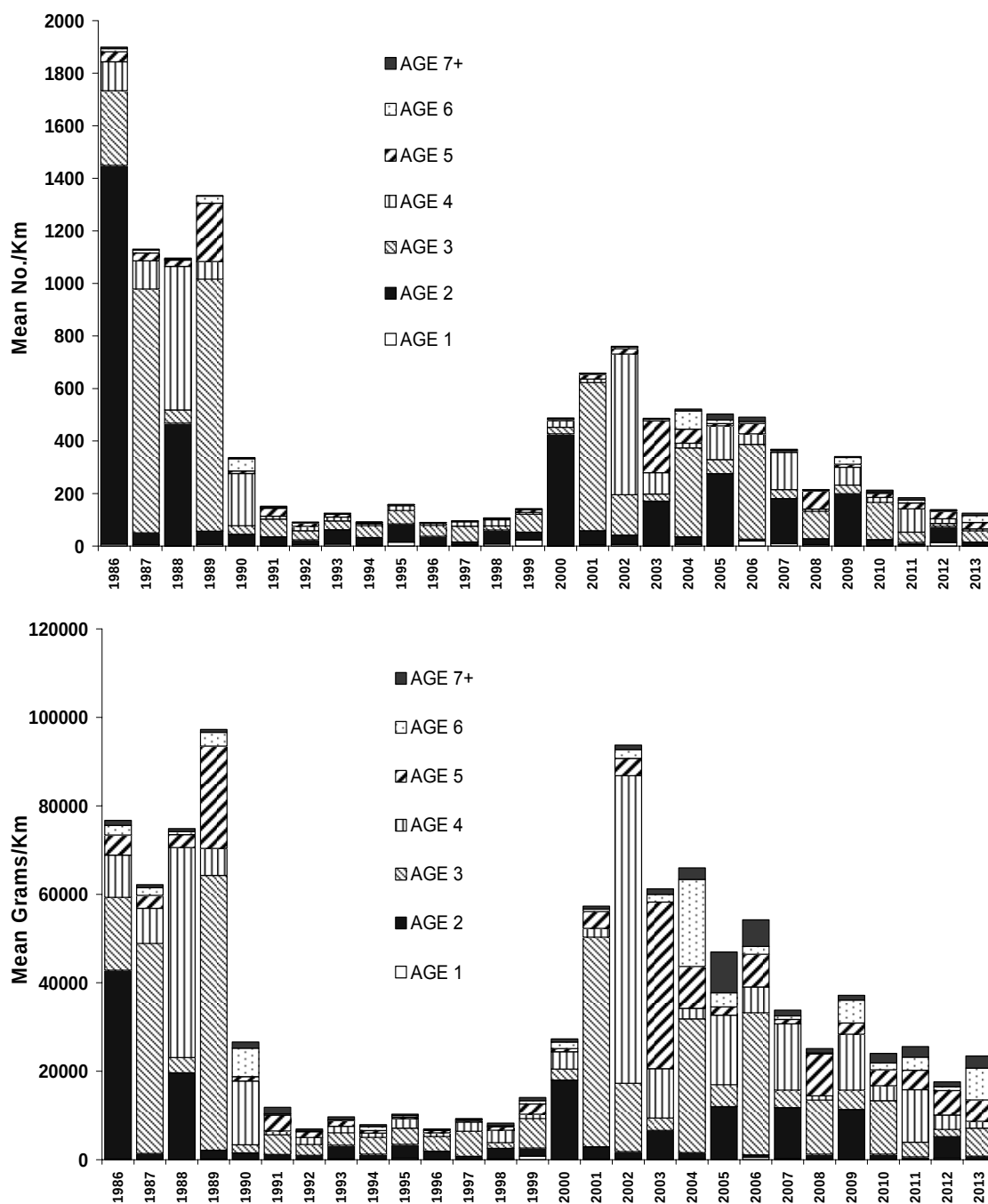


Figure 4.4.2 Catch at age of Yellow Perch in Long Point Bay Index Gill Nets set overnight at 12-30 ft. (3.7-9.1 m) depths during June-August, 1986-2013. Catch reported in Arithmetic Mean Number per Kilometer (top graph) and Arithmetic Mean Weight (g) per Kilometer (bottom graph). Age 7 and older Yellow Perch combined.

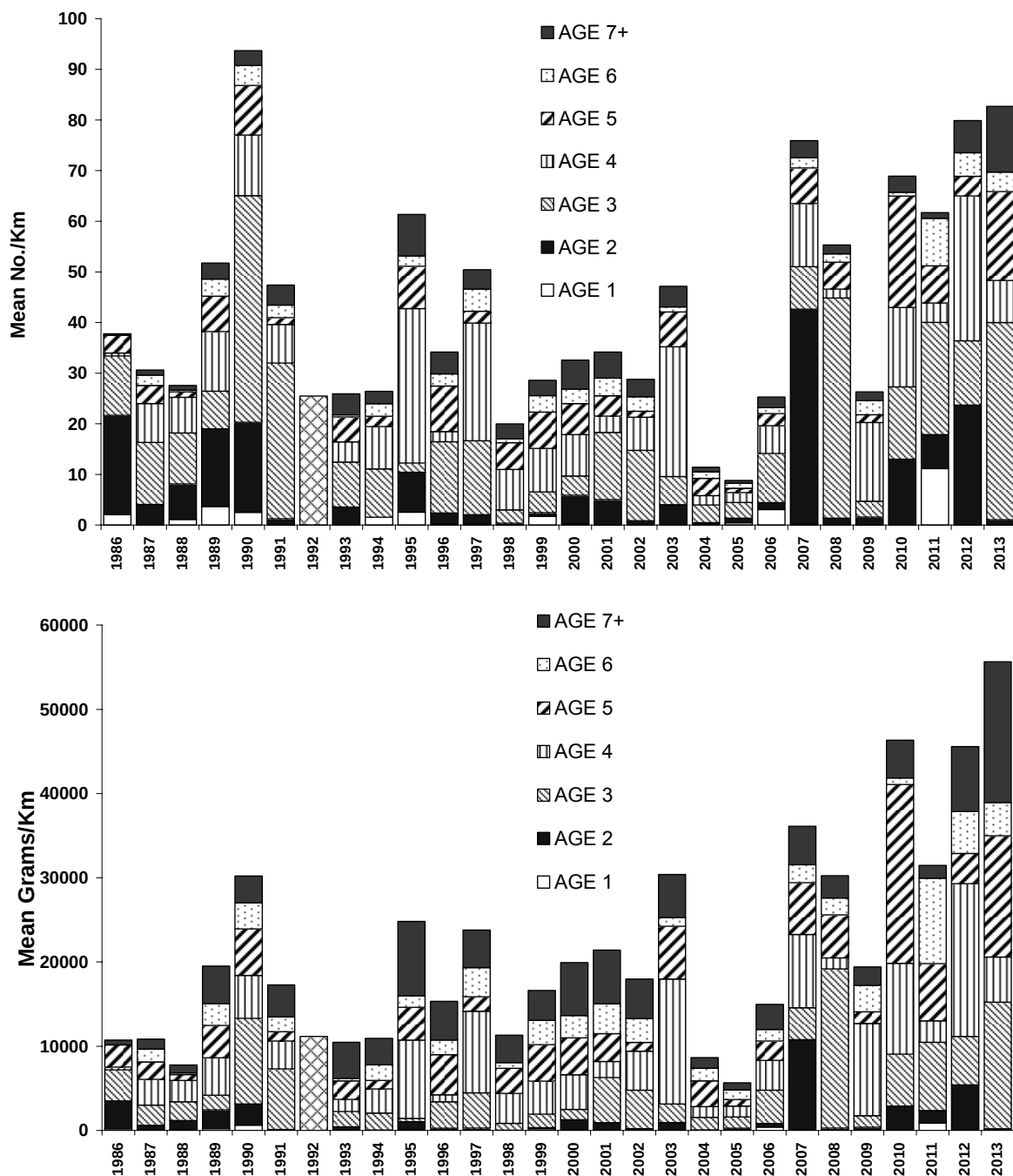


Figure 4.4.3 Catch at age of Smallmouth Bass in Long Point Bay Index Gill Nets set overnight at 12-30 ft. (3.7-9.1 m) depths during June-August, 1986-2013. Catch reported in Arithmetic Mean Number per Kilometer (top graph) and Arithmetic Mean Weight (g) per Kilometer (bottom graph). Age 7 and older Smallmouth Bass combined. 1992 ages unknown.

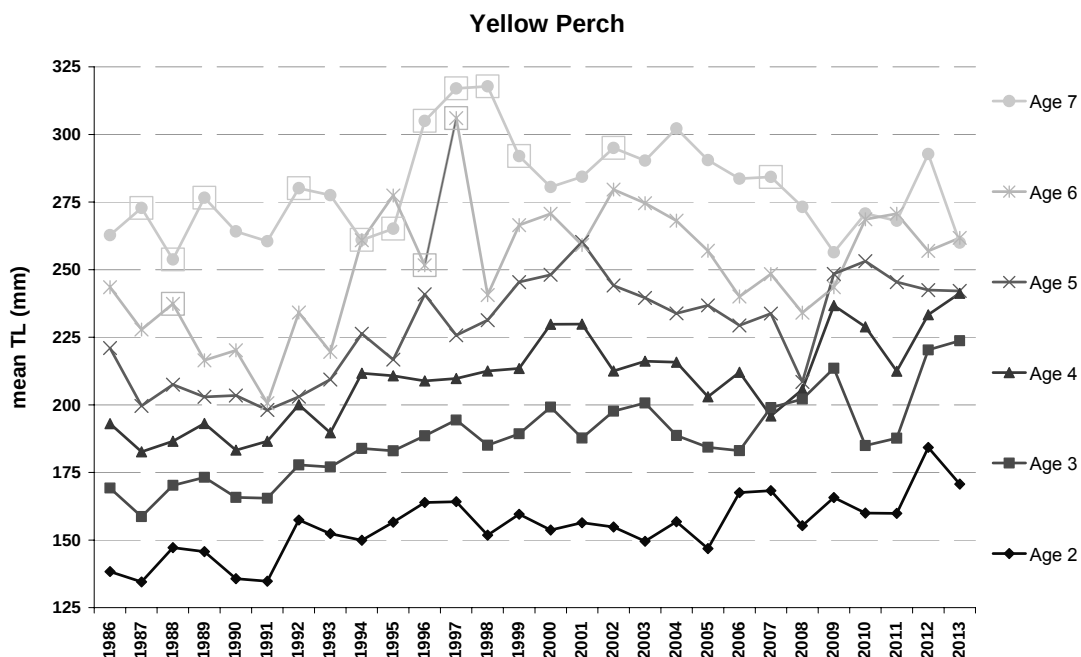


Figure 4.4.4 Yellow Perch mean total length (mm) at ages 2 to 7 in Long Point Bay Index Gill Nets set overnight at 12-30 ft. (3.7-9.1 m) depths during June-August, 1986-2013. Males and females combined. Mean values outlined with a box were estimated from $N < 10$ samples.

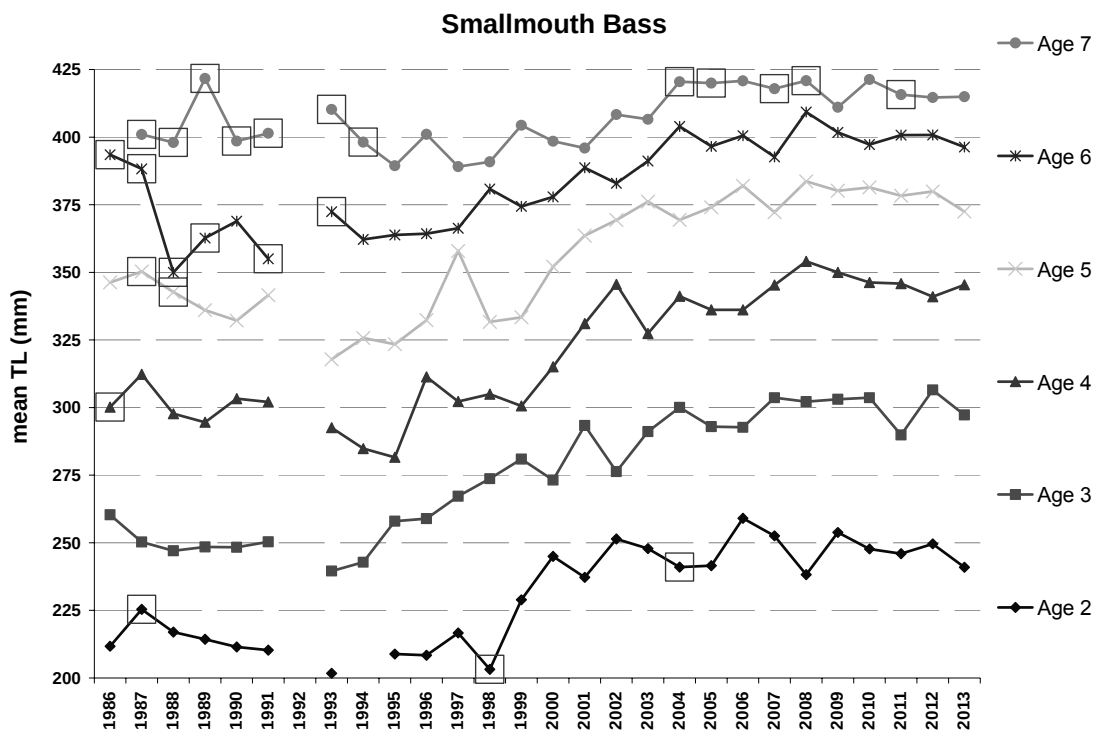


Figure 4.4.5 Smallmouth Bass mean total length (mm) at ages 2 to 7 in Long Point Bay Index Gill Nets set overnight at 12-30 ft. (3.7-9.1 m) depths during mid-June to mid-September 1986-2013. Males and females combined. Mean values outlined with a box were estimated from $N < 10$ samples. Smallmouth Bass ages were not available for 1992 samples.

5. FISHERIES MANAGEMENT PROJECTS

5.1 Lake Erie Asian Carp Surveillance Program

The Asian Carps include four species of fish. Three of these species Bighead Carp (*Hypophthalmichthys nobilis*), Silver Carp (*Hypophthalmichthys molitrix*) and Grass Carp (*Ctenopharyngodon idella*) have become naturalized in the United States. Two of these species (Bighead and Silver Carps) have dispersed north up the Mississippi River basin and have the potential to colonize the Great Lakes. Individual Grass Carp have been observed within the Lake Erie watershed.

Environmental DNA (eDNA) is genetic material which is shed by living or dead organisms into the environment. The presence of eDNA in the environment indicates that the organism may have been present. The collection of eDNA provides a method for detecting species present in low abundance, which may not be found through conventional surveys. In September 2012, LEMU commenced a field program utilizing eDNA to assess if Asian Carps are present in the Canadian waters of Lake Erie or the St. Clair System. This program continued in 2013, with water samples tested for Bighead, Silver, and Grass Carp eDNA.

The LEMU Asian Carp eDNA surveillance program occurred from May to July 2013. During this time water samples were taken from 79 sites in Lake Erie, Lake Erie tributaries, Lake St. Clair, Thames River, Sydenham River, and Lake Huron tributaries (Figure 5.1.1). Sixty-two of these sites were sampled twice.

Environmental DNA water sampling followed the University of Notre Dame protocol (Mahon et al, 2010). Three water samples were taken during each sampling event in order to verify any potential positive results. The LEMU Wheatley office filtered the water samples. Filtered samples were sent to Dr. Chris Wilson (Aquatic Research and Monitoring Section, Trent University) for DNA amplification PCR and enzyme gel electrophoresis.

During two years of the program, no Asian Carp eDNA was detected in water samples.

In addition to the directed eDNA sampling, LEMU index netting programs (described in this report) found no Asian Carp in Lake Erie and Lake St. Clair. Furthermore, the Ontario commercial fishery in Lake Erie works with LEMU to report catches of invasive species. The commercial fishery uses a variety of fishing methods, including gill nets, trap nets, and trawls. In 2013 there were approximately 33,000 km of gill nets deployed and 2280 hours of trawling by the commercial fishery in Lake Erie. No Asian Carps were reported by the Ontario commercial fishery in Lake Erie.

Reference:

Mahon, A. R., A. Rohly, M. Budny, E. Elgin, C. L. Jerde, W. L. Chadderton, and D. M. Lodge. 2010. Environmental DNA Monitoring and Surveillance: Standard Operation Procedures. Report to the United States Army Corps of Engineers, Environmental Laboratories, Cooperative Environmental Studies Unit, Vicksburg, Mississippi. CESU agreement #W912HZ-08-2-0014, modification P00007.

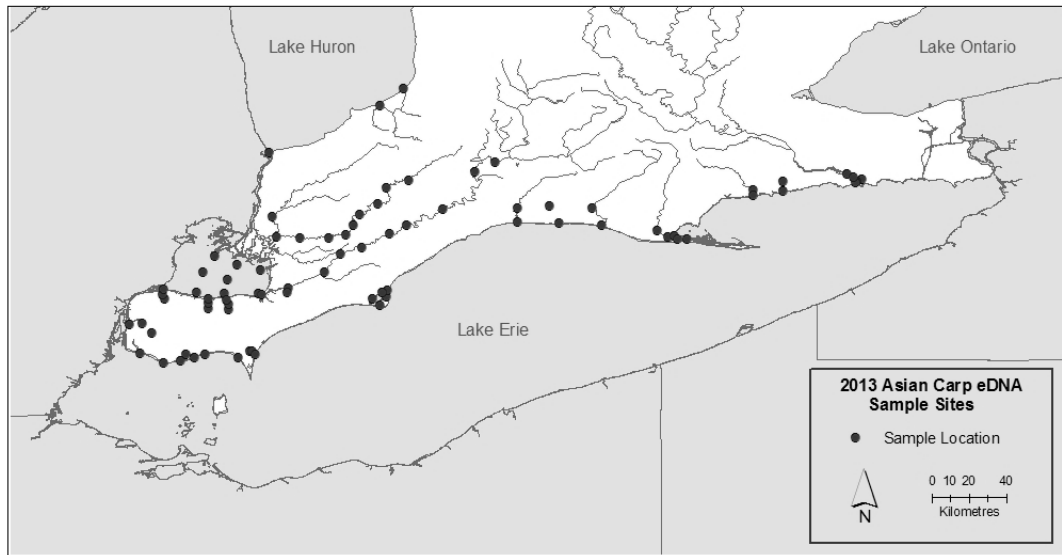


Figure 5.1.1 Location of sample sites for 2013 Asian Carp surveillance program.

5.2 Assessment of Incidental Catch in Commercial Rainbow Smelt Trawls

Lake Whitefish and Lake Herring (Cisco) were historically important components of Lake Erie's fish community and were the target of significant fisheries. Lake Herring are currently considered extirpated in Lake Erie, while the Lake Whitefish population is low relative to recent decades. In recent years, the commercial harvest and CPUE of Lake Whitefish has been declining in Lake Erie. Ciscos are rarely reported in the fishery or lake programs and are the focus of bi-national efforts of assessment and rehabilitation. The decline in Lake Whitefish appears to be related to poor recruitment, possibly driven by environmental changes and invasive species. Current fisheries surveys do not adequately capture juvenile stages of either species making assessment of recruitment difficult. The commercial Rainbow Smelt trawl fishery does capture juvenile Lake Whitefish as well as Cisco on occasion. In the summer of 2013, a study was undertaken to determine the quantity of incidentally caught fish, particularly juvenile Lake Whitefish in commercial Rainbow Smelt trawls in the Eastern basin of Lake Erie.

The goal of this project was to evaluate the utility of using by-catch in the commercial fishery as an assessment tool for these species. To date, uncertainty caused by the paucity of Cisco samples has hindered bi-national progress on native fish rehabilitation. This project will contribute information to the Lake Erie Committee's efforts to restore Cisco. It may also provide insight into Lake Whitefish recruitment and production and may highlight susceptibility of other under reported species to the Rainbow Smelt fishery.

Four staff working out of Port Dover, Ontario, rode aboard commercial Rainbow Smelt vessels at random, on a daily basis between July 17 and October 3, 2013. Sub-samples of Rainbow Smelt were shovelled into packers from random portions of each trawl harvest, to a maximum of three packers per trawl. While on board the trawling vessels, all visible by-catch was recorded. Samples were weighed, counted and processed for smaller incidentally caught species. Rainbow Smelt were returned to totes aboard the vessel to be landed as part of the day's harvest. The total lengths of thirty individuals per incidental species captured was measured. All Lake Herring, juvenile Lake Whitefish and Lake Trout observed were brought back to the lab for further processing. Effort

information was obtained from the Daily Catch Reports and all trawl start and end coordinates were obtained from handheld GPS units.

Catch per unit of effort (CPUE) for all incidentally caught species was calculated as number of fish caught per trawl hour. The CPUE for Rainbow Smelt was calculated as weight of fish caught in pounds per trawl hour. These were summarized and expanded by each month of the project and were then expanded for the entire fishery. Harvest estimates were obtained for smaller sub-sampled fish by expanding the fraction of the observed catch by the total trawl weight reported on the DCR. Further expansions for all fish observed in the trawls were calculated by multiplying the catch per unit effort from each observed trawl by the total trawl effort for each month and for the total 2013 effort.

The total effort for the whole 2013 Rainbow Smelt fishery amounted to 2,280 trawl hours. Between July 17 and October 3, 45 trawling events were sampled (Figure 5.2.1). This resulted in 160 hours of onboard sampling, representing 7% of the commercial trawl fishery observed by effort. The total Rainbow Smelt harvest in 2013 amounted to 6.9 million pounds, 78% of which was landed from Ontario statistical district 4 (OE-4), with the remaining 22% from OE-5. Negligible amounts of Rainbow Smelt were harvested from the remaining statistical districts. Of the nearly 7 million pounds of Rainbow Smelt harvested, 411,463 lbs was from boats with observers present. Of that harvest, 4% was sub-sampled, an equivalent of 15,033 lbs.

In total, six (6) juvenile Lake Whitefish were collected throughout the course of this study, consisting of one young-of-year and 5 yearling fish (Figure 5.2.2). Twenty adult Lake Whitefish were also collected during the onboard observations in 2013 (Figure 5.2.3). One (1) Lake Herring was surrendered during the study. It was harvested along the southern shore of Long Point (Figure 5.2.4), and was aged as 5 years. A total of 36 Lake Trout were observed throughout the study, 17 of which were released alive. A program to reestablish Lake Trout in the Eastern Basin of Lake Erie has been underway since 1973; therefore Lake Trout that could not be released were surrendered to the OMNR and returned to the lab for biological processing and determination of stocked strain (Table 5.2.1).

Estimated catches of incidental species in the total Rainbow Smelt harvest were highest in July, followed by August, and September; they were negligible in October due to low fishing effort (Table 5.2.2). Of the species observed, Alewife, Round Goby and Emerald Shiners were captured in high numbers. The estimated catch for young-of-year Lake Whitefish was 135 individuals and estimated number of yearling fish caught was 55. Aside from the presence of fish from 2012 and 2013 year classes, the significance of these juveniles is unclear as there is no basis for comparison.

Lake Erie's Lake Whitefish population is currently in a state of decline. Although some recruitment is evident, to what extent is unclear. In 2013 there were no other juvenile Lake Whitefish observed by any other means on Lake Erie. Reliable Lake Whitefish recruitment indices are lacking. Plans to continue monitoring the Lake Whitefish population through extensive boat and plant observations are planned to occur in 2014.

Table 5.2.1 Lake Trout surrendered to Ontario Ministry of Natural Resources from the Incidental Commercial Rainbow Smelt Trawl Project, 2013.

Fish ID	Date	Year	Grid	Total Length (mm)	Fork Length (mm)	Total Weight (g)	Sex	Age	Coded Wire Tag	Strain*	Clip Codes	Year Stocked
1	16-Jul-13	2013	139	740	680	4626	M		00003		01	
2	23-Jul-13	2013	114	562	520	2593	F	4	600210	LC	01	2010
3	23-Jul-13	2013	166	635	580	3399	F	5	600178	AI	01	2009
4	23-Jul-13	2013	166	312	286	289	M	2	630385	SI	01	2012
5	23-Jul-13	2013	166	443	395	295	M		00002		01	
6	23-Jul-13	2013	166	615	560	2697	F	4	630317	SI	01	2010
7	22-Jul-13	2013	168	620	550	3488	M	5	630271	SI	01	2009
8	22-Jul-13	2013	168	600	560	3226	M	4	600212	LC	01	2010
9	22-Jul-13	2013	168	620	576	3245	M	5	600174	LC	01	2009
10	22-Jul-13	2013	168	334	308	387	M	2	630383	SI	01	2012
11	31-Jul-13	2013	192	665	620	4380	M	4	600210	LC	01	2010
12	9-Aug-13	2013	164	518	472	1757	M	3	600244	LC	01	2011
13	27-Aug-13	2013	114	555	505	2238	F	3	630377	SI	01	2011
14	27-Aug-13	2013	114	308	280	265	M	3	600244	LC	01	2011
15	28-Aug-13	2013	113	620	568	2723	F	3	630378	SI	01	2011
16	28-Aug-13	2013	113	609	556	2651	M	4	00002		02	2010
17	28-Aug-13	2013	113	246	229	119	M	1	630432	SI	01	2013
18	28-Aug-13	2013	113	239	223	131	F		640309		01	
19	28-Aug-13	2013	113	223	204	91	F	1	630433	SI	01	2013
20	11-Sep-13	2013	116	578	534	2924	M	3	600244	LC	01	2011

* LC = Lake Champlain SI = Slate Island AI = Apostle Island

Table 5.2.2 Estimated incidental catch from Rainbow Smelt trawls by month, 2013.

Large Species	Category	Month				Total
		July	Aug.	Sept.	Oct.	
Brown Trout	No category	15	11	8	0	34
Burbot	No category	92	106	15	0	213
Common Carp	No category	31	0	0	0	31
Freshwater Drum	No category	183	64	23	40	310
Lake Herring	No category	15	0	0	0	15
Lake Trout	No category	260	149	23	40	471
Lake Whitefish	No category	229	32	15	0	276
	Yearling	15	32	8	0	55
Rainbow Trout	No category	15	21	0	0	36
Sea Lamprey	No category	31	11	8	20	69
Shorthead Redhorse	No category	0	0	8	0	8
Smallmouth Bass	No category	0	11	0	0	11
	Jumbo	61	74	76	0	212
Walleye	No category	76	11	0	0	87
	No. 1	0	42	0	0	42
White Bass	No category	92	85	0	0	177
White Perch	No category	61	42	8	20	131
White Sucker	No category	0	11	0	0	11
Yellow Perch	No category	1,222	478	76	40	1,815
Grand Total		2,398	1,178	267	159	4,002

Small Sub-Sampled Species	Category	Month				Total
		July	Aug.	Sept.	Oct.	
Alewife	No category	316,896	114,036	25,244	0	456,175
Emeral Shiner	No category	100,910	64,190	57,683	0	222,784
Lake Whitefish	YOY	0	0	135	0	135
Round Goby	No category	126,188	154,589	22,045	720	303,542
Trout-perch	No category	481	727	0	0	1,208
Yellow Perch	Juvenile any species	7,001	137	0	0	7,138
Grand Total		551,475	333,679	105,107	720	990,982

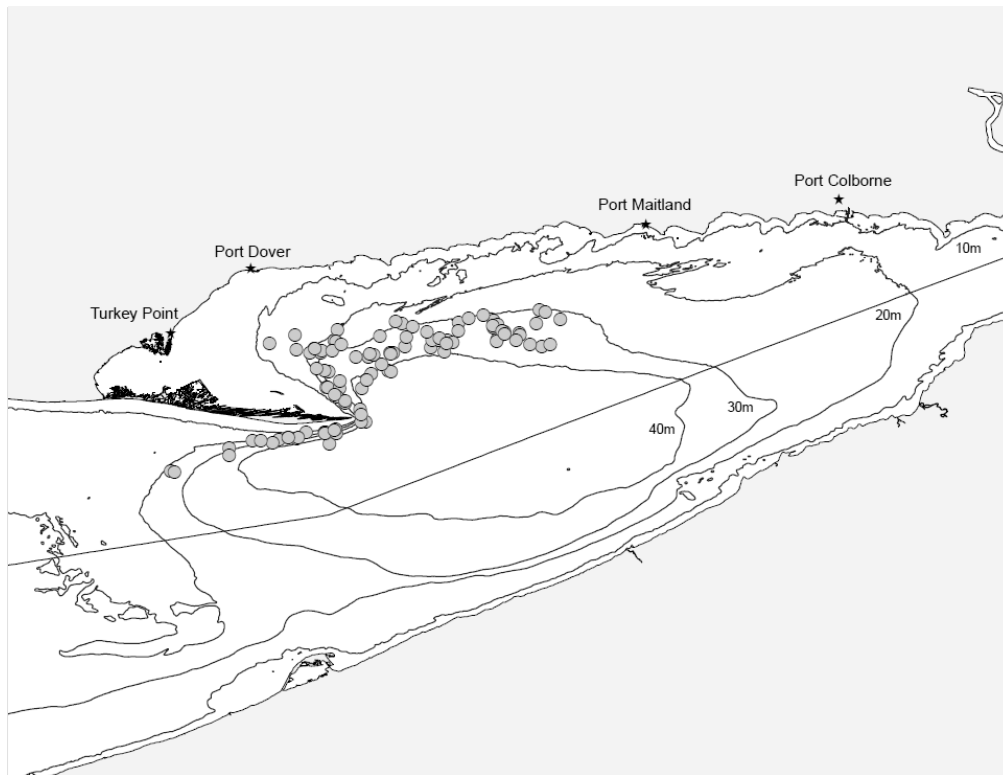


Figure 5.2.1 Trawl locations in OE-4 and OE-5 during the 2013 Rainbow Smelt by-catch study.

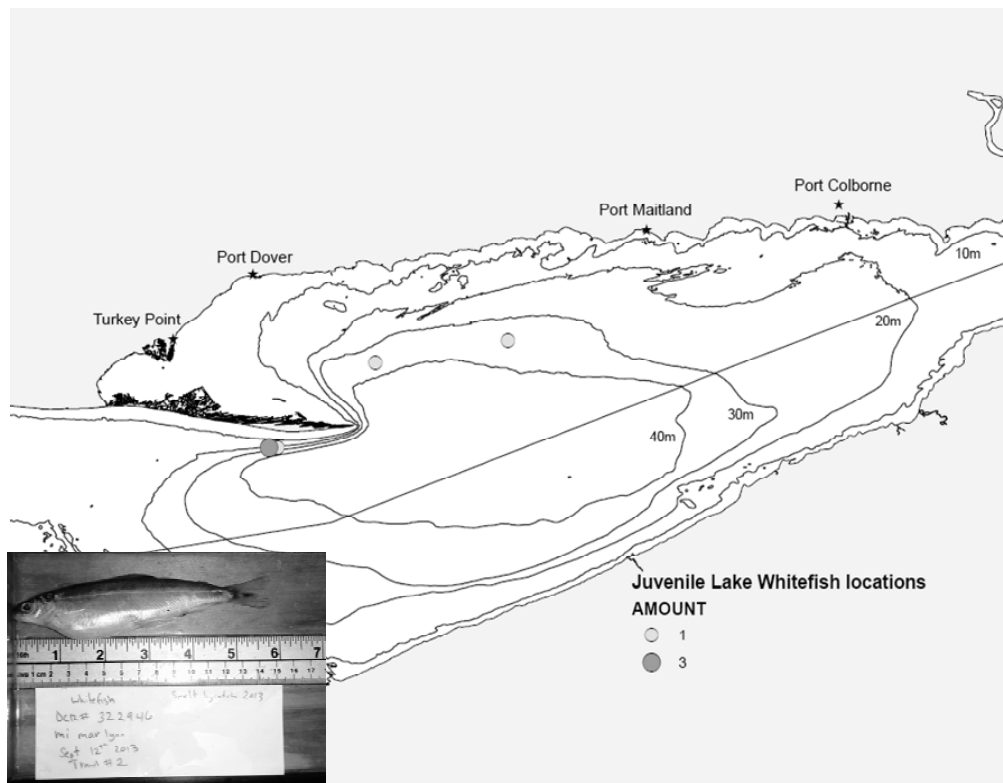


Figure 5.2.2 Locations of incidentally caught Juvenile Lake Whitefish during the 2013 Rainbow Smelt by-catch study. (Inset: young-of-year fish)

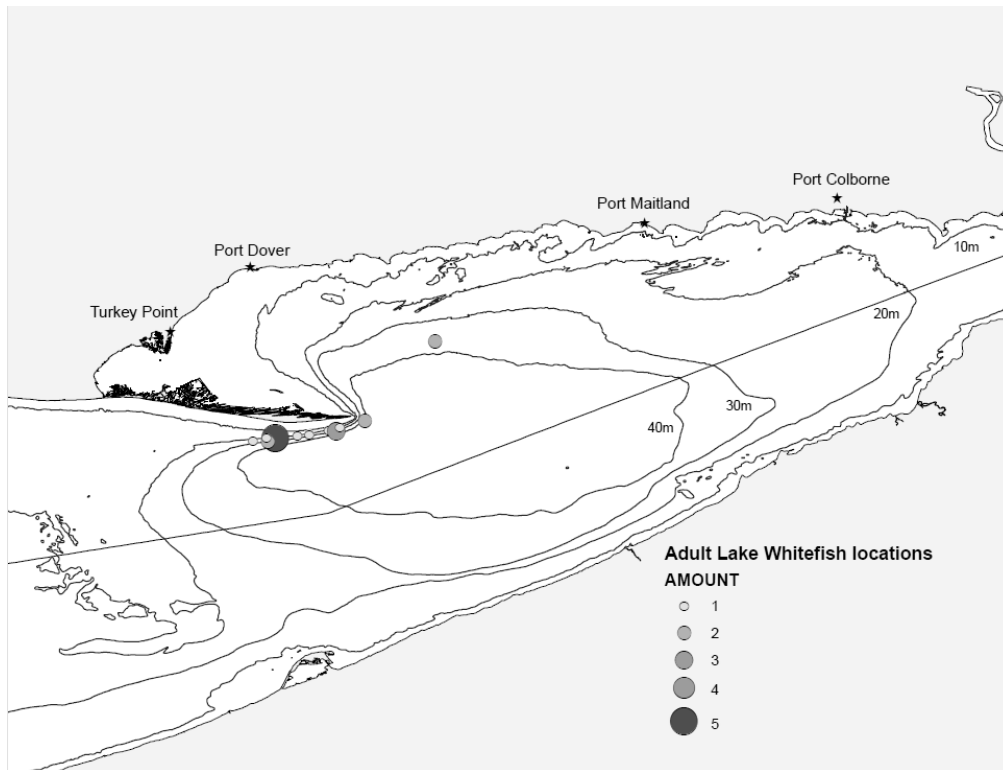


Figure 5.2.3 Locations of adult Lake Whitefish observed during the 2013 Rainbow Smelt by-catch study.

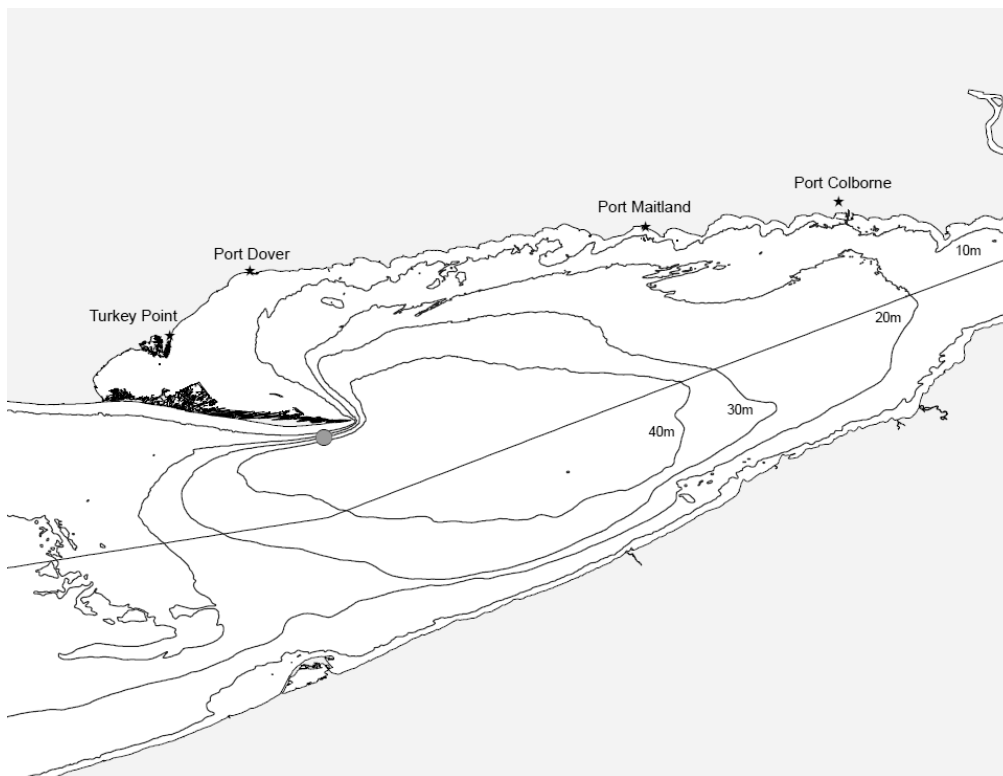


Figure 5.2.4 Location of one (1) Lake Herring (age 5) surrendered during the 2013 Rainbow Smelt by-catch study.

5.3 Supplementary Sampling for the Assessment of the Fall Lake Whitefish Fishery

Lake Whitefish (*Coregonus clupeaformis*) were a historically important component of the Lake Erie fish community, and the target of significant fisheries in both Canada and the United States throughout the late 1800's into the 1900's. Lakewide commercial harvests of Lake Whitefish were often reported to exceed 2 million pounds. The highest harvest on record attained 7 million pounds in 1949 (GLFC, 2013). By the early 1960's most Coregonid (Lake Herring and Lake Whitefish) species were on a decline in Lake Erie. By the 1980's, there was a resurgence in the Lake Whitefish population, and by the late 90's into the 2000's harvests were once again within the range of historical levels. Since that time, population numbers have fluctuated drastically. Currently the Lake Erie Lake Whitefish population appears to be again on the decline. This decline has been primarily attributed to poor recruitment. The total harvest of Lake Erie Whitefish in 2013 was nearly 158 thousand pounds. Ontario harvested 60%, and Ohio 40%. Total harvest in 2013 was 54% lower than the total harvest in 2012, which was a decrease of 56% for Ontario and 47% for Ohio. No harvest was reported for Michigan, Pennsylvania or New York. (GLFC, CWTG report 2013)

In 2013, Ontario's statistical district one (OE-1) harvested the highest fraction of Lake Whitefish (79% of the total harvest), followed by OE-2 at 16%, the remaining 5% of the harvest was distributed among the other units. Of the harvest in the west basin 77% was taken between October and December, with only 15% of the total harvest from gill nets targeting Lake Whitefish, while the remaining 85% were from fisheries targeting other species, such as Walleye and White Bass.

A supplementary assessment of the Lake Erie Lake Whitefish population was carried out by the Lake Erie Management Unit throughout the fall and into the winter months of 2013 to monitor the Lake Erie Lake Whitefish gill net fishery. The main objective for this program was to determine the size and age composition of the fall harvest, beyond what is captured by our Commercial Catch sampling program. A combination of onboard observations and plant sampling occurred between November 1 and December 6, 2013. All fishing effort data was obtained from Daily Catch Reports and biological attributes such as scale samples, total and fork lengths and estimated weights were collected for each fish. Sex and state of maturity was determined for fish not dressed or where remnants of gonads remained.

Samples were obtained from 17 of 44 boats harvesting Lake Whitefish in 2013, resulting in 63 separate fishing events being observed and 102 samples in total. Maximum sample size was 40 fish. In total, 2,794 fish were sampled, an equivalent of roughly 12,500 lbs, or 13% of the total gill net harvest from 2013. Of the fish sampled, ages ranged from 3 to 22 years (Figure 5.3.1). The 2003 cohort was the most abundant, representing 46% of the 2013 Lake Whitefish harvest sampled through the fall project. The next most common age group was age 8, from the 2005 year class representing 23% of the sampled harvest. These patterns correspond to similar patterns observed through standard Lake Erie Commercial Catch sampling program (2013), where age ten fish represented 40% of the harvest sampled and age 8 represented 17%.

Gender could only be determined for 495 fish or 18% of the total sample. All Lake Whitefish are dressed before landing, and as the majority of the fish (95%) were sampled at the plant, it was difficult to determine sex unless remnants of the gonads were present in the body cavity. Of the sampled fish we could obtain sexes for, 36% were males and 64% were females. Length at age curves are similar to those reported in the past (Figure 5.3.2). Average total length for males was 545 mm and for females was 595 mm. Of all fish sampled average length was 573 mm, which was comparable to the standard Commercial Catch Sampling program.

Reference:

Coldwater Task Group. 2013. Report of the Lake Erie Coldwater Task Group, March 2013. Presented to the Standing Technical Committee, Lake Erie Committee of the Great Lakes Fishery Commission, Ann Arbor, Michigan, USA.

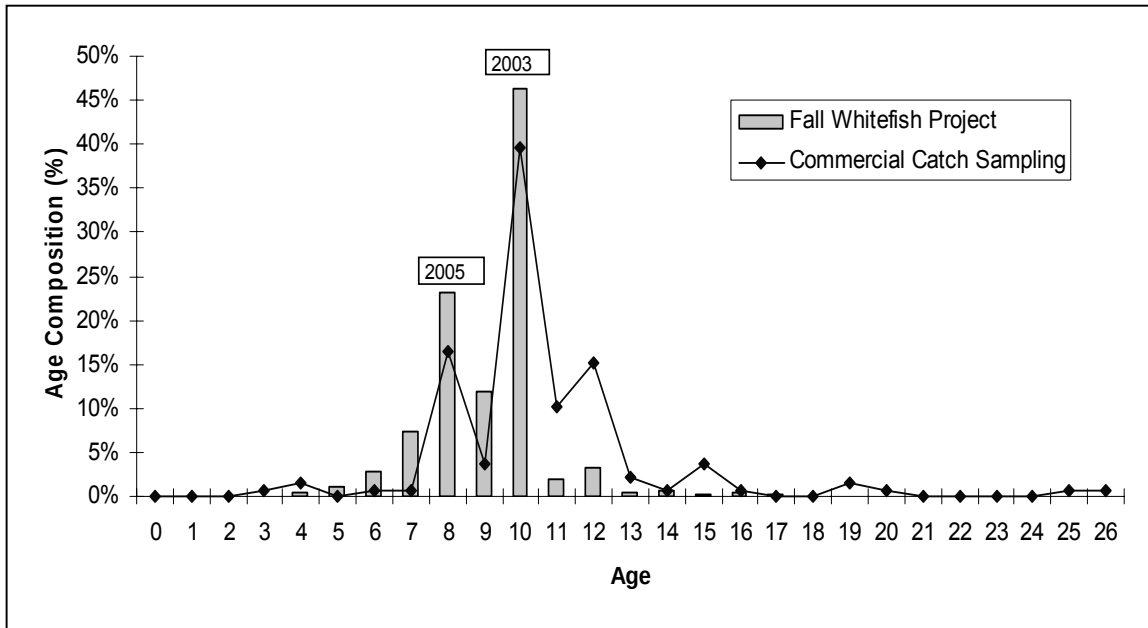


Figure 5.3.1 Age composition of Lake Whitefish scales sampled from the Supplementary Fall Whitefish project as well as otoliths from the Commercial Catch samples obtained in 2013.

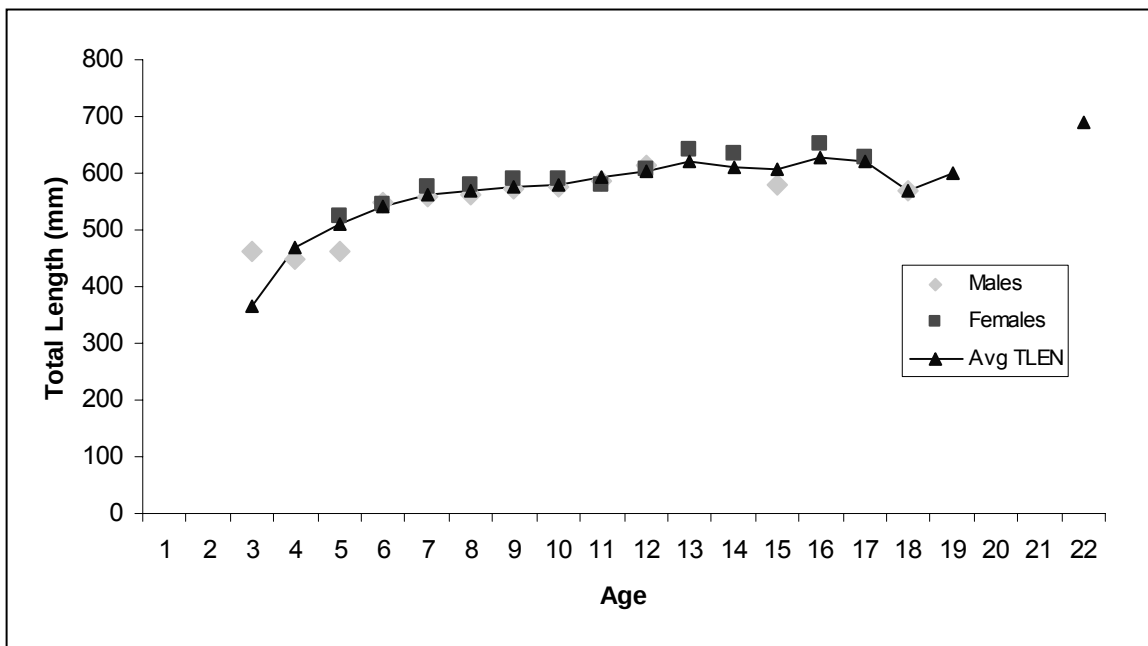


Figure 5.3.2 Length at age curve for males, females and all fish sampled during the Supplementary Fall Whitefish project, 2013.

6. LAKE ST. CLAIR PROJECTS

6.1 St. Clair System Sport Fishery Diary Program

The St. Clair System Sport Fishery Diary Program is an ongoing survey used to track general trends in catch rates and angler activity targeting a variety of fish species in Lake St. Clair, Detroit River and St. Clair River. This is a combined program with the Lake Erie Sport Fishery Diary Program and volunteer anglers complete a page in a diary for each fishing trip taken as outlined in section 3 of this report.

In 2013, 50 volunteers completed diaries in the St. Clair System (Lake St. Clair, Detroit River and St. Clair River) (Table 6.1.1). Anglers from both Ontario and Michigan participated in the diary program for the St. Clair System. LEMU collected information from Ontario anglers, while the Michigan Department of Natural Resources collected data from Michigan anglers. There were 32 participants in Lake St. Clair, 31 participants in the Detroit River, and 12 participants in the St. Clair River (some angler's fish in more than one area). The number of participants decreased in Lake St. Clair (from 34 participants in 2012) and St. Clair River (from 15 participants in 2012), but increased in Detroit River (from 30 participants in 2012).

In total there were 885 fishing trips by angler diarists in the St. Clair System (Table 6.1.1). The total effort was 9,426 rod hours, with 64% of effort in Lake St. Clair, 30% in the Detroit River and 6% in the St. Clair River.

Table 6.1.1 Total effort reported by Sport Fishery Diary Program participants in Lake St. Clair, Detroit River, and St. Clair River, 2013.

Survey Area	Number of Diarists	Number of Trips	Number of Rods per Trip	Total Rod Hours	Hours per Trip
Lake St. Clair	32	501	2.6	6,004	4.6
Detroit River	31	326	2.0	2,830	4.3
St. Clair River	12	58	2.3	592	4.4
Total	50^a	885	2.4	9,426	4.5

^a Diarist may fish more than one survey area in a year.

Lake St. Clair

Lake St. Clair diarists fished 6,004 rod hours of effort over 501 fishing trips (Table 6.1.1). In 2013, 57% of diary participant effort in Lake St. Clair was directed towards Walleye, 29% of effort was directed towards Yellow Perch, 21% of effort was directed towards Smallmouth Bass, and 8% of effort was directed towards Muskellunge (effort may be directed towards more than one species simultaneously) (Table 6.1.2, Figure 6.1.1). Additional species targeted with greater than one percent of the effort included: Rock Bass (3%), Pumpkinseed (3%), Largemouth Bass (2%), Northern Pike (2%), White Bass (1%) and Freshwater Drum (1%).

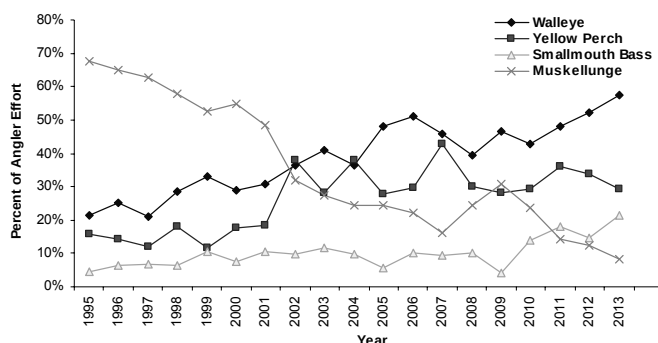


Figure 6.1.1 Percent of angler diarist effort in Lake St. Clair by species 1995-2013.

The 2013 Walleye catch rate (0.487 fish per rod hour) decreased 12% percent from the 2012 catch rate (Table 6.1.2). The Yellow Perch catch rate (2.225 fish per rod hour) decreased 27% from the 2012 catch rate. The Smallmouth Bass catch rate (0.611 fish per rod hour) decreased 16% from 2012. In 2013, the Smallmouth Bass catch rate in Lake St. Clair was slightly higher than the catch rate in the Detroit River; however the Detroit River had a higher catch rate in the previous year, albeit with very low effort (Figure 6.1.4). The 2013 Muskellunge catch rate (0.066 fish per rod hour) decreased 52% from 2012 (Table 6.1.2).

Detroit River

Detroit River diarists fished 2,830 rod hours of effort over 326 fishing trips (Table 6.1.1). In the Detroit River, 84% of diary participant effort was directed towards Walleye, 14% of effort was directed towards Yellow Perch, and 2% of effort was directed towards Smallmouth Bass, (Table 6.1.2, Figure 6.1.2). Additional species targeted with more than one percent of the effort included: Largemouth Bass (4%) and Bluegill (1%).

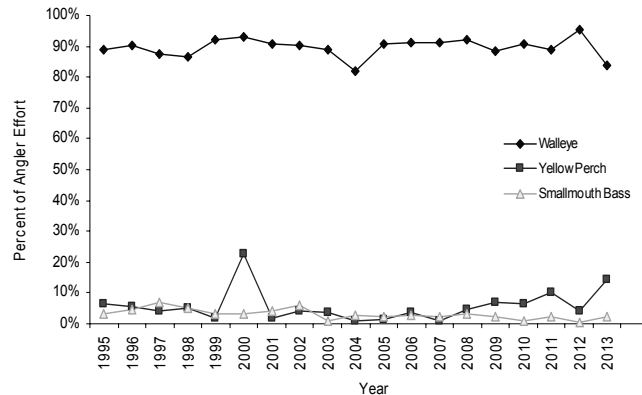


Figure 6.1.2 Percent of angler diarist effort in the Detroit River by species 1995-2013.

The 2013 Walleye catch rate (0.656 fish per rod hour) decreased 11% percent from the 2012 catch rate (Table 6.1.2). The Yellow Perch catch rate (4.540 fish per rod hour) increased 65% from the 2012 catch rate. The Yellow Perch catch rate in the Detroit River was higher than Yellow Perch catch rate in Lake St. Clair, but had less than one-third the effort (Figure 6.1.5). This differed from 2012 when the highest average Yellow Perch catch rate was in Lake St. Clair. The Smallmouth Bass catch rate (0.422 fish per rod hour) decreased 46% from 2012.

St. Clair River

St. Clair River diarists fished 592 rod hours of effort over 58 fishing trips (Table 6.1.1). In the St. Clair River, 69% of diary participant effort was directed towards Walleye, and 2% of effort was directed towards Rainbow Trout, (Table 6.1.2, Figure 6.1.3). Additional species targeted with at least one percent of the effort included: White Bass (5%), Largemouth Bass (4%), and Smallmouth Bass (1%).

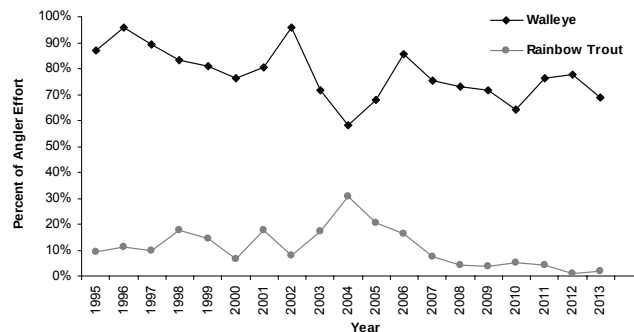


Figure 6.1.3 Percent of angler diarist effort in the St. Clair River by species 1995-2013.

The 2013 Walleye catch rate (0.845 fish per rod hour) increased 37% from the 2012 catch rate (Table 6.1.2). The Walleye catch rate in the St. Clair River was higher than the Walleye catch rate in Lake St. Clair and the Detroit River (Figure 6.1.6). This differs from 2012 when the Walleye catch rate was highest in the Detroit River.

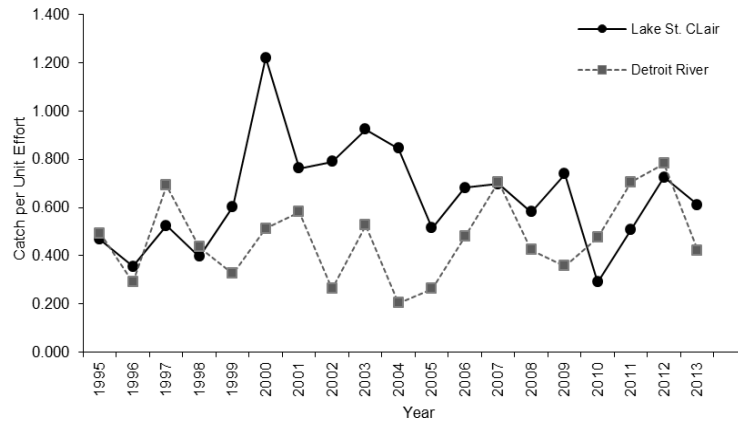


Figure 6.1.4 Smallmouth Bass catch per unit effort (fish per rod hour) in Lake St. Clair and the Detroit River, Sport Fish Diary Program 1995-2013.

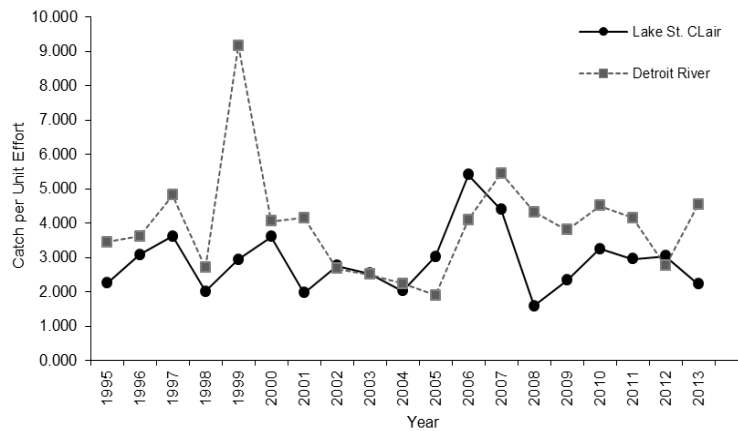


Figure 6.1.5 Yellow Perch catch per unit effort (fish per rod hours) in Lake St. Clair and the Detroit River Sport Fish Diary Program 1995-2013.

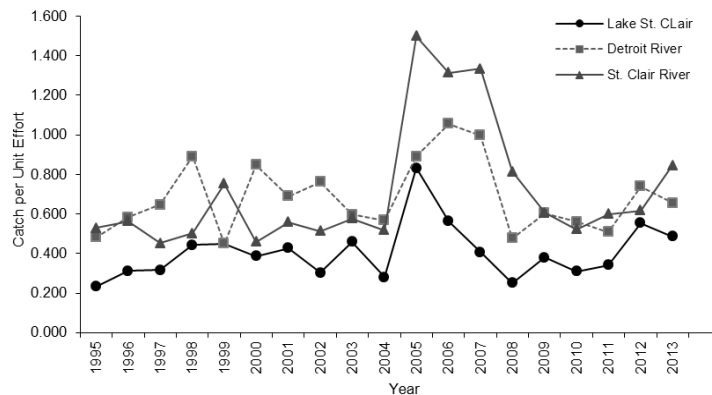


Figure 6.1.6 Walleye catch per unit effort (fish per rod hour) in Lake St. Clair, Detroit River and the St. Clair River Sport Fish Diary Program 1995-2013.

Table 6.1.2 Angler success rates (CPUE) of non-charter boat anglers targeting particular species in the Lake St. Clair, Detroit River and St Clair River, 1995-2013^a. Effort may be directed at more than one species simultaneously.

Lake St Clair																	
Year	Total Rod Hours	Walleye				Yellow Perch				Smallmouth Bass				Muskellunge			
		Trips	Rod Hours	CPUE	% Total Effort	Trips	Rod Hours	CPUE	% Total Effort	Trips	Rod Hours	CPUE	% Total Effort	Trips	Rod Hours	CPUE	% Total Effort
1995	28,867	451	6,185	0.234	21%	340	4,524	2.246	16%	137	1,317	0.467	5%	642	19,524	0.073	68%
1996	24,093	484	6,097	0.313	25%	265	3,462	3.076	14%	153	1,533	0.356	6%	494	15,629	0.093	65%
1997	22,387	409	4,697	0.317	21%	253	2,714	3.607	12%	149	1,537	0.524	7%	400	14,010	0.103	63%
1998	19,532	510	5,600	0.443	29%	304	3,505	2.008	18%	127	1,248	0.397	6%	383	11,326	0.095	58%
1999	17,509	622	5,792	0.450	33%	224	2,065	2.943	12%	222	1,841	0.604	11%	314	9,199	0.069	53%
2000	15,862	442	4,613	0.387	29%	228	2,811	3.594	18%	190	1,216	1.220	8%	267	8,714	0.086	55%
2001	15,644	444	4,797	0.428	31%	246	2,907	1.958	19%	209	1,665	0.763	11%	254	7,568	0.115	48%
2002	12,327	425	4,475	0.303	36%	412	4,658	2.756	38%	153	1,207	0.790	10%	156	3,953	0.070	32%
2003	13,577	543	5,533	0.458	41%	335	3,829	2.532	28%	179	1,586	0.924	12%	141	3,730	0.091	27%
2004	10,287	393	3,740	0.280	36%	293	3,917	2.019	38%	126	1,000	0.845	10%	114	2,510	0.094	24%
2005	10,104	526	4,845	0.833	48%	232	2,798	3.028	28%	82	556	0.514	6%	109	2,468	0.085	24%
2006	8,229	436	4,204	0.564	51%	231	2,455	5.401	30%	84	829	0.681	10%	89	1,838	0.071	22%
2007	7,911	376	3,633	0.407	46%	275	3,399	4.384	43%	90	742	0.698	9%	65	1,264	0.118	16%
2008	7,164	291	2,819	0.250	39%	154	2,143	1.578	30%	88	731	0.581	10%	81	1,752	0.060	24%
2009	8,903	425	4,142	0.381	47%	157	2,495	2.326	28%	42	378	0.738	4%	79	2,746	0.103	31%
2010	7,010	305	3,008	0.310	43%	157	2,051	3.252	29%	88	964	0.290	14%	53	1,651	0.090	24%
2011	6,994	323	3,373	0.341	48%	165	2,525	2.947	36%	84	1,256	0.509	18%	28	994	0.090	14%
2012	6,884	352	3,587	0.553	52%	143	2,317	3.041	34%	71	1,009	0.725	15%	31	853	0.137	12%
2013	6,004	350	3,446	0.487	57%	102	1,753	2.225	29%	101	1,288	0.611	21%	19	498	0.066	8%
95-13 Avg.	13,120	427	4,452	0.407	39%	238	2,965	2.891	22%	125	1,153	0.644	8%	196	5,801	0.090	47%

Detroit River																	
Year	Total Rod Hours	Walleye				Yellow Perch				Smallmouth Bass				Muskellunge			
		Trips	Rod Hours	CPUE	% Total Effort	Trips	Rod Hours	CPUE	% Total Effort	Trips	Rod Hours	CPUE	% Total Effort	Trips	Rod Hours	CPUE	% Total Effort
1995	4,297	558	3,817	0.482	89%	41	286	3.439	7%	28	149	0.494	3%	9	164	0.171	4%
1996	4,087	569	3,695	0.583	90%	30	218	3.611	5%	26	186	0.290	5%	9	133	0.248	3%
1997	4,867	625	4,255	0.646	87%	33	206	4.807	4%	44	330	0.691	7%	11	113	0.177	2%
1998	5,247	707	4,533	0.890	86%	32	272	2.696	5%	32	275	0.437	5%	25	150	0.133	3%
1999	3,861	622	3,560	0.450	92%	14	80	9.157	2%	17	122	0.327	3%	9	63	0.079	2%
2000	3,333	503	3,103	0.847	93%	15	758	4.053	23%	16	107	0.513	3%	8	21	0.578	1%
2001	4,036	531	3,654	0.690	91%	12	77	4.147	2%	23	177	0.582	4%	18	137	0.007	3%
2002	4,382	553	3,961	0.763	90%	15	175	2.671	4%	26	265	0.264	6%	17	234	0.141	5%
2003	3,733	463	3,317	0.597	89%	13	132	2.500	4%	4	32	0.527	1%	20	152	0.204	4%
2004	2,947	300	2,420	0.568	82%	4	28	2.237	1%	12	88	0.204	3%	16	191	0.257	6%
2005	2,299	246	2,086	0.891	91%	4	31	1.888	1%	8	50	0.263	2%	3	13	0.154	1%
2006	1,789	219	1,635	1.057	91%	7	64	4.094	4%	4	48	0.479	3%	1	22	0.091	1%
2007	1,418	172	1,294	0.997	91%	3	13	5.440	1%	5	34	0.706	2%	2	42	0.095	3%
2008	1,473	153	1,355	0.477	92%	14	68	4.317	5%	6	50	0.424	3%	0	0	0.000	0%
2009	3,064	365	2,704	0.604	88%	26	219	3.791	7%	7	70	0.357	2%	2	30	0.267	1%
2010	3,468	391	3,150	0.560	91%	19	233	4.495	7%	4	30	0.475	1%	1	24	0.000	1%
2011	2,832	364	2,519	0.509	89%	37	288	4.154	10%	9	61	0.706	2%	0	0	0.000	0%
2012	2,931	377	2,792	0.739	95%	16	129	2.750	4%	2	8	0.783	0%	0	0	0.000	0%
2013	2,830	289	2,378	0.656	84%	31	401	4.540	14%	8	62	0.422	2%	0	0	0.000	0%
95-13 Avg.	3,310	421	2,959	0.685	90%	19	193	3.936	6%	15	113	0.471	3%	8	78	0.137	2%

St Clair River																	
Year	Total Rod Hours	Walleye				Rainbow Trout				Chinook							
		Trips	Rod Hours	CPUE	% Total Effort	Trips	Rod Hours	CPUE	% Total Effort	Trips	Rod Hours	CPUE	% Total Effort				
1995	2,179	316	1,900	0.530	87%	15	205	0.010	9%	27	309	0.013	14%				
1996	2,070	318	1,984	0.562	96%	16	229	0.000	11%	36	516	0.033	25%				
1997	2,299	276	2,053	0.453	89%	21	220	0.009	10%	37	505	0.075	22%				
1998	2,852	311	2,372	0.503	83%	36	501	0.000	18%	67	733	0.046	26%				
1999	2,189	274	1,776	0.754	81%	33	321	0.012	15%	67	603	0.045	28%				
2000	1,330	165	1,017	0.460	76%	16	88	0.045	7%	31	227	0.084	17%				
2001	1,391	161	1,121	0.558	81%	20	244	0.021	18%	22	190	0.068	14%				
2002	841	120	807	0.514	96%	10	65	0.015	8%	17	182	0.044	22%				
2003	848	97	608	0.577	72%	12	144	0.014	17%	21	261	0.291	31%				
2004	1,078	84	627	0.519	58%	20	329	0.146	31%	11	128	0.016	12%				
2005	1,279	150	869	1.499	68%	14	262	0.031	20%	6	75	0.107	6%				
2006	1,428	175	1,222	1.313	86%	9	232	0.026	16%	0	0	0.000	0%				
2007	977	118	736	1.335	75%	3	72	0.167	7%	1	3	0.400	0%				
2008	964	123	703	0.815	73%	1	39	0.385	4%	2	5	0.632	0%				
2009	951	98	681	0.606	72%	3	35	0.000	4%	3	22	0.000	2%				
2010	1,077	68	689	0.523	64%	1	54	0.019	5%	1	6	0.000	1%				
2011	726	61	555	0.600	76%	1	30	0.033	4%	0	0	0.000	0%				
2012	821	70	638	0.618	78%	1	6	0.067	1%	0	0	0.000	0%				
2013	592	46	408	0.845	69%	1	12	0.000	2%	0	0	0.000	0%				
95-13 Avg.	1,363	160	1,093	0.715	78%	12	162	0.053	11%	18	198	0.098	12%				

^aCPUE represents observed catch divided by observed angling effort in rod-hours directed at that particular species.

6.2 Lake St. Clair Fall Trap Net Index

The Lake St. Clair Fall Trap Net Index is an adult fish community index that has been conducted annually since 1974. This program surveys the adult fish community at three sites in Lake St. Clair and information from this program provides a trend through time data series describing fish species composition, indices of abundance, and age group composition for each sampling location.

Single trap nets were set at three index fishing sites on Lake St. Clair as shown in Figure 6.2.1. The south shore site was Tremblay Creek, Mitchell's Bay was the north shore site, and the east shore site was St. Luke's. All three sites were fished in 1974; however from 1975 to 1985 only two sites, Tremblay Creek and Mitchell's Bay were fished. From 1986 to 2013, all three sites were fished each year, with the exception of 1999, 2002, and 2010 when no fishing occurred.

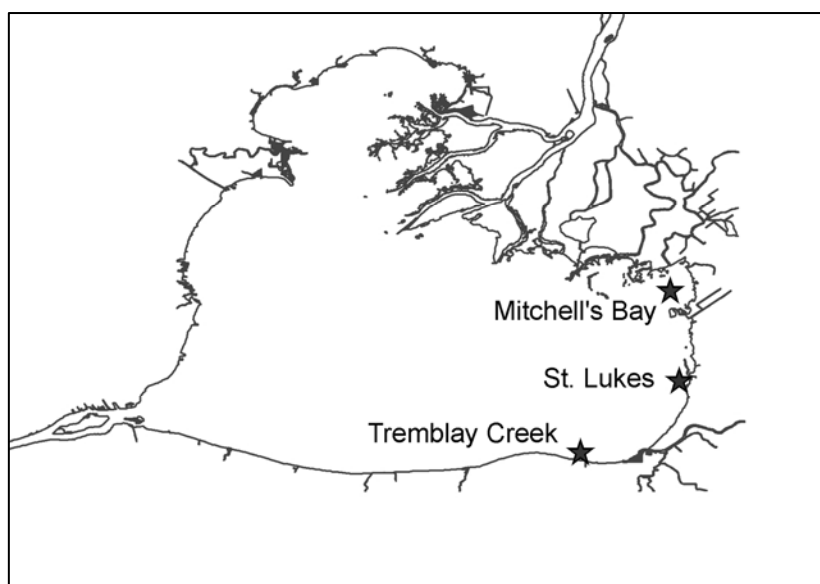


Figure 6.2.1 Lake St. Clair Fall Trap Net Index site locations.

Nets were set approximately 0.8 kilometres from the shoreline, with the leads set perpendicular to the shoreline. The water depth at the index fishing sites averaged three metres. The nets were approximately 20 ft. long, with an 8 ft. long front end and 40 ft. wings. The lead of the nets was 310 ft. long with 7 inch mesh. The wings and front had 4 inch mesh; the crib had 2 inch mesh. In 2013, the nets were set from September 27 to November 16. Lifts were scheduled for three times per week, however, in many cases nets were lifted less frequently than this due to rough water conditions.

At each sampling event, all nets were lifted, emptied of fish, and immediately reset. All fish were identified and fork length was measured. Selected species were sub-sampled in the field for later age assessment, or returned to the lab for more detailed examination and MOE (Ministry of Environment) contaminant sample preparation. Secchi disc depth and water temperature were recorded at each lift. Data for 2013 are preliminary.

In 2013, there was a total of 146 net nights of effort (Figure 6.2.2). There were 49.8 net nights of effort at Mitchell's Bay, 46.9 nights of effort at St. Luke's, and 49.8 nights of effort at Tremblay Creek. Three nights of effort were lost at St. Luke's due to net damage.

In total, across all survey years, 43 different species have been captured during the Lake St. Clair fall trap net index. In 2013, 26 species were caught. The most commonly caught species were Freshwater Drum (24% of the catch), White Perch (22%), and Channel Catfish (15%) (Figure 6.2.3). In addition to these species, Pumpkinseed and Bluegill were also common at the Mitchell's Bay site.

The total catch per net night at all three sites combined, was 13.4 fish in 2013; this was a decrease of 14% from 2012 (Figure 6.2.3). At Mitchell's Bay the catch rate was 10.6 fish per net night, a decrease of 45% from 2012 (Table 6.2.1). The St. Luke's catch rate increased 30% in 2013 to 17.2 fish per net night (Table 6.2.2). At Tremblay Creek the catch rate was 12.6 fish per net night, a decrease of 9% from 2012 (Table 6.2.3).

The average Walleye CPUE has decreased since the beginning of the survey period. From 1974 to 1990 the average Walleye CPUE was 5.3 fish per net night, this decreased to an average of 1.2 fish per net night from 1991-2012 at the Tremblay Creek and Mitchell's Bay sites combined (standard north and south sites, fished from 1974 to 2012). In 2013, the mean Walleye CPUE was 0.46 fish per net night (at all sites combined), and Walleye comprised 3.4% of the catch. The long term (1986 to 2012) average CPUE at all sites combined was 1.9 fish per net night and Walleye comprised 8% of the catch on average. In 2013, the highest catch rates of Walleye were at the St. Luke's site (Figure 6.2.4).

In 2013, the highest Yellow Perch catch rate was at Mitchell's Bay (0.18 fish per net night) (Figure 6.2.5). The overall 2013 catch rate (0.13 fish per net night) was less than the long term average (0.31 fish per net night), and Yellow Perch comprised only 1.0% of the catch compared to the 1986 to 2012 average value of 1.8%.

In 2013, the highest Smallmouth Bass catch rate was at St. Luke's (0.94 fish per net night) (Figure 6.2.6). The average 2013 Smallmouth Bass catch rate at all sites combined (0.46 fish per net night) was less than the long term average (0.60 fish per net night), however it was higher than the 2012 catch rate of 0.25 fish per net night. Smallmouth Bass comprised 3.5% of the total catch in 2013 which was similar to the long term average of 3.4%.

Table 6.2.1 Catch (numbers) per net night by species and year at the Mitchell's Bay site (A hyphen (-) indicates no fish were caught, a zero (0) indicates less than 0.05 fish per net night).

YEAR	CATCH PER NET NIGHT																										TOTAL							
	Freshwater Drum	Walleye	Yellow Perch	Black Crappie	Largemouth Bass	Smallmouth Bass	Bluegill	Pumpkinseed	Rock Bass	White Bass	White Perch	Burbot	Stoner Cat	Channel Catfish	Brown Bullhead	Common Carp	Shorthead Redhorse	Sucker	Golden Redhorse	Silver Redhorse	Spotted Sucker	Bigmouth Buffalo	White Sucker	Quillback Carpsucker	Mooneye	Muskellunge		Northern Pike	Gizzard Shad	Bowfin	Longnose Gar	Others*		
1974	0.3	0.7	0.0	7.0	0.5	0.1	2.3	16.0	2.0	0.1	-	-	-	1.9	0.8	1.3	-	-	-	-	-	-	-	0.1	0.0	-	-	0.7	0.1	2.1	-	0.2	36.0	
1975	0.7	2.6	0.2	16.9	0.3	0.1	1.9	2.9	0.2	0.3	-	-	-	2.1	1.5	2.7	-	-	-	-	-	-	-	0.1	0.1	-	-	0.6	0.0	0.9	0.0	0.3	34.3	
1976	4.3	4.3	0.1	8.5	0.6	0.3	2.8	5.4	2.4	0.7	-	-	-	1.9	2.1	10.6	0.0	-	-	0.2	-	-	-	0.4	0.4	-	-	1.6	0.0	1.5	-	0.2	48.5	
1977	0.2	1.4	0.0	7.0	0.2	0.2	0.2	0.9	0.3	0.1	-	-	-	1.8	1.6	1.7	0.2	-	-	0.0	-	-	-	0.3	0.1	-	-	0.4	0.1	0.9	-	-	18.8	
1978	2.8	2.3	0.1	7.2	0.1	0.5	0.2	2.2	0.3	0.3	-	-	-	0.9	1.9	4.5	0.0	0.0	0.0	-	-	-	-	0.1	0.1	-	-	0.5	0.1	0.7	-	0.1	24.6	
1979	5.9	3.4	0.1	2.3	0.2	0.4	0.0	1.4	0.7	0.4	-	-	-	1.9	0.9	1.0	0.4	0.2	0.1	0.2	-	-	-	0.2	0.3	0.0	-	0.6	-	0.9	0.0	0.1	36.4	
1980	3.9	3.3	0.1	3.0	0.1	0.4	0.1	3.9	0.5	0.2	-	-	-	1.7	1.4	6.8	0.1	-	-	0.2	-	-	-	0.1	0.1	-	-	0.6	0.1	1.1	-	0.0	27.5	
1981	6.9	2.6	0.6	3.5	0.0	0.3	-	3.3	0.3	0.1	0.1	-	-	0.6	1.2	5.4	0.4	0.0	-	0.0	-	-	-	0.0	0.1	-	-	0.6	-	3.5	-	-	29.6	
1982	4.8	2.0	0.6	4.5	0.1	0.6	0.2	4.1	0.3	0.4	0.1	-	-	1.1	0.9	4.8	0.2	0.0	0.0	0.0	-	-	-	0.0	0.1	-	-	0.4	0.0	1.2	-	-	26.4	
1983	3.0	2.6	0.7	11.9	0.2	0.3	0.7	7.7	1.2	0.2	0.1	-	-	0.4	0.5	0.5	0.4	0.2	0.1	0.0	0.0	-	-	0.0	0.0	-	-	0.5	0.0	0.8	-	-	31.8	
1984	2.8	1.7	0.1	13.7	0.3	0.7	0.5	2.9	0.5	0.2	0.1	-	-	0.6	0.3	0.9	0.2	0.1	0.1	0.1	0.0	-	-	0.0	0.0	-	-	0.3	0.1	0.4	-	-	26.3	
1985	4.4	3.2	0.3	19.5	0.5	1.2	0.3	10.6	0.7	0.6	0.1	-	-	1.9	2.3	1.6	1.1	0.1	0.1	0.1	0.0	-	-	0.3	0.1	-	-	0.7	0.0	2.3	-	-	51.4	
1986	5.4	2.0	0.1	6.2	0.1	0.2	0.1	1.2	0.5	0.5	0.9	0.0	-	2.7	0.2	1.2	0.5	0.1	0.3	0.0	0.0	-	-	0.1	0.3	-	-	0.3	0.0	0.3	-	0.1	23.1	
1987	4.4	2.4	0.3	1.6	0.3	0.3	0.2	1.3	0.8	0.1	0.4	-	-	0.6	1.5	1.2	0.1	0.0	0.1	-	-	-	-	0.1	0.0	0.1	-	1.1	0.1	0.8	-	0.0	17.7	
1988	3.4	1.6	0.1	0.4	0.0	0.0	1.0	0.8	0.4	0.2	0.2	-	-	0.2	1.1	1.0	0.1	0.1	0.1	-	-	-	-	0.0	0.1	0.0	-	0.6	-	0.7	-	-	12.0	
1989	2.5	0.8	0.2	1.6	0.2	0.2	0.8	0.6	0.3	0.0	-	-	-	0.8	0.1	0.8	0.3	0.1	0.1	0.1	-	-	-	0.1	0.1	-	-	0.6	-	0.2	-	-	10.1	
1990	4.4	0.9	0.0	1.4	0.1	0.3	1.2	0.6	0.3	0.0	0.4	-	-	1.6	0.5	1.0	0.5	0.0	0.1	0.1	0.1	-	-	0.2	0.0	-	-	0.1	0.0	0.3	-	-	14.1	
1991	1.6	0.3	0.0	2.5	0.4	0.7	1.5	0.7	0.2	0.1	-	-	-	0.8	0.1	0.5	0.2	0.1	0.0	-	-	-	-	-	0.0	-	-	0.0	0.1	0.1	-	0.0	10.3	
1992	4.4	1.2	0.4	3.3	0.0	0.7	0.2	1.1	1.1	0.1	0.3	-	-	0.9	0.1	0.6	0.4	0.1	0.1	0.1	0.0	-	-	0.1	0.1	-	-	0.4	-	0.1	-	-	15.7	
1993	5.6	2.4	0.4	0.6	0.7	0.2	1.2	2.0	0.7	0.1	0.3	-	-	0.9	0.2	0.7	0.2	0.1	0.6	0.0	0.0	-	-	0.0	0.0	-	-	0.7	0.1	0.4	-	-	18.2	
1994	2.9	0.9	1.3	1.9	0.3	0.2	3.4	1.7	1.0	0.7	-	-	-	1.2	0.4	0.6	0.5	0.1	0.2	0.1	0.2	-	-	0.0	0.8	-	-	0.3	0.0	0.2	-	-	18.6	
1995	0.4	0.2	0.4	0.5	0.3	0.0	7.2	1.5	0.1	-	0.1	-	-	0.4	0.2	0.4	0.1	-	-	-	0.1	-	-	-	-	-	-	0.5	-	0.1	-	-	12.6	
1996	6.2	1.4	0.5	1.5	0.2	0.1	2.3	2.2	0.6	0.1	1.1	-	-	0.4	0.1	0.6	0.3	0.2	0.2	0.2	-	-	-	0.0	0.2	-	-	0.7	-	0.2	-	-	19.6	
1997	2.7	0.5	0.1	0.8	0.3	0.3	1.2	3.1	1.1	0.1	0.3	-	-	1.0	0.2	0.5	0.2	0.1	0.1	0.1	0.1	-	-	0.0	0.0	-	-	0.4	0.0	0.1	-	-	13.0	
1998	0.8	0.5	0.7	0.2	0.1	0.2	0.0	0.4	1.5	0.1	0.2	-	-	0.2	-	0.3	0.3	0.1	0.1	0.1	0.1	-	-	0.3	-	-	0.0	0.4	0.1	0.1	-	0.0	6.5	
2000	4.6	1.8	0.4	1.0	1.1	0.9	0.8	1.4	0.6	0.3	0.5	-	-	1.2	0.1	1.1	0.4	0.1	0.1	1.7	0.2	0.1	-	-	0.4	-	-	2.8	0.1	0.5	-	-	21.8	
2001	3.6	0.6	0.2	0.2	0.2	0.1	0.9	1.2	0.2	0.1	0.4	-	-	0.4	0.4	0.6	0.3	-	0.2	0.1	0.1	-	-	0.2	0.0	0.1	-	0.1	0.9	0.4	-	-	11.1	
2003	3.3	0.6	0.1	0.1	0.2	0.1	0.2	0.3	0.4	0.1	0.7	-	-	0.5	0.1	0.1	0.1	-	0.5	0.1	-	-	-	-	0.3	0.0	0.1	0.3	0.3	0.0	0.0	0.0	8.4	
2004	2.2	0.3	0.9	0.2	0.4	0.3	0.4	3.2	0.9	0.1	0.6	-	-	0.9	0.1	0.5	0.2	0.1	0.4	0.1	0.0	-	-	-	0.2	-	-	0.0	0.3	0.0	0.2	-	-	12.3
2005	1.2	0.1	0.3	0.2	0.3	0.2	1.0	1.0	0.5	0.0	0.2	-	-	0.2	0.1	0.7	0.1	-	0.1	-	-	-	-	-	-	-	-	0.2	-	0.1	-	-	8.1	
2006	2.4	1.3	0.5	0.1	1.0	0.1	1.4	4.3	0.5	0.6	1.2	-	-	0.4	0.1	1.8	0.4	0.2	0.2	0.2	0.2	-	-	0.2	0.1	-	-	0.0	1.9	0.2	0.1	-	0.5	19.9
2007	0.7	0.2	0.1	-	0.6	0.0	2.3	3.1	0.9	0.1	0.1	-	-	0.4	0.0	0.5	0.0	0.0	0.0	0.0	0.1	-	-	0.1	-	-	-	0.4	0.0	0.0	-	-	0.0	9.9
2008	0.6	0.2	0.0	0.0	0.2	0.1	0.1	0.5	0.3	0.1	0.1	-	-	0.4	0.0	0.2	-	0.0	0.1	0.1	0.1	-	-	0.1	0.0	-	-	0.2	-	0.0	-	-	0.0	3.6
2009	1.1	0.5	0.2	0.0	0.3	0.2	0.3	1.4	0.7	0.0	0.3	-	-	0.3	0.0	0.2	0.0	0.0	-	-	0.0	-	-	0.1	-	-	-	0.0	0.2	-	-	0.1	6.2	
2011	0.3	0.1	0.4	0.0	0.2	0.1	0.3	3.1	0.3	0.4	0.8	-	-	1.4	0.0	0.2	0.0	0.1	0.1	0.1	0.0	0.0	-	-	0.0	-	-	0.0	0.1	0.0	0.4	-	0.1	8.5
2012	0.3	0.6	0.3	1.0	0.7	0.0	6.6	4.7	0.2	0.1	0.3	-	-	0.3	0.3	0.5	0.1	0.0	0.2	0.1	0.0	0.0	0.1	0.0	-	-	0.1	1.7	-	0.5	0.0	0.5	19.3	
2013	1.5	0.4	0.2	0.1	0.2	0.1	1.1	1.7	0.3	0.5	1.3	-	-	1.3	0.1	0.5	0.0	0.0	0.0	0.2	-	-	-	0.0	-	-	0.1	0.7	0.1	0.1	-	0.0	10.6	
Mean	2.9	1.4	0.3	3.6	0.3	0.3	1.2	2.8	0.6	0.2	0.4	0.0	-	1.0	0.6	1.6	0.2	0.1	0.2	0.1	0.2	0.1	0.0	0.1	0.1	0.0	0.0	0.6	0.1	0.6	0.0	0.1	19.5	

*Others include: Goldfish, Rainbow Trout, Silver Lamprey, Lake Whitefish, Coho Salmon, and Yellow Bullhead.

Table 6.2.2 Catch (numbers) per net night by species and year at the St. Luke's site (A hyphen (-) indicates no fish were caught, a zero (0) indicates less than 0.05 fish per net night).

CATCH PER NET NIGHT																																				
YEAR	Freshwater Drum	Walleye	Yellow Perch	Black Crappie	Largemouth Bass	Smallmouth Bass	Bluegill	Pumpkinseed	Rock Bass	White Bass	White Perch	Burbot	Stonecat	Channel Catfish	Brown Bullhead	Common Carp	Shorthead Redhorse	Sucker	Golden Redhorse	Silver Redhorse	Spotted Sucker	Bigmouth Buffalo	White Sucker	Quillback Carpsucker	Mooneye	Muskellunge	Northern Pike	Gizzard Shad	Bowfin	Longnose Gar	Others*	TOTAL				
1974	2.6	2.5	0.1	1.7	-	0.2	-	1.3	1.8	1.5	-	-	0.0	3.2	0.0	0.3	-	-	-	-	-	-	0.2	0.4	-	0.0	0.4	0.1	-	-	-	0.3	16.7			
1986	22.0	6.4	0.7	0.2	0.0	0.8	-	0.1	1.2	3.5	14.6	-	-	4.5	-	0.7	0.9	0.2	0.8	-	-	-	0.4	1.3	-	0.0	0.2	-	-	-	-	-	58.6			
1987	6.8	7.9	0.3	0.1	0.0	0.6	-	-	1.1	3.6	11.0	-	-	4.2	-	0.4	0.4	0.2	0.5	-	-	-	0.3	0.7	0.0	0.1	0.3	-	-	0.0	-	-	38.4			
1988	15.2	5.3	0.0	0.1	0.0	1.4	0.0	0.1	0.8	4.0	7.8	0.0	-	3.7	0.0	0.8	0.7	0.0	0.5	-	-	-	0.1	0.7	0.1	0.0	1.1	0.0	-	0.1	0.1	0.1	42.7			
1989	9.8	3.7	-	0.0	0.0	1.0	-	-	0.2	1.3	3.2	0.0	-	5.5	-	0.5	0.2	0.3	0.3	-	-	0.1	0.0	0.7	-	0.0	0.3	-	-	-	-	-	27.2			
1990	7.9	3.1	0.4	-	0.0	0.6	-	-	0.3	2.0	5.0	0.0	-	8.1	0.0	1.0	1.0	0.3	1.8	-	-	-	0.3	1.5	-	0.1	0.5	0.0	0.0	-	-	-	34.0			
1991	14.1	1.9	0.2	-	-	2.9	-	-	0.0	0.6	2.5	-	-	4.3	-	0.7	0.5	0.1	0.5	-	-	-	0.1	0.8	0.0	-	0.2	-	-	0.0	0.0	0.0	30.0			
1992	7.2	1.0	0.3	-	0.0	0.1	0.0	0.1	0.5	0.1	0.9	0.0	-	1.8	0.0	1.5	0.4	-	0.0	-	-	-	0.1	0.5	-	-	0.1	-	-	0.0	-	-	14.8			
1993	12.4	2.3	0.5	0.3	0.2	0.3	0.6	0.3	1.5	0.3	4.0	0.1	-	0.8	0.4	0.9	0.8	0.0	0.3	0.0	-	0.0	1.2	-	0.0	0.0	0.0	0.0	-	-	-	-	26.7			
1994	12.0	3.9	0.4	-	0.1	4.1	0.1	0.1	1.1	0.6	1.0	0.1	-	6.3	0.1	0.7	0.7	0.1	0.4	-	0.0	0.1	0.9	-	0.0	0.2	-	0.0	-	0.0	-	0.0	32.7			
1995	16.0	1.0	0.4	0.0	0.1	1.1	0.2	0.2	1.2	0.6	1.7	0.0	0.1	1.2	0.0	0.5	0.7	0.2	0.5	-	-	0.0	0.1	1.0	-	0.0	0.2	0.0	-	0.0	-	0.0	26.9			
1996	11.7	1.5	0.0	0.2	0.2	0.5	0.1	0.2	1.3	0.7	3.2	0.0	-	3.8	0.0	1.4	0.4	0.4	0.3	-	0.0	0.0	1.8	-	0.1	0.1	0.0	0.0	0.0	0.1	-	0.1	28.1			
1997	7.1	1.4	0.3	0.1	0.2	0.9	0.0	0.5	3.4	0.6	1.0	0.0	-	5.4	-	0.5	0.2	0.6	0.7	-	0.0	-	2.1	-	0.1	0.2	-	-	0.1	0.1	0.1	0.1	25.4			
1998	5.8	0.4	0.7	-	-	0.3	-	0.3	1.6	0.1	1.6	0.0	-	2.3	-	0.1	0.1	0.2	0.1	-	-	-	0.1	0.3	-	0.0	0.1	-	-	0.0	-	0.0	-	14.3		
2000	11.6	1.3	0.4	-	0.0	1.0	0.0	0.0	0.1	0.5	2.6	-	-	4.6	0.0	0.6	0.4	0.0	1.1	-	-	-	0.2	0.8	-	-	0.2	0.0	0.1	-	0.0	0.0	25.4			
2001	8.9	0.7	0.1	-	0.0	0.3	-	0.0	0.2	0.7	1.8	-	-	4.6	-	0.4	0.4	-	0.4	-	-	-	-	0.5	-	0.1	0.1	0.0	-	-	-	0.0	19.1			
2003	6.9	0.7	-	-	0.0	0.5	-	-	0.1	1.0	1.9	-	-	8.8	0.0	0.4	0.1	0.0	0.4	-	-	-	-	2.9	-	0.1	0.1	0.0	-	0.0	0.0	0.0	24.0			
2004	5.5	0.3	0.1	0.1	0.1	0.2	-	0.2	0.8	0.5	5.6	-	-	1.8	0.0	0.4	0.3	0.1	0.4	-	-	0.1	0.4	-	0.4	-	0.0	-	0.0	0.1	0.0	17.0				
2005	4.2	0.2	0.1	0.0	0.0	0.1	-	0.0	0.2	0.5	3.3	-	-	1.0	0.0	0.6	0.1	0.1	0.2	-	-	0.2	-	2.1	-	0.1	-	-	0.2	0.0	0.2	13.3				
2006	10.6	1.1	1.1	-	0.0	0.3	0.1	0.1	1.1	0.5	3.9	-	-	2.3	-	0.9	0.5	0.1	0.0	-	-	-	-	2.7	-	0.0	-	-	0.1	0.2	25.7	-	0.1	0.2	25.7	
2007	5.9	0.1	0.1	-	0.1	0.3	0.2	0.1	0.3	0.3	2.7	-	-	1.6	0.0	0.5	0.1	0.0	0.1	-	-	0.0	-	2.2	-	0.0	0.1	-	-	0.1	0.1	15.0	-	0.1	0.1	15.0
2008	4.0	0.6	0.1	-	0.0	0.1	0.0	-	0.5	0.5	1.8	-	-	2.2	-	0.4	0.0	0.0	0.3	-	-	0.0	-	1.7	-	0.0	0.1	0.0	-	0.1	0.1	12.8	-	0.1	0.0	12.8
2009	7.7	0.9	0.0	-	0.0	0.2	0.0	0.0	0.2	0.8	3.5	-	-	2.8	0.0	1.0	0.1	0.4	0.2	-	-	-	-	3.1	-	0.0	-	0.0	-	0.1	0.1	21.4	-	0.1	0.0	21.4
2011	7.6	0.9	0.1	-	0.1	0.4	-	0.1	0.3	1.7	4.3	-	-	2.6	0.0	0.3	0.0	0.2	0.2	-	-	0.0	-	1.8	0.0	-	-	0.1	-	0.1	0.0	20.9	-	0.1	0.0	20.9
2012	4.1	0.3	0.2	-	0.0	0.3	0.1	0.0	0.1	0.7	2.7	-	-	3.9	0.0	0.1	0.0	0.0	0.0	-	-	-	0.4	-	0.4	-	0.0	0.0	0.0	-	0.0	0.0	-	0.0	13.3	
2013	7.0	0.6	0.1	-	0.1	0.9	0.0	0.1	0.2	0.5	3.2	-	-	2.6	0.0	0.3	0.1	-	0.0	-	-	-	-	0.9	-	0.1	0.3	-	-	0.1	0.0	17.2	-	0.1	0.0	17.2
Mean	9.0	1.9	0.3	0.2	0.1	0.8	0.1	0.2	0.8	1.1	3.8	0.0	0.0	3.6	0.1	0.6	0.4	0.2	0.4	0.0	0.0	0.0	0.1	1.3	0.0	0.0	0.2	0.0	0.0	0.1	0.1	0.1	24.7			

*Others include: Lake Whitefish, Longnose Sucker, Rainbow Trout, Silver Lamprey, Flathead Catfish, Goldeye, Yellow Bullhead, and Alewife

Table 6.2.3 Catch (numbers) per net night by species and year at the Tremblay Creek site (A hyphen (-) indicates no fish were caught, a zero (0) indicates less than 0.05 fish per net night).

YEAR	CATCH PER NET NIGHT																																	
	Freshwater Drum	Walleye	Yellow Perch	Black Crappie	Largemouth Bass	Smallmouth Bass	Bluegill	Pumpkinseed	Rock Bass	White Bass	White Perch	Burbot	Stonecat	Channel Catfish	Brown Bullhead	Common Carp	Shorthead Redhorse	Sucker	Golden Redhorse	Silver Redhorse	Spotted Sucker	Bigmouth Buffalo	White Sucker	Quillback Carpsucker	Mooneye	Muskellunge	Northern Pike	Gizzard Shad	Bowfin	Longnose Gar	Others*	TOTAL		
1974	12.9	6.3	1.4	0.0	-	0.4	0.0	0.0	2.8	1.6	-	-	0.9	2.6	-	0.1	-	-	-	-	-	-	0.7	0.2	0.1	-	-	0.0	-	-	-	1.2	31.3	
1975	2.9	2.1	0.1	-	-	0.2	-	-	1.3	0.5	-	-	-	2.9	-	0.1	-	-	-	-	-	-	0.1	0.2	0.0	-	-	-	0.1	-	-	0.2	10.8	
1976	6.8	3.8	0.2	-	-	0.2	-	-	0.9	0.8	-	-	0.1	0.8	-	0.4	0.5	-	0.2	0.4	-	-	0.1	0.1	0.1	-	-	-	0.1	-	-	0.1	15.0	
1977	39.1	7.1	1.0	-	-	0.6	-	-	2.8	8.2	0.0	-	0.1	22.9	-	0.7	1.1	0.3	0.4	0.0	0.0	0.0	0.8	1.6	0.1	0.1	0.1	0.0	0.4	-	-	-	0.1	87.3
1978	16.3	9.5	1.8	0.0	0.0	0.8	0.0	0.0	2.7	3.1	0.0	0.0	0.1	4.5	0.0	0.2	0.9	0.3	0.0	0.0	0.0	0.0	0.6	0.4	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	41.3	
1979	11.3	12.8	0.1	0.0	-	0.4	-	-	0.8	2.9	-	-	0.0	4.3	-	0.9	1.7	0.3	0.1	0.0	0.0	0.0	0.7	0.9	0.1	-	0.0	0.1	-	-	-	0.0	37.5	
1980	30.2	13.2	0.5	0.1	-	0.2	-	-	1.2	2.2	0.1	-	0.0	1.7	-	0.8	1.0	0.2	0.4	0.0	0.0	0.0	0.6	1.5	0.0	0.1	-	0.0	-	-	-	-	54.1	
1981	26.9	7.8	3.2	0.0	-	0.2	-	-	3.5	4.2	1.6	0.0	0.2	2.6	0.0	0.4	1.0	0.2	0.1	0.1	0.1	-	1.2	0.5	-	-	0.0	-	-	-	-	-	53.7	
1982	3.0	9.1	1.4	0.1	-	0.2	-	-	3.1	1.5	2.5	-	0.1	1.3	-	0.3	0.9	0.1	0.1	0.1	0.1	-	0.6	0.1	-	-	0.0	-	-	0.0	-	-	24.3	
1983	8.5	13.4	0.1	0.1	-	0.1	-	-	2.3	3.4	7.9	0.0	0.1	0.9	-	0.3	1.0	0.2	0.3	0.0	0.0	0.0	0.9	1.1	-	-	0.0	0.1	1.9	-	-	0.1	42.3	
1984	3.2	4.4	1.6	0.0	-	0.3	-	-	2.6	0.9	9.0	0.0	0.1	2.4	-	0.1	0.2	0.1	0.2	0.0	0.0	0.0	0.6	0.2	0.0	0.0	0.0	0.5	-	-	-	-	26.5	
1985	33.2	15.6	1.0	-	-	0.4	0.0	-	1.2	2.2	10.6	0.1	-	1.9	0.0	0.5	0.4	0.1	0.6	0.0	0.0	-	0.6	0.2	0.0	0.0	0.0	0.0	0.2	-	-	-	0.1	70.3
1986	13.6	13.4	0.5	0.1	-	0.1	-	-	1.3	2.2	22.1	0.2	0.1	3.8	-	1.0	0.5	0.1	0.4	0.0	0.0	-	0.7	1.1	-	0.0	0.1	0.1	-	-	-	-	0.1	61.4
1987	7.2	13.5	0.6	0.0	-	0.1	-	-	1.3	2.7	19.5	0.1	0.1	1.3	0.0	0.4	0.8	0.1	0.2	0.1	0.2	-	0.5	0.4	0.0	-	0.1	0.0	-	-	-	-	48.7	
1988	2.3	6.7	0.2	-	0.0	0.9	-	-	1.5	0.9	8.0	0.1	0.0	1.3	-	0.3	1.1	0.2	0.2	0.0	0.0	-	0.4	0.5	0.0	0.0	0.1	-	-	0.1	-	0.1	24.9	
1989	3.0	2.4	0.2	-	0.0	1.6	-	-	1.1	0.3	3.2	0.1	-	2.8	-	0.1	0.3	0.0	0.0	0.0	0.0	-	0.1	0.3	0.0	0.0	0.0	0.1	-	-	-	-	16.0	
1990	3.2	5.8	0.2	-	-	0.9	-	0.0	0.9	0.6	8.2	-	-	2.3	-	0.8	0.7	0.2	1.2	0.0	0.0	-	0.0	0.2	1.1	0.1	0.1	0.0	0.1	-	-	-	26.7	
1991	2.1	3.4	0.1	0.0	0.0	0.5	0.0	0.0	0.1	0.1	4.5	0.0	0.0	2.9	0.0	0.4	0.4	0.3	0.8	0.0	0.0	-	0.0	0.6	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	16.5	
1992	2.6	1.8	0.1	-	-	0.3	-	-	0.1	0.4	1.6	-	0.0	2.5	-	0.6	0.6	0.0	0.9	0.0	0.0	-	0.0	0.6	0.1	0.1	-	0.0	-	-	-	-	14.9	
1993	2.8	3.2	0.2	0.0	-	0.4	-	0.0	1.1	0.3	2.4	-	-	1.8	0.1	0.4	0.6	0.1	1.0	0.0	0.0	-	0.1	0.2	0.1	0.0	0.0	0.1	-	-	-	-	12.5	
1994	3.0	2.0	0.1	-	0.1	0.7	0.0	-	1.2	0.0	0.7	-	-	2.6	-	0.2	0.6	0.1	0.9	0.0	0.0	-	0.0	0.2	-	0.1	0.0	0.0	-	-	-	-	6.1	
1995	1.5	0.5	0.4	-	0.1	0.1	0.0	0.2	0.2	0.0	0.2	0.0	-	1.3	0.0	0.5	0.5	0.0	0.3	0.0	0.0	-	-	-	-	-	0.0	0.2	-	-	-	-	26.7	
1996	8.7	3.2	0.6	0.0	0.0	0.9	-	0.0	1.4	0.4	4.3	-	-	5.0	0.1	0.7	0.5	0.2	0.2	0.0	0.0	-	0.0	0.0	0.1	-	0.0	0.1	-	-	-	-	18.8	
1997	3.1	1.5	0.1	0.0	0.0	1.6	-	0.0	5.3	0.1	2.9	-	3.2	0.1	0.1	0.3	0.1	0.1	0.1	0.0	0.0	-	0.0	0.0	0.2	0.0	0.1	-	-	-	-	-	11.8	
1998	2.2	0.8	0.2	-	0.0	1.8	-	-	1.1	0.1	0.7	0.1	-	3.8	-	0.0	0.3	-	0.0	0.0	0.0	-	0.1	0.1	-	0.0	0.1	0.4	-	-	-	0.1	18.8	
2000	2.7	2.0	0.0	-	0.0	1.4	-	-	0.3	1.5	4.1	0.1	-	4.2	-	0.2	0.8	0.0	0.0	0.0	-	-	0.2	0.0	0.1	0.6	0.9	-	-	-	-	0.0	18.8	
2001	2.1	1.3	0.9	-	-	1.7	-	-	0.6	0.4	5.4	-	-	6.1	-	0.3	0.4	-	-	-	-	-	0.0	0.5	-	0.1	0.2	-	-	-	-	-	19.8	
2003	2.9	1.0	0.2	-	0.0	1.6	-	-	1.0	0.5	6.8	-	-	7.3	-	0.0	0.3	-	0.1	-	-	-	0.0	0.2	0.0	0.1	0.2	0.1	-	-	-	0.3	22.4	
2004	1.2	0.7	0.1	-	0.1	0.6	-	0.0	0.9	0.2	2.9	-	-	3.2	-	0.1	0.3	0.1	0.1	-	-	-	-	0.2	-	0.1	0.1	0.1	-	-	0.0	0.1	11.0	
2005	1.3	1.4	0.4	-	-	1.3	-	-	1.0	0.2	2.5	-	-	3.2	-	0.2	0.2	-	-	-	-	-	-	0.2	-	0.1	0.1	0.0	-	-	-	-	12.0	
2006	9.9	3.7	0.5	-	0.1	0.9	-	0.0	0.3	0.7	3.8	-	-	11.3	-	0.8	0.4	0.1	0.3	0.0	0.0	-	2.2	0.0	0.2	0.1	0.4	-	-	-	-	0.2	36.1	
2007	5.1	0.5	0.5	-	-	0.6	-	-	0.5	0.1	1.7	-	-	3.6	-	0.1	0.3	0.1	-	0.0	0.0	-	0.0	-	0.1	0.0	0.1	0.5	-	-	0.0	0.1	14.0	
2008	4.0	0.5	0.7	-	-	0.9	-	-	0.8	0.6	2.7	-	-	3.7	-	0.1	0.3	0.1	0.0	0.0	0.0	-	0.1	-	0.2	-	0.1	0.1	-	-	-	0.0	15.1	
2009	2.9	0.7	1.0	-	-	0.7	-	0.0	0.5	0.4	1.7	-	-	6.7	0.0	0.0	0.1	0.1	0.1	-	-	-	-	0.2	-	0.0	0.1	0.0	-	-	-	-	0.1	15.4
2011	4.1	1.1	0.4	0.0	-	0.5	0.0	0.1	0.4	1.9	4.5	-	-	4.1	-	0.2	0.3	0.2	0.2	-	-	-	-	1.2	0.0	0.2	0.0	0.1	-	-	-	0.0	19.6	
2012	2.3	0.9	-	-	-	0.4	-	-	0.4	0.6	1.4	-	-	4.7	-	0.0	0.2	0.3	0.7	-	-	-	0.9	-	0.4	0.2	0.2	-	-	-	0.0	0.1	13.8	
2013	1.4	0.4	0.1	-	0.0	0.4	-	-	0.1	1.5	4.3	-	-	2.3	-	0.1	0.0	0.1	0.4	-	-	-	-	0.9	-	0.1	0.2	0.3	-	0.0	0.1	0.0	12.6	
Mean	7.8	4.8	0.6	0.0	0.0	0.7	0.0	0.0	1.3	1.3	4.6	0.1	0.1	3.9	0.0	0.3	0.6	0.1	0.3	-	-	0.0	0.4	0.6	0.1	0.1	0.1	0.1	0.2	0.0	0.0	0.1	27.1	

*Others include: Goldfish, Sauger, Lake Sturgeon, Rainbow Trout, Silver Lamprey, Lake Whitefish, Alewife, and Flathead Catfish.

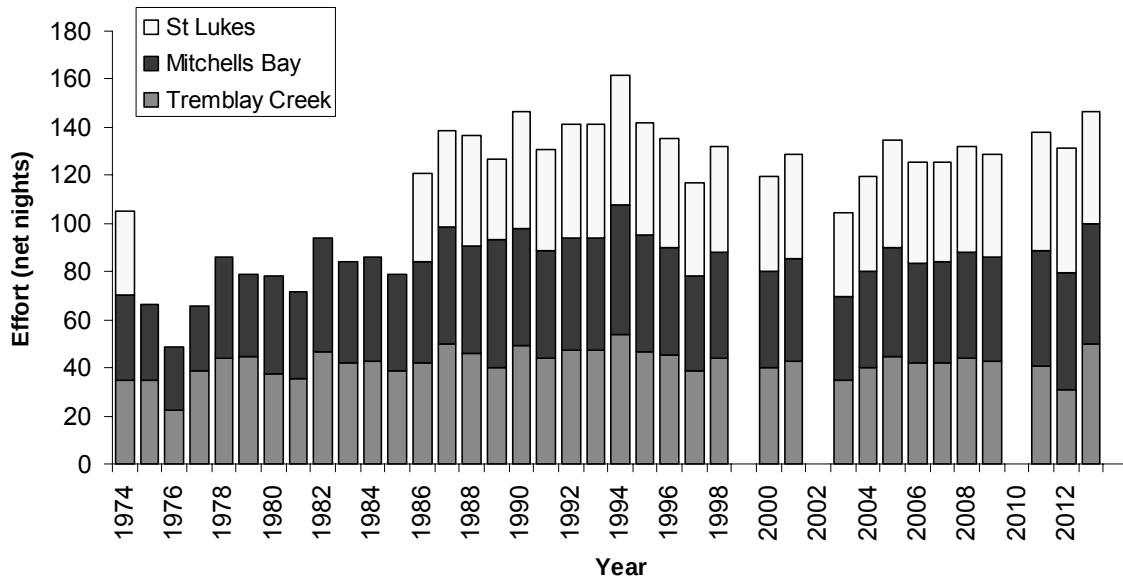


Figure 6.2.2 Total effort for the Lake St. Clair Fall Trap Net Index by site, 1974 to 2013 (St. Luke's was not fished from 1975 to 1985).

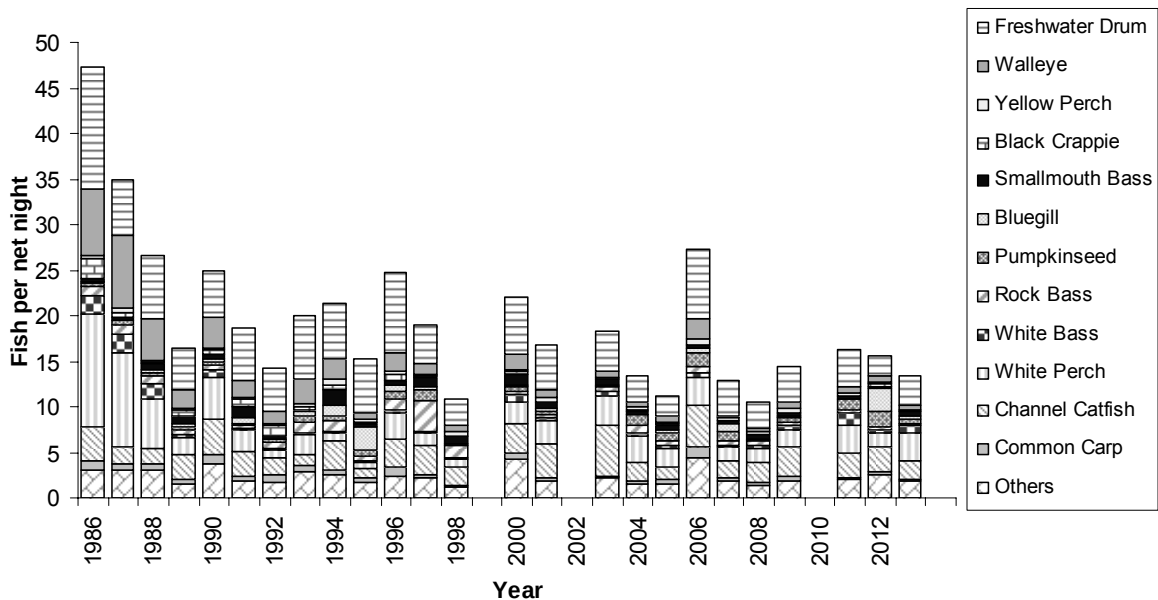


Figure 6.2.3 Catch per net night by species for all sites combined (Mitchell's Bay, St. Luke's, Tremblay Creek), 1986 to 2013.

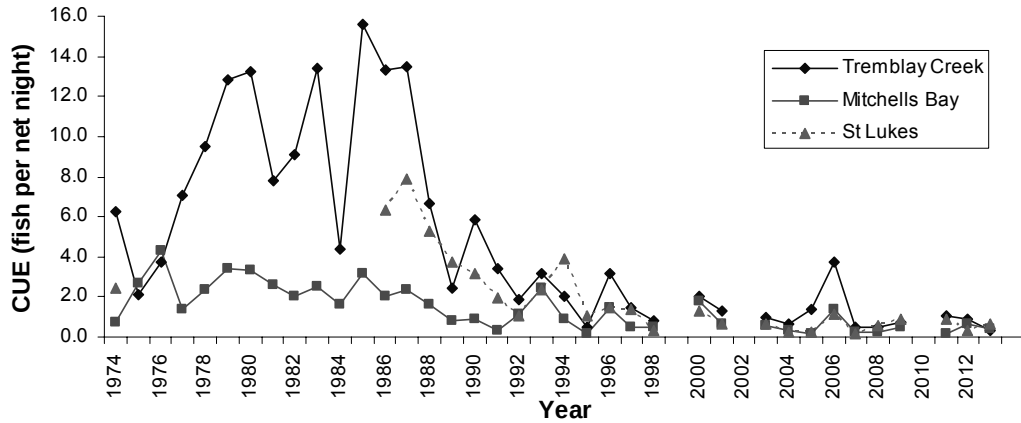


Figure 6.2.4 Catch per net night of Walleye at Tremblay Creek, Mitchell's Bay and St. Luke's sites, 1974 to 2013.

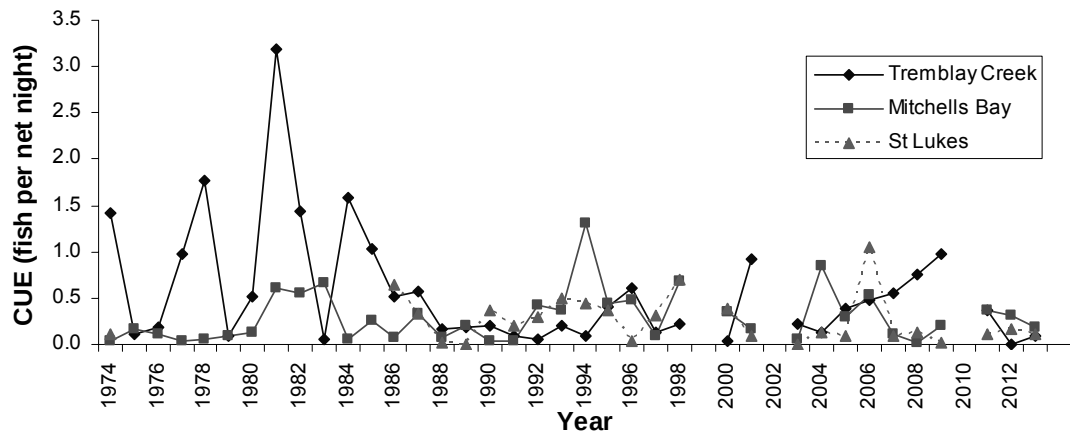


Figure 6.2.5 Catch per net night of Yellow Perch at Tremblay Creek, Mitchell's Bay and St. Luke's sites, 1974 to 2013.

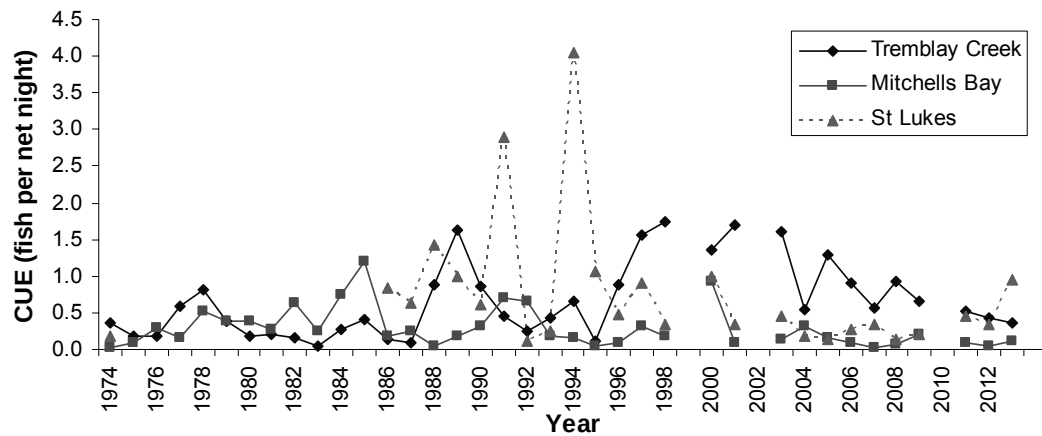


Figure 6.2.6 Catch per net night of Smallmouth Bass at Tremblay Creek, Mitchell's Bay and St. Luke's sites, 1974 to 2013.

6.3 Lake St. Clair Nearshore Index Fishing Program

Lake St. Clair is among the most biologically diverse freshwater ecosystems in Canada. The lake is host to an abundant and diverse population of warm water fish species, and it provides critical spawning and nursery areas for many species. These species include several economically important species and some species at risk.

Surveys of young-of-the-year (YOY) fish in Lake St. Clair have been carried out by the Ontario Ministry of Natural Resources intermittently since 1979. Recently the survey has been completed each year from 2007 to 2013. The primary objective of the Lake St. Clair Nearshore Index Fishing Program is to assess the nearshore fish community along the southern shoreline of the lake. The survey is also used to assess the abundance of current year classes for target sport and commercial fish species. In addition the program has the ability to track and identify invasive species and listed species at risk.

For this study, young-of-year fish from eight fixed sites (Figure 6.3.1) along the Canadian shores of Lake St. Clair are captured over a nine week time period, from June 1 to July 31, 2013. The survey is carried out using a small mesh (Ace 24 lb. 1/8" – 3.2 mm) size beach seine that is dragged twice for 30 meters at each site. Catches are standardized across species and sampling years using the catch-per-unit effort (CPUE) statistic (defined as: number of fish caught/seine haul). Species richness and the Shannon-Wiener index are used as measures of biodiversity.

A total of 142 seine hauls were performed over the 2013 sampling period. The nearshore habitats of Lake St. Clair vary between sample sites and include a range of habitats from open sandy areas to areas with dense vegetation. For the 2013 sample year, mean site depth fished was 0.50 m, ranging from 0.4 to 0.7 m. Mean secchi disk transparency depths ranged from 0.2 m to 0.7 m and averaged 0.4 m across the sites. On average, 2013 had both cooler air and water temperatures than 2012. Ambient air temperature averaged throughout the 2013 survey period was 23°C, and ranged from 21.3°C to 24.2°C. Average water temperature of Lake St. Clair among the eight sites during the 2013 study period was 23°C, and ranged from 22.3°C to 24.1°C.

The survey nets captured a total of 37,668 fish, which is a 66% increase from 2012. The survey represented 54 different species, from 15 families (Table 6.3.1). Of the total catch lakewide, 84% (31,691 fish) were young-of-year fishes. Gizzard Shad, larval Cyprinids, and Sand Shiners were the predominant species caught throughout the sampling period. Species richness varied from 13 to 33, but the lakewide total was 54. Shannon-Wiener diversity scores ranged from 0.87 to 2.26 with a lakewide average of 2.24 which is less than expected (3.99) based on species richness. Average lakewide CPUE was 265 fish/seine haul and increase of 46% over the 2012 CPUE. Six types of invasive species were captured throughout the sample period; Alewife, Goldfish, Common Carp, White Perch, and Round and Tubenose Goby, all of which have been previously reported in the waters of Lake St. Clair. Alewife have not been observed in the Lake St. Clair Young-of-Year Index Survey since 2005.

Catch of sport fish was moderate, with 156 YOY Yellow Perch, and 3 YOY Walleye caught. The 2013 sampling season produced 1 YOY Muskellunge, a species caught sporadically and in relatively small numbers throughout the history of this survey. Abundance of YOY Smallmouth and Largemouth Bass was relatively low, when combined, accounted for only 1% of the total YOY catch. One species at risk, the endangered Pugnose Shiner (*Notropis anogenus*), was captured at the St. Luke's site.

Historically, this program has not captured high numbers of YOY Walleye, Yellow Perch or Muskellunge even in years of known strong year classes. Due to the temporal patchiness of the dataset, clear relationships between littoral zone YOY sport fish abundance and recruitment indices have not been apparent. Future work will address this information gap and provide a predictive tool for assessing year class strength of sport fish on Lake St. Clair. Overall, the sporadic nature of historical sampling in the Lake St. Clair Young-of-Year Index Survey has prevented reporting on trends in the dynamics of the nearshore fish community. Ongoing annual sampling will enable us to

quantify observed changes in this ecosystem and will be a valuable tool for assessing recruitment of economically important species as well as the state of the forage fish base.

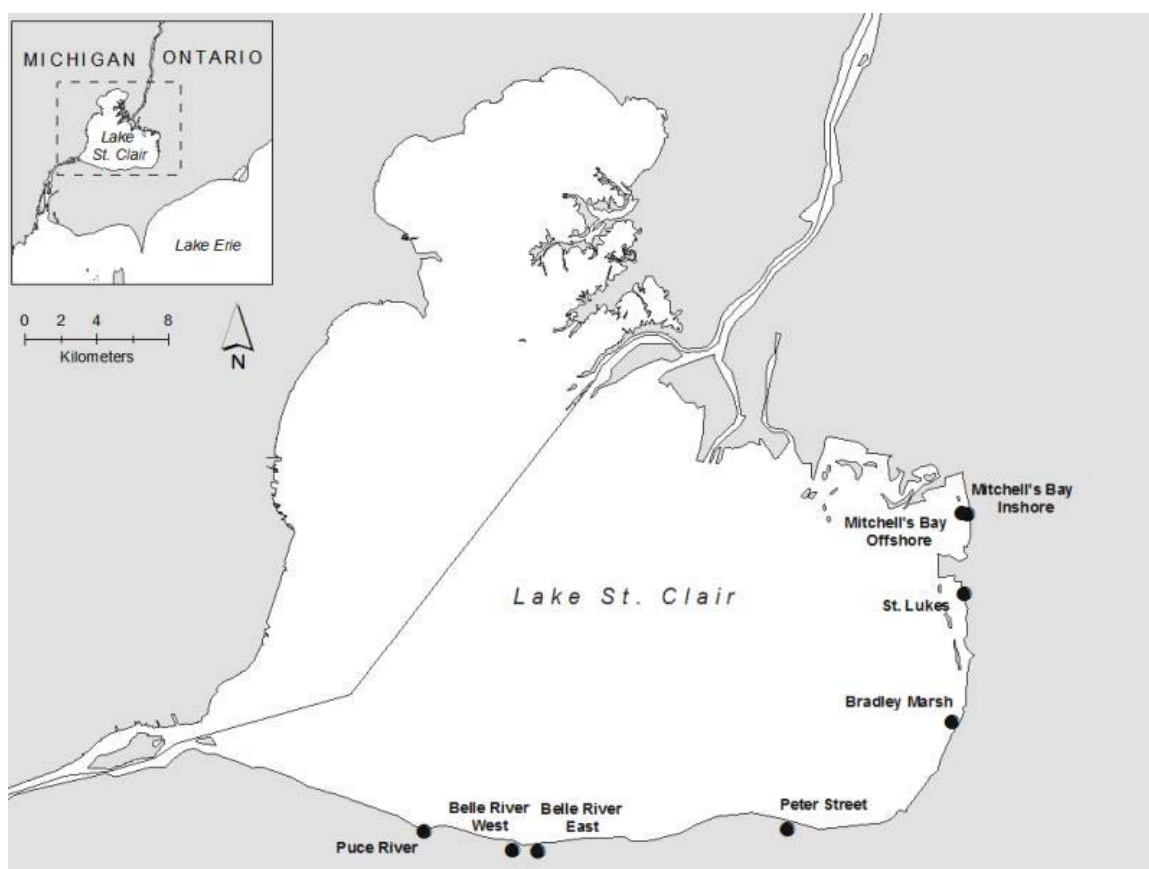


Figure 6.3.1 Location of eight fixed sites on Lake St. Clair of the Lake St. Clair Nearshore Index Fishing Program.

Table 6.3.1 Catch (numbers) summary for all species caught in Lake St. Clair, 2013.

Common Name	Scientific Name	Trophic Guild	Total YOY	Total Adult	Total Catch	Total CPUE (#fish/seine haul)	Relative Abundance (%)
Gizzard Shad	<i>Dorosoma cepedianum</i>	Planktivore	13,695	224	13,919	98.02	37.0
Minnow spp	<i>Cyprinid spp</i>	-	6,053	200	6,253	44.04	16.6
Sand Shiner	<i>Notropis stramineus</i>	Planktivore	812	2,254	3,066	21.59	8.1
Brook Silverside	<i>Labidesthes sicculus</i>	Planktivore	2,565	245	2,810	19.79	7.5
Spottail Shiner	<i>Notropis hudsonius</i>	Planktivore	1,608	412	2,020	14.23	5.4
White Perch	<i>Morone americana</i>	Benthivore	1,543	86	1,629	11.47	4.3
Sucker spp	<i>Catostomid spp</i>	-	1,490	4	1,494	10.52	4.0
Temperate Bass spp	<i>Percichthyid spp</i>	Benthivore	1,282	166	1,282	9.03	3.4
Bluegill	<i>Lepomis macrochirus</i>	Benthivore	703	39	711	6.12	2.3
Logperch	<i>Percina caprodes</i>	Benthivore	39	711	750	5.28	2.0
Spotfin Shiner	<i>Cyprinella spiloptera</i>	Planktivore	9	489	498	3.51	1.3
Mimic Shiner	<i>Notropis volucellus</i>	Planktivore	151	261	412	2.90	1.1
Bluntnose Shiner	<i>Pimephales notatus</i>	Planktivore	43	291	334	2.35	0.9
Banded Killifish	<i>Fundulus diaphanus</i>	Benthivore	71	253	324	2.28	0.9
Unidentified		-	317	317	317	2.23	0.8
Yellow Perch	<i>Perca flavescens</i>	Piscivore	156	148	304	2.14	0.8
White Bass	<i>Morone chrysops</i>	Piscivore	292	4	296	2.08	0.8
Sunfish spp	<i>Centrarchid spp</i>	-	253	253	253	1.78	0.7
Largemouth Bass	<i>Micropterus salmoides</i>	Piscivore	232	5	237	1.67	0.6
Emerald Shiner	<i>Notropis atherinoides</i>	Planktivore	158	72	230	1.62	0.6
Smallmouth Bass	<i>Micropterus dolomieu</i>	Piscivore	74	74	74	0.52	0.2
Round Goby	<i>Neogobius melanostomus</i>	Benthivore	14	33	47	0.33	0.1
Tubenose Goby	<i>Proterorhinus marmoratus</i>	Benthivore	30	13	43	0.30	0.1
Channel Catfish	<i>Ictalurus punctatus</i>	Benthivore	24	12	36	0.25	0.1
Goldfish	<i>Carassius auratus</i>	Benthivore	20	2	22	0.15	0.1
Common Carp	<i>Cyprinus carpio</i>	Benthivore	16	3	19	0.13	0.1
Ghost Shiner	<i>Notropis buchanani</i>	Planktivore	4	15	19	0.13	0.1
Longnose Gar	<i>Lepisosteus osseus</i>	Piscivore	2	1	1	0.01	<0.01
Herring spp	<i>Clupeidae spp</i>	-	2	2	2	0.01	<0.01
Alewife	<i>Alosa pseudoharengus</i>	Planktivore	2	1	3	0.02	<0.01
Muskelunge	<i>Esox masquinongy</i>	Piscivore	1	1	1	0.01	<0.01
Central Mudminnow	<i>Umbra limi</i>	Planktivore	1	1	1	0.01	<0.01
Quillback	<i>Carpiodes cyprinus</i>	Benthivore	2	2	2	0.01	<0.01
White Sucker	<i>Catostomus commersonii</i>	Benthivore	4	4	4	0.03	<0.01
Shorthead Redhorse	<i>Moxostoma macrolepidotum</i>	Benthivore	1	1	1	0.01	<0.01
Catostomus spp	<i>Catostomus spp</i>	-	1	1	2	0.01	<0.01
Buffalo spp	<i>Ictiobus spp</i>	Benthivore	1	1	1	0.01	<0.01
Pugnose Shiner	<i>Notropis anogenus</i>	Planktivore	1	1	1	0.01	<0.01
Blackchin Shiner	<i>Notropis heterodon</i>	Planktivore	3	7	10	0.07	<0.01
Blacknose Shiner	<i>Notropis heterolepis</i>	Planktivore	1	8	8	0.06	<0.01
Fathead Minnow	<i>Pimephales promelas</i>	Benthivore	1	1	1	0.01	<0.01
Catfish spp	<i>Ictalurid spp</i>	Benthivore	1	1	1	0.01	<0.01
Brown Bullhead	<i>Ameiurus nebulosus</i>	Benthivore	1	1	1	0.01	<0.01
Tadpole Madtom	<i>Naturus gyrinus</i>	Benthivore	1	1	1	0.01	<0.01
Brindled Madtom	<i>Naturus miurus</i>	Benthivore	1	1	1	0.01	<0.01
Trout-perch	<i>Percopsis omiscomaycus</i>	Benthivore	6	12	18	0.13	<0.01
Rock Bass	<i>Ambloplites rupestris</i>	Benthivore	9	9	18	0.13	<0.01
Green Sunfish	<i>Lepomis cyanellus</i>	Benthivore	1	1	1	0.01	<0.01
Pumpkinseed	<i>Lepomis gibbosus</i>	Benthivore	18	18	18	0.13	<0.01
White Crappie	<i>Pomoxis annularis</i>	Benthivore	1	1	1	0.01	<0.01
Black Crappie	<i>Pomoxis nigromaculatus</i>	Benthivore	1	1	1	0.01	<0.01
Pomoxis spp	<i>Pomoxis spp</i>	Benthivore	3	2	3	0.01	<0.01
Walleye	<i>Stizostedion vitreum</i>	Piscivore	1	1	1	0.02	<0.01
River Darter	<i>Percina shumardi</i>	Benthivore	5	1	1	0.01	<0.01
Freshwater Drum	<i>Aplodinotus grunniens</i>	Benthivore	1	1	6	0.04	<0.01
Totals			31,691	5,977	37,668	265.27	100.0

6.4 Sydenham River Walleye Tagging

The Sydenham River is a tributary of the St. Clair system which extends upstream over 100 km inland from Chancel Ecarte (Figure 6.4.1). Sport fishing for Walleye is popular on the Sydenham River but Walleye population assessment information is lacking. In 2013, a tagging study was instituted in order to assess the status and population characteristics of the Sydenham River Walleye population. Abundance, exploitation, survival, movement, and biological characteristics may be described using tagging and recapture data following years of study and recaptures.

Walleye were collected from March 12 to April 30, 2013 on the Sydenham River by electrofishing from a 21 foot Smith Root vessel operating at 14 amps and 500 volts. A total of 399 Walleye were tagged with size 10 or 12 Monel jaw tags and passive integrated transponder (PIT) tags. The PIT tags 12 mm in length (TX1400STBE and TX1411SSTBE 134.2 KHz) were injected ventrally, anterior to the pelvic fins into the dermis of Walleye using pre-loaded syringes. The PIT tag number was identified using a Dextron 2001F-ISO reader. Double tagging (jaw + PIT) allows for jaw tag loss estimation and recapture detection on Lake Erie, Lake St Clair and other Great Lakes where PIT scanning occurs. Total lengths were measured, sex and reproductive state were recorded and several anterior dorsal spines were removed for aging tagged Walleye. Environmental conditions and measurements were documented.

Locations where tagging occurred in 2013 on the east and north branches of the Sydenham River are illustrated in Figure 6.4.1. The numbers of Walleye tagged by jaw tag type (non-reward and reward) and sex are presented in Table 6.4.1. The majority of Walleye tagged were male (82%), with females accounting for 4% while sex could not be determined externally for 14% of Walleye. Age compositions and mean lengths at age by sex of tagged fish are presented in Figure 6.4.2. Ages of tagged Walleye ranged from age 3 to 16. Walleye ages 5 to 8 accounted for 63% of fish tagged, with age 7 being most abundant. There were no exceptional year classes evident from the age composition of tagged Walleye. Mean length at age suggested that growth rates of this Walleye population may be slower than Walleye from Lake Erie (Figure 6.4.2). While collecting Walleye for tagging by electrofishing in 2013, there were 35 tagged fish recaptured. One Walleye (1/35 or 3%) had lost its' jaw tag 39 days after the fish was tagged. Numbers of Walleye and rates of recapture by sex and type of jaw tag (non-reward and reward) are presented in Table 6.4.1. Twelve tagged Walleye were recaptured by anglers following tagging in 2013 until February, 2014 (Figure 6.4.1). Recaptures occurred from May to October in 2013 and from January to February by ice fishing on the Sydenham River in 2014 (Figure 6.4.3). Fishery recapture rates were 5.1% for reward tags and 2.1% for non-reward tags with rates differing according to sex and tag type (Table 6.4.1).

Table 6.4.1.1 Number of Walleye double tagged (jaw and PIT) on the Sydenham River in 2013. Also, number of Walleye recaptured by anglers from 2013 to February 2014. NR = Non Reward Jaw Tag, R = Reward Jaw Tag

Sex	Tagged			Recaptured			Recaptured / Tagged		
	NR	R	Total	NR	R	Total	NR	R	Total
Male	230	96	326	4	4	8	1.7%	4.2%	2.5%
Female	12	4	16	0	1	1	0.0%	25.0%	6.3%
Unknown	19	38	57	1	2	3	5.3%	5.3%	5.3%
ALL	261	138	399	5	7	12	1.9%	5.1%	3.0%

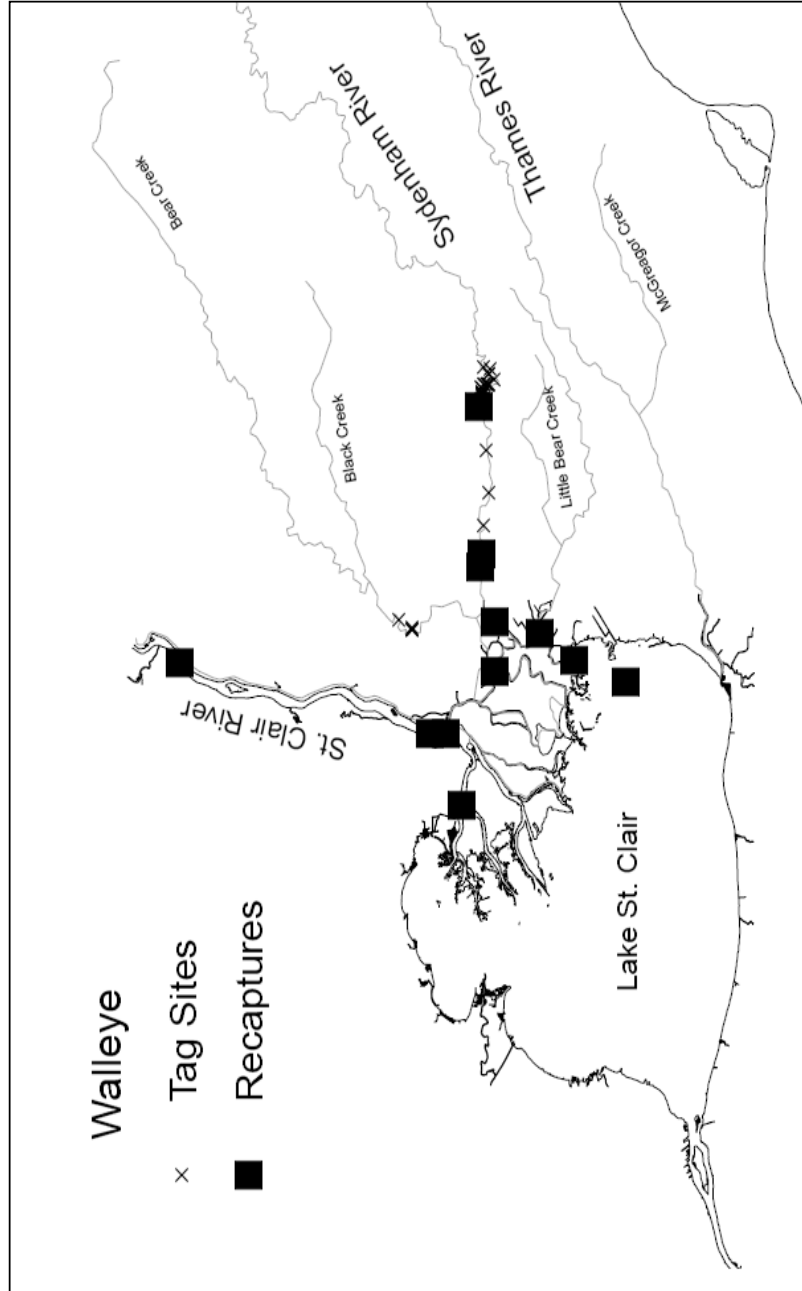


Figure 6.4.1 Walleye tag (Jaw and PIT) locations on the Sydenham River in 2013 and recapture locations from 2013 to February 2014. Note some tag sites are hidden by recapture symbols.

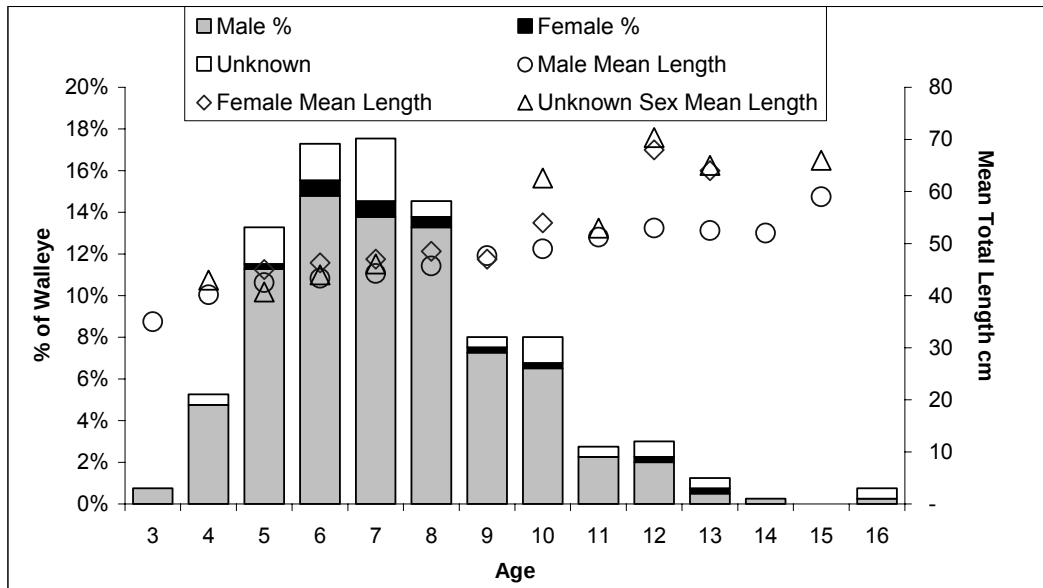


Figure 6.4.2 Age composition of Walleye tagged on the Sydenham River in 2013 by sex. Mean total length at age (dorsal spines) by sex on second Y axis.

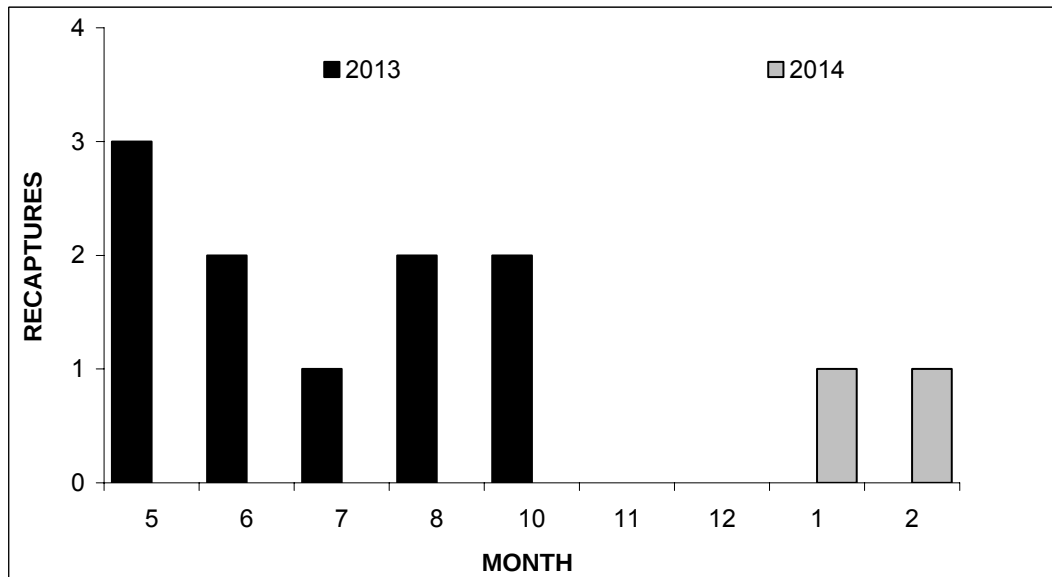


Figure 6.4.3 Monthly recaptures in 2013 - 2014 of Walleye tagged on the Sydenham River in 2013.

APPENDIX A

LAKE ERIE MANAGEMENT UNIT STAFF 2013

LONDON

659 Exeter Road, London, ON N6E 1L3
Tel: 519-873-4610 Fax: 519-873-4645

Bruce Hawkins – Lake Manager
Richard Drouin – Lead Management Biologist
Jennifer Richards – C.O.A. Coordinator

Karen Pringle – Administrative Assistant
Ryan Hamelin – Coastal Wetland Biologist Intern

WHEATLEY

320 Milo Road, Wheatley, ON N0P 2P0
Tel: 519-825-4684 Fax: 519-825-3163

Brian Locke – Fisheries Assessment Supervisor
Tyler Genereaux – Operations Coordinator
Craig McDonald – Vessel Master
Megan Belore – Assessment Biologist
Andy Cook – Assessment Biologist
Karen Soper – Systems Officer
Rob Dietz – Fisheries Technician
Aida Baptista – Data Entry Operator
Debbie Seili – Clerk Typist/Receptionist
Aaron Barber – A/Enforcement Supervisor
Sean Insley – Conservation Officer
Kevin Sprague – Conservation Officer
Colin Stass – Conservation Officer
Bill Ingham – Intelligence & Investigation Officer

Seasonal Staff:

Andrew Neilson – Fisheries Technician
Christine Benoit – Fisheries Technician
Chris Gignac – Fisheries Technician
David Scratch – Fisheries Technician
Joey Battaglia – Fisheries Technician
Lindsay Bennett – Fisheries Technician
Chris Thomas – Fisheries Technician
Allen DiMenna – Port Officer
Paul Merritt – A/Port Officer
Travis Stromness – A/Port Officer
Brandy Breault – SEP Student
Ron Green – SEP Student
Sarah Moccia – SEP Student
Brianne Fennema – Team Lead Stewardship Ranger/
Fisheries Technician
Bryan Bradley – Stewardship Youth Ranger
Eric Mullen – Stewardship Youth Ranger
Joshua Reding – Stewardship Youth Ranger
Derek Towes – Stewardship Youth Ranger

AQUATIC ECOSYSTEMS SCIENCE SECTION – WHEATLEY OFFICE

Yingming Zhao – Research Scientist
Kristina Wantola – SEP Student
Samantha Esteves – SEP Student

PORT DOVER

49 Passmore Ave. Unit # 7, P.O. Box 429
Port Dover, ON N0A 1N0
Tel: 519-583-0981 Fax: 519-583-1547

Kurt Oldenburg – Fisheries Ecology Supervisor
Dixie Greenwood – Operations Coordinator
Gord Ives – Vessel Master
Wyatt Hall – Fisheries Technician
Tom MacDougall – Assessment Biologist
Larry Witzel – Assessment Biologist

Seasonal Staff:

Duncan Norrie – Fisheries Technician
Tina Werner – Fisheries Technician
Heather Whitford – Fisheries Technician
Paul Lovett – Fisheries Technician
Garett Ashton – A/Port Officer
Jotham Dumesnil – A/Port Officer
Paige Vroom – SEP Student
Brennan DeBoer – SEP Student

AYLMER

615 John Street North
Aylmer, Ontario N5H 2S8
Tel: (519) 773-9241 Fax: (519) 773-9026

Mark McMillan – Conservation Officer

Acronyms Reference:

A/ - Acting
C.O.A. – Canada Ontario Agreement
SEP – Summer Experience Program

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