

2016 Annual Report

Ontario Ministry of Natural Resources and Forestry
Lake Erie Management Unit



The Lake Erie Management Unit of the Ontario Ministry of Natural Resources and Forestry 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 Photos:

Top Photo: Ontario Ministry of Natural Resources and Forestry Port Dover Vessel Erie Explorer

Bottom Photo: Ontario Ministry of Natural Resources and Forestry Wheatley Vessel Keenosay

2016 Annual Report

**Ontario Ministry of Natural Resources and Forestry
Lake Erie Management Unit**

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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 annual fisheries assessment programs, Port Observer program, and management activities on the Canadian waters of Lake Erie, Lake St. Clair and connecting waters.

The Province of Ontario and four U.S. States share responsibility for managing the fishery resource in Lake Erie; international cooperation is essential to the sustainable management of Lake Erie's fisheries. The Lake Erie Committee, formed under the auspices of the Great Lakes Fishery Commission, is comprised of representatives from state and provincial fisheries management agencies. This committee works to set harvest levels for the lake.

The LEMU 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, which was established to help guide future Walleye and Yellow Perch management in Lake Erie. This group is facilitated by staff from the Quantitative Fisheries Centre of Michigan State University and consists of Lake Erie Committee members, agency staff, and stakeholders from all jurisdictions bordering Lake Erie.

In addition, the LEMU leads and supports, through collaboration with Regional Operating Division, Provincial Services Division (Science and Research Branch) and Policy Division (Natural Resources Conservation Policy Branch), numerous projects under the Canada Ontario Agreement with respect to Great Lakes ecosystems. These projects include native species restoration, state of resource science, invasive species surveillance and response, as well as ecosystem restoration.

The purpose of this 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 recommended 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.

1. EXECUTIVE SUMMARY STATUS OF MAJOR STOCKS

Walleye

The lakewide commercial Walleye harvest (5.0 million lbs.) in 2016 represented 77% of the 6.5 million pound quota. The 2016 harvest was slightly above the mean harvest from 2000 to present (4.8 million lbs.) but below the mean harvest from the inception of individual transferable quotas (ITQs) (1984 to present; 6.3 million lbs.; Figure 1.1). Walleye harvest (lbs.) across statistical districts (Ontario Erie or OE) OE1 to OE5 during 2016 was 40%, 31%, 19%, 4% and 6%, respectively. The commercial Walleye fishery age composition (range:1-19) in the west and central basins, consisted mostly of age 2 , age 1 and age 13 (2003 year class) fish. Age composition of walleye harvested in the east basin (range: one to 19.) was dominated by age 13 (2003 year class).

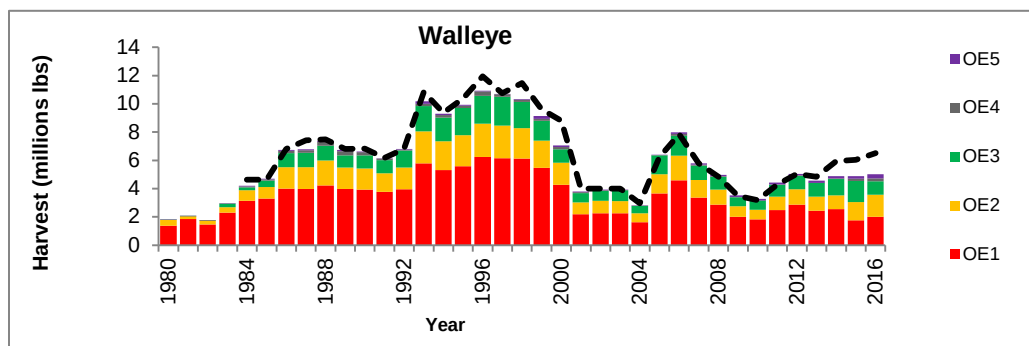


Figure 1.1 Walleye commercial harvest by statistical district in Lake Erie, 1980-2016. Lakewide quota presented as dotted line.

Lakewide Partnership gill net surveys confirmed walleye in the east basin were composed of older walleye. Record numbers of age 1, with high catches of age 2 fish were present in west (OE-1) and central basin (OE-1,2) indices. East basin indices were strong for age 1 and 2 fish and moderate for ages 3 and older fish. Interagency trawl surveys indicated good or stronger year class strength for the 2014 and 2015 cohorts, while the 2016 cohort was assessed as weak to moderate in strength. Commercial and recreational fishing success in 2017 is expected to improve, influenced by recruitment of young Walleye.

Walleye in Lake Erie are assessed and managed cooperatively by Lake Erie jurisdictions and partners. The current exploitation policy adopted in 2014 for the Total Allowable Catch (TAC) area which includes OE1-3 was developed through the Lake Erie Percid Management Advisory Group (LEPMAG) as part of a revised Walleye Management Plan (WMP). Walleye migrations from the TAC area into the east basin are evident from Great Lakes Acoustic Telemetry Observation System (GLATOS) studies. East basin fishery performance is influenced by the abundance of local and migratory stocks. Continuous improvements to our understanding of the lakewide dynamics are accomplished through ongoing cooperative research and assessment for potential incorporation into future management plans.

Yellow Perch

The commercial fishery harvested 4.5 million pounds of Yellow Perch in 2016, attaining the quota allocated. The Yellow Perch harvest in 2016 was below the mean harvest from 2000 to present (5.5 million lbs.) and the long term mean harvest from when ITQs were introduced in 1984 (6.0 million lbs.). The distribution of harvest across statistical districts 1 to 5 in 2016 was 21%, 29%, 42%, 4% and 4.4%,

respectively (Figure 1.2). Overall, Yellow Perch harvest was the same as in 2015, but in 2016, increased in OE1 and OE4 and decreased in OE2, OE3 and OE5. Lakewide, age composition was highest for age 4, 2 and 3, respectively. Fishery age compositions varied seasonally and spatially with younger fish becoming more common in the harvest during summer and fall. Age 2 Yellow Perch were most common in the harvest from OE1, OE5 and OE2, but less common in OE3 and were absent from OE4's spring and summer commercial fisheries. Older Yellow Perch were less common in the west basin (OE1) fishery compared to central (OE2, OE3) and east basin (OE4, OE5) fisheries. Fisheries in 2017 will continue to benefit from the 2014 and 2012 cohorts with variable contributions from older fish across the lake.

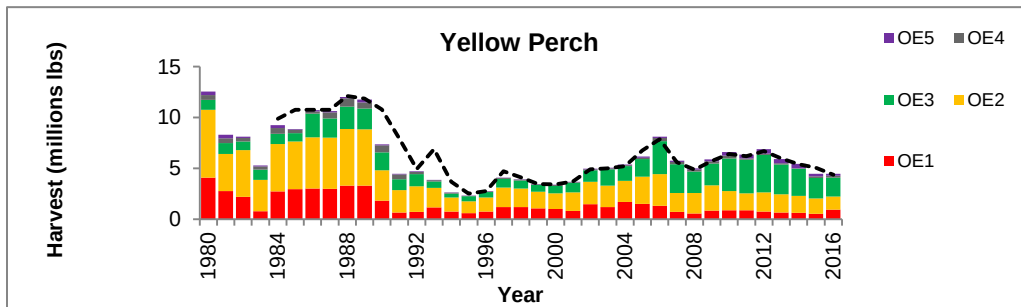


Figure 1.2 Yellow Perch commercial harvest by statistical district in Lake Erie, 1980-2016. Lakewide quota presented as dotted line.

In Partnership gill net surveys, age 2 abundance indices increased lakewide, most evident in the central and east basin surveys. Partnership indices for ages 3 and older Yellow Perch improved in 2016 in the west and east basin surveys, but declined slightly in the west-central basin and more so in the east-central basin index. In contrast, the Long Point Bay gill net index in 2016 was the lowest observed over the 31 year time series for ages 2 and older.

Recruitment of age 2 fish in 2017 in the west and central basins is expected to range from moderate (west basin) to weakly moderate (central basin areas) based on west basin interagency yearling trawl indices and the Partnership assessment of age 1 Yellow Perch abundance. Multiple assessments in the east basin and Long Point Bay predict above average recruitment in 2017.

Yellow Perch recruitment indicators differ spatially between jurisdictions, management areas and at different life stages. Yellow Perch Task Group abundance and recruitment estimates using data combined from agencies may differ from indicators exclusive to Ontario waters. To enhance Yellow Perch recruitment forecasting in central Lake Erie, a pilot interagency bottom trawling survey in Ontario waters of the central basin was initiated in 2016. OMNRF and United States Geological Survey (USGS) research vessels completed this extensive survey during October, 2016. The benefits of this survey will accumulate over continued years of field work.

Ontario gill net fishery harvest and effort data, along with trawl and gill net survey data contribute to interagency assessment and quota recommendations. Ontario commercial and recreational fishery representatives, OMNRF, United States (US) management agencies and stakeholders, and the Quantitative Fisheries Center at Michigan State University are currently engaged in the Lake Erie Percid Management Advisory Group (LEPMAG) process. The LEPMAG is working to improve Yellow Perch assessment, address fishery requirements and performance indicators while contributing to the development of a Lake Erie Yellow Perch Management Plan.

Lake Whitefish

Declining Lake Whitefish recruitment and abundance in Lake Erie resulted in major quota reductions in Ontario beginning in 2014 (Figure 4). The commercial harvest of Lake Whitefish is incidental and mainly occurs in large mesh gill net fisheries targeting Walleye and White Bass and to a lesser extent in small mesh gill net fisheries and trawls targeting Rainbow Smelt. Lake Whitefish harvest in 2016 was 31,733 pounds, and was distributed across OE1 to OE5 as follows: 76%, 19%, 3%, 1% and 1% (Figure 1.3). The age composition of Lake Whitefish in the large mesh gill net fishery was comprised mainly of fish between the ages of 8 and 18, with age 13 (2003 year class), being most abundant. Age 2 Lake Whitefish were also present in the large mesh gill net fishery harvest. Lake Whitefish caught as bycatch in Rainbow Smelt trawls included ages 1, 2 and 3 with age 1 (2015 cohort) most common.

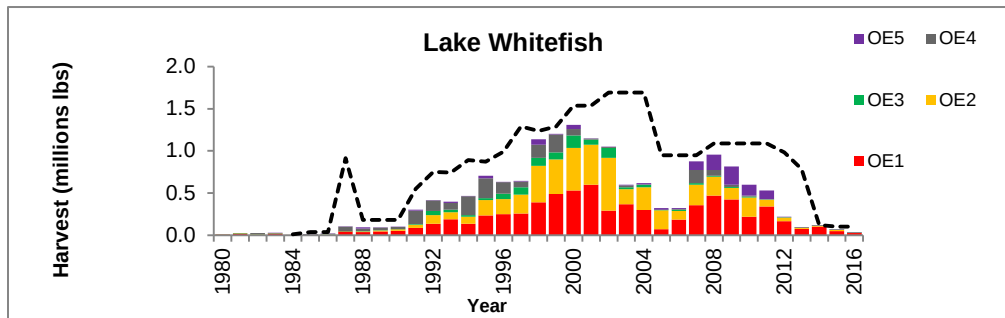


Figure 1.3 Lake Whitefish commercial harvest by statistical district in Lake Erie, 1980-2016. Lakewide quota presented as dotted line.

Partnership gill net surveys provide further evidence of declining adult Lake Whitefish abundance. However, the presence of age 1 and 2 Lake Whitefish in the partnership gill net survey, and incidental catches in the fisheries, may indicate potential recruitment of the 2014 and 2015 year classes in future years. The magnitude of this recruitment and subsequent contribution to spawner biomass in the future is uncertain. OMNRF is working with partners to improve assessment and develop management strategies for Lake Whitefish through collaborative efforts of the Lake Erie Committee, the Coldwater Task Group, the Great Lakes Telemetry and Observation System (GLATOS) network, the Great Lakes Fishery Commission and the Data Deficient Work Group.

2. COMMERCIAL FISHERY

2.1 Lake Erie Fishery

In 2016, total commercial landings from Ontario waters of Lake Erie were 27.4 million pounds, an increase of 3.3 million pounds (14%) from 2015 (Table 2.1.2). The value of the total commercial landings in 2016 was \$37 million, an increase of almost \$6.6 million (22%) from 2015 (Table 2.1.2). The increase in harvest is due, almost entirely, to higher landings of Rainbow Smelt (2.4 million pounds) in 2016. Harvest and landed value in 2016 are presented for each species by statistical district (Ontario Erie or OE, Figure 2.1) in Table 2.1.3.

Rainbow Smelt

The total landings of Rainbow Smelt increased 29% to 10.7 million pounds in 2016 (Tables 2.1.2 and 2.1.3, Figure 2.1.4). The harvest was taken from OE-4 (78%) and OE-3 (18%). Summer harvest in OE-4 was primarily age 1 (73%) and age 2 (18%) fish. Age 2 fish comprised 58% of OE-3 harvests during the summer. The commercial fishery harvested 67% of the quota allocated for 2016. Of the 160 licences with Smelt quota, only 32 landed Rainbow Smelt in 2016, while only 13 attained 70% or more of their individual quota. The landed value of Rainbow Smelt was \$2.5 million up 28% from 2015 (Tables 2.1.2 and 2.1.3).

Yellow Perch

In 2016 Yellow Perch landings increased marginally to 4.5 million pounds (Tables 2.1.2 and 2.1.3, Figure 2.1.4). The commercial fishery harvested 102% of allocated quota in 2016. Spring fisheries were characterized by harvest from a broad range of ages with Ages 4 and 5 making a significant contribution to the harvest in OE-1 to OE-3 and OE-5 (61% to 74% combined). In the summer and fall harvest in OE-1, OE-2 and OE-5 ages 1 and 2 were the major contributors while in OE-3 it was mainly age 4 fish. The landed value of Yellow Perch increased 25% from 2015 to \$16.0 million in 2016 (Tables 2.2 and 2.3).

Walleye

Walleye landings increased 3% to 5 million pounds in 2016 (Tables 2.1.2 and 2.1.3, Figure 2.1.4). Seventy-seven percent of the 2016 quota was harvested. Lakewide harvest by Walleye size category was: Jumbo (48%), Number 1 (43%) and Number 2 (8%) (see Table 2.1.6 for description of size categories). In the Number 1 category, the 2013 and 2014 year classes, ages 2 and 3, made up significant portions of the harvest in OE-1 to OE-3 (41 to 95% combined). Number 1 fish of the age classes 6 and 10+ comprised the majority of the spring harvest in OE-5 (80% combined). Fish aged 3 to 6 of the Number 1 category became a significant part of the summer and fall harvests in OE-1 through OE-3 (75 to 100%).

White Bass

The total landings of White Bass increased by 7% to 4.3 million pounds in 2016 (Tables 2.1.2 and 2.1.3, Figure 2.1.4). The majority of harvest occurred in statistical districts OE-1 (40%) and OE-2 (31%) (Table 2.1.2). In OE-1 and OE-2, fish aged 4 to 6 dominated the spring harvest (91 to 93% combined). Age 4 fish were a significant contributor to the OE-2 summer harvest (92%), while age 4 and 5 fish contributed significantly to fall harvests in OE-1 and OE-2 (81 and 83% combined) (Table 2.1.7). White Bass have not been regulated by quota since 1993. The landed value of White Bass increased 24% to \$3.1 million in 2016 (Tables 2.1.2 and 2.1.3).

White Perch

The total landings of White Perch increased 21% to 2.4 million pounds in 2016 (Tables 2.1.2 and 2.1.3, Figure 2.1.4). The majority of harvest occurred in statistical districts OE-2 (52%), OE-1 (26%) and OE-3 (22%). In OE-1, ages 6, 7 and 8 were the major contributors to the spring harvest (37% 26% and 17% respectively) while fish aged 5, 6 and 7 contributed to the spring harvests in OE-2 (22%, 36% and 24% respectively) (Table 2.1.8a). The fall harvests in OE-1 were dominated by age groups 2 (20%), and 5 (27%) (Table 2.1.8a). Age groups 4 and 5 dominated the fall harvests in OE-2 (38% and 19% respectively) (Table 2.1.8b). White Perch are not regulated by quota. The total landed value of White Perch increased 49% to \$1.4 million in 2016 (Tables 2.1.2 and 2.1.3).

Lake Whitefish

The total landings of Lake Whitefish decreased 37,000lbs (-54%) to 32,000 pounds in 2016 (Tables 2.1.2 and 2.1.3, Figure 2.1.4). Lake Whitefish were not targeted by the commercial fishery; all Lake Whitefish were harvested as bycatch. The commercial fishery harvested 32% of the quota allocated for 2016. Seventy-six percent of the total harvest came from OE-1 (down 50%), while 19% was harvested from OE-2 (down 60%). In 2016 transfers of Walleye out of Quota Zone 1 to help protect breeding Lake Whitefish stocks continued, and this may have contributed to lower whitefish harvests in the fall. Few samples were obtained through our assessment program, but from the fish that were sampled all were harvested in the fall in OE-1 and were dominated by age 10+ fish (94%) (Table 2.1.9). The landed value of Lake Whitefish decreased \$66,500 (-57%) to \$50,000 in 2016 (Tables 2.1.2 and 2.1.3).

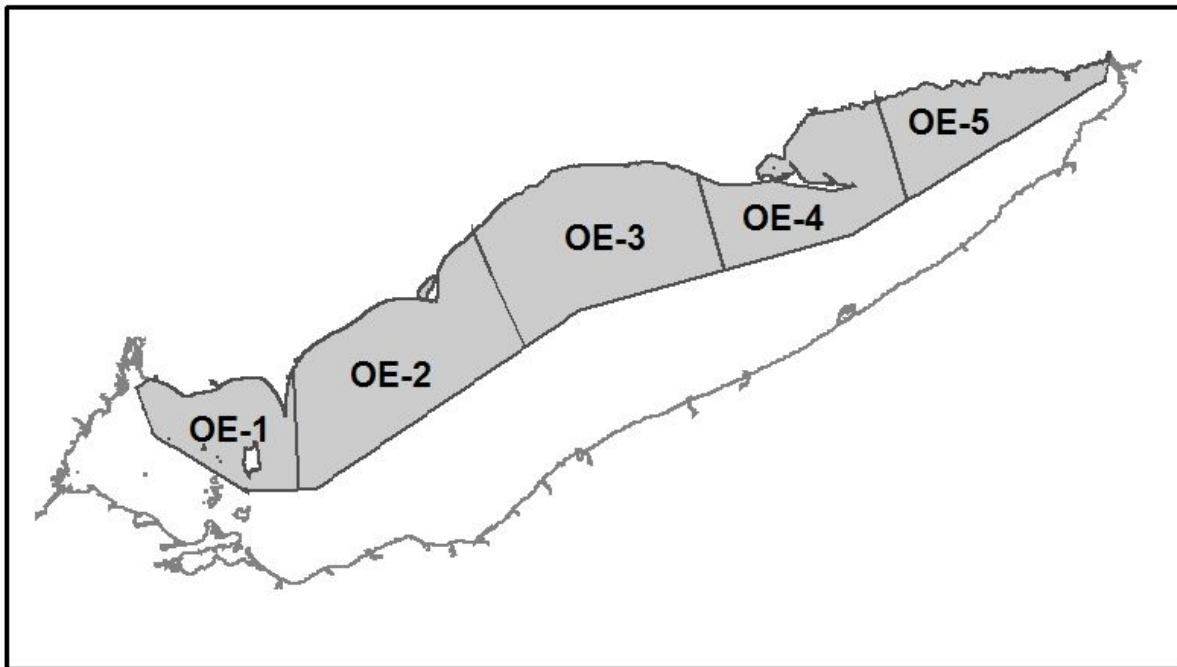


Figure 2.1.1 Spatial location of statistical districts in the Canadian waters of Lake Erie.

Table 2.1.1 Total annual commercial fishery landings (pounds) and value (\$ CDN) from the Canadian waters of Lake Erie, 1960-2016.

Year	Total Pounds	Total Value	Year	Total Pounds	Total Value
1960	28,181,000	2,033,000	1989	42,225,415	36,642,716
1961	36,350,000	2,516,000	1990	42,533,681	31,191,417
1962	43,296,419	2,296,635	1991	42,447,098	28,198,998
1963	34,069,000	2,523,635	1992	32,814,073	28,888,799
1964	25,391,428	2,377,284	1993	35,524,282	27,545,957
1965	35,096,120	3,319,307	1994	28,306,102	29,957,675
1966	41,435,283	3,104,813	1995	27,788,500	32,158,827
1967	37,775,009	3,339,460	1996	27,566,700	31,406,644
1968	39,415,250	2,973,814	1997	32,912,134	33,640,390
1969	48,025,996	4,244,149	1998	34,731,109	38,144,985
1970	31,755,446	3,770,281	1999	30,540,383	34,114,272
1971	29,075,559	4,254,692	2000	22,871,377	30,872,107
1972	29,978,000	5,324,000	2001	22,096,515	26,612,420
1973	39,829,000	7,038,000	2002	25,237,063	30,349,232
1974	38,686,000	5,634,000	2003	21,702,507	25,414,340
1975	30,548,620	6,009,093	2004	27,106,068	23,688,955
1976	25,729,080	6,000,970	2005	25,065,670	30,237,098
1977	35,853,556	7,736,701	2006	22,847,529	30,750,957
1978	40,159,610	9,883,626	2007	28,224,615	27,584,280
1979	40,839,668	17,555,598	2008	25,824,134	21,698,647
1980	42,849,000	14,207,000	2009	23,969,575	21,373,889
1981	44,711,277	20,279,830	2010	19,789,394	25,617,325
1982	59,500,000	26,183,000	2011	21,648,261	27,774,266
1983	45,682,046	17,613,206	2012	25,816,359	31,800,755
1984	36,305,219	26,349,853	2013	24,812,164	25,819,801
1985	43,367,069	20,255,403	2014	22,788,225	27,482,778
1986	39,112,618	34,961,819	2015	24,053,286	30,375,728
1987	47,542,123	36,458,014	2016	27,366,906	36,968,907
1988	45,333,210	42,069,940			

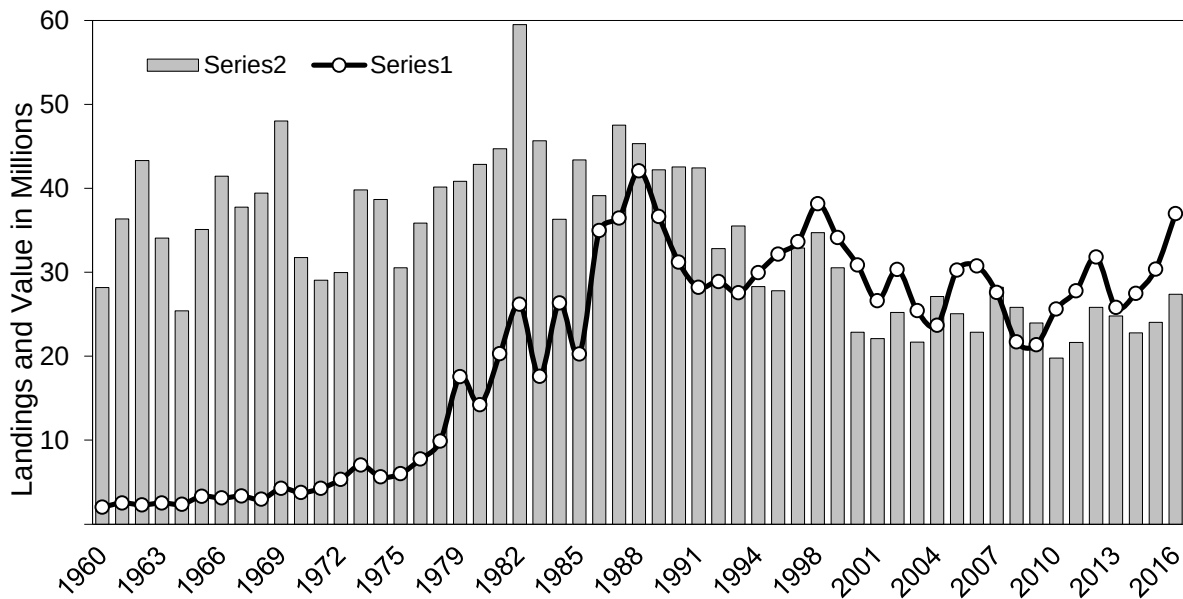


Figure 2.1.2 Commercial fishery landings (pounds) (Series 2) and value (\$ CDN) (Series 1) from the Canadian waters of Lake Erie, 1960-2016.

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, 2016.

Species	Landings by Statistical District					Total Landing	Total Value
	OE-1	OE-2	OE-3	OE-4 ^a	OE-5		
Brown bullhead	0	0	0	0	0	0	\$0
Burbot	0	6	10	79	15	110	\$0
Carp	2,763	921	4,970	26		8,680	\$1,522
Catfish	14,142	21,573	3,645	70	121	39,551	\$12,443
Freshwater drum	35,334	104,272	161,411	1,230		302,247	\$62,442
Gizzard shad	0	0	0	0	0	0	\$0
Lake whitefish	24,201	6,045	826	415	246	31,733	\$49,924
Rainbow smelt	71	180,430	1,928,072	8,410,455	219,648	10,738,676	\$2,492,866
Rock bass	26	1	0	0	0	27	\$12
Suckers	57,786	14,232	1,036	0	26	73,080	\$27,869
Walleye	1,999,177	1,561,377	963,568	202,883	280,581	5,007,586	\$13,491,725
White bass	1,561,044	2,004,077	627,783	46,851	20,295	4,260,050	\$3,141,207
White perch	631,346	1,246,483	532,935	6,914	4,913	2,422,591	\$1,406,622
Yellow perch	947,052	1,283,379	1,875,625	180,278	196,055	4,482,389	\$16,282,148
Mixed ^b	183	2	0	1	0	186	\$127
Total Landing (lbs)	5,273,125	6,422,798	6,099,881	8,849,202	721,900	27,366,906	
Total Value (\$)	\$10,314,353	\$11,121,266	\$10,818,080	\$3,180,767	\$1,534,441		\$36,968,907

^a Excludes Inner Long Point Bay.

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

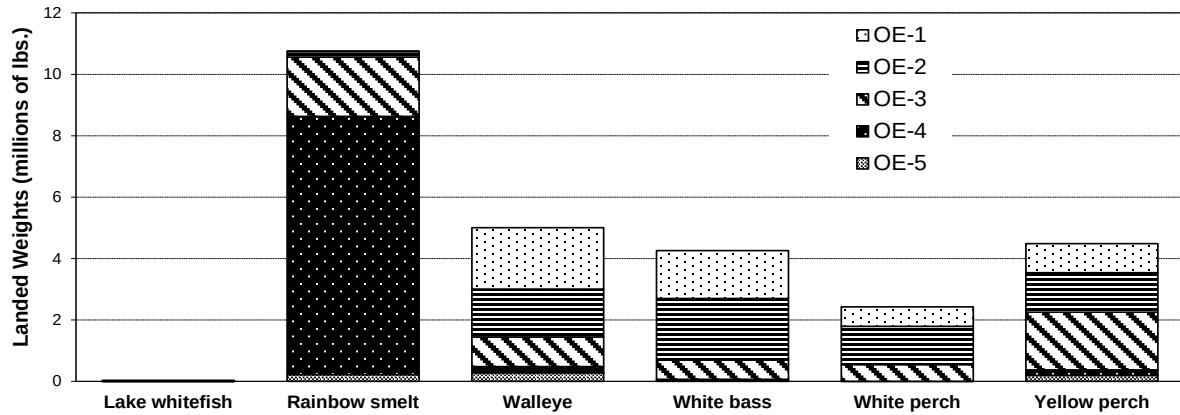


Figure 2.1.3 Total annual commercial fishery landed weights (millions of lbs.) for principle species by statistical district, Lake Erie 2016.

Table 2.1.3 Change in weight of the annual commercial fishery landed weight (pounds) from 2015 to 2016 by the 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	0	0	-4	0	0	-4	0
Burbot	0	-4	-73	57	0	-20	-10
Carp	-1,098	-123	4,560	-15	0	3,324	708
Catfish	-15,163	8,412	-2,535	21	-42	-9,307	-2,568
Freshwater drum	-10,255	33,617	48,819	-253	0	71,928	20,850
Gizzard shad	-348	-2,856	-347	0	0	-3,551	-343
Lake whitefish	-24,529	-9,000	-3,063	-477	-12	-37,081	-66,532
Rainbow smelt	44	-851,636	-432,886	3,619,941	70,160	2,405,623	550,360
Rock bass	19	-5	0	0	0	14	5
Suckers	19,926	3,663	556	-7	12	24,150	25,376
Walleye	245,317	278,445	-533,588	37,505	100,328	128,007	1,701,483
White bass	144,793	279,122	-141,235	-7,162	6,037	281,555	601,737
White perch	164,068	4,947	253,934	289	3,526	426,764	461,792
Yellow perch	405,114	-206,054	-142,482	24,946	-59,433	22,091	3,300,294
Mixed ^b	134	-7	-1	1	0	127	26
Total Landing (lbs.)	928,022	-461,479	-948,345	3,674,846	120,576	3,313,620	
Total Value (\$)	3,179,694	1,672,978	144,720	1,234,675	349,901		6,593,179

^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.

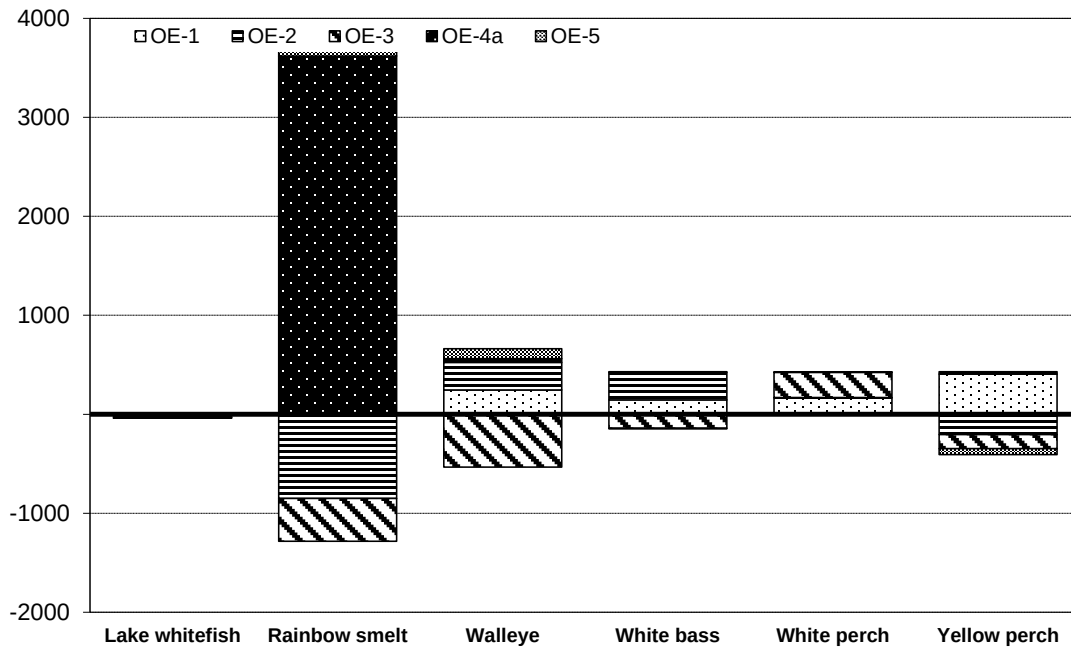


Figure 2.1.4 Change in weight of the annual commercial fishery landings (1000's of lbs.) from 2015 to 2016 for principle species by statistical district, Lake Erie.

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, 2016. N is sample size, sexes combined.

Stat. Dist.	Season*	Year Class and Age										All Ages	
		2016	2015	2014	2013	2012	2011	2010	2009	2008	2007	Average	n
		0	1	2	3	4	5	6	7	8	9		
Age Group Composition (%) **													
OE-3	Summer	-	40	58	1	-	-	-	-	-	-	1.6	77
OE-4	Spring	-	41	39	10	7	2	-	-	-	-	1.9	250
	Summer	-	73	18	8	1	1	-	-	-	-	1.4	815
	Fall	-	85	7	3	5	-	-	-	-	-	1.3	73
Mean Total Length (mm)													
OE-3	Summer	-	120	156	204	-	-	-	-	-	-	141.9	77
OE-4	Spring	-	90	124	159	170	181	-	-	-	-	118.1	250
	Summer	-	107	145	178	198	218	-	-	-	-	120.5	815
	Fall	-	110	137	163	172	-	-	-	-	-	117.1	73
Mean Round Weight (g)													
OE-3	Summer	-	9	22	47	-	-	-	-	-	-	16.8	77
OE-4	Spring	-	4	10	22	27	32	-	-	-	-	10.3	250
	Summer	-	7	18	33	48	66	-	-	-	-	11.4	815
	Fall	-	7	15	24	27	-	-	-	-	-	9.3	73

* 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, 2016. N is sample, size, sexes combined.

Stat. Dist.	Season*	Year Class and Age										All Ages	
		2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	Average	n
		1	2	3	4	5	6	7	8	9	10+		
Age Group Composition (%) **													
OE-1	Spring	-	1	23	53	12	8	1	1	0	-	4.1	277
	Summer	-	45	43	9	0	2	0	-	0	-	2.7	799
	Fall	-	64	30	5	1	0	0	0	-	-	2.5	359
OE-2	Spring	-	0	9	56	18	9	1	3	1	1	4.6	834
	Summer	-	55	23	18	2	2	0	0	-	-	2.7	640
	Fall	-	74	15	8	2	0	0	0	-	-	2.4	280
OE-3	Spring	-	-	2	50	17	14	1	7	4	4	5.2	1071
	Summer	-	8	7	66	13	4	0	1	1	-	4.1	519
	Fall	-	21	8	54	9	5	1	2	0	0	3.9	238
OE-4	Spring	-	-	-	18	20	28	2	16	7	9	6.3	120
	Summer	-	-	3	38	13	18	-	18	13	-	5.8	40
OE-5	Spring	-	2	12	49	12	17	1	6	1	2	4.7	160
	Summer	-	71	7	16	2	2	-	2	0	0	2.7	319
	Fall	2	93	1	3	-	1	-	-	-	-	2.1	155
Mean Total Length (mm)													
OE-1	Spring	-	197	216	223	227	232	225	237	221	-	223	277
	Summer	-	211	216	222	239	217	216	-	272	-	214	799
	Fall	-	216	220	235	254	200	212	275	-	-	218	359
OE-2	Spring	-	197	214	220	224	232	230	247	256	263	223	834
	Summer	-	213	217	225	219	234	261	205	-	-	217	640
	Fall	-	223	234	250	237	275	261	264	-	-	228	280
OE-3	Spring	-	-	211	220	228	228	231	236	235	245	225	1071
	Summer	-	210	217	221	231	235	212	229	245	-	222	519
	Fall	-	220	219	229	240	232	222	260	334	270	228	238
OE-4	Spring	-	-	-	223	226	225	247	230	226	229	226	120
	Summer	-	-	226	222	234	235	-	227	246	-	230	40
OE-5	Spring	-	203	224	228	233	237	229	239	257	259	231	160
	Summer	-	216	233	232	243	257	-	249	232	232	222	319
	Fall	196	220	281	256	-	238	-	-	-	-	222	155
Mean Round Weight (g)													
OE-1	Spring	-	87	125	135	147	155	141	177	139	-	136	277
	Summer	-	125	128	143	167	129	136	-	273	-	129	799
	Fall	-	129	134	165	221	85	102	296	-	-	133	359
OE-2	Spring	-	95	125	133	143	164	164	212	251	316	143	834
	Summer	-	130	140	155	142	183	221	114	-	-	138	640
	Fall	-	147	174	225	177	303	240	266	-	-	159	280
OE-3	Spring	-	-	116	129	144	141	138	157	156	176	138	1071
	Summer	-	125	136	146	171	186	122	167	213	-	150	519
	Fall	-	142	141	161	192	181	159	259	615	257	164	238
OE-4	Spring	-	-	-	122	134	128	172	138	134	139	132	120
	Summer	-	-	128	133	153	158	-	141	172	-	146	40
OE-5	Spring	-	110	134	138	135	150	115	149	215	207	141	160
	Summer	-	134	171	163	184	233	-	198	150	169	146	319
	Fall	104	137	305	220	-	177	-	-	-	-	141	155

* 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 (>76mm) gill nets by statistical district and season, 2016. N is sample size, sexes combined.

Stat. Dist.	Season*	Category**	Year Class and Age										All Ages	
			2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	Average	n
			1	2	3	4	5	6	7	8	9	10+		
Age Group Composition (%)***														
OE-1	Spring	Number 1	-	5	36	19	19	8	3	2	1	8	4.6	299
		Whitegill	-	-	10	5	15	20	-	5	10	35	7.3	20
	Summer	Number 1	-	60	35	-	5	-	-	-	-	-	2.5	20
	Fall	Number 1	4	85	6	1	2	1	0	0	-	0	2.2	518
		Jumbo	-	5	47	10	14	12	2	-	2	9	4.5	58
		Number 2	98	2	-	-	-	-	-	-	-	-	1.0	60
		Whitegill	5	85	10	-	-	-	-	-	-	-	2.1	20
OE-2	Spring	Number 1	-	1	22	19	22	15	4	1	2	13	5.3	259
		Jumbo	-	-	-	1	7	7	6	4	11	62	8.9	148
		Number 2	-	100	-	-	-	-	-	-	-	-	2.0	40
	Summer	Number 1	-	53	11	5	11	16	5	-	-	-	3.4	19
		Jumbo	-	-	-	5	21	11	5	11	11	37	7.7	19
	Fall	Number 1	6	84	7	2	0	0	1	-	-	-	2.1	339
		Jumbo	-	-	5	10	30	25	5	-	-	25	6.4	20
OE-3	Spring	Number 1	-	-	16	18	30	12	2	3	2	16	5.7	93
		Jumbo	-	1	1	2	15	10	6	6	10	50	8.2	178
		Whitegill	-	-	5	15	30	5	5	5	10	25	6.7	20
	Summer	Number 1	2	12	16	15	19	13	4	4	2	12	5.1	210
		Jumbo	-	-	8	10	15	7	7	2	10	42	7.5	60
	Fall	Number 2	100	-	-	-	-	-	-	-	-	-	1.0	20
OE-4	Summer	Number 1	-	-	5	5	-	75	-	-	-	15	6.4	20
		Jumbo	-	-	-	1	1	10	2	12	7	68	9.2	119
		Whitegill	-	-	-	-	-	10	10	5	5	70	9.2	20
OE-5	Spring	Jumbo	-	-	-	-	-	33	3	17	1	47	8.3	120
	Summer	Number 1	-	-	-	5	10	40	-	5	5	35	7.5	20
	Fall	Jumbo	-	-	-	5	-	30	-	3	5	58	8.4	40
Mean Total Length (mm)														
OE-1	Spring	Number 1	-	355	472	508	525	543	557	538	539	556	500	299
		Whitegill	-	-	483	489	500	506	-	578	607	575	540	20
	Summer	Number 1	-	431	486	-	477	-	-	-	-	-	453	20
	Fall	Number 1	376	442	491	508	512	511	547	505	-	560	446	518
		Jumbo	-	506	538	564	569	586	569	-	622	612	557	58
		Number 2	348	372	-	-	-	-	-	-	-	-	348	60
OE-2	Spring	Whitegill	407	451	485	-	-	-	-	-	-	-	452	20
	Summer	Number 1	-	378	466	510	521	539	542	563	538	557	514	259
		Jumbo	-	-	-	523	559	576	604	644	638	678	649	148
		Number 2	-	352	-	-	-	-	-	-	-	-	352	40
	Fall	Number 1	-	372	488	510	499	527	539	-	-	-	438	19
		Jumbo	-	-	-	535	561	548	592	581	642	593	582	19
	Fall	Number 1	388	457	491	503	510	492	531	-	-	-	457	339
		Jumbo	-	-	566	573	581	614	632	-	-	660	610	20

Continued ...

Table 2.1.6 continued...

Stat. Dist.	Season*	Category**	Year Class and Age										All Ages	
			2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	Average	n
			1	2	3	4	5	6	7	8	9	10+		
Mean Total Length (mm) continued...														
OE-3	Spring	Number 1	-	-	465	509	530	524	501	516	534	557	518	93
		Jumbo	-	366	465	531	552	563	587	619	623	654	615	178
		Whitegill	-	-	482	528	555	562	642	600	660	643	587	20
	Summer	Number 1	283	391	478	497	516	540	547	539	538	562	499	210
		Jumbo	-	-	530	551	559	551	596	565	624	655	604	60
	Fall	Number 2	335	-	-	-	-	-	-	-	-	-	335	20
OE-4	Summer	Number 1	-	-	465	505	-	550	-	-	-	554	544	20
		Jumbo	-	-	-	544	652	608	599	632	643	657	646	119
		Whitegill	-	-	-	-	-	606	625	545	597	685	660	20
OE-5	Spring	Jumbo	-	-	-	-	-	577	579	597	651	631	606	120
	Summer	Number 1	-	-	-	531	554	536	-	546	549	557	546	20
	Fall	Jumbo	-	-	-	532	-	594	-	654	697	644	626	40
Mean Round Weight (g)														
OE-1	Spring	Number 1	-	425	1068	1346	1400	1483	1637	1354	1388	1519	1245	299
		Whitegill	-	-	1029	862	1140	1201	-	1699	2198	1732	1468	20
	Summer	Number 1	-	718	1000	-	1078	-	-	-	-	-	835	20
	Fall	Number 1	506	832	1159	1313	1367	1276	1346	1169	-	1504	862	518
		Jumbo	-	1459	1683	2025	1980	2243	2059	-	3258	2530	1922	58
		Number 2	394	445	-	-	-	-	-	-	-	-	395	60
		Whitegill	563	916	1083	-	-	-	-	-	-	-	915	20
OE-2	Spring	Number 1	-	549	1119	1351	1430	1560	1618	1789	1610	1520	1382	259
		Jumbo	-	-	-	1503	1719	1981	2350	2559	2563	3075	2748	148
		Number 2	-	432	-	-	-	-	-	-	-	-	432	40
	Summer	Number 1	-	457	1167	1100	1262	1355	1454	-	-	-	844	19
		Jumbo	-	-	-	1516	1796	1795	2360	2040	2898	2041	2043	19
	Fall	Number 1	569	920	1183	1267	1318	1117	1439	-	-	-	931	339
		Jumbo	-	-	1651	2007	2168	2703	2798	-	-	3038	2509	20
OE-3	Spring	Number 1	-	-	1085	1341	1508	1520	1336	1520	1580	1676	1436	93
		Jumbo	-	483	1162	1486	1734	1895	2054	2504	2499	2784	2396	178
		Whitegill	-	-	1150	1561	1684	1764	2695	2057	2968	2528	2052	20
	Summer	Number 1	207	572	1089	1269	1409	1595	1646	1546	1578	1655	1289	210
		Jumbo	-	-	1615	1850	1910	1779	1959	2155	2530	2689	2265	60
	Fall	Number 2	358	-	-	-	-	-	-	-	-	-	358	20
		Whitegill	-	-	-	-	-	2421	2668	1674	2279	3085	2866	20
OE-4	Summer	Number 1	-	-	1072	1389	-	1726	-	-	-	1604	1658	20
		Jumbo	-	-	-	1652	2792	2347	2446	2621	2862	2870	2770	119
		Whitegill	-	-	-	-	-	2421	2668	1674	2279	3085	2866	20
OE-5	Spring	Jumbo	-	-	-	-	-	1966	1992	2143	2458	2467	2234	120
	Summer	Number 1	-	-	-	1517	1717	1586	-	1539	1731	1673	1631	20
	Fall	Jumbo	-	-	-	1643	-	2402	-	3073	3571	2850	2697	40

* 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 (>76mm) gill nets for marketable fish by statistical district and season, 2016. N is sample size, sexes combined.

Stat. Dist.	Season*	Year Class and Age										All Ages	
		2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	Average	n
		1	2	3	4	5	6	7	8	9	10+		
Age Group Composition (%) **													
OE-1	Spring	-	-	1	47	24	21	4	2	1	-	4.9	240
	Fall	-	1	6	62	19	6	5	-	-	1	4.4	160
OE-2	Spring	-	-	1	42	23	26	5	2	1	0	5.0	311
	Summer	-	-	3	92	5	-	-	-	-	-	4.0	39
	Fall	-	1	-	64	19	15	1	-	-	-	4.5	80
Mean Total Length (mm)													
OE-1	Spring	-	-	331	335	349	360	378	393	395	-	347	240
	Fall	-	332	328	340	352	366	390	-	-	401	346	160
OE-2	Spring	-	-	325	336	357	371	386	387	401	388	354	311
	Summer	-	-	309	330	340	-	-	-	-	-	330	39
	Fall	-	300	-	344	361	374	409	-	-	-	352	80
Mean Round Weight (g)													
OE-1	Spring	-	-	453	467	544	580	691	650	705	-	524	239
	Fall	-	559	493	572	638	752	860	-	-	1013	608	160
OE-2	Spring	-	-	449	496	579	637	641	681	697	654	563	310
	Summer	-	-	369	466	479	-	-	-	-	-	464	39
	Fall	-	348	-	582	709	772	1126	-	-	-	638	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 (>76mm) gill nets for marketable fish by statistical district and season, 2016. N is sample size, sexes combined.

Stat. Dist.	Season*	Year Class and Age										All Ages	
		2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	Average	n
		1	2	3	4	5	6	7	8	9	10+		
Age Group Composition (%)**													
OE-1	Spring				3	12	37	26	17	4	3	6.7	120
	Fall		20	7	17	27	14	10	3	2		4.6	117
OE-2	Spring				6	22	36	24	8	4	1	6.2	160
	Fall		5	4	38	19	11	14	8	1		5.1	79
Mean Total Length (mm)													
OE-1	Spring				262	274	280	294	297	304	312	287	120
	Fall		226	245	258	275	283	289	301	308		264	117
OE-2	Spring				258	272	282	291	297	301	316	283	160
	Fall		247	260	267	282	289	296	305	314		279	79
Mean Round Weight (g)													
OE-1	Spring				284	313	346	404	402	422	456	371	120
	Fall		207	268	323	383	420	463	481	558		350	117
OE-2	Spring				305	365	386	423	479	423	538	396	159
	Fall		292	332	373	428	467	517	532	574		423	79

* 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 large mesh (<76mm) gill nets for marketable fish by statistical district and season, 2016. N is sample size, sexes combined.

Stat. Dist.	Season*	Year Class and Age										All Ages	
		2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	Average	n
		1	2	3	4	5	6	7	8	9	10+		
Age Group Composition (%)**													
OE-1	Spring	-	-	8	35	28	14	8	7	-	-	5.0	72
	Summer	-	22	40	20	13	5	1	-	-	-	3.4	237
OE-2	Summer	-	55	28	9	6	1	1	-	-	-	2.8	80
	Fall	-	51	13	21	8	8	-	-	-	-	3.1	39
Mean Total Length (mm)													
OE-1	Spring	-	-	235	241	261	270	288	291	-	-	257	72
	Summer	-	208	237	249	263	273	270	-	-	-	238	237
OE-2	Summer	-	208	235	255	267	276	295	-	-	-	225	80
	Fall	-	221	235	252	273	270	-	-	-	-	237	39
Mean Round Weight (g)													
OE-1	Spring	-	-	197	230	312	309	358	364	-	-	281	72
	Summer	-	148	214	249	298	324	300	-	-	-	223	237
OE-2	Summer	-	147	207	264	317	316	483	-	-	-	191	80
	Fall	-	189	241	303	382	379	-	-	-	-	249	39

* 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 (>76mm) gill nets by statistical district and season, 2016. N is sample size, sexes combined.

Stat. Dist.	Season*	Year Class and Age										All Ages	
		2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	Average	n
		1	2	3	4	5	6	7	8	9	10+		
Age Group Composition (%)**													
OE-1	Fall	-	4	-	-	-	-	-	2	-	94	9.6	50
Mean Total Length (mm)													
OE-1	Fall	-	403	-	-	-	-	-	591	-	617	608	50
Mean Round Weight (g)													
OE-1	Fall	-	620	-	-	-	-	-	2051	-	2439	2358	50

* 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 (0.40%) by weight of the total annual commercial harvest landed in Ontario waters of Lake Erie. In 2016, total commercial landings were 108,658 pounds (Table 2.2.1) an increase of 17% from 2015. Of this value, live fish accounted for 69%. The value of the total commercial landings in 2016 was \$130,170, an increase of 21% from 2015, and 0.35% of the total value of the Commercial fishery in Ontario waters of Lake Erie (Table 2.2.1).

Yellow Perch

In 2016, the total landing of Yellow Perch was 9,128 pounds, an increase of 31% from 2015. The Inner Bay commercial fishery harvested 34% of their allocated quota in 2016. The majority of Yellow Perch (92%) were caught in the spring (March and April). The landed value of Yellow Perch in 2016 was 68% larger than 2015 at \$28,542.

Northern Pike

In 2016, the total landing of Northern Pike was 8,753 pounds, an increase of 23% from 2015. The Inner Bay commercial fishery harvested 32% of their allocated quota in 2016. The majority of Northern Pike (97%) were caught in the spring (March and April). The landed value of Northern Pike in 2016 was \$4,805, an increase of 79% from 2015.

Table 2.2.1 Total annual commercial fishery landings (landed weight in pounds) and value dollars by fish species for Inner Long Point Bay, 2016

Species	Total Landing^a	Total Value
Bowfin	14,947	\$18,050
Brown Bullhead	29,297	\$12,723
Carp	4,814	\$1,937
Freshwater Drum	143	\$39
Lepomis spp.	29,096	\$49,010
Mudpuppy	4,896	\$4,754
Northern Pike	8,753	\$4,805
Pomoxis spp.	742	\$2,437
Rock Bass	6,592	\$7,728
White Perch	246	\$145
White Bass	4	
Yellow Perch	9,128	\$28,542
Total Landing (lbs.)	108,658	
Total Value (\$)		\$130,170

^a Only Inner Long Point Bay.

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

3. RECREATIONAL FISHERIES

3.1 Lake Erie Sport Fishery Diary Program

The Lake Erie Sport Fishery Diary Program is an ongoing survey that allows the Lake Erie Management Unit (LEMU) 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 33rd year in 2016. The survey area covered is illustrated in Figure 3.1.1. 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.

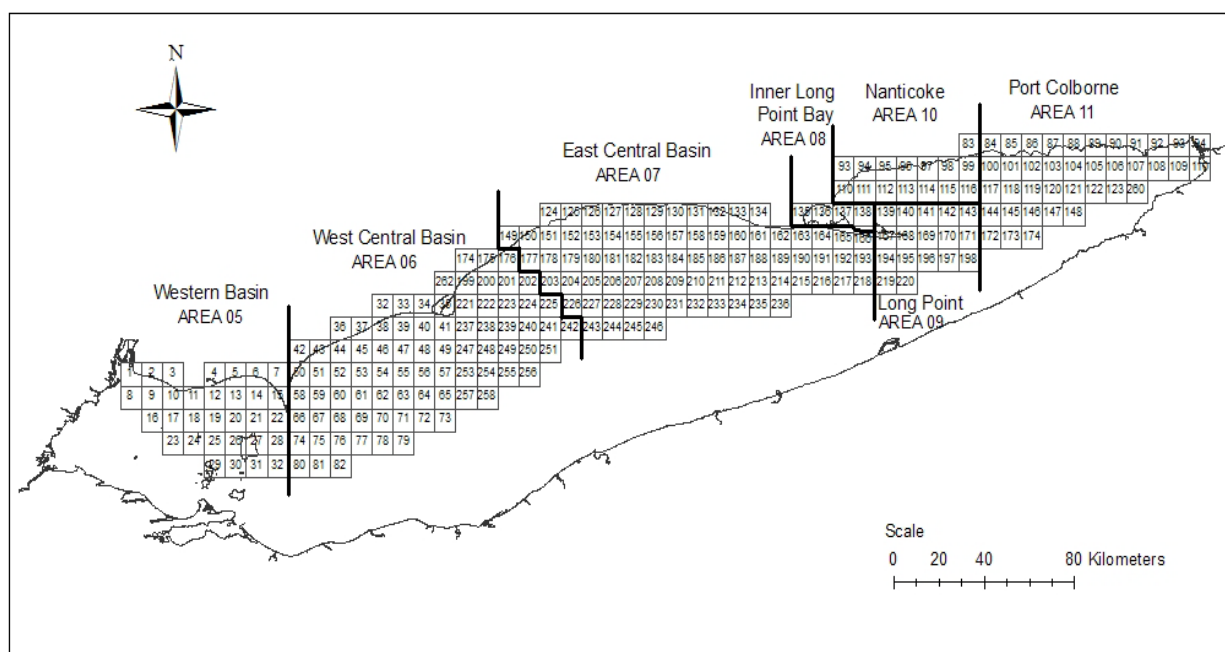


Figure 3.1.1 Lake Erie Sport Fishery Diary Survey Areas, 2016.

In 2016, 56 volunteers from Ontario completed angler diaries in Lake Erie. Of the Ontario Sport Fishery Diary volunteers fishing in all areas, 77% have been participating in the program for three years or more. Sixty-three percent have been involved in the program for ten years or more, and 46% 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 five minute grid location within these areas (Figure 3.1.1).

Total diarist effort and catch for each area is presented in Tables 3.1.1, 3.1.2 and 3.1.3. Observed catch rates of selected preferred species by area, for the years 1990 to 2016, are presented in Tables 3.1.4, 3.1.5, 3.1.6 and 3.1.7. Effort may be directed at multiple species simultaneously, therefore, the percentages of annual effort directed at species may total more than 100% in Figures 3.1.2 to 3.1.4.

Western Basin (Area 05)

Seventeen participants completed diaries with western basin fishing effort. Western basin diarists fished 2,540 rod hours of effort over 155 fishing trips (Table 3.1.1). The majority of angling effort recorded by diarists in the western basin was directed towards Walleye (81%) and Yellow Perch (25%) (Table 3.1.4, Figure 3.1.2). Other species targeted in the western basin with at least 1% of the effort were Rainbow Trout (2%), Smallmouth Bass (1%), and Largemouth Bass (1%). One thousand six hundred and two Walleye were caught, and 2,255 Yellow Perch were caught in the western basin (Table 3.1.3).

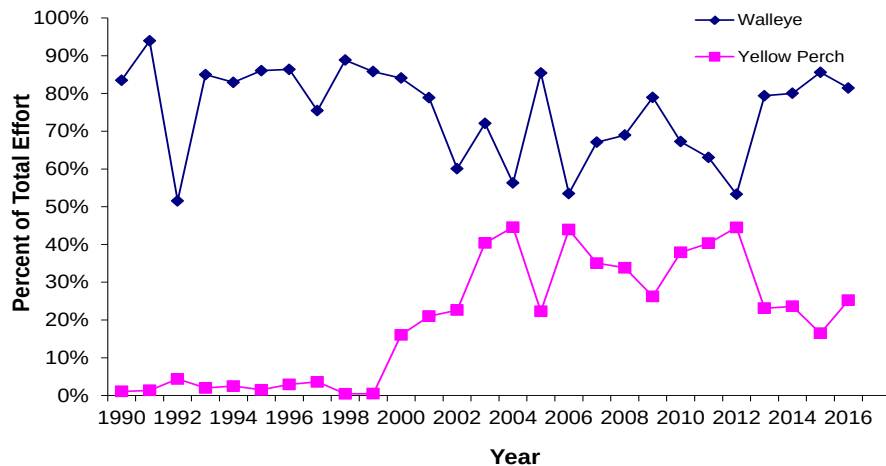


Figure 3.1.2 Western basin angler percent of area effort, Lake Erie Sport Diary Program, 1990-2016.

The Walleye catch per unit effort (CPUE) was 0.755 fish per rod hour; this was a 35% increase from the 2015 CPUE. The CPUE for Walleye was higher in the western basin (0.755 fish per rod hour) than in the central (0.155 fish per rod hour) and eastern basins (0.092 fish per rod hour) (Figure 3.1.5). The Yellow Perch CPUE was 3.509 fish per rod hour; this was a decrease of 42% from 2015 CPUE.

Central Basin (Areas 06 and 07)

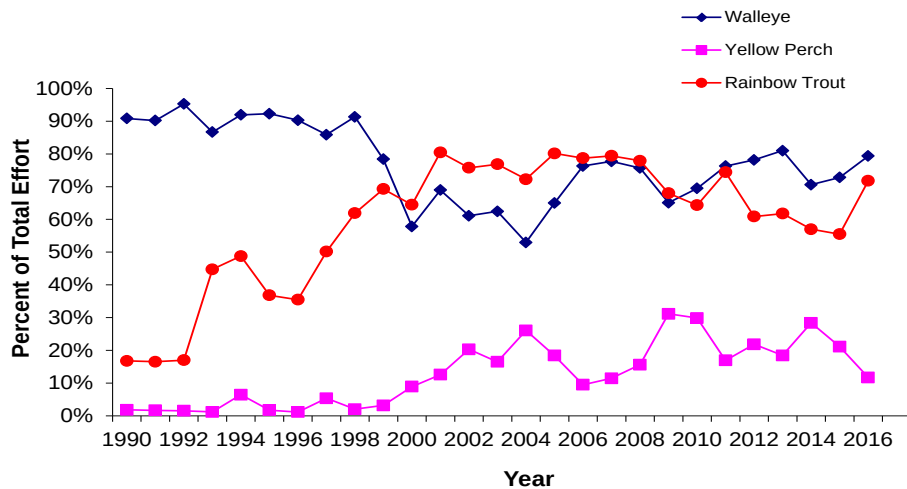


Figure 3.1.3 Central basin angler percent of area effort, Lake Erie Sport Diary Program, 1990-2016.

Thirty participants completed diaries with central basin fishing effort. Central basin diarists fished 4,469 rod hours of effort over 198 fishing trips (Table 3.1.1). The majority of angling effort recorded by diarists in the central basin was directed towards Walleye (79%), Rainbow Trout (71%), and Yellow Perch (12%) (Figure 3.1.3). Rainbow Trout and Walleye are often targeted simultaneously. Only one other species was targeted with at least one percent of effort, White Bass, with 2% of the effort. Six hundred and seventy-three Rainbow Trout were caught, 575 Walleye were caught, and 2,471 Yellow Perch were caught in the central basin (Table 3.1.3).

The overall central basin Walleye CPUE was 0.155 fish per rod hour; this was an increase of 8% from the 2015 CPUE (Figure 3.1.5). Walleye CPUE was higher in the east-central basin (Area 06; 0.183 fish per rod hour) than the west-central basin (Area 07; 0.143 fish per rod hour) (Table 3.1.5). The overall central basin Rainbow Trout CPUE was 0.200 fish per rod hour; this was a decrease of 5% from the 2015 CPUE. Rainbow Trout CPUE was the higher in the west-central basin (Area 06; 0.224 fish per rod hour) compared to the east-central basin (Area 07; 0.085 fish per rod hour; Table 3.1.5). The overall central basin Yellow Perch CPUE was 4.747 fish per rod hour; this was a decrease of 9% from the 2015 CPUE. The CPUE for Yellow Perch was the highest in the central basin (4.747 fish per rod hour) compared to the west (3.509 fish per rod hour) and eastern basins (2.556 fish per rod hour) (Figure 3.1.6). Within the central basin, Yellow Perch CPUE was higher in the west-central basin (Area 06; 6.267 fish per rod hour) than the east-central basin (Area 07; 4.629 fish per rod hour), however there were only 4 trips targeting Yellow Perch in the west-central basin.

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

Twenty-seven participants completed diaries with eastern basin fishing effort. Eastern basin diarists fished 2,654 rod hours of effort over 239 fishing trips (Table 3.1.1). The majority of angling effort recorded by diarists in the eastern basin was directed towards Walleye (50%), Smallmouth Bass (25%), and Yellow Perch (20%) (Figure 3.1.4). Other fish species targeted in the eastern basin with at least 1% of the effort included: Northern Pike (9%), Largemouth Bass (7%), Rainbow Trout (4%), Rock Bass (3%), and Bluegill (1%). One hundred and twenty-three Walleye were caught, 532 Smallmouth Bass were caught, and 1,418 Yellow Perch were caught in the eastern basin (Table 3.1.3).

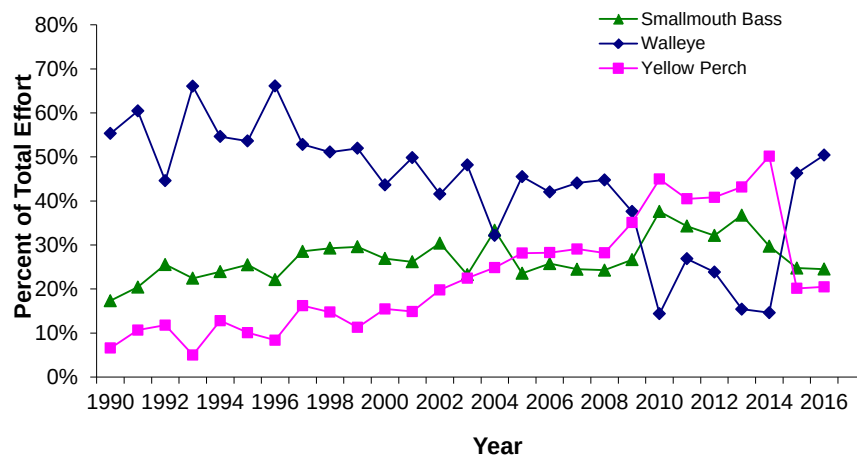


Figure 3.1.4 Eastern basin angler percent of area effort, Lake Erie Sport Diary Program, 1990-2016.

The overall eastern basin Yellow Perch CPUE was 2.556 fish per rod hour; this was a decrease of 19% from the 2015 CPUE (Figure 3.1.6). Within the east basin, Yellow Perch CPUE was highest in the Inner Long Point Bay area (Area 08; 7.221 fish per rod hour) (Table 3.1.7). The overall eastern basin Smallmouth Bass CPUE was 0.751 fish per rod hour; this was a decrease of 32% from the 2015 CPUE. Smallmouth Bass CPUE was highest in the Inner Long Point Bay area (Area 08; 0.820 fish per rod hour) (Table 3.1.6). The overall eastern basin Walleye CPUE was 0.092 fish per rod hour; this was a decrease of 43% from the 2015 CPUE (Figure 3.1.5). Walleye CPUE was highest in the Port Colborne area (Area 11; 0.102 fish per rod hour) (Table 3.1.6).

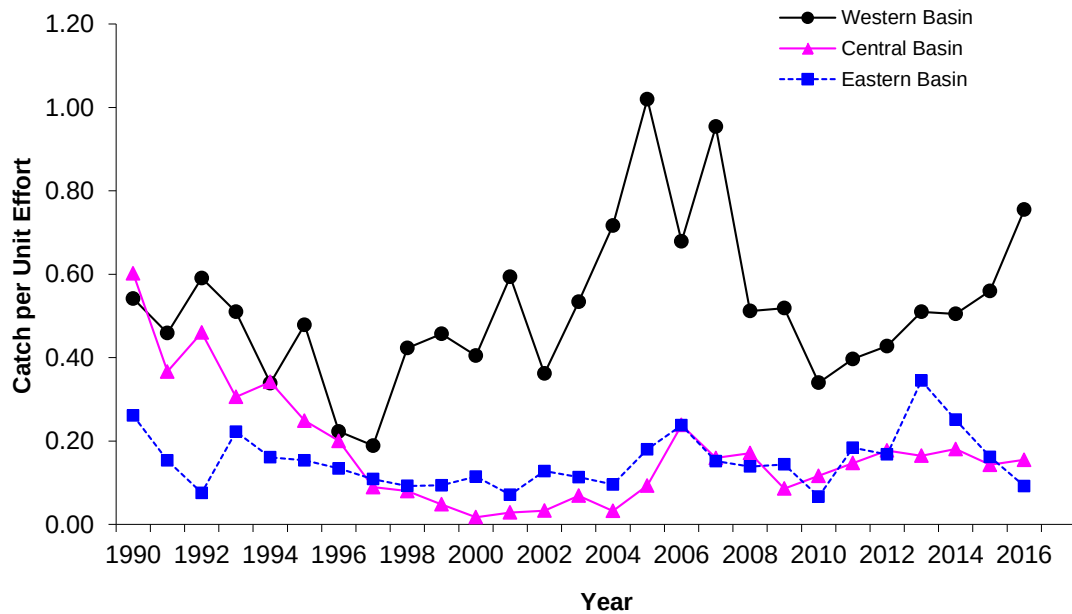


Figure 3.1.5 Walleye catch per unit effort (fish per rod hour) by basin, Lake Erie Sport Diary Program, 1990-2016.

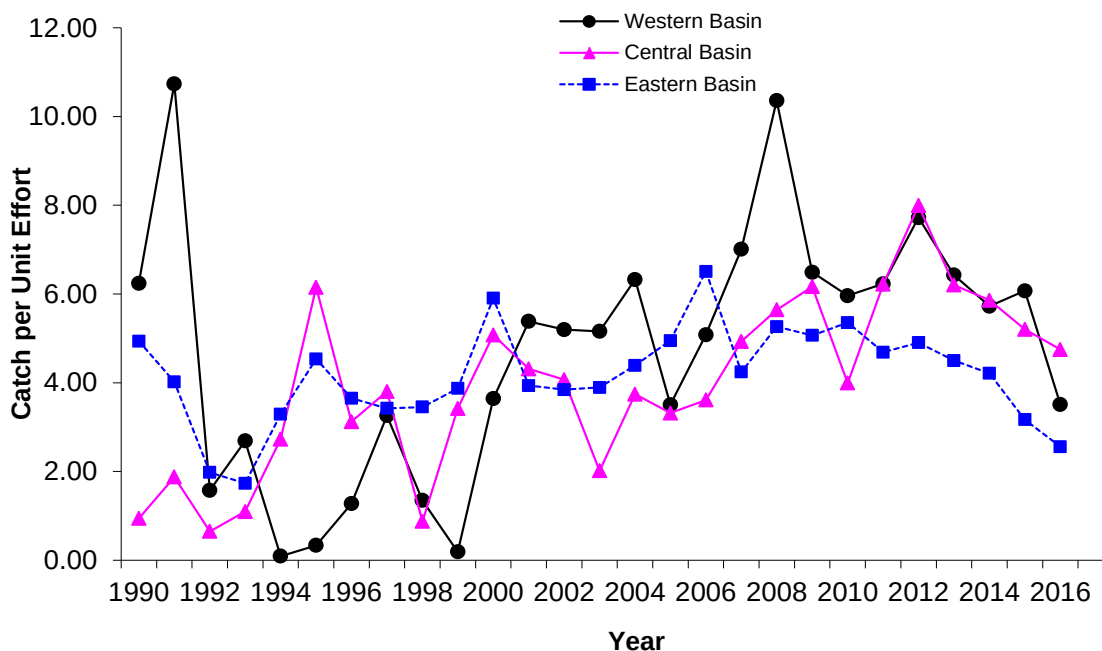


Figure 3.1.6 Yellow Perch catch per unit effort (fish per rod hour) by basin, Lake Erie Sport Diary Program 1990-2016.

Table 3.1.1 Total effort by survey area, reported by Sport Fishery Diary Program participants, 2016.

Survey Area	Number of Diarists	Number of Trips	Number of Rods per Trip	Total Rod Hours
Western Basin	17	155	3.9	2,540
West-Central Basin	18	120	5.0	2,890
East-Central Basin	14	78	4.1	1,579
Inner Long Point Bay	16	88	2.3	674
Long Point Bay	7	37	2.9	354
Nanticoke	11	54	2.2	396
Port Colborne	7	60	3.6	1,230
Total	56^a	592	3.6	9,663

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

Table 3.1.2 Total effort by survey area, reported by Sport Fishery Diary Program non-charter boat participants, 1986-2016.

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
2014	13	70	1,165	11	48	1,389	15	99	1,852	21	105	850
2015	15	77	1,551	22	81	2,141	17	115	2,254	22	98	798
2016	17	155	2,540	18	120	2,890	14	78	1,579	16	88	674
90-16 Avg.	24	147	1,705	31	210	4,177	30	195	3,058	43	253	2,554

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
2014	5	20	181	8	92	658	5	23	328	54	457	6,423
2015	7	26	213	10	90	774	9	63	994	54	550	8,724
2016	7	37	354	11	54	396	7	60	1,230	56	591	9,631
90-16 Avg.	24	109	1,461	27	184	1,709	22	207	3,257	122	1,306	17,921

Table 3.1.3 Total catch and harvest reported by sport fishery diary participants, Lake Erie Sport Fishery Diary Program, 2016.

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	-					1	-					2	-
Gizzard Shad															-	-
Chinook Salmon			1	1											1	1
Pink Salmon			2	-											2	-
Coho Salmon			4	4											4	4
Rainbow Trout	10	4	614	554	59	59	2	2	2	2	8	8			693	627
Brown Trout			1	1									1	1	1	1
Lake Trout															1	1
Rainbow Smelt					1	-									1	-
Northern Pike	4	-					52	5	211	57	1	-			268	62
Muskellunge	4	-											1	-	5	-
Common Carp	1	-													1	-
Channel Catfish	20	4	1	-	23	1	2	-	1	-					47	5
White Perch	161	33	19	1	68	-							2	-	250	34
White Bass	179	36	130	27	150	2			6	-	36	-	32	2	533	67
Rock Bass	4	-	14	4			242	30	49	-	20	-	1	1	330	35
Pumpkinseed			15	15			7	2	2	-	1	-			25	17
Bluegill			127	12			120	1			70	35			317	48
Smallmouth Bass	92	10	2	-			344	226	85	66	50	25	53	13	626	340
Largemouth Bass	15	-	1	-			249	46	1	-	3	-			269	46
Black Crappie															2	2
Lepomis sp.							30	-							36	3
Yellow Perch	2,255	1,709	235	60	2,236	1,961	970	371	187	113	86	18	175	138	6,144	4,370
Walleye	1,602	1,029	374	266	201	161			6	6	6	6	111	105	2,300	1,573
Round Goby	4	1	2	-	73	46							16	16	95	63
Freshwater Drum	250	28	51	-	106	-	6	-	3	-	27	-	29	-	472	28
Total	4,601	2,854	1,594	945	2,917	2,230	2,022	681	554	244	316	97	421	276	12,425	7,327

Table 3.1.4 Angler success rates (CPUE) of non-charter boat anglers targeting particular species, western basin survey area, Lake Erie, 1990-2016^a. Effort may be directed at more than one species simultaneously.

Western Basin (Area 05)									
Year	Total Rod Hours	Walleye				Yellow Perch			
		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%
2014	1,165	46	933	0.505	80%	28	275	5.726	24%
2015	1,551	62	1,328	0.560	86%	16	256	6.070	16%
2016	2,540	102	2,069	0.755	81%	59	640	3.509	25%
90-16 Avg.	1,659	109	1,256	0.519	75%	30	309	4.723	12%

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

Table 3.1.5 Angler success rates (CPUE) of non-charter boat anglers targeting particular species, west-central and east-central basins survey areas, Lake Erie, 1990-2016^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%
2014	1,389	43	1,340	0.148	96%	38	1,254	0.030	90%	4	22	3.116	2%
2015	2,141	60	1,841	0.129	86%	55	1,636	0.291	76%	1	12	0.348	1%
2016	2,890	88	2,445	0.143	85%	101	2,656	0.224	92%	4	38	6.267	1%
90-16 Avg.	4,143	159	3,336	0.167	80%	108	2,635	0.147	69%	17	182	4.366	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%
2014	1,852	40	948	0.229	51%	22	593	0.030	32%	58	899	5.925	49%
2015	2,254	50	1,359	0.163	60%	24	803	0.045	36%	64	918	5.265	41%
2016	1,579	40	1,077	0.183	68%	20	562	0.085	36%	36	483	4.629	31%
90-16 Avg.	3,013	142	2,365	0.193	74%	64	1,353	0.072	46%	45	558	3.670	23%

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

Table 3.1.6 Angler success rates (CPUE) of non-charter boat anglers targeting particular species, Inner Long Point Bay and Long Point Bay survey areas, Lake Erie, 1990-2016^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%
2014	850	45	416	0.932	49%	41	325	4.532	38%	20	166	1.057	19%	5	32	1.480	4%
2015	798	47	463	0.956	58%	18	94	7.611	12%	22	161	1.315	20%	10	46	1.231	6%
2016	674	42	388	0.820	58%	20	131	7.221	20%	28	179	1.300	27%	9	54	0.280	8%
90-16 Avg.	2,601	128	1,408	0.862	55%	66	656	5.131	27%	23	670	1.114	23%	26	245	0.474	8%

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%	29	293	1.453	15%
1995	1,949	24	390	0.067	20%	87	1,389	0.086	71%	0	0		0%	31	345	1.216	18%
1996	1,713	20	321	0.044	19%	78	1,316	0.105	77%	0	0		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%	0	0		0%	10	106	1.349	40%	12	159	1.279	60%
2011	139	0	0		0%	0	0		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%
2014	181	0	0		0%	0	0		0%	13	112	1.143	62%	5	68	0.574	38%
2015	213	2	20	0.000	9%	5	40	0.050	19%	15	105	2.019	49%	6	68	0.735	32%
2016	354	8	57	0.035	16%	10	79	0.076	22%	19	177	1.189	50%	6	88	0.789	25%
90-16 Avg.	1,424	36	545	0.076	35%	59	864	0.077	44%	11	104	1.013	21%	19	213	1.066	22%

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

Table 3.1.7 Angler success rates (CPUE) of non-charter boat anglers targeting particular species, Nanticoke and Port Colborne survey areas, Lake Erie, 1990-2016^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%	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%
2014	658	78	538	3.674	82%	3	47	0.149	7%	1	16	0.063	2%	14	94	1.604	14%
2015	774	57	344	2.198	44%	20	359	0.164	46%	2	13	0.000	2%	17	103	2.394	13%
2016	396	30	150	0.533	38%	16	174	0.035	44%	7	45	0.179	11%	8	75	0.658	19%
90-16 Avg.	1,690	84	595	4.160	49%	68	836	0.089	35%	20	226	0.065	13%	33	282	1.359	17%

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%
2014	328	12	248	0.271	76%	3	21	0.524	6%	13	119	2.321	36%
2015	994	50	878	0.166	88%	8	53	0.396	5%	14	122	2.453	12%
2016	1,230	48	1,086	0.102	88%	9	101	0.523	8%	15	199	0.877	16%
90-16 Avg.	3,311	140	2,696	0.170	81%	43	432	0.941	12%	25	203	1.988	10%

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

3.2 Niagara River Creel

Attempts to assess the sport fishery of the Niagara River in the past have been sporadic and have rarely encompassed the entirety of the river, above and below the Niagara Falls, in both Canadian and US jurisdictions. Until the current survey, no assessments had taken place in Ontario waters since 1999 when a bi-national effort surveyed the upper river (upstream of Niagara Falls) as a partnership between New York State Department of Environmental Conservation (NYSDEC) and the Ontario Ministry of Natural Resources and Forestry Lake Erie Management Unit (OMNRF-LEMU) (Einhouse et al. 2002).

In 2016, a creel survey was devised that would monitor the entire 60 km of river (upper and lower) in both Ontario and New York waters from mid-May through mid-October. Its design was based on the previous 1999 upper river aerial-access creel however instantaneous boat counts were not collected using aircraft; Boat counts, collected from a vehicle driving the length of the river, on the US shoreline, were used as a proxy for instantaneous counts. Although primarily focused on the boat fishery, creel clerks did opportunistically collect information from shore anglers, in particular those adjacent to access point interview locations.

OMNRF-LEMU employed two creel clerks and oversaw the survey of Ontario waters which complimented activities in New York. Surveys were conducted on each weekend day as well as three randomly selected weekdays. Complete-trip boat angler interviews were conducted daily at three access points chosen randomly from a list of seven locations (6 in the upper river; 1 in the lower river). This work complimented that of NYSDEC at ten locations on the US shoreline (6 upper; 4 lower). Full details of the methodology can be found in Legard (2017).

The general picture of the fishery that emerged from the survey corresponds with historic characterizations of the upper (warmwater fishery focused on Smallmouth Bass) and lower (coldwater fishery focused on migratory salmonids) sections of river. With its focus primarily on the summer season, the current survey also emphasized the importance smallmouth bass in the lower river; the targeting of salmonids would be expected to increase later in the year. The survey summaries that follow are derived from Legard (2017). Results were also considered relative to the earliest Niagara Fishery Summaries (Stramko and Paine, 1984).

Upper Niagara River

When stratifying the seasons within the survey as “Spring” (May 16 – June 17); “Summer” (June 18 – September 5); and “Fall” (September 6 – October 16), it was observed that the highest fishing effort in the upper river occurred in the summer (45,748 angler hours) followed by spring (9,294 angler hours) and fall (6,923 angler hours). Even when correcting for differences in the duration of each period, summer still experienced twice the effort as the spring period which, in turn experienced approximately twice the fishing effort as the fall period.

The results from the upper river are directly comparable to those from the 1999 survey and show that boat fishing effort in 2016 (61,965 angler hours) was 57% greater than boat effort in 1999 (39,350 angler hours). The highest targeted effort in the upper river was directed at Smallmouth Bass, and was similar for both Ontario and New York Anglers (59% and 65%; respectively). Muskellunge was secondarily targeted (10% and 5%; respectively), followed by Walleye (9% and 4%; respectively). Approximately 20% of anglers described fishing for “anything”. Smaller proportions (<5%) targeted “other” species (e.g. Yellow Perch, Northern Pike). Upper river shore fishers in Ontario mainly targeted Yellow Perch (42%), followed by “anything” (29%), “bass” (16%), and Walleye (8%) whereas upper river shore fishers in New York targeted “anything” (73%), followed by Smallmouth Bass (14%) and Walleye (6%).

The overall catch rate for the boat anglers targeting Smallmouth Bass in the upper river was 0.42 fish/hour, approximately half that reported by Einhouse (2002) for 1999 (0.8 fish/hour). These rates declined from spring (0.92 fish/hour), through to fall (0.27 fish/hour), and were consistently higher for Ontario anglers. Muskellunge, although targeted during both summer and fall, were only reported caught during summer interviews. Whereas the overall summer catch rate for Muskellunge was 0.11 fish/hour, rates differed between New York and Ontario anglers (0.19 and 0.02 fish/hour; respectively). Muskellunge catch rates were similar to those reported in 1999, in 2003 (NY waters) and that reported in an independent angler diary program (Legard 2017).

Estimates calculated by Legard (2017), confirm that the most targeted species, Smallmouth Bass, represented the highest catch (17,497) and harvest (1,058; Table 1) in the upper river in 2016. The next highest catches represented species rarely targeted (Yellow Perch; 1,926 caught) or not targeted at all (Freshwater Drum; 1,492 fish). An estimated 36% of the Yellow Perch catch was harvested, whereas 62% of the more frequently targeted Walleye was harvested. Other species caught include: Bluegill; various sucker species (Catostomidae); Common Carp; Northern Pike; Pumpkinseed; Rock Bass; Round Goby; and White Bass.

Lower Niagara River

The boat fishery in the lower river is limited by access. The single lower river access point that was monitored as part of this survey was at Queenston, Ontario. The New York shoreline had one access point at Lewiston, and one near the mouth at Fort Niagara. Limited access may explain the lower total effort estimated for the boat fishery in this section of river (21,963 angler hours) compared to that of the upper (61,965 angler hours). The season breakdown shows increasing lower river effort as: spring (3,840 angler hours), summer (7,019 angler hours), and fall (11,104 angler hours). Standardizing for number of days per seasonal category, "summer", had the lowest effort, followed by "spring" and "fall".

Legard (2017) points out that, while the largest overall targeted effort was directed at Smallmouth Bass, then Salmonids, "anything", and Walleye, there was a seasonal shift from targeting Smallmouth Bass (spring and summer) to Salmonids (fall). Also, whereas New York anglers targeted effort was distributed between Smallmouth Bass (45% of targeted effort) and Salmonids (30% of targeted effort), Ontario Anglers' effort was less balanced between the two species, at 56% and 11%; respectively. Further, a category of "other" species (including Muskellunge, Longnose Gar, and Yellow Perch) were targeted by 11% of Ontario anglers but only 1% of New York anglers. Lower river shore fishers in Ontario mainly targeted "Anything" (69%), followed by Smallmouth Bass, Walleye, and Salmonids (8% each). Preferred targets in the New York lower river shore fishery were more evenly distributed between "Anything" (44%), Salmonids (28%), and Smallmouth Bass (21%).

The 2016 survey provides a snapshot of Niagara River fisheries and represents the first time that both the upper and lower river sections, in both jurisdictional waters, have been surveyed in recent times. Inconsistencies in methods and approaches to analysis between past surveys make assessing trends through time difficult however.

3.3 2016 LEMU Angler Outreach

In 2015 the Provincial Services Division (PSD) of the Ministry of Natural Resources and Forestry (MNRF) set out the 2015-16 to 2020-21 strategic direction. This document aligns PSD directives to MNRF and the Government of Ontario. One PSD goal was to "Increase public awareness of Ontario's natural resources and importance of ecological sustainability". This PSD goal relates to the MNRF's goal of "promot(ing) knowledge of Ontario's natural resources, their management and opportunities for their enjoyment" and the Government of Ontario goal of being a "leader on environmental sustainability and

climate change mitigation". To address the PSD goal, the Lake Erie Management Unit (LEMU) implemented an angler outreach campaign.

The 2016 objective of the outreach campaign was to increase the presences of the LEMU in the recreational fishing community of Lake Erie. A secondary objective was to aid in the dissemination of angler diaries for the angler diary program.

In 2016 the LEMU outreach campaign with the booth/tent (fig 3.3.1; fig 3.3.2) was scheduled to attend eight events. Educational handout materials included an LEMU/OMNRF factsheet, GLFC factsheets, 2016 fishing regulations, invasive species brochures, information of youth employment opportunities. The LEMU booth/tent attended seven fishing derbies across the Lake Erie basin engaging an estimated 445+ people (Figure 3.3.3; Table 3.3.1). One event (Harrow Colchester South Lion's Walleye Tournament) was cancelled due to weather. In 2016 we took the electrofishing boat (Figure 3.3.1) to four events to showcase some of our equipment and provide a conversation starter; this appears to have worked. In 2016 MNRF bobbers were created as promotional materials and 133 disseminated during events. Only eight angler diaries were handed out directly to interested anglers in 2016, compared to 44 in 2015. Dissemination of angler diaries was down from 2015 because diaries were only handed out to people that showing genuine interested in participating in the program due to the limited returns (11%) in 2015.

In 2016 there were some early signs of successfully increasing the presence of the LEMU in the recreational fishing community. The Port Colborne Conservation Club requested LEMU to return to their event (444 walleye tournament). The Amherstburg Malden and Anderdon (AMA) Sportsmen Association solicited involvement in their adult Walleye tournament after previous involvement in their children's fishing derby. A return invitation to the Mitchell's Bay Open and the PGYCM kid's fishing derby has also been extended for 2017. Phone calls from people LEMU staff had previously contacted, regarding GLATOS acoustic receivers that washed ashore, were also received.



Figure 3.3.1 Outreach booth display with electrofishing boat.



Figure 3.3.2 Outreach weight station at the SWOC kids fishing derby.

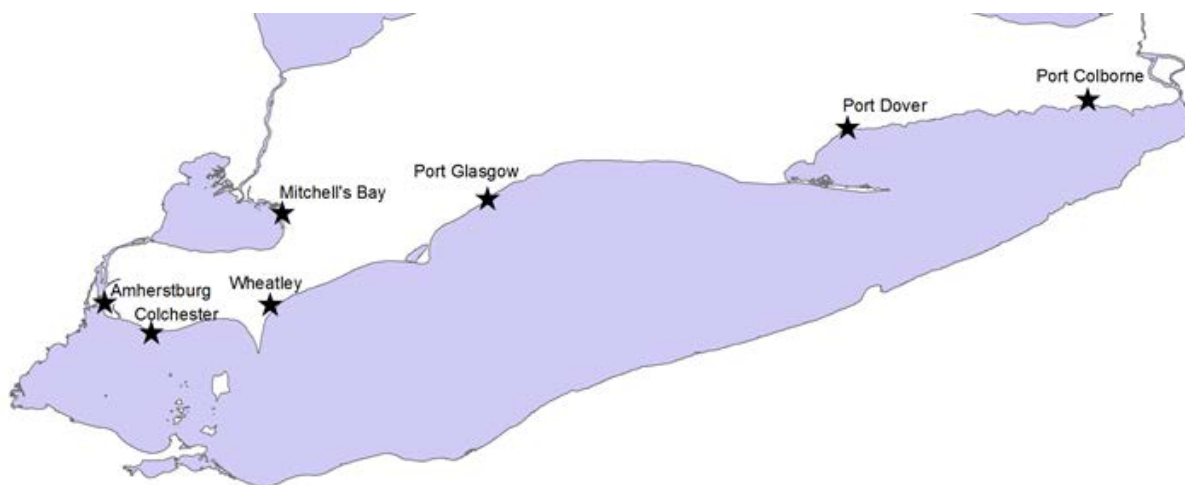


Figure 3.3.3 Map of 2016 angler outreach event locations.

Table 3.3.1 Summary of 2016 Angler outreach events.

Event	Location	Date	Time present	Number of people visiting booth (estimated)	Number of conversations between LEMU and anglers (estimated)	Number of angler diaries handed out	Comment
Port Dover Perch Derby	Port Dover	April 23, 2016	8 hrs	45	35	3	
Harrow Colchester South Lion's Walleye Derby	Colchester	June 11, 2016					Event cancelled due to weather
AMA Sportsmen Kids fishing derby	Amherstburg	June 19, 2016	6 hrs	100	100	3	First event that the electroboat was taken to, lots of interest
444 Walleye Tournament	Port Colborne	June 25, 2016	4.5 hrs	20	4	2	
SWOC Kids fishing derby*	Wheatley	July 9, 2016	5 hrs	100+	>100	0	LEMU ran the weigh station
Mitchell's Bay Open Bass Tournament	Mitchell's Bay	July 9, 2016	3.5hrs	100	75	1	
PGYCM Kids fishing Derby*	Port Glasgow	July 10, 2016	5.5 hrs	20	50+	0	
SWOC Big Boyz Fishing Tournament	Wheatley	July 31, 2016	4.5	60	50	0	
Total			37 hrs	445+	414+	8	

* did not disseminate angler diaries at kids fishing derbies

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 statistical catch-at-age analyses to estimate population abundance of Yellow Perch and Walleye. These population estimates are critical elements of the international allocation process for these species.

The lakewide survey was partitioned spatially into projects defined as the west, west-central, east-central, Pennsylvania Ridge and eastern basins. In 2016, 133 sites were fished across Lake Erie by three commercial fishing vessels: the Lincoln R, the Amanda May and the Lee Marie (Figure 4.1.1). Lake Erie fish processors assisted by transporting fish and gear, providing cold storage and supplying ice for boats. Since 2003, gill nets 110 feet in length with a mesh size of 4.75" (121 millimetres), 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. Comparisons of mean Walleye catch and size distributions in 2016 are made for index and auxiliary gear. Also in 2016, additional one fathom canned index nets were fished at 12 of the 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.

Partnership index gill nets consisted of 1,250 feet (0.38 kilometre) 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 millimetres to 152 millimetres). Mesh sizes two inches (57 millimetres) and greater were composed of two 50 foot panels, and those less than two inches were single panels 50 feet (15.25 metres) in length. Sets are intended to be approximately 24 hours in duration. Average fishing duration in 2016 was 21.5 hours, ranging from 15.7 to 29.0 hours (STD=2.6, N=309).

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 metres and greater than 10 metres. In the west-central and east-central basins, depths were grouped as 0 to 15 metres, 15 to 20 metres, and greater than 20 metres. The Pennsylvania Ridge and eastern basin depth strata were partitioned as 0 to 15 metres, 15 to 30 metres and depths greater than 30 metres. The number of locations fished in the west, west-central, east-central, Pennsylvania Ridge and east basin surveys were 22, 36, 36, nine 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 one fathom (1.8 metres). In the west-central and east-central basins, gill nets were canned at 2.7 fathoms (five metres) or 6.0 fathoms (11 metres) or 9.2 fathoms (17 metres). The central basin surveys were fished following fall turnover, when the water temperature was uniform throughout the water column. Twelve additional gangs of one 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 Pennsylvania Ridge and east basin areas, 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 metres) or four fathoms (7.3 metres), or eight fathoms (14.6 metres) at all sites. Additional canned nets were fished within the thermocline where possible in the east basin and Pennsylvania Ridge surveys.

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 centimetres in length). Otoliths were collected from Yellow Perch 15 centimetres 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 millimetres. Otoliths were collected from all Walleye 38 centimetres and larger, and from subsamples of catches of smaller Walleye (minimum of six per site). Lake Trout heads were retained to recover coded wire tags present in stocked Lake Trout. 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, Lake Whitefish, Smallmouth Bass, White Perch and White Bass. Catch rates presented have not been adjusted for selectivity bias associated with the gang configuration of mesh sizes.

The Partnership Index began September 5, 2016 in the east basin survey and was completed on September 15, 2016 at which time the Pennsylvania Ridge survey began. The nine sites in the Pennsylvania Ridge were done by September 17, 2016 and gear was transported to begin the west basin survey on September 20, 2016. The west basin field work concluded September 30, 2016. After fall turnover, the west-central basin survey started on October 4, 2016 and was finished by October 15, 2016, overlapping with commencement of the east-central survey. Index fishing continued in the east-central basin until all sites were fished by October 25, 2016.

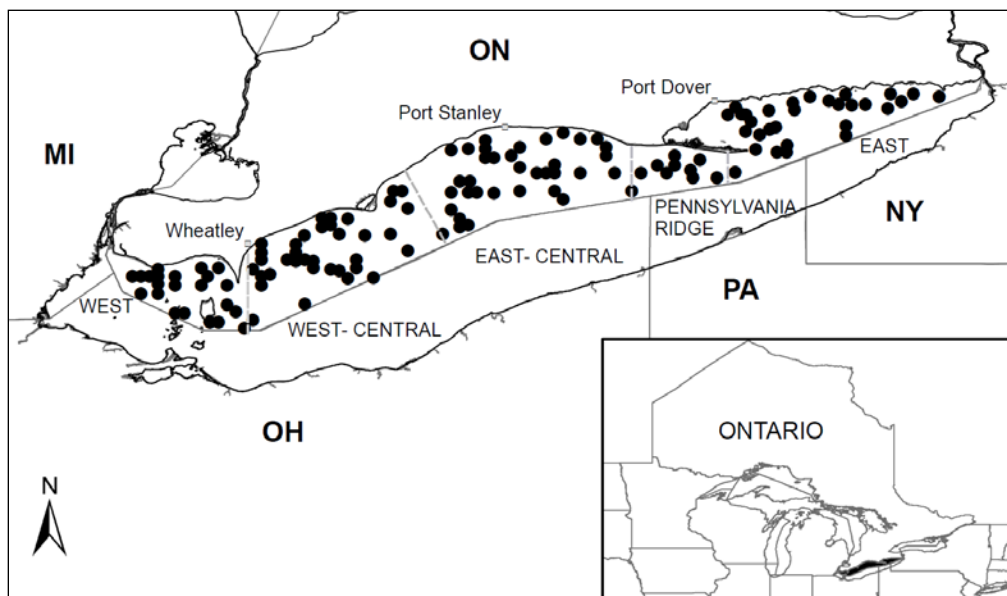


Figure 4.1.1 Lake Erie Partnership Index Fishing gill netting locations fished in 2016.

Fish Community

Catch in numbers of fish by species over the time series is presented for the west, west-central, east-central, Pennsylvania Ridge and east basin in Tables 4.1.1 to 4.1.5 respectively. Catches were standardized to an equal number of gangs as specified in Tables 4.1.1 to 4.1.5. 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 1998. Tables 4.1.1 to 4.1.5 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 4.1.6a (1989-2003) and Table 4.1.6b (2004-2016) with corresponding sampling effort by gear. Twenty five fish species and one hybrid (Carp-Goldfish) were caught in index gill nets in 2016.

Alewife abundance in Lake Erie has been depressed since 2003, showing only periodic upturns in 2006, 2012 and 2013. In 2016 surveys, 71 Alewife were caught, distributed among west-central, east-central and east basin surveys (Tables 4.1.1 – 4.1.6). The majority of the Alewives caught in 2016 were yearling or older with total lengths ranging from 165 millimetres to 229 millimetres. A single YOY Alewife was caught in the east basin survey with a total length of 111 millimetres. Gizzard Shad abundance indices were moderate (east) or better (west, central) throughout Lake Erie, with low catches observed in the Pennsylvania Ridge survey (Tables 4.1.1-4.1.5). Length distributions indicated young-of-the-year represented 69%, 52%, 26%, 91% and 24% of Gizzard Shad caught in the west, west-central, east-central, east and Pennsylvania Ridge surveys, respectively.

Invasive Round Gobies first appeared in the Partnership index in the west-central basin during 1997 (Tables 4.1.2 and 4.1.6). 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 4.1.5). Lakewide, the catch of Round Gobies in 2016 was slightly below the time series average (Table 4.1.6); however, relative catches of Round Gobies varied regionally. Round Goby catches ranged from low (e.g., central basin) to moderate (e.g., west, Pennsylvania Ridge) to high (e.g., east basin) (Tables 4.1.1 to 4.1.5). Due to their smaller size and body shape, Round Gobies are not completely vulnerable to capture in index gill nets.

Freshwater Drum abundance was below average lakewide in 2016 (Table 4.1.6). Regionally, Freshwater Drum catches were low in the west and central basin surveys but appeared moderate in east basin and Pennsylvania Ridge indices (Tables 4.1.1 to 4.1.5). Albeit with fluctuations between years, Freshwater Drum catches exhibited a gradual decline over the time series in the east basin. Catches improved slightly in 2016, but remained below average (Table 4.1.5). Based on length frequencies, YOY Freshwater Drum were only present in west (1%) and west-central (2%) basin catches during 2016. With the exception of the west-central basin survey, mean length of Freshwater Drum has trended upwards over time, reflecting decreasing recruitment, at least regionally.

Burbot is a native, cold water species which has experienced decline in Lake Erie for more than a decade due to poor recruitment. Lakewide Burbot catches in 2016 were very low; but, total catch (14) exceeded the previous four years (Table 4.1.6). Burbot catches were distributed between Pennsylvania Ridge (nine), east (four) and east-central basin (one) surveys in 2016. Fourteen Burbot were examined for Sea Lamprey scars and wounds; one Burbot had two A2 Sea Lamprey wounds. Burbot lengths ranged from 198 to 765 millimetres with a mean length of 505 millimetres. The presence of juveniles (2/14) suggests potential for recovery if environmental conditions support future recruitment.

Lake Trout are stocked in Lake Erie by U.S. agencies and OMNRF 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 2016, a

total of 10 Lake Trout were caught in index gear (Table 4.1.6b) fished in the Pennsylvania Ridge (one) and east basin (nine) surveys. All 10 Lake Trout were caught in gear fished on bottom. Gear depths at which Lake Trout were caught ranged from 22 to 49 metres (mean=30 metres). Water temperatures at which Lake Trout were caught ranged from 6.2 °C to 15.6 °C (mean=9.2 °C). The east basin Lake Trout catch in standard index nets in 2016 (10) was less than the previous 11 years and below the time series mean (23.9) (Table 4.1.5). All Lake Trout had fin clips including nine adipose and one left pectoral-right ventral clip. Strains were identified for eight of the 10 Lake Trout caught. The number of Lake Trout by strain in 2016 was Slate Island (four), Finger Lakes (two), Lake Champlain (one), and Michipicoten (one). Lake Trout caught in index gear in 2016 had total lengths ranging from 235-777 millimetres with a mean length of 645 millimetres. Only one out of the ten Lake Trout was a juvenile. Ages based on coded wire tags ranged from one to seven, with a mean of 5.0. One Lake Trout exhibited an A1 Sea Lamprey wound, for a wounding rate of 0.10 (all Lake Trout) or 0.11 (adult Lake Trout). The wounded Lake Trout was one of four Slate Island strain adults caught.

In the west basin survey, eight Lake Sturgeon were caught in index gill nets during 2016 (Table 4.1.1). The 2016 catch equaled that of 2004 and was second to the highest Lake Sturgeon catch observed in 2007 (nine). Total lengths ranged from 35 to 70 centimetres (mean=54 centimetres). None of the Lake Sturgeon had visible tags. All fish were identified, measured and released. The Great Lake – Upper St. Lawrence River population of Lake Sturgeon currently has *Threatened* status under Ontario's Endangered Species Act.

After a decline that began in 2000, Silver Chub catches increased suddenly to the longterm average in 2016 (Table 4.1.1, 4.1.6). Silver Chub were present only in the west basin survey during 2016. The Silver Chub ranged from 132 to 221 millimetres total length with a mean length of 161 millimetres. Silver Chub were retained for genetic and morphometric analyses. Lake Erie is in the northern part of the geographic range of Silver Chub. Silver Chub currently has *Threatened* status under Ontario's Endangered Species Act.

Lakewide Rainbow Trout (or Steelhead) catch in Partnership index gill nets during 2016 (14) was moderate but below the time series mean (29) (Table 4.1.6b). Rainbow Trout catches were confined to Pennsylvania Ridge and east basin surveys in 2016 in nets that were fished suspended in the thermocline (seven), suspended at nine metres (four) and on bottom (three). The fish ranged from 312 to 534 millimetres with a mean total length of 392 millimetres. None of the Rainbow Trout examined exhibited Sea Lamprey scars or wounds. Rainbow Trout represent the majority of more than two million Salmonids stocked annually by Lake Erie agencies. Naturalized populations of Rainbow Trout occur in Lake Erie.

Four Brown Trout were caught lakewide in 2016 (Table 4.1.6), with three caught in nets fished on bottom in the east basin survey and one from gear fished in the thermocline within the Pennsylvania Ridge area. Brown Trout ranged from 278 millimetres to 587 millimetres, with an average total length of 391 millimetres. All fish lacked fin clips and there were no Sea Lamprey wounds or scars visible. Brown Trout are stocked by Lake Erie agencies annually, although some naturalized populations may exist in Lake Erie.

Pink Salmon were caught periodically throughout lakewide Partnership surveys (Table 4.1.6). Four Pink Salmon were caught in 2016 exclusively in eastern Lake Erie (4.1.6); two were caught in standard canned nets and two were caught in nets fished in the thermocline. The sex composition of the four mature fish was equal and the mean length was 580 mm. Pink Salmon were introduced to Lake Superior during the 1950s and became established in the Great Lakes (Holm et al. 2009). Small, naturalized populations of Pink Salmon may exist in Lake Erie.

Species Biomass

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. Mean biomass per gang of all species increased to some degree in all Lake Erie surveys in 2016. West basin species biomass in 2016 (77 kilograms/gang) was ranked 77th percentile in the time series, above the basin average (59 kilograms/gang). West-central biomass in 2016 (55 kilograms/gang, 50th percentile) was near the time series average (54 kilograms/gang). East-central biomass (43 kilograms/gang, 69th percentile) exceeded the time series average (37 kilograms/gang) whereas east basin biomass (18 kilograms/ gang, 40th percentile) was just below the long term mean (20 kilograms/ gang). Pennsylvania Ridge biomass (25 kilograms/gang, 27th percentile) was well below average (34 kilograms/gang). Mean fish biomass was greatest in the west basin in 2016, followed by the west-central, east-central, Pennsylvania Ridge, and east basin surveys respectively.

The smallest mesh size in the index gear configuration is 32 millimetres, which excludes most small bodied forage fish such as Rainbow Smelt, Emerald Shiners, and juvenile fish of many species. Round Gobies are caught in index gill nets when they are larger, but due to body shape and benthic behaviour, they are under represented in gill net assessments; they accounted for less than 1% of biomass in all 2016 surveys.

Fish biomass in the 2016 west basin survey increased 48% from 2015, and consisted of Gizzard Shad (36%), Yellow Perch (19%), Walleye (14%), White Perch (7%), Channel Catfish (7%), Freshwater Drum (7%), White Bass (6%) and other species (3%). Shorthead Redhorse Suckers (2%) also contributed significantly to west basin biomass in 2016. Biomass increased from 2015 for Gizzard Shad (457%), Channel Catfish (64%), Walleye (47%), Freshwater Drum (37%) and White Bass (28%). Decreases in biomass were evident for White Perch (44%) and Yellow Perch (5%). White Bass, Channel Catfish and Gizzard Shad biomass levels were at 92nd, 92nd, and 81st percentiles for their respective time series. Yellow Perch (69th), Freshwater Drum (65th), Walleye (54th) and White Perch (50th) biomass percentiles were greater than or equal to medians of their time series. Alewife biomass in 2016 was near zero, continuing a trend of diminished levels that began in 2003. Smallmouth Bass historically accounted for more than 1% of all biomass but represented less than 1% in 2016, ranking 4th percentile over the 1990-2016 west basin time series. Shorthead Redhorse and Quillback Carpsucker biomass represented 96th and 46th percentiles respectively in 2016 relative to their time series, while White Sucker biomass was low and ranked 12th percentile.

West-central basin total biomass per gang in 2016 (55 kilograms/gang) was comparable to 2015 (54 kilograms/gang). Mean biomass per gang in 2016 was dominated by White Perch (25%), Yellow Perch (23%), Gizzard Shad (20%), Freshwater Drum (13%), Walleye (12%), and White Bass (1%) leaving 6% attributed to other species. White Perch and Gizzard Shad biomass was high in 2016, attaining 81st and 77th percentiles respectively. Walleye and Yellow Perch biomass levels were moderate in 2016, attaining 54th and 42nd percentiles respectively. Freshwater Drum (23rd percentile) and White Bass (19th percentile) biomass levels were relatively low in 2016. Alewife biomass in 2016 (20 grams/gang) was low relative to the time series, but exceeded 42% of other years due to their collapse since 2003. Channel Catfish (3%) and White Suckers (2%) contributed significantly to total biomass in 2016, with Channel Catfish biomass in 2016 attaining the 96th percentile in the time series.

In the east-central basin survey, mean total biomass in 2016 (43 kilograms/gang) was slightly (7%) higher than 2015 (40 kilograms/gang). Mean biomass per gang in 2016 was dominated by Yellow Perch (32%), Walleye (26%), White Perch (14%), Gizzard Shad (14%), Freshwater Drum (12%), and White Bass (1%), with 2% attributed to other species. Walleye biomass in 2016 was the highest of the time series. Gizzard Shad biomass was ranked 77th percentile in 2016. Yellow Perch and White Perch biomass levels were 54th percentiles of their 27 year time series. Freshwater Drum (27th percentile) and White Bass (4th percentile) biomass levels were low in 2016. Alewife biomass was very low in 2016, exceeding 23% of years in the time series. Channel Catfish accounted for 1% of total biomass in 2016; this year was ranked as 89th percentile in the time series.

The species composition of eastern Lake Erie consists of warm, cool, and cold water fish communities. In the east basin survey, mean biomass per gang of all species in 2016 increased 60% from 2015. Seven species represented 90% of the fish biomass in 2016 including Yellow Perch (47%), Walleye (14%), Freshwater Drum (14%), White Bass (6%), Smallmouth Bass (4%), Gizzard Shad (3%) and Lake Trout (2%). Yellow Perch biomass increased 316% in 2016, exceeding 76% of previous surveys. Walleye biomass dropped by 13% in 2016; this biomass represented the 68th percentile in the time series. White Bass biomass increased 63% in 2016 and exceeded 88% of previous years. Smallmouth Bass biomass in 2016 was 143% greater than observed in 2015 but was low, representing the 16th percentile. Gizzard Shad biomass in 2016 was below the mean but exceeded 44% of earlier years, including 2014 and 2015. White Perch, White Sucker and Burbot accounted for small proportions of total biomass in 2016 (2%, 1%, and <1% respectively) and were low in 2016 relative to their time series. Alewife biomass in 2016 (54 grams/gang) accounted for <1% of total biomass, ranking 36th percentile in the time series. Historically, Alewife comprised a significant fraction of total fish biomass; the 1989-2016 mean was 1.3 kilograms/gang or 7 % of the total. Lake Trout biomass in 2016 (421 grams/gang) dropped 86% from 2015 and was higher than only 32% of previous surveys. Other species that contributed at least 1 % to total biomass in 2016 included Channel Catfish (2%), Lake Whitefish (1%), Rainbow Trout (1%) and Rainbow Smelt (1%). Numbers were rounded to the nearest percentage.

Yellow Perch

In 2016, Yellow Perch catch rates (all ages) increased from 2015 in the west-central (107%), and east basin (261%) surveys, but decreased in the west (25%), east-central basin (12%), and Pennsylvania Ridge (70%) surveys (Figure 4.1.3). Yellow perch catch rates for all ages in 2016 ranked 62nd (west), 38th (west-central), 58th (east-central), 27th (Pennsylvania Ridge), and 96th (east basin) percentiles.

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.

Yellow Perch ages 1 to 7 were present in the 2016 west basin survey with age 2 fish being the most abundant age group (2014 year class; 58%) followed by age 1 (2015 year class; 24%) and age 3 (2013 year class, 14%) (Figure 4.1.3). In the 2016 west-central basin survey, the Yellow Perch age composition included ages 1 to 10 with age 2 (2014 year class 73%), age 1 (2015 year class 9%) and age 4 (2012 year class 8%) most abundant. East-central Yellow Perch catches in 2016 consisted of fish ages 1 to 13 with age 2 (2014 year class, 58%), age 4 (2012 year class, 23%) and age 3 (2013 year class, 7%) representing most of the catch. Pennsylvania Ridge catches were comprised of Yellow Perch ages 1 to 12, with age 4 (2012 year class, 41%), age 2 (2014 year class, 25%), and age 5 (2011 year class, 16%) most abundant. Age 1 Yellow Perch represented only 1% of the catch in Pennsylvania Ridge. East basin

catches included Yellow Perch ages 1 to 10, with age 1 (2015 year class, 50%) and age 2 (2014 year class, 43%) dominant.

The cohort strength of the 2015 year class was assessed as strong in the east basin (100th percentile) and moderately strong in the west basin survey (65th percentile), but was assessed as weaker in the west-central (38th percentile), east-central (35th percentile) and Pennsylvania Ridge (36th percentile) surveys. The abundance index of Yellow Perch ages 6 and older in 2016 was the highest in the Pennsylvania Ridge survey where they represented 14% of Yellow Perch caught. Ages 6 and older Yellow Perch were significant in the 2016 east-central basin survey, accounting for 4% of Yellow Perch caught. The contribution of age 6 and older Yellow Perch in the west, west-central and east basin surveys was lower, representing 2%, 1% and 1% of 2016 catches respectively.

The mean age of Yellow Perch caught reflects differences in age composition between surveys with the highest value in the Pennsylvania Ridge survey (3.8) and the lowest value in the east basin (1.7) (Figure 4.1.4). Yellow Perch sex ratios remained relatively stable over the time series to 2016, during which females represented 44% (west) to 56% (west-central) of Yellow Perch ages 2 and older (Figure 4.1.5).

Mean total length (millimetres) and weight (grams) for each sex was plotted by basin for Yellow Perch collected in 2016 with 95% confidence limits to compare with the time series average up to 2015 (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 for which annual mean size of older fish fall below the time series mean. Mean length and weight at age in 2016 was near or above average for males in all surveys, except for some males age 5 or older in the west and west-central basin surveys which appeared smaller than average (Figure 4.1.6). Female length and weight at age in 2016 was near or above average lakewide for the majority of ages. 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 in all basins. Despite interannual fluctuations, temporal trends of increasing length at age appear in the west and east basin surveys (Figure 4.1.7). In contrast, mean length at age in west-central and east central basin surveys exhibited a gradual decline amidst fluctuations.

All Yellow Perch caught during the 2016 fall Partnership gill net survey were scanned for passive integrated transponder (PIT) tags, which were applied by Ontario MNRF 2009-2015 and by Ohio DNR in 2013-2015. All Yellow Perch (2,639 kilograms or 24,785 fish) 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 2016.

Walleye

Walleye catch rates in 2016 increased from 2015 lakewide (Figure 4.1.8). The increase throughout the lake was attributed to abundant yearling Walleye (2015 year class).

Young-of-the-year (YOY or age 0) Walleye indices were below average in all surveys (Figure 4.1.8). Age 1 (2015 cohort) Walleye indices in 2016 were either highest (east-central, Pennsylvania Ridge) or second highest (west, west-central, east) in each time series (Figure 4.1.8). Age 2 (2014 cohort) Walleye catch rates in 2016 were moderate in the west basin (62nd percentile) but were ranked higher in the west-central (77th percentile), east-central (88th percentile), Pennsylvania Ridge (86th percentile) and east basin (84th percentile) surveys. Age 3 (2013 cohort) accounted for 2% or less of Walleye caught in all 2016 surveys and were weak relative to each time series (Figure 4.1.8). Age 4 (2012 year class) Walleye in 2016 did not contribute significantly (<1%) to catches in west and central basin surveys, but were more prevalent in east basin (13% of catch; 84th percentile) and Pennsylvania Ridge surveys (2% of catch; 55th percentile).

Walleye ages 5 and 6 were poorly represented in west and central basin surveys (<1% of catch) and were marginally present in east and Pennsylvania Ridge surveys ($\leq 3\%$ of catch). Catch rates of age 7 and older Walleye were minimal in the west, west-central and east-central basin surveys (<1% of catch) but were more significant in the east basin (12% of catch, 60th percentile) and to a lesser degree in the Pennsylvania Ridge (2% of catch; 14th percentile) surveys. Age 13 Walleye (2003 year class) comprised less than 1% of the catch in the west and central basin surveys but was more abundant in the east basin (3%) and Pennsylvania Ridge (1%) surveys in 2016.

The mean age of Walleye caught in 2016 was the lowest in the east-central (1.1), followed by the west (1.2), west-central (1.2), Pennsylvania Ridge (1.6) and east basin surveys (3.3) (Figure 4.1.9). Walleye mean age in 2015 and 2016 was strongly influenced by the strength of the 2015 year class at ages 0 and 1 respectively.

The percentage of age 2 and older Walleye caught that were female in 2016 surveys ranged from 39% to 54% in surveys. In 2016, the proportions of age 2 and older Walleye that were female were slightly below average in all surveys (Figure 4.1.10).

Mean total length (millimetres) and weight (grams) with 95% confidence limits for each sex was plotted by basin for Walleye collected in 2016. The average size at age for each sex across years pooled to 2015 was plotted for comparison (Figure 4.1.11). Mean lengths and weights of age 1 Walleye were below average in the west and central basin surveys for both sexes and for females in the east basin (Figure 4.1.11). In the east basin 2016 survey, mean length and weights for older males and females fell below time series averages (Figure 4.1.11). To describe change in mean length over time, trends are presented for young-of-the-year (YOY) Walleye with sexes pooled, yearlings with sexes pooled and ages 2 and 3 Walleye by sex for the west, central basin surveys combined and east basin survey (Figure 4.1.12). YOY Walleye mean length was slightly above average in 2016 for fish collected during the west basin survey, but was below average for YOY caught in combined central basin surveys. Mean lengths of Walleye ages 1 to 3 gradually increased over the time series but declined in recent years (Figure 4.1.12). Age specific metrics may be influenced by the transition from using scales to otoliths for age determination.

In 2016, Walleye index gill net catch rates were greater in bottom nets compared to standard canned index nets in the west, west-central, and east-central basin surveys (Figure 4.1.13). In contrast, Walleye catch rates in the east basin were highest in nets suspended in the thermocline (7.4 Walleye/gang), followed by standard canned nets (4.0 Walleye/gang) and bottom nets (2.6 Walleye/gang) (Figure 4.1.13). Catch rates in auxiliary index nets fished at one fathom (i.e. 1.8 metres) depths in the west-central basin (22.9 Walleye/gang) were higher than observed for standard canned (16.3 Walleye/gang) but were lower than catch rates in bottom nets (30.3 Walleye/gang). Similarly, catch rates in one fathom canned nets in the east-central basin (26.8 Walleye/gang) were greater than standard canned nets (19.2 Walleye/gang) but less than nets fished on bottom (41.7 Walleye/gang) (Figure 4.1.13). Catch rate comparisons among gear and depths are influenced by dominant age groups which vary spatially and annually.

Walleye catch rates in commercial style, 50 mesh, 121 millimetre (4¾ inch) nets fished adjacent to all index canned nets were highest in the west and west-central basin surveys (0.6 Walleye/net) compared to the east-central and east basin surveys (0.4 Walleye/net). In Figure 4.1.13, central basin catch rates combined nets fished at standard depths along with canned nets fished at one fathom. Total lengths of Walleye caught in index nets ranged from 13 to 74 centimetres, whereas commercial style 4¾ inch nets caught Walleye 25 centimetres to 75 centimetres in length and were generally composed of larger Walleye (Figure 4.1.13).

Walleye catch rates in 4¾ inch (121 millimetre) 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). The Walleye catch rate in 2016 (0.51 Walleye/net) was the lowest observed for the pooled west-central 2003-2016 time series (Figures 4.1.14). The Walleye catch rate in the east basin (0.31 Walleye/Net) was also lowest in 2016 over the time series (4.1.15). Ages in the auxiliary west and central surveys ranged from one to 18 with ages one (22%), three (13%), five (12%), 13 (10%) and nine (10%) most common. In the east basin, Walleye ages ranged from one to 16 with ages 13 (21%), 14 (11%), and six (14%) most abundant. Walleye ages seven and older accounted for 35% of Walleye caught in the west and central areas compared to 57% of Walleye caught in the east basin (Figures 4.1.14 and 4.1.15).

All six,101 Walleye caught and sampled from Partnership index and auxiliary gear were scanned for PIT tags in 2016. No PIT tags were detected.

Lake Whitefish

Lake Whitefish are a migratory cold water species caught in central basin surveys after fall turnover and in the cold, hypolimnetic waters of the eastern basin during thermal stratification. 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 have declined in abundance due to weaker year classes that followed the strong 2003 year class. Seventeen Lake Whitefish were caught in Partnership index gear in 2016. Catches were distributed between the west-central basin (one), east-central basin (four), Pennsylvania Ridge (three) and east basin (nine). One additional Lake Whitefish was caught in auxiliary 121-millimetre canned nets in the west-central basin in 2016.

Lake Whitefish indices are standardized to equal effort among mesh sizes. Lake Whitefish catch rates remained low in 2016; catch rates (Whitefish/gang) by basin were: west-central (0.01), east-central (0.06), Pennsylvania Ridge (0.17), and east basin (0.15). A composite index of all gill net surveys using standard index gear excluding the west basin, is presented in Figure 4.1.16. Catch rates in the 2016 composite index marginally exceeded the previous five years and was 19th percentile over the time series.

The age composition of Lake Whitefish caught in Partnership index gear in 2016 included ages 1 to 17, with age 1 (2015 year class, 35% of catch) and age 13 (2003 year class, 29% of catch) most abundant (Figure 4.1.17). In addition, one mature female Lake Whitefish was caught in auxiliary 121 millimetre gear that was age 15. The presence of age 1 Lake Whitefish is a positive sign, as yearlings haven't been observed in the Partnership index since 2008. None of the Lake Whitefish caught in index and auxiliary gear exhibited Sea Lamprey wounds or scars in 2016.

The mean age in the Lake Whitefish population began a trend upward following the recruitment of the 2003 year class at age 2 in 2005. In 2015, the mean age dropped significantly due to young of the year (age 0) Lake Whitefish caught in 2015. An increase in mean age was observed in 2016 as this cohort advanced in age one year (Figure 4.1.17). The lengths and weights of Lake Whitefish at age caught in index gill nets during 2016 are presented in Figure 4.1.18 along with mean size at age for the time series. Mean length and weight at age 1 (sex unknown) and age 13 (males) in 2016 were comparable to long term means. Samples sizes in 2016 at other ages and for females lack precision for valid comparisons.

Smallmouth Bass

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

(Figure 4.1.1), which is recognized as excellent habitat for Smallmouth Bass. Smallmouth Bass catch rates in 2016 were low for both the west (31st percentile, catch=14) and east basin (8th percentile, catch=48) (Table 4.1.1, Table 4.1.5, Figure 4.1.19). West basin Smallmouth Bass age composition ranged from zero to 18 whereas east basin ages ranged from one to 17. Age 0 Smallmouth Bass dominated the age composition in the west basin survey, accounting for 80% of Smallmouth Bass. Eastern Smallmouth Bass catches included fish ages two (27%), six (15%), and other ages with 35% of Smallmouth Bass age seven or older. Yearling Smallmouth Bass were larger than average in the 2016 east basin survey while mean lengths and weights of other ages were comparable to long term averages (Figure 4.1.20). Sample sizes of Smallmouth Bass from the 2016 west basin survey were too low for size comparisons to be made.

White Perch

White Perch catch rates in 2016 increased in the west-central and Pennsylvania Ridge surveys but decreased from 2015 in all other surveys (Figure 4.1.21). White Perch catches in 2016 were moderate in west-central (58th percentile) and Pennsylvania Ridge (48th percentile) surveys with weaker catches in the west (38th percentile), east-central (37th percentile) and east basin (30th percentile) surveys. White Perch ages ranged from zero to eight in the west and west-central basins, zero to seven in the east-central basin, zero to six in Pennsylvania Ridge survey and zero to seven in the east basin survey (Figure 4.1.21). Young-of-the-year accounted for significant proportions of White Perch catches in the west (24%) and east (33%) basin surveys in 2016, whereas YOY represented 3% or less in central basin and Pennsylvania Ridge surveys. Yearling White Perch were prevalent in the west and central basin surveys but were less common in the east basin and Pennsylvania Ridge surveys. Age 2 White Perch were prominent in catches lakewide, while age 4 White Perch were abundant in central and east basin surveys (Figure 4.1.21). Mean lengths and weights at age were at or above average for most age groups in all basins surveyed in 2016 (Figure 4.1.22).

White Bass

White Bass abundance decreased over recent years from peak abundance levels observed two to five years previously, depending on the survey (Figure 4.1.23). In 2016, White Bass catch rates were relatively high in the east basin, moderate in the west basin and Pennsylvania Ridge surveys, and weak in the central basin surveys (Figure 4.1.23, Tables 4.1.1-4.1.6). White Bass ages ranged from zero to eight in the west, zero to five in the west-central, zero to six in the east-central, three to five in Pennsylvania Ridge and zero to six in the east basin surveys (Figure 4.1.23). Age 0 White Bass were present lakewide but YOY were dominant in the central basin surveys, accounting for 63% to 70% of White Bass in the west-central and east-central basin surveys respectively. Age 4 (2012 cohort) White Bass were prominent lakewide, representing 55% (west), 20% (west-central), 19% (east-central), 83% (Pennsylvania Ridge) and 60% (east basin) of survey catches. Lengths and weights of age 2 female White Bass in the west basin and age 4 and 6 White Bass in the east basin were below average size in 2016 (Figure 4.1.24). The remaining White Bass mean lengths and weights at age were near or above average in 2016 (Figure 4.1.24).

References:

Holm, E., N. Mandrak and M. Burridge. 2009. The ROM Field Guide to Freshwater Fishes of Ontario. Royal Ontario Museum. ISBN 978-0-88854-459-9. pp 462.

Table 4.1.1 Total numbers of each species caught during western basin Partnership Index Fishing, Lake Erie, 1990-2016. Numbers are standardized to 44 gangs. Average catch from 1990-2016 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	2014	2015	2016	Average	
Silver Lamprey	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0.1	
Sea Lamprey	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	2	0	0.1	
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	2	8	2.1	
Longnose Gar	0	0	1	0	1	0	0	0	0	1	7	4	1	0	0	0	0	0	0	0	1	1	0	2	1	1	0	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	0	0	0	386.1	
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	1,767	1,343	6,710	4,759.6	
Pink Salmon	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	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	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	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	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	0	0	0.7	
Rainbow Smelt	8	1	0	37	0	1	0	1	1	0	1	95	1	0	1	1	2	2	34	1	1	0	2	0	2	0	0	7.1	
Muskelunge	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	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	12	14	6	9.8	
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	43	97	56	75.6	
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	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	0	0	0	1.0	
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	39	66	85	29.8	
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	0	0	0.7	
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	12	4	0	1.2	
Common Carp	25	29	4	7	3	2	7	3	1	3	16	22	6	1	4	1	8	3	3	5	1	3	9	1	4	0	0	6.4	
Silver Chub	25	35	147	121	59	96	89	73	67	185	133	61	48	44	84	21	38	9	2	1	2	8	3	6	16	5	53	53.0	
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	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	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	0	0	0.0	
Brown Bullhead	0	0	1	0	0	0	0	0	0	0	3	1	1	0	0	2	0	1	1	0	0	0	2	0	1	0	0	0.5	
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	343	185	245	128.9	
Stonercat	1	1	0	1	0	0	1	0	2	2	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	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	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	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	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	0	0	0.0	
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	4,223	2,636	1,956	2,223.3	
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	728	294	333	352.8	
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	12	6	7	9.3	
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	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	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	21	13	14	74.1	
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	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	0	0	0.1	
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	5,328	6,381	5,268	4,625.3	
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	582	1,008	1,636	1,045.6	
Round Goby	0	0	0	0	0	0	0	0	5	3	5	4	4	4	10	2	0	0	12	5	1	1	0	3	5	5	1	2.6	
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	661	237	397	490.7	
Goldfish-Carp Hybrid	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	1	1	0	1	4	0.4	
Total	3,551	14,517	11,383	11,624	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	13,801	12,298	16,781	14,290	
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	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	44	44	44	43	
Note: Values are continually corrected for errors and may be updated from previous reports.																													

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

Table 4.1.2 Total numbers of each species caught during west-central basin Partnership Index Fishing, Lake Erie, 1990-2016. Numbers are standardized to 72 gangs. Average catch from 1990-2016 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	2014	2015	2016	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	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	0	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	0	0	0	17	1,748.5
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	422	1,751	3,169	3,366.2	
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	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	0	0	0.5	
Rainbow Trout	2	0	1	0	0	2	0	0	0	3	1	0	3	2	0	0	3	1	0	0	1	0	0	0	0	0	0	0.7	
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	7	5	1	21.7	
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	7	5	1	21.7	
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	290	157	18	264.3	
Muskellunge	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	0	0	0.0	
Quilback	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	2	0	0.4	
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	45	101	121	61.3	
Spotted Sucker	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	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	0	0	0.1	
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	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	4	25	2.9	
Goldfish	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0	0	0	0	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	0	1	0	1.1	
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	0	0	0	1.7	
Emerald Shiner	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	3	0	0	0	0	0	0	0.2	
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	9	0	0.4	
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	0	0.4	
Channel Catfish	17	28	25	15	6	25	27	5	6	3	13	1	9	7	7	11	49	65	13	44	70	63	52	127	61	141	97	36.5	
Stoneroll	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	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	0	0	2.0	
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	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	3,054	5,561	4,696	4,117.1	
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	491	258	134	485.2	
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	0	0.2	
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	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	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	0	0	0.5	
Largemouth Bass	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	0	0.1	
Yellow Perch	1,810	2,315	2,105	1,165	2,020	2,260	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	6,453	2,846	6,090	7,632.6	
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	258	1,138	1,400	539.3	
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	4	6	1	9.2	
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	583	2,594	991	1,660.1	
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	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	11,673	14,574	16,764	19,904	
Number of Sites	34	36	36	36	36	36	36	36	28	36	36	36	36	36	36	36	36	36	36	36	36	36	36	35	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	72	70	72	72	71	

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

Table 4.1.3 Total numbers of each species caught during east-central basin Partnership Index Fishing, Lake Erie, 1989-2016. Numbers are standardized to an effort of 72 gangs. Average catch from 1989-2016 is 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	2014	2015	2016	Average	
Lake Sturgeon	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	0	0	0.0	
Alewife	677.3	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	0	0	3	1,876.4
Gizzard Shad	860.0	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	578	254	24	116	1,557	1,280.0	
Coho Salmon	1.3	2	0	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	0	0	0	2	0	9	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	
Rainbow Trout	2.7	0	1	2	1	0	2	2	1	1	0	2	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0.6	
Lake Trout	1.3	0	1	2	0	2	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	2	0	0	1	0	0	0.4	
Lake Whitefish	5.3	2	2	4	41	21	24	142	46	33	21	11	21	27	14	43	36	13	6	13	9	2	1	0	2	4	4	20.8	
Rainbow Smelt	320.0	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	158	717	150	615.6	
Northern Pike	-	12	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	0.4	
Quillback	-	0	0	0	24	9	3	0	1	0	5	0	0	0	2	2	0	0	0	0	1	0	5	0	1	4	0	2.2	
White Sucker	72.0	52	63	72	129	78	126	46	60	56	71	30	135	13	60	78	83	35	35	73	52	62	30	28	39	62	16	60.9	
Silver Redhorse	-	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	0	0.0	
Golden Redhorse	-	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	
Shorthead Redhorse	-	15	0	4	12	0	2	2	1	2	18	0	1	0	0	0	1	1	1	3	1	3	0	0	1	3	1	2.8	
Goldfish	-	0	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	0.1	
Lake Chub	-	0	0	2	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	
Common Carp	-	0	0	1	5	0	0	0	1	0	7	4	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.7
Silver Chub	-	0	0	1	0	0	0	0	24	14	18	7	2	0	1	4	2	2	0	2	0	2	0	0	3	1	0	3.2	
Emerald Shiner	-	0	0	0	15	2	5	0	0	0	0	0	0	2	2	0	1	0	2	4	0	0	2	0	0	0	0	1.3	
Common 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	0	0.1	
Spottail Shiner	-	2	1	1	3	0	0	2	0	18	0	0	10	0	2	0	2	0	0	0	0	2	0	0	0	0	5	0	1.8
Notropis sp.	9.3	0	2	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	
Channel Catfish	12.0	3	11	10	43	19	12	7	6	6	26	9	23	2	17	8	11	18	0	8	8	12	19	12	5	39	19	13.6	
Stonercat	-	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	
Tadpole Madtom	-	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	0.0	
Burbot	30.7	13	9	19	20	19	14	25	36	15	2	12	9	0	1	3	2	1	2	0	2	1	0	2	1	0	1	8.1	
Trout-perch	-	7	1	19	12	4	0	2	2	1	0	15	4	12	7	1	3	0	4	0	0	0	0	0	0	0	0	3.7	
White Perch	7,621.3	4,449	1,929	3,480	809	382	2,03	268	179	529	1,086	1,225	4,046	1,567	1,777	6,905	3,674	2,364	2,688	1,713	2,440	3,009	6,230	3,705	1,400	2,883	1,673	2,347.0	
White Bass	636.0	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	267	215	70	354.8	
Rock Bass	-	0	0	0	3	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1	0	0	0	0	1	0.4	
Bluegill	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0.1	
Smallmouth Bass	-	0	0	0	0	0	0	0	6	2	0	0	1	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0.7	
Largemouth Bass	-	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	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	1	0	0	0	0.0	
Yellow Perch	3,332.0	1,121	1,174	1,295	726	2,179	1,944	4,881	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	7,487	7,814	6,464	6,025.8	
Walleye	465.3	118	207	276	367	366	237	82	70	17	29	27	99	68	639	473	310	63	45	81	33	152	108	92	97	504	2,052	254.3	
Round Goby	-	0	0	0	0	0	0	0	2	40	61	34	157	76	70	148	39	41	41	34	91	68	22	4	47	18	16	38.8	
Freshwater Drum	3,612.0	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	239	541	454	1,173.9	
Goldfish-Carp hybrid	-	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	0	0.0	
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	14,585	9,772	12,927	12,481	14,090	
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	36	36	36	32	
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	72	72	72	63	
Note: Values are continually corrected for errors and may be updated from previous reports.																													

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

Table 4.1.4 Total numbers of each species caught during Pennsylvania Ridge Partnership Index Fishing, Lake Erie, 1991-2016. Numbers are standardized to an effort of 18 gangs. Average catch from 1991-2016 is presented for each species. The study was not done in 1996, 1997 and 2013. Only standard canned nets are included (no thermocline gangs).

Species	1991	1992	1993	1994	1995	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Average	
Longnose Gar	0	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	
Alewife	740	1,530	0	16	133	605	69	2,284	42	1,076	0	0	0	0	489	0	0	11	2	263	0	0	0	0	0	302.5
Gizzard Shad	16	20	36	531	95	96	101	515	141	374	15	17	2	163	20	85	48	98	306	246	0	1	2	24	123.0	
Pink Salmon	1	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	
Coho Salmon	2	0	2	0	0	0	1	0	2	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0.4	
Chinook Salmon	0	0	0	1	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	
Rainbow Trout	1	0	2	0	1	2	5	3	8	17	7	13	35	8	0	1	1	1	4	3	0	1	6	2	5.0	
Lake Trout	1	2	8	5	9	3	2	0	5	4	1	10	3	4	2	1	2	3	5	4	0	6	1	1	3.4	
Lake Whitefish	13	17	33	15	53	59	1	1	14	1	9	3	12	1	115	43	11	0	0	2	0	0	1	3	17.0	
Rainbow Smelt	179	22	38	38	60	40	14	8	111	21	54	80	9	16	630	183	86	6	10	489	0	3	54	63	92.3	
Muskellunge	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	
Quillback	0	0	0	0	0	0	1	2	6	1	0	2	0	2	0	1	2	0	12	0	0	6	1	0	1.5	
White Sucker	18	20	12	15	15	62	11	9	65	10	24	16	13	19	7	12	72	40	37	15	0	12	20	21	22.7	
Silver Redhorse	0	0	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	3	1	0	0	1	0	0.3	
Golden Redhorse	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	
Shorthead Redhorse	0	3	3	1	2	24	2	2	18	2	3	9	0	3	0	6	44	2	50	0	0	4	2	2	7.6	
Redhorse sp.	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	
Common Carp	0	0	0	0	0	0	0	3	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.2	
Silver Chub	0	0	0	0	0	0	0	0	3	0	8	0	0	1	0	2	2	0	1	0	0	0	0	0	0.7	
Emerald Shiner	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0.1	
Spottail Shiner	0	3	0	0	0	0	0	0	0	0	0	3	0	1	0	0	0	0	2	0	0	1	0	0	0.4	
Channel Catfish	0	4	2	3	0	4	2	1	5	2	0	1	0	1	2	1	1	0	10	1	0	2	1	3	1.9	
Stonecat	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	
Burbot	8	8	8	12	15	71	59	36	74	49	76	49	10	10	54	17	20	8	14	6	0	1	1	9	25.6	
Trout-perch	0	0	0	0	0	0	0	1	4	2	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0.4	
White Perch	446	195	93	34	46	70	56	68	142	104	129	34	39	186	16	73	44	436	425	58	0	218	11	164	128.6	
White Bass	55	63	7	4	84	35	20	36	26	5	6	5	3	103	20	34	18	21	106	9	0	146	69	37	38.0	
Rock Bass	1	1	0	1	1	13	7	2	9	1	0	0	0	2	0	1	0	2	3	0	0	0	0	0	1.8	
Smallmouth Bass	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	
Black Crappie	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	
Yellow Perch	714	20	190	104	483	1,743	1,654	3,752	1,881	3,008	1,115	1,310	2,558	4,710	4,280	3,508	3,783	5,204	2,853	4,395	0	2,595	3,036	1,309	2,258.5	
Walleye	13	34	23	27	47	19	12	7	13	7	14	9	102	30	7	39	31	18	20	17	0	30	36	105	27.5	
Round Goby	0	0	0	0	0	0	2	19	30	38	37	4	9	146	95	67	28	25	22	3	0	1	1	8	22.3	
Freshwater Drum	285	118	43	142	88	103	41	62	74	56	39	15	9	21	14	37	127	56	98	3	0	120	9	102	69.2	
Total	2,493	2,060	501	949	1,134	2,953	2,062	6,813	2,679	4,782	1,540	1,581	2,804	5,917	5,263	4,112	4,321	5,931	3,985	5,515	0	3,147	3,252	1,853	2,909.5	
Number of Sites	9	9	9	9	9	9	9	9	9	9	9	9	9	9	4	9	9	9	9	9	0	9	9	9	7.8	
Number of Gangs	18	18	18	18	18	18	18	18	18	18	18	18	18	18	8	18	18	18	18	18	18	18	18	18	18	15.5

NOTE: Values are continually corrected for errors and may be updated from previous reports.

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

Table 4.1.5

Total numbers for each species caught during eastern basin Partnership Index Fishing surveys, Lake Erie, 1989-2016. Numbers are standardized to an effort of 60 gangs. Average catch from 1989-2016 is 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. Supplementary Walleye cap area catches are not included.

Species	1989	1990	1991	1992	1993	1994	1995	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	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	0	0.0	
Longnose Gar	1	0	0	0	0	0	0	1	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	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	1	59	29	679.7	
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	0	3	322	259.7	
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	0	2	0.4	
Coho Salmon	0	0	4	2	2	0	0	0	1	0	2	1	0	0	1	1	0	0	1	0	0	0	1	0	0	0	0.6	
Chinook Salmon	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0.2	
Rainbow Trout	1	3	5	8	0	2	4	6	2	0	4	6	6	1	15	1	1	1	2	7	4	1	1	8	6	9	5	4.1
Brown Trout	1	0	0	0	0	0	0	0	0	0	0	21	2	2	1	0	0	0	1	0	3	0	1	1	0	3	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	18	58	9	23.9	
Lake Whitefish	15	43	35	14	0	10	8	133	6	0	2	18	2	2	3	45	16	39	4	45	0	4	0	0	0	0	9	17.3
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	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	268	223	203	199.2	
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	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	0	0	0.1	
Quillback	4	0	0	0	0	5	0	0	2	4	3	0	1	0	0	0	4	4	0	3	2	4	4	0	0	0	1.5	
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	40	21	12	76.8	
Silver Redhorse	0	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	0.0	
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	0	0	0.4	
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	2	0	0	20.4	
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	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	0	0	0	1.2	
Silver Chub	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	0.0	
Emerald Shiner	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	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	0	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	4	4	15	7.4	
Stonercat	12	3	6	3	7	0	0	0	10	2	3	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1.8	
Burbot	5	11	20	11	29	49	53	238	185	212	108	143	171	113	101	31	64	25	24	9	21	5	5	5	2	4	63.2	
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	0	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	149	7	65	338.4	
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	375	79	116	87.7	
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	76	0	1	82.2	
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	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	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	92	20	48	246.9	
Largemouth Bass	0	0	0	0	0	0	0	0	0	1	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	
Black Crappie	6	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	
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	789	1,220	4,692	1,945.0	
Walleye	140	79	31	57	63	46	34	29	41	62	41	42	31	38	345	109	199	98	162	65	173	70	74	150	90	136	92.5	
Round Goby	0	0	0	0	0	0	0	0	0	0	9	19	178	93	54	23	55	27	25	26	45	11	44	34	5	19	60	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	171	84	206	244.1	
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	5,664	4,417	5,818	7,191	3,175	5,143	4,923	2,152	1,898	5,938	4,426	
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	30	30	30	25	
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	60	60	60	50	
Note: Values are continually corrected for errors and may be updated from previous reports.																												

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

Table 4.1.6a Observed total numbers of each species caught fishing monofilament index gill nets in all basins during Partnership Index surveys, Lake Erie, 1989-2003.

Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Silver Lamprey	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Sea Lamprey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Sturgeon	-	-	-	1	1	1	1	2	1	2	-	3	-	2	5
Longnose Gar	1	-	-	1	-	1	-	-	-	2	9	4	1	-	1
Alewife	2,498	5,322	27,914	5,799	2,601	3,534	6,270	890	212	6,696	15,805	16,499	1,477	25,749	9
Gizzard Shad	945	1,871	13,502	4,682	7,382	8,264	10,485	2,932	2,618	5,919	16,717	12,686	7,520	29,523	9,866
Pink Salmon	-	-	4	1	1	-	-	-	-	-	1	-	-	-	-
Coho Salmon	8	1	6	1	4	-	-	-	-	-	7	3	5	9	1
Chinook Salmon	-	-	4	1	1	2	3	-	11	1	2	1	1	4	-
Rainbow Trout	4	7	6	8	4	1	5	-	2	9	101	65	60	96	49
Atlantic Salmon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brown Trout	1	-	-	1	-	-	-	-	-	3	-	1	1	23	2
Lake Trout	14	7	9	6	24	21	10	-	-	15	13	21	43	23	38
Lake Whitefish	21	47	46	34	71	41	105	15	192	258	89	74	39	58	82
Cisco	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Rainbow Smelt	1,005	1,027	1,099	537	531	574	2,409	435	615	1,296	1,021	483	1,770	1,262	489
Northern Pike	-	8	1	-	-	-	-	-	-	-	-	-	-	-	-
Muskellunge	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Mooneye	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Quillback	3	-	1	5	22	12	6	12	5	5	16	19	43	26	27
White Sucker	271	284	264	316	260	211	178	98	142	244	261	324	356	439	255
Spotted Sucker	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Silver Redhorse	-	-	-	-	-	-	-	-	-	2	-	5	-	2	-
Golden Redhorse	-	-	-	-	-	-	-	-	19	-	2	23	6	-	-
Shorthead Redhorse	33	86	23	57	73	27	19	15	52	63	45	116	90	22	55
Redhorse sp.	-	-	-	-	-	-	-	-	-	1	-	-	-	25	-
Goldfish	-	-	-	-	-	-	2	-	-	-	2	4	-	-	-
Lake Chub	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
Common Carp	18	28	25	6	11	3	5	8	4	2	4	28	28	8	2
Silver Chub	-	25	35	150	115	59	97	89	73	90	203	154	72	52	52
Hornyhead Chub	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Emerald Shiner	-	-	-	-	12	1	3	1	-	-	-	1	-	1	4
Common Shiner	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Spottail Shiner	-	1	1	4	2	-	-	-	2	-	19	-	-	10	-
Notropis sp.	7	-	2	-	-	-	-	-	-	-	-	-	-	-	-
Brown Bullhead	-	1	-	1	-	1	-	-	-	-	2	4	2	1	-
Channel Catfish	13	76	134	79	132	66	89	86	48	56	79	88	129	126	156
Stonecat	10	4	6	2	5	1	1	1	-	3	12	2	3	-	-
Tadpole Madtom	-	-	6	1	-	-	-	-	-	-	-	-	-	-	-
Brindled Madtom	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Burbot	47	25	40	36	46	57	41	2	31	348	266	277	222	223	284
Trout-perch	2	4	1	16	10	2	1	-	3	6	1	2	22	6	14
White Perch	9,084	8,138	5,195	11,233	5,806	2,577	2,388	1,524	1,493	1,245	4,613	6,684	4,489	8,472	8,212
White Bass	710	483	642	283	160	741	539	439	1,622	542	941	1,135	617	1,036	889
Rock Bass	171	63	51	83	97	97	27	12	9	77	323	553	174	30	39
Pumpkinseed	-	1	-	-	7	-	-	2	-	-	-	1	1	-	-
Bluegill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Smallmouth Bass	112	288	130	296	405	466	187	249	163	457	338	1,100	442	234	267
Largemouth Bass	-	1	-	-	-	-	-	-	-	-	-	1	-	-	4
Black Crappie	5	-	-	-	-	1	-	-	-	-	-	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	31,933	31,305	30,226	30,870
Walleye	519	1,168	2,232	2,275	2,641	1,513	2,500	1,348	1,709	900	990	1,745	909	1,118	1,804
Round Goby	-	-	-	-	-	-	-	-	1	13	82	113	101	399	247
Freshwater Drum	3,809	5,442	3,775	5,278	3,075	2,948	2,024	1,900	2,724	1,963	3,090	3,841	3,509	6,804	3,800
Goldfish-Carp hybrid	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Number of Fish	23,060	28,104	60,668	37,040	27,632	27,697	36,086	18,975	24,512	29,938	64,415	77,995	53,438	106,009	57,528
Sites	60	107	124	116	115	103	99	58	91	121	133	142	142	144	144
Standard Canned Gangs	54	98	118	114	112	103	99	58	91	121	133	142	142	144	144
Bottom Gangs	60	107	124	116	115	103	99	58	91	121	133	142	142	144	144
Thermocline Gangs	10	4	0	0	0	0	0	0	0	0	25	23	26	34	29
Aux Central Basin 1 fa Gangs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2m Above Thermocline	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0
Total Gangs	124	209	242	230	227	206	198	116	182	242	316	307	310	322	317

Table 4.1.6b (cont'd) Observed total numbers of each species caught fishing monofilament index gill nets in all basins during Partnership Index surveys, Lake Erie, 2004-2016. Average catches presented for 1989-2016.

Species	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Average
Silver Lamprey	1	-	-	-	-	-	1	-	-	-	-	-	-	0
Sea Lamprey	-	-	-	-	-	-	1	1	1	-	-	-	2	0
Lake Sturgeon	8	1	1	10	2	-	2	2	1	4	1	2	8	2
Longnose Gar	-	-	1	-	-	1	2	-	4	2	1	1	2	1
Alewife	127	81	2,482	34	13	5	199	135	2,954	10,703	1	59	71	4,934
Gizzard Shad	9,131	22,246	12,510	7,790	4,211	3,685	16,607	12,524	23,350	4,783	2,294	3,351	12,072	9,624
Pink Salmon	1	-	-	-	-	1	2	-	3	-	-	-	4	1
Coho Salmon	-	1	1	-	1	1	-	1	2	1	-	-	-	2
Chinook Salmon	1	2	-	-	-	1	2	1	-	-	-	-	-	1
Rainbow Trout	22	111	58	4	14	42	39	34	15	20	8	17	14	29
Atlantic Salmon	-	1	-	-	-	-	-	-	-	-	-	-	-	0
Brown Trout	3	3	-	-	2	4	1	5	-	1	1	-	4	2
Lake Trout	32	23	44	16	23	39	68	115	108	45	25	61	10	30
Lake Whitefish	35	153	168	104	170	99	85	11	14	2	9	10	17	73
Cisco	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Rainbow Smelt	1,629	910	745	1,688	2,556	2,766	1,023	1,464	1,184	1,924	749	1,210	551	1,177
Northern Pike	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Muskellunge	-	-	-	-	-	1	-	-	-	-	1	-	-	0
Mooneye	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Quillback	19	14	16	13	14	14	3	29	16	8	19	21	8	14
White Sucker	354	380	368	203	228	453	343	539	268	199	179	302	226	284
Spotted Sucker	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Silver Redhorse	5	-	-	-	-	-	-	3	1	-	-	1	-	1
Golden Redhorse	-	-	-	-	-	-	1	-	-	-	-	-	-	2
Shorthead Redhorse	51	17	20	70	48	146	41	111	45	29	48	75	114	57
Redhorse sp.	-	-	-	-	-	1	-	-	-	-	-	-	-	1
Goldfish	-	6	-	-	5	2	-	-	-	-	12	4	-	1
Lake Chub	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Common Carp	5	2	11	8	4	5	2	7	9	4	4	1	-	9
Silver Chub	85	26	41	12	9	8	2	11	4	6	19	6	53	55
Hornyhead Chub	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Emerald Shiner	3	-	3	-	2	5	5	4	3	1	-	-	-	2
Common Shiner	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Spottail Shiner	10	-	3	1	-	-	2	2	-	-	1	14	-	3
Notropis sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Brown Bullhead	-	2	-	1	1	-	-	-	3	1	1	-	-	1
Channel Catfish	131	271	234	313	131	221	190	356	357	294	415	375	381	180
Stonecat	-	-	-	1	-	-	1	-	1	-	-	-	-	2
Tadpole Madtom	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Brindled Madtom	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Burbot	176	148	105	70	56	54	19	48	12	7	9	3	14	95
Trout-perch	7	1	3	1	5	2	1	2	1	-	-	-	-	4
White Perch	11,504	17,150	19,774	12,492	11,996	9,940	10,212	14,762	14,622	15,127	9,052	11,461	8,902	8,862
White Bass	1,287	1,362	2,668	1,762	1,339	1,291	1,448	4,080	4,792	3,991	2,589	1,460	904	1,420
Rock Bass	51	31	21	103	11	76	54	6	32	10	88	6	9	82
Pumpkinseed	3	-	1	-	-	-	1	-	-	-	-	-	-	1
Bluegill	-	-	1	-	1	-	-	2	-	-	-	-	-	0
Smallmouth Bass	232	320	445	614	332	289	178	64	143	106	113	33	63	288
Largemouth Bass	1	-	-	2	-	-	-	1	-	-	-	-	-	0
Black Crappie	1	-	2	-	-	-	-	1	-	1	-	-	-	0
Yellow Perch	42,626	33,730	32,913	34,412	40,323	37,662	28,524	30,750	26,779	14,166	22,785	21,304	24,784	21,570
Walleye	4,469	4,052	2,316	1,303	1,443	1,743	1,429	3,168	1,842	1,202	1,209	3,194	6,024	2,027
Round Goby	161	196	260	106	200	205	173	140	81	45	62	49	86	97
Freshwater Drum	4,631	4,789	4,315	2,554	2,858	3,610	2,038	3,562	3,613	3,240	1,788	3,469	2,160	3,450
Goldfish-Carp hybrid	-	-	-	1	1	2	2	-	1	3	-	2	6	1
Total Number of Fish	76,802	86,029	79,530	63,688	65,999	62,374	62,701	71,941	80,261	55,925	41,483	46,491	56,489	54,386
Sites	143	144	140	119	143	143	141	144	142	122	133	133	133	124
Standard Canned Gangs	143	144	140	119	143	143	141	144	142	122	133	133	133	123
Bottom Gangs	143	144	140	119	143	143	141	144	142	122	133	133	133	124
Thermocline Gangs	26	13	20	0	26	24	19	24	21	12	16	14	19	14
Aux Central Basin 1 fa Gangs	24	24	24	24	25	24	24	24	24	24	24	24	24	11
2m Above Thermocline	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total Gangs	336	325	324	262	337	334	325	336	329	280	306	304	309	273

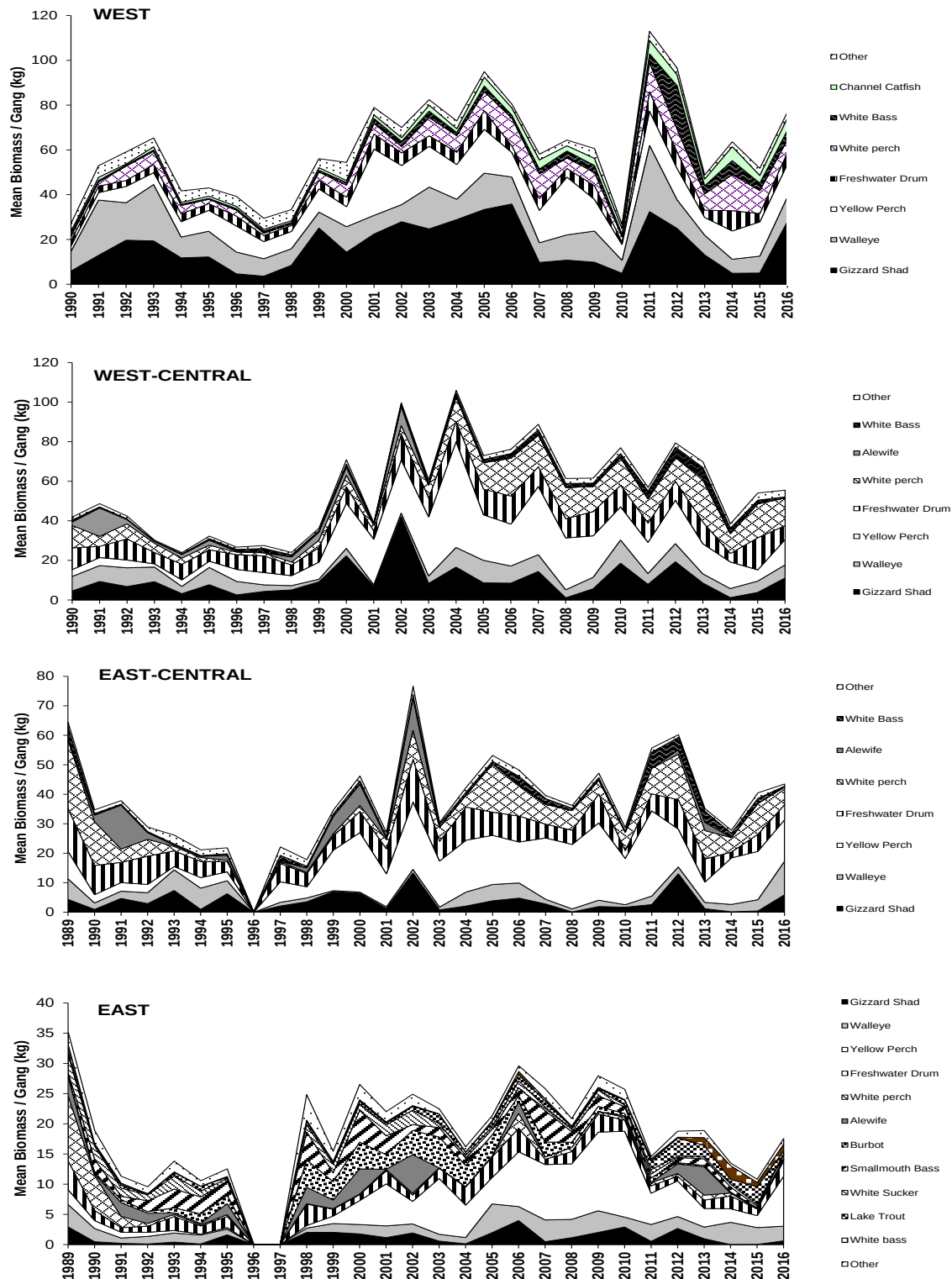


Figure 4.1.2 Mean species biomass (kilograms/gang) by basin, Partnership Index Fishing, 1989-2016. Species with an average biomass representing less than 3% of the average of all species combined were included in "Other" group. Thermocline gangs (1989, 1990, 1999-2016) were included for the east basin. 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.

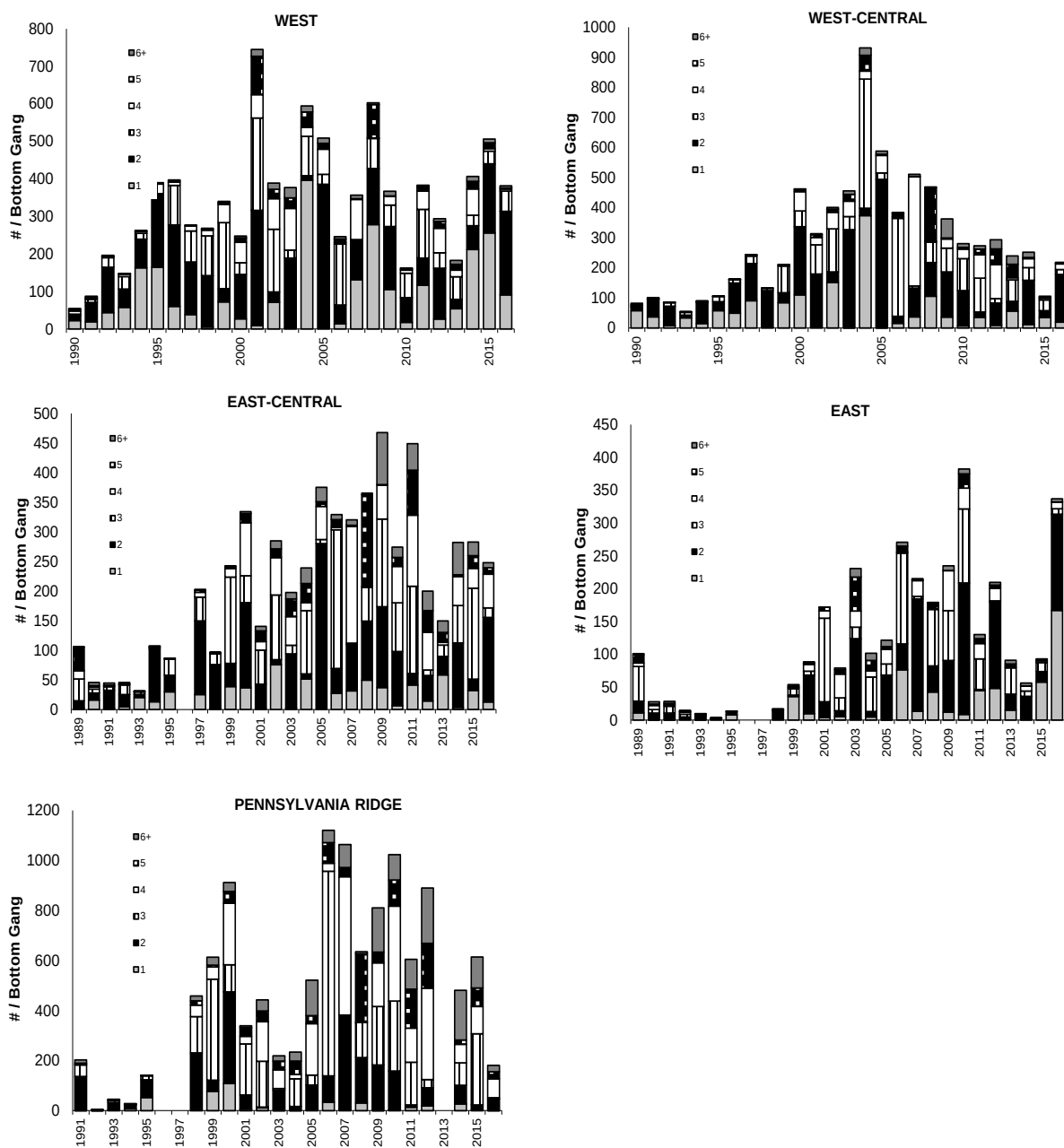


Figure 4.1.3 Yellow perch catch at age (number) per bottom gang of Partnership index gill nets, by basin. Time frames and axes differ among basins. Absent bars indicate when studies were not done. Ages 6 and older pooled. East basin results include depths 30 metres or less. Walleye Cap Areas surveys have not been completed since 2012. Surveys were not done in east-central 1996, and east in 1996, 1997. The 1995 east basin survey had low sample size. The Pennsylvania Ridge survey was not done in 1996, 1997, and in 2013.

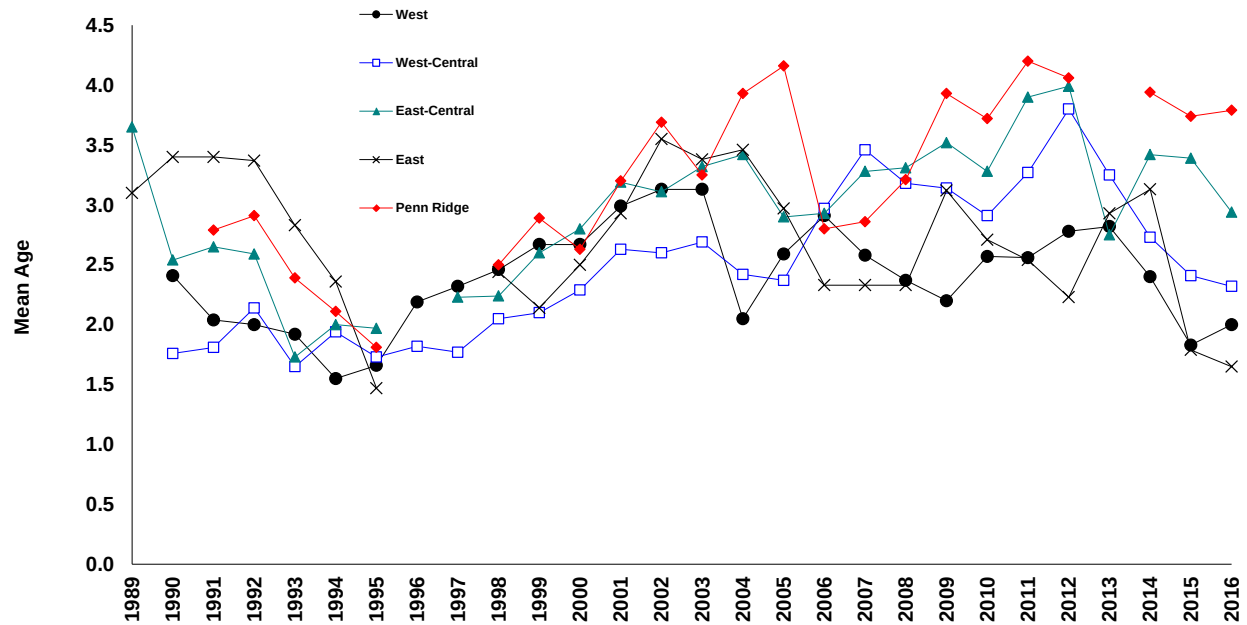


Figure 4.1.4 Mean age of yellow perch caught in Partnership index gill nets by basin, 1989-2016. All age groups included in calculations. Ages based on scales and otoliths since 2005.

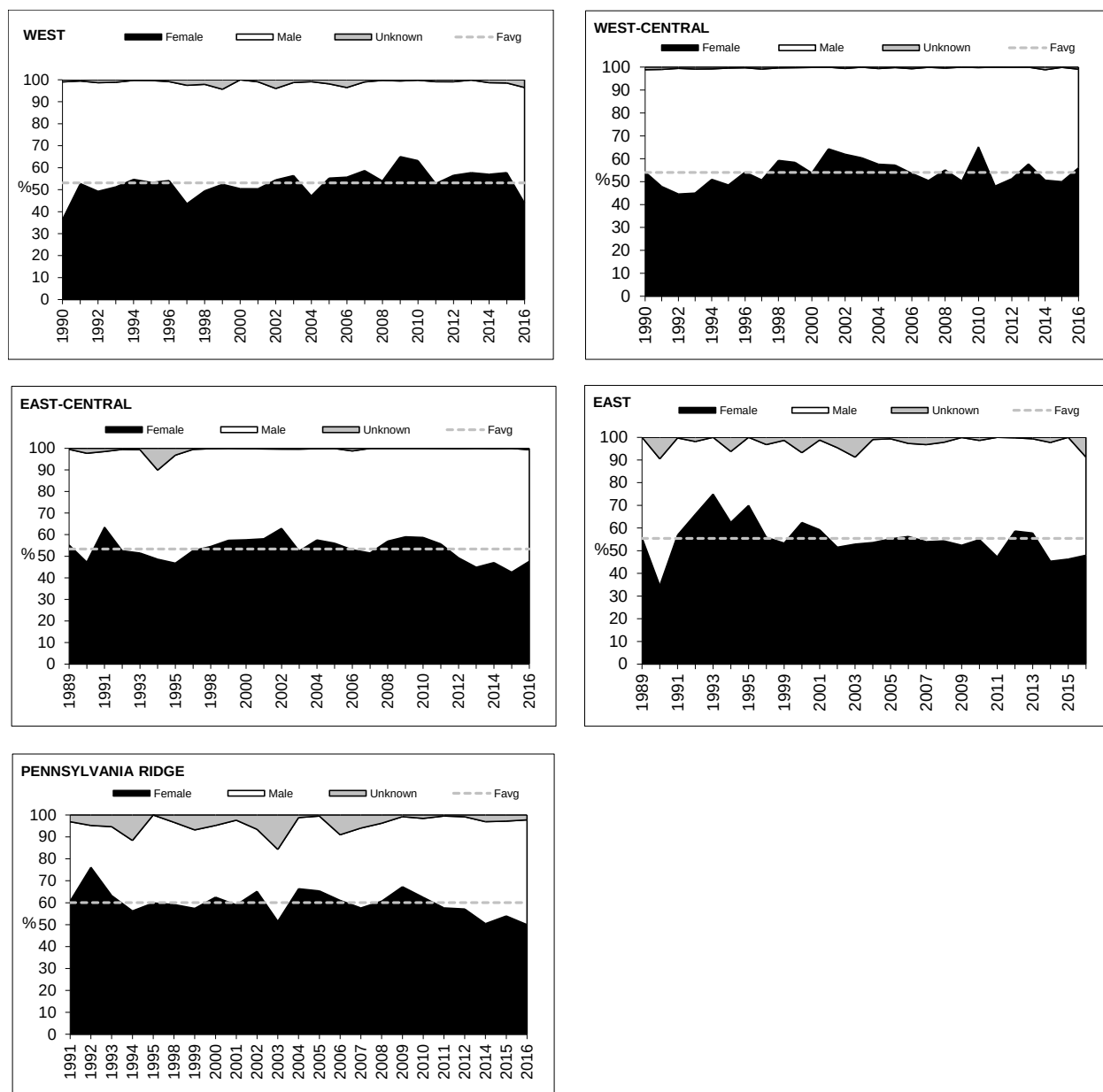


Figure 4.1.5 Proportion of yellow perch ages 2 and older represented by each sex caught in fall. Partnership index gill netting, 1989-2016. Note absent years in east-central, and east basin time series. Dashed line represents average fraction of females over the time series. Pennsylvania Ridge survey not done in 2013.

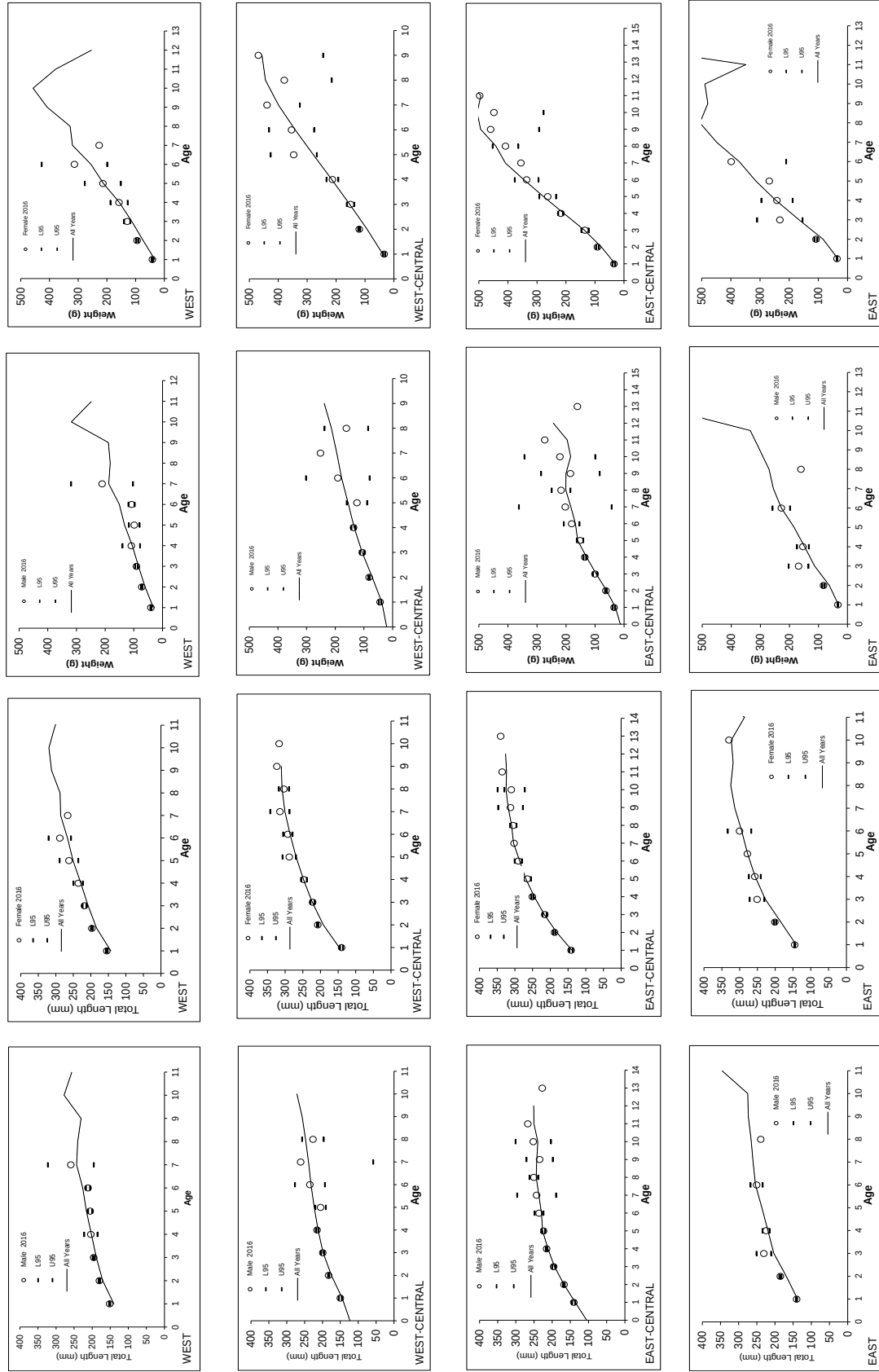


Figure 4.1.6 Yellow perch mean total length (mm) and weight (g) of males and females at age for the west (top row), west-central, east-central and east (bottom row) basins in 2016 (circles). 95% confidence limits shown. Dotted line represents mean size at age for all years to 2015. Partnership Index Fishing, 1989-2016. Fish with ages but unknown gender excluded.

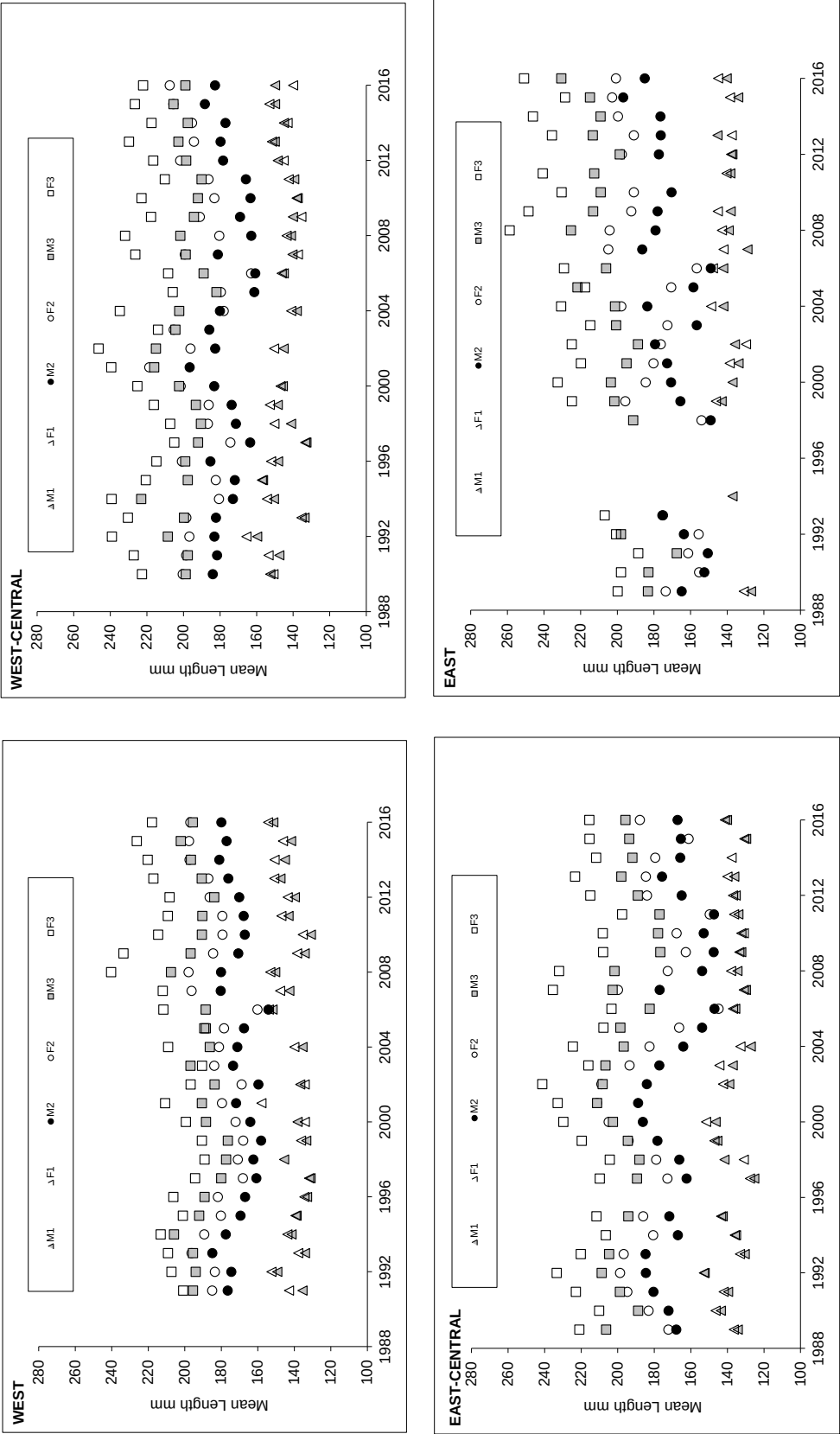
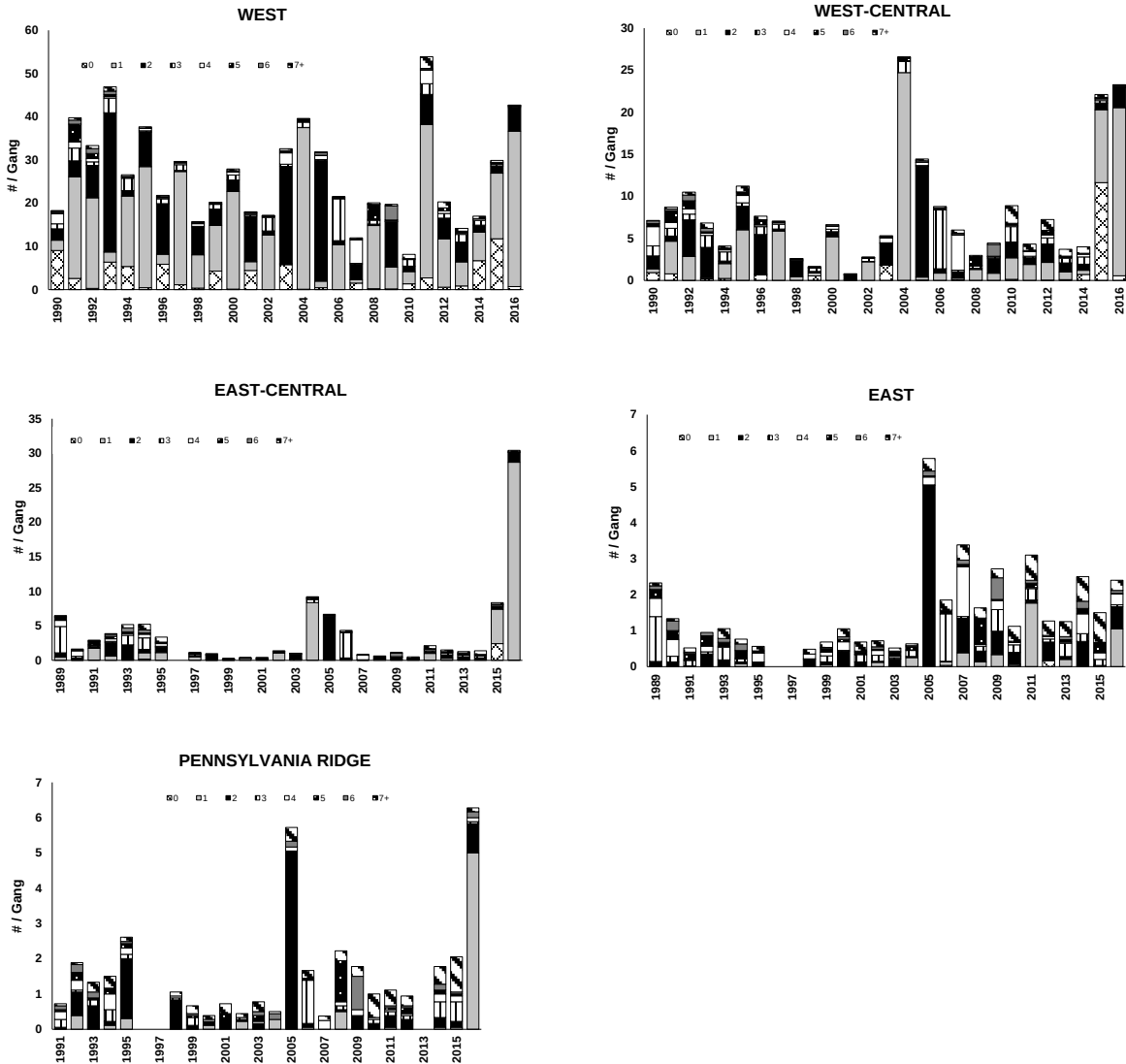


Figure 4.1.7 Mean total length (mm) of Yellow Perch ages 1, 2, and 3 by sex in the west, west-central, east-central and east basin surveys. East includes the walleye cap area sites. M=male F=female. Samples with less than 6 fish were excluded. Mean is weighted by relative effort among mesh sizes. Samples 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 index gill nets (canned and bottom), in the west, west-central, east-central, Pennsylvania Ridge and east basin Partnership surveys. Only standard canned sets are included in all 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 survey was not done in 1996, 1997, 2013. East basin survey was not done in 1996 and 1997. East basin survey had low sample size in 1995.

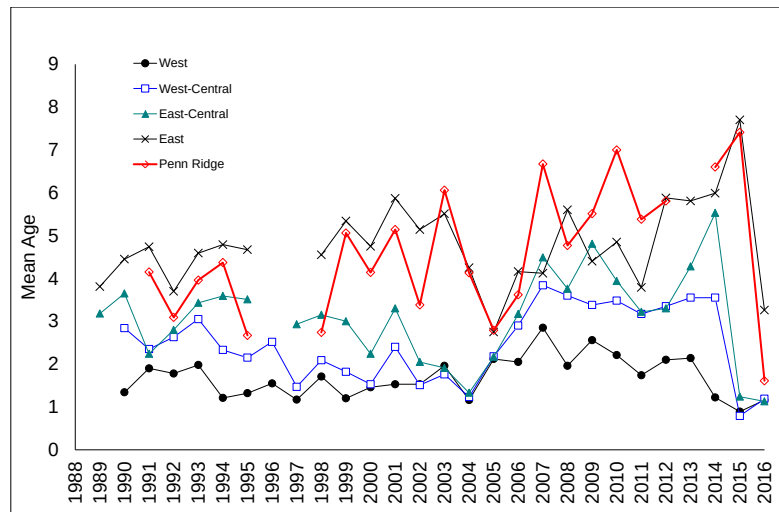


Figure 4.1.9 Mean age of walleye caught in Partnership index gill nets by basin, 1989-2016.

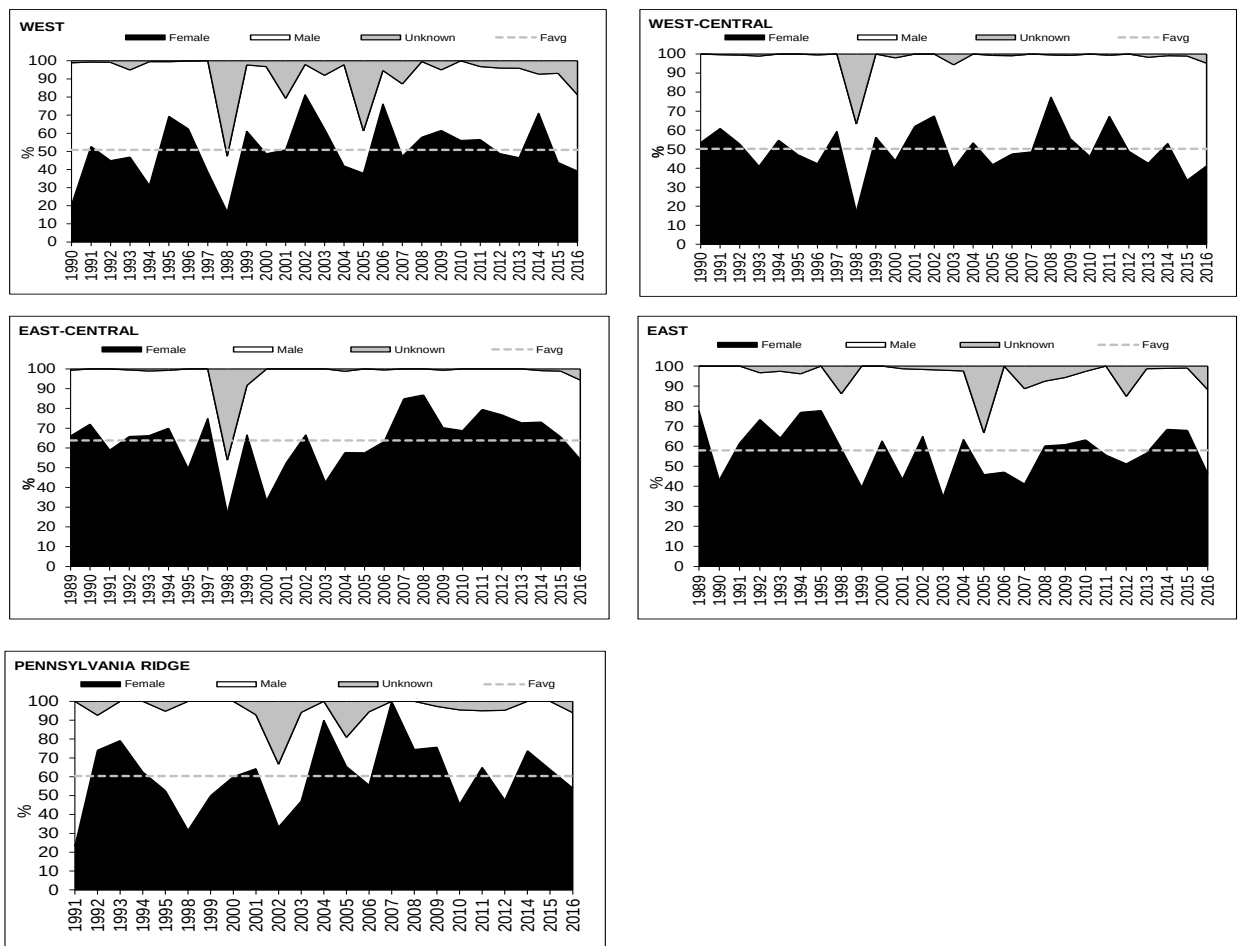


Figure 4.1.10 Proportion of walleye ages 2 and older represented by each sex caught in fall Partnership index gill netting, 1989-2016. Note absent years in east-central and east basin time series. Dashed line represents average proportion of females over the time series. Pennsylvania Ridge not fished in 2013.

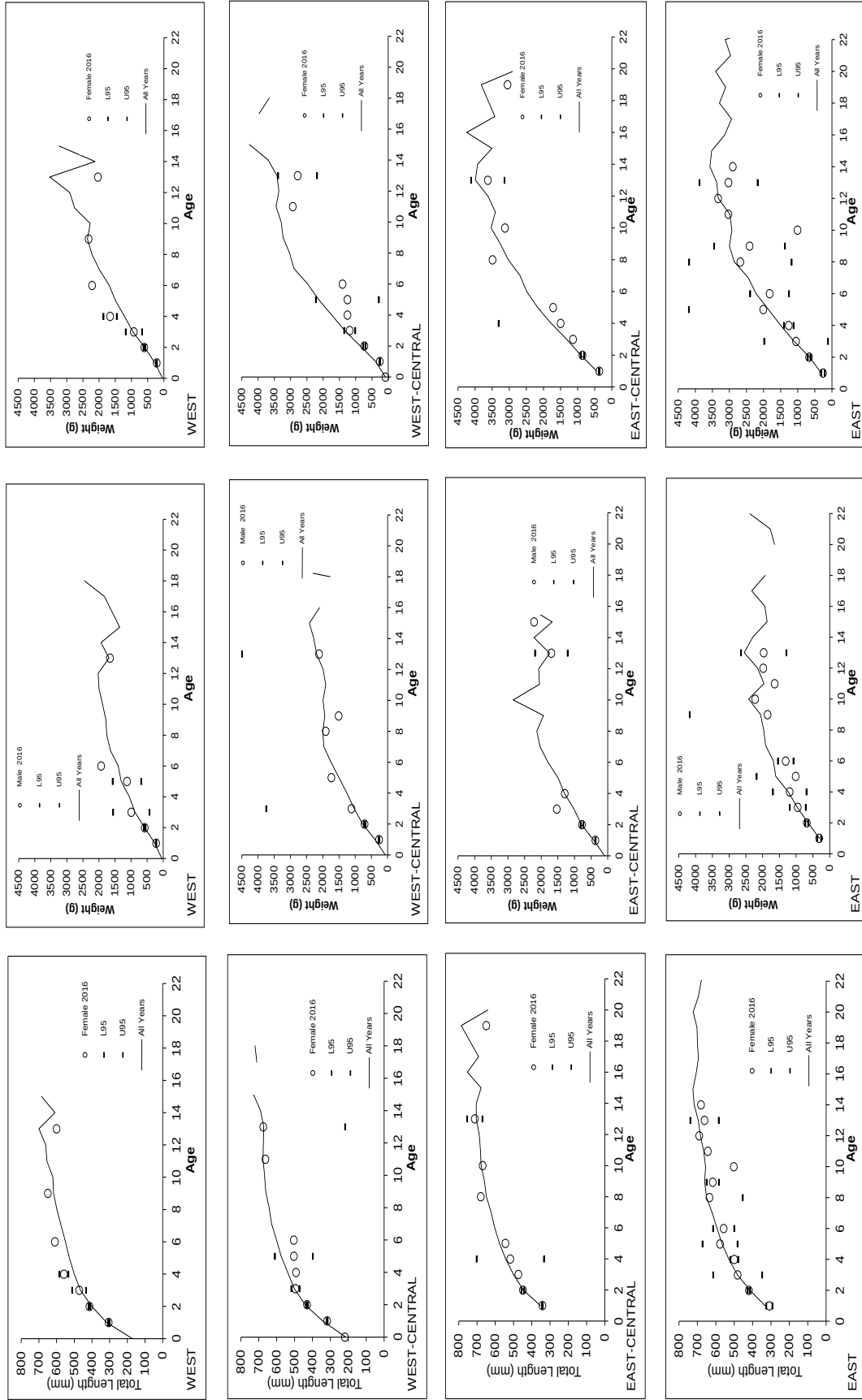


Figure 4.1.11 Walleye mean total length (mm) and weight (g) of males and females at age for the west (top row), west-central, east-central and east (bottom row) basins in 2016 (circles). 95% confidence limits shown. Dotted line represents mean size at age for all years to 2015. Partnership Index Fishina. 1989-2015. Fish with ages but unknown gender excluded.

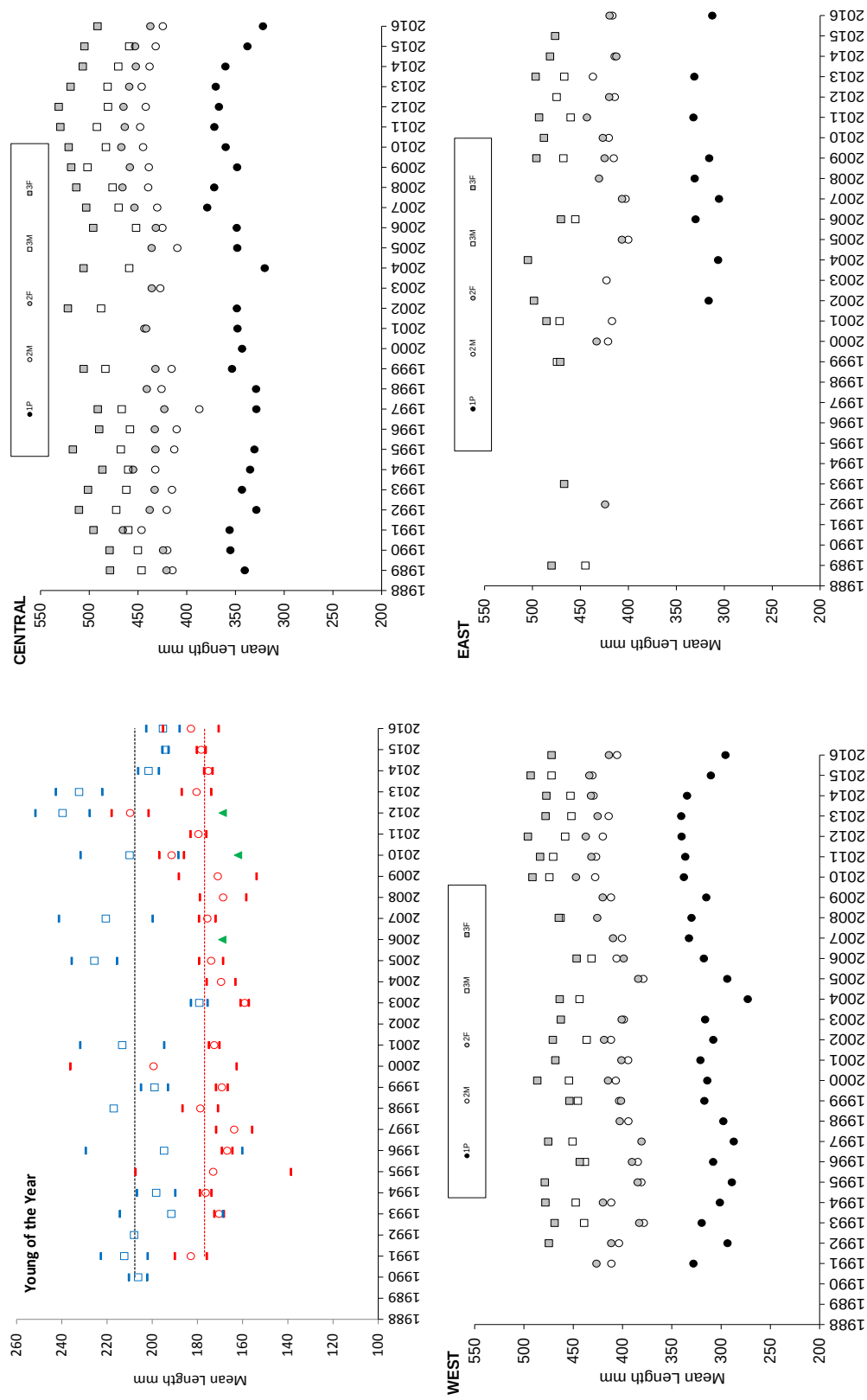


Figure 4.1.12 Mean total length of young of the year (YOY) Walleye in the west (circles), central (squares) and east basin (triangles, top left) and for ages 1, 2 and 3 by sex for the west (top right), central (bottom left) and east basin (bottom right) surveys. YOY mean lengths with 95% confidence limits. P indicates F is female and M is male. Samples restricted temporally for west (September), central ($\geq$ October) and east basin ($\leq$ September). Time series means presented for YOY west and central

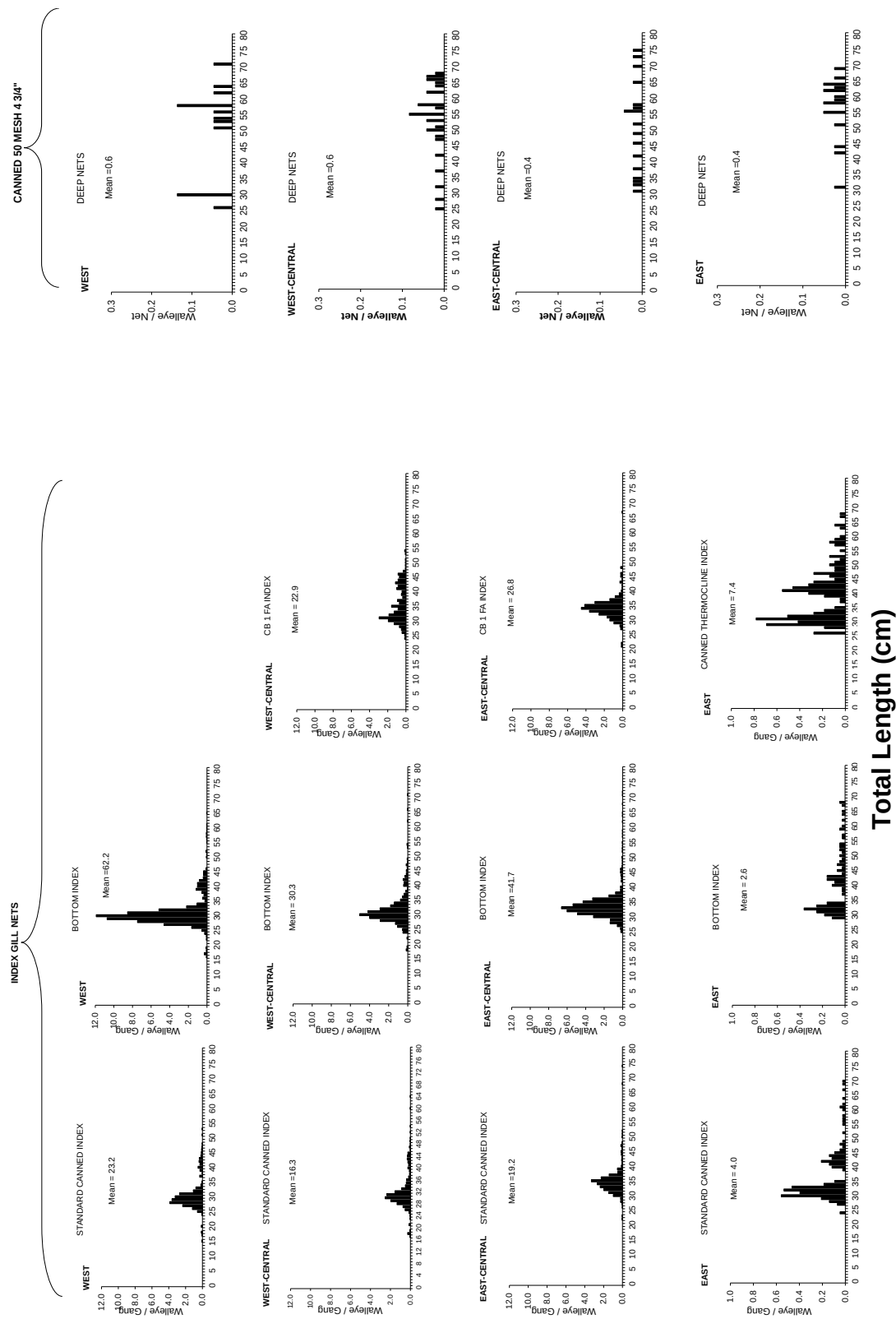


Figure 4.1.13 Walleye catch rates in 2016 by 1 cm length intervals in west basin (top row), west-central (2nd row) east central (3rd row) and east basin (bottom row) in standard index canned gill nets, bottom nets central basin 1 fathom canned nets, canned thermocline nets (east only) and in 50 mesh 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, 2016.

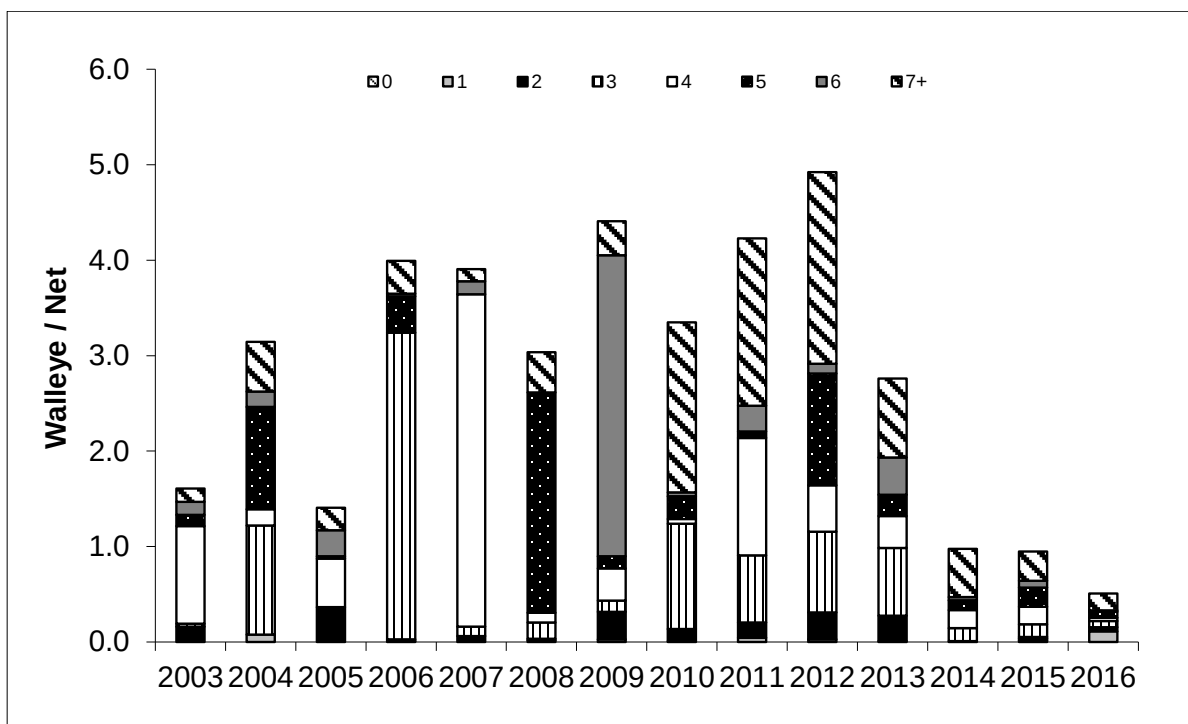


Figure 4.1.14 Walleye catch at age per 50 mesh deep 121 mm, 34 mm canned gill net fished adjacent to index gill nets in the west, west-central, and east-central basins. All canned depths.

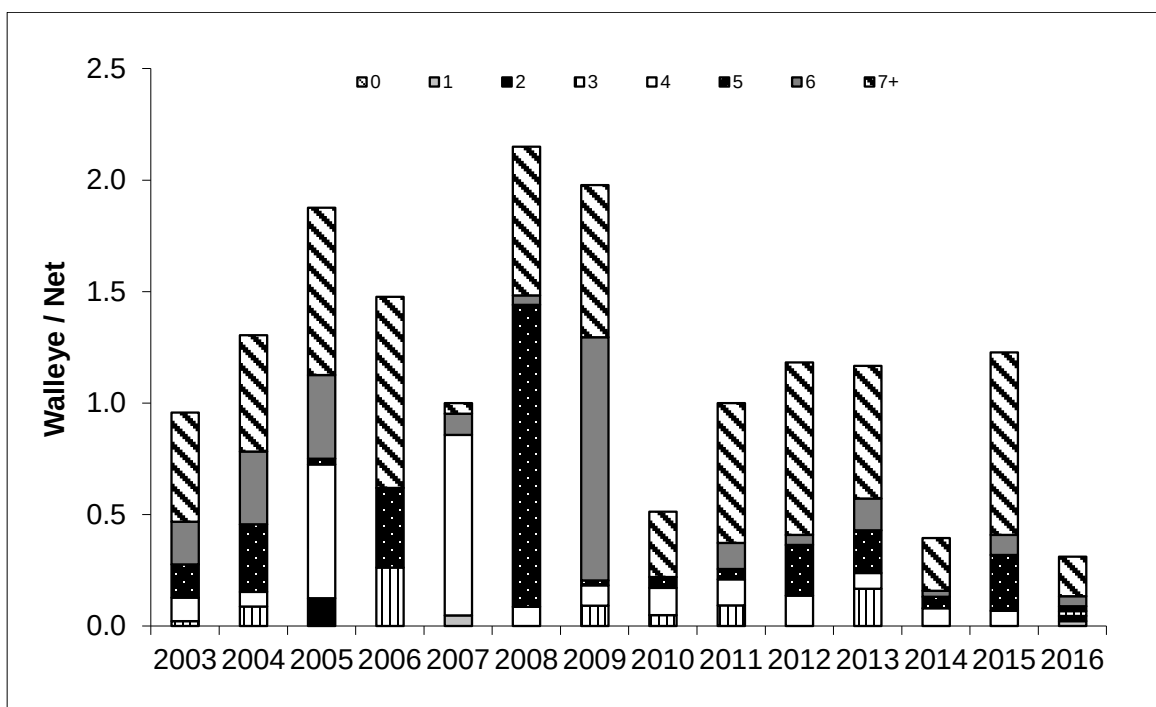


Figure 4.1.15 Walleye catch at age per 50 mes deep 121 mm, 34m canned gill net fished adjacent to index gill nets in east basin surveys. This graph excludes Pennsylvania Ridge and Walleye cap area surveys. All canned depths included.

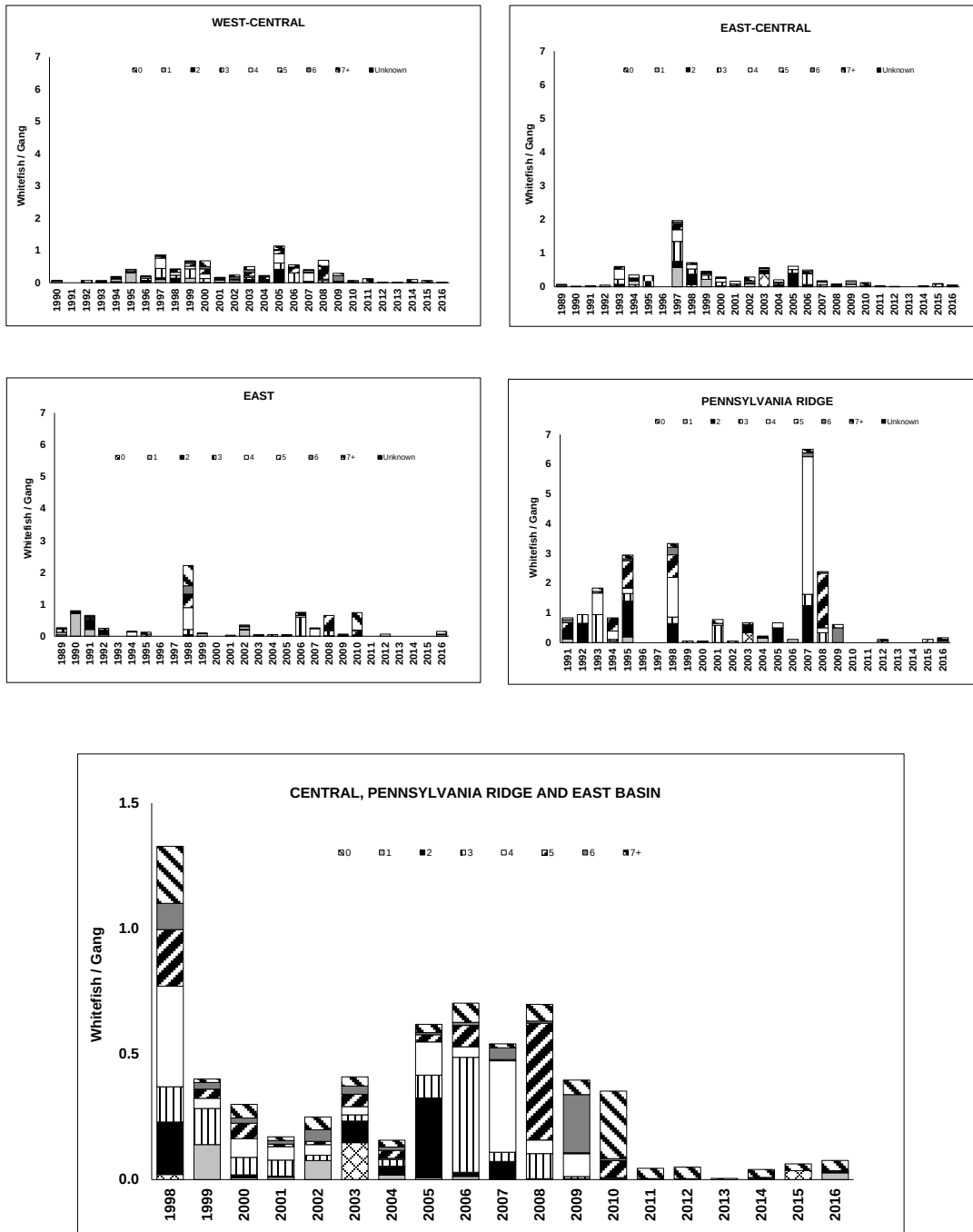


Figure 4.1.16 Lake Whitefish catch at age (numbers) per gang of index gill nets (canned and bottom) in the west-central, east-central, Pennsylvania Ridge, east basin and with basins pooled. Only standard canned sets included in east basin and Pennsylvania Ridge graphs. Whitefish samples lacking age data 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 was not fished in 2013. Walleye Cap area sites not fished since 2013.

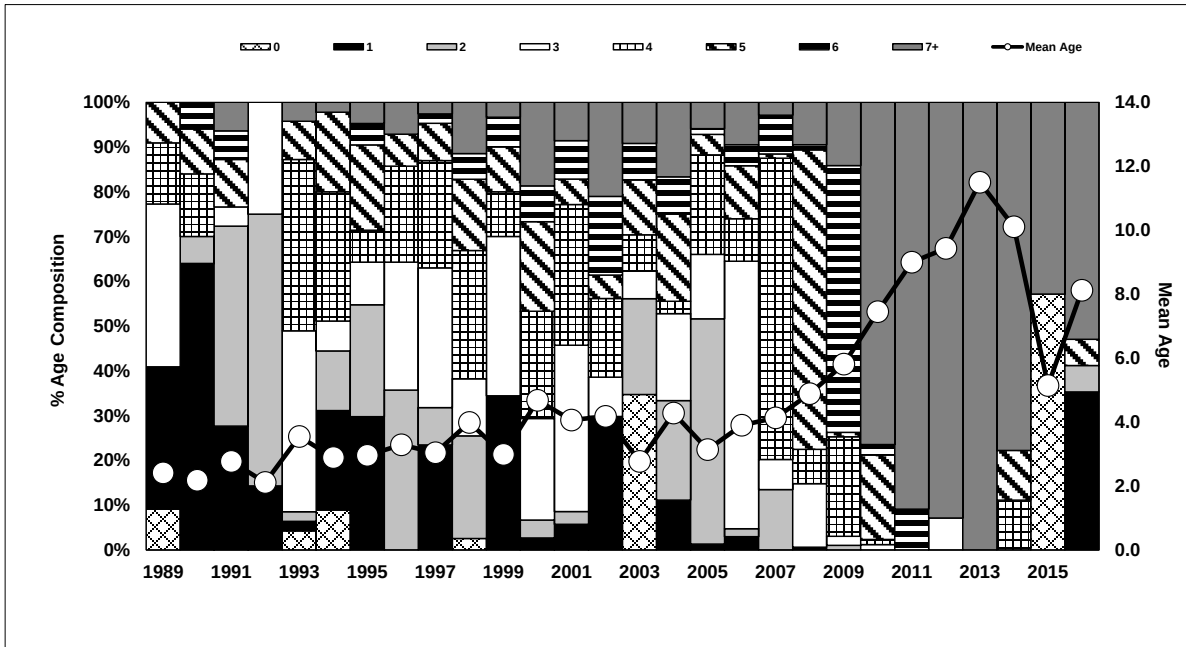


Figure 4.1.17 Whitefish age composition and mean age (line) from Partnership Index Fishing, all basins combined, all index gear included. Ages 7 and older pooled in 7+ group. Otolith and scale ages were determined in 2016. Standardized to equal effort among mesh sizes.

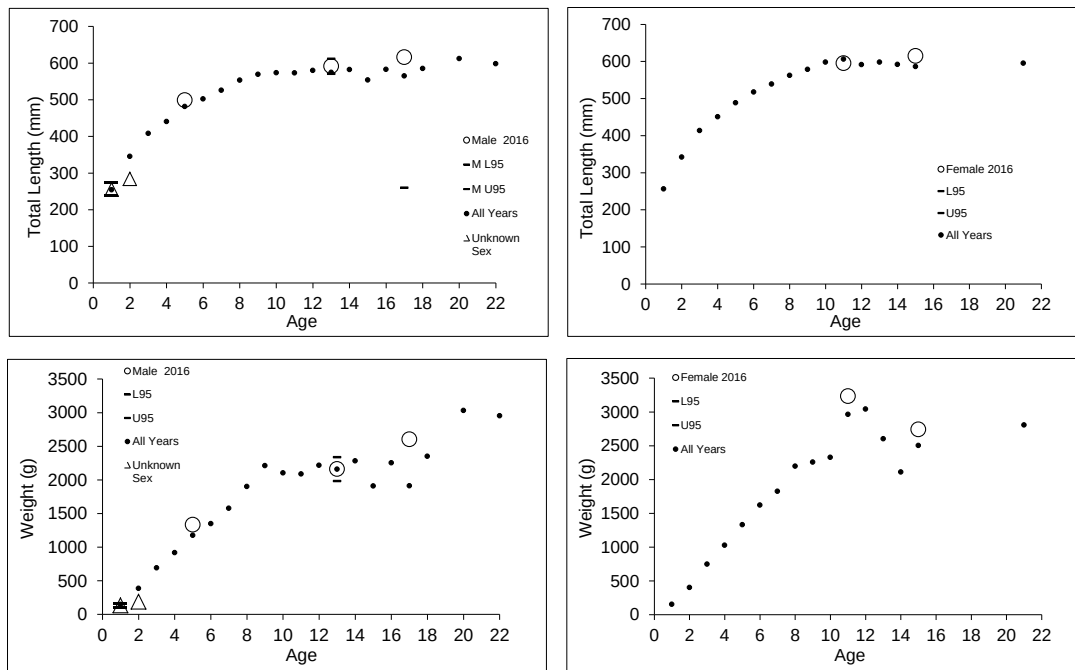


Figure 4.1.18 Mean length (top) and weight (bottom) at age for male (left) and female (right) Lake Whitefish, 2016 (circles). 95% confidence limits shown. Dotted line represents mean size at age 1989-2015, combined. Ages based on scales prior to 2006. Partnership Index Fishing 1989.

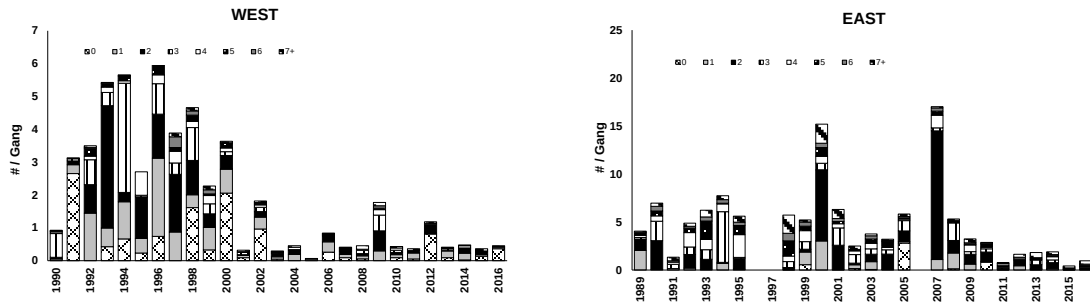


Figure 4.1.19 Smallmouth Bass catch at age (numbers) per gang of index gill nets (canned and bottom), in the west and east basin Partnership surveys 1989-2016. Only standard canned sets are included in east basin graph. Absent bars indicate years when study was not done. East includes extra Walleye Cap Area sites.

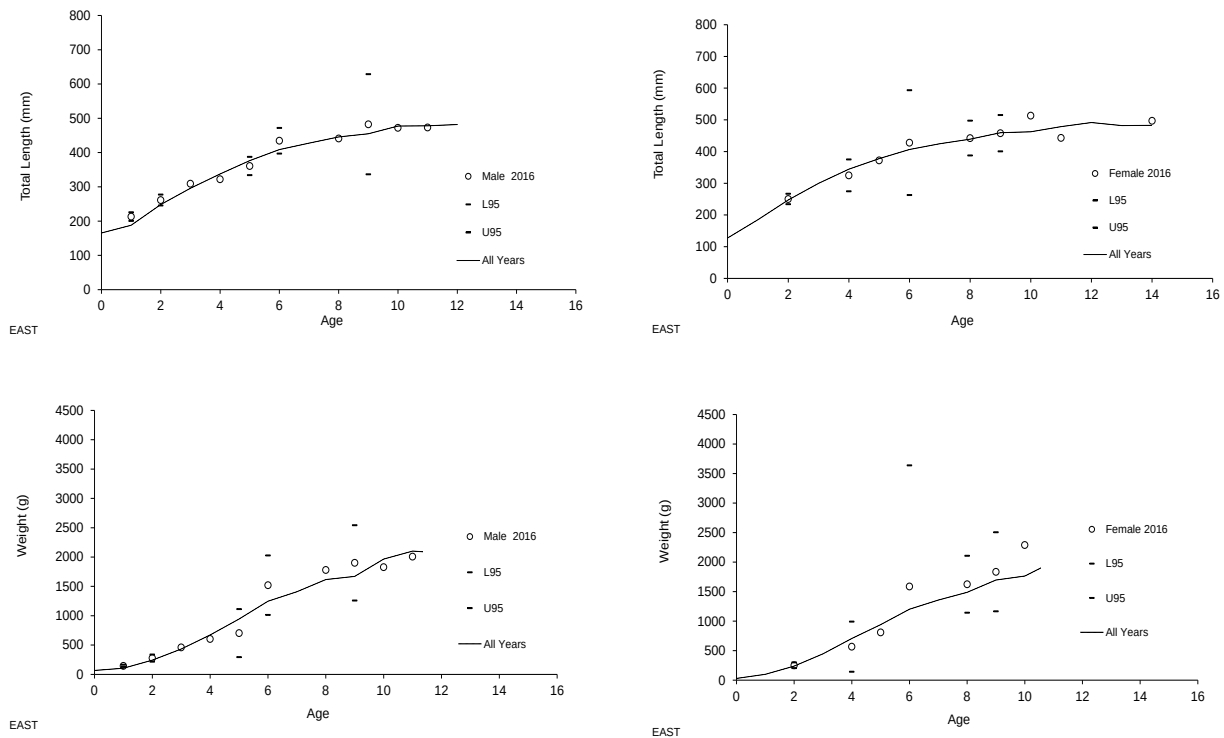


Figure 4.1.20 Smallmouth Bass mean total length (millimetre) and weight (grams) of males and females at age for the east basin in 2016 Index Fishing, 1989-2016. The 2016 west basin sample size was too small to plot.

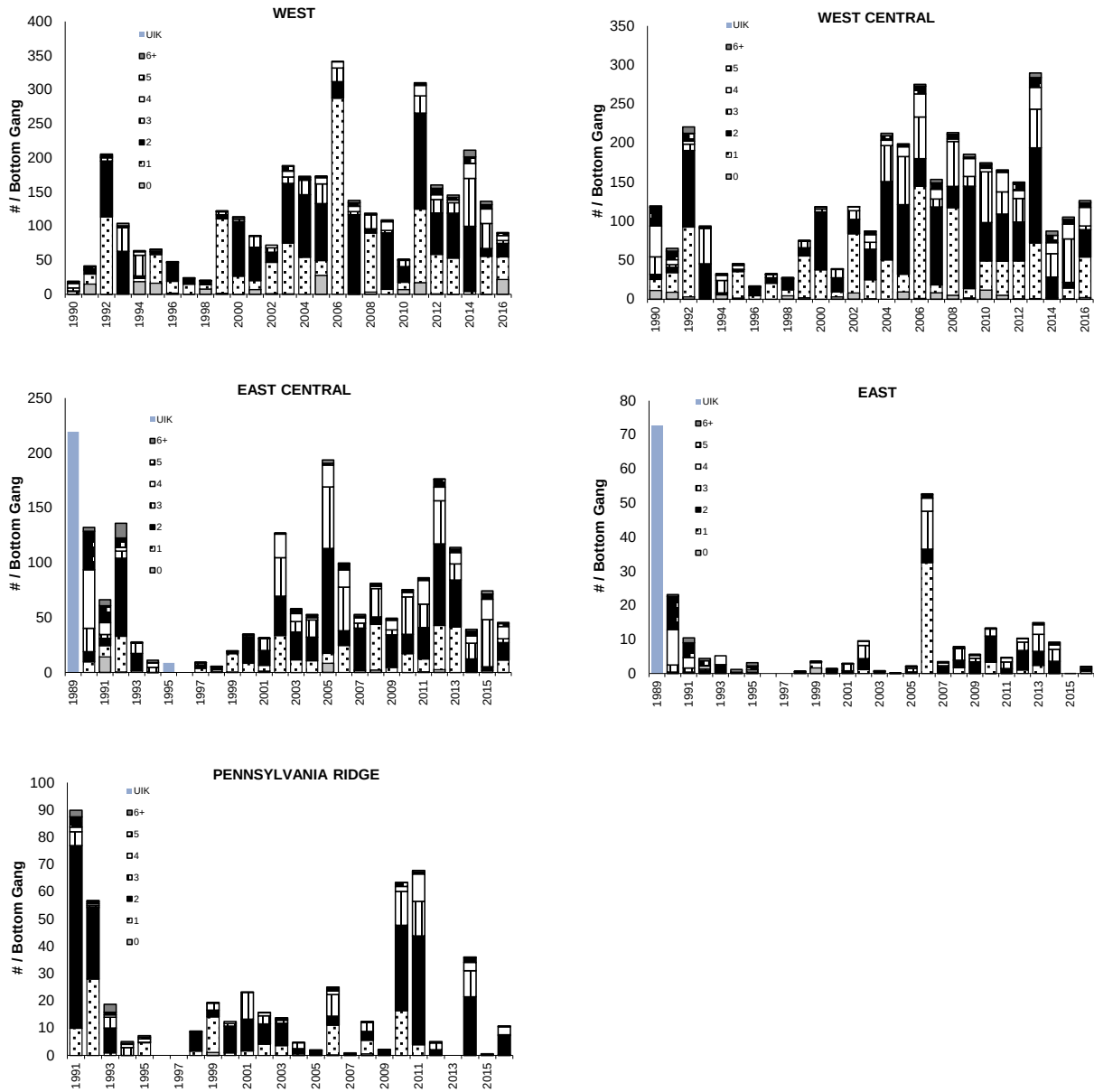


Figure 4.1.21 White Perch catch at age (number) per gang of Patnership bottom gill nets, by basin. Time frames and axes differ among basins. Absent bars indicate when studies were not done. Ages 6 and older pooled. East 'n' results include depths 30 metres or less. Survey in the east basin 1995 had low sample size. Pennsylvania Ridge survey was not done in 1996 and 2013. 'UK' indicates ages are unknown.

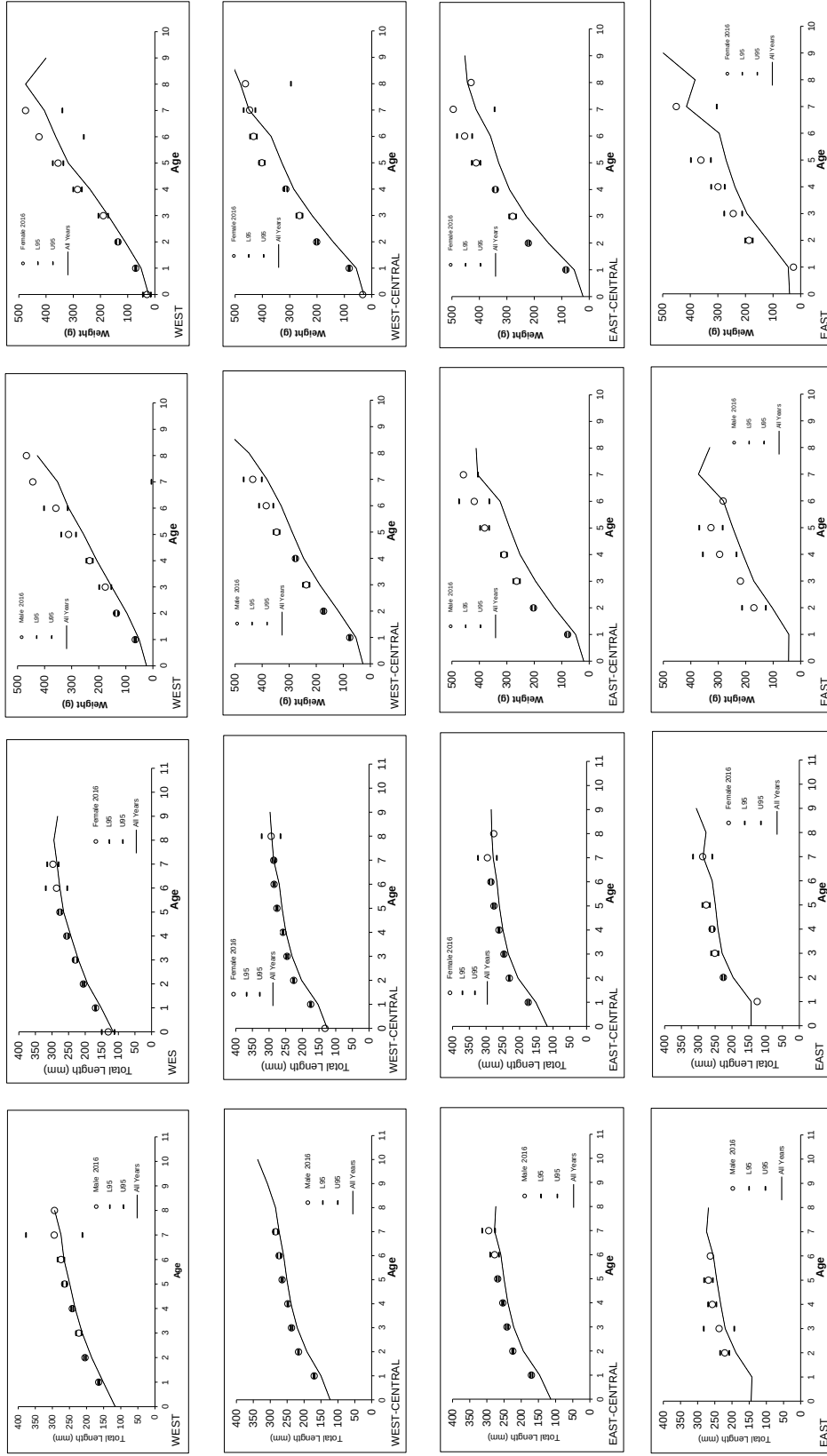


Figure 4.1.22 White perch mean total length (mm) and weight (g) of males and females at age for the west (top row), west-central, east-central and east (bottom row) basins in 2016 (circles). 95% confidence limits shown. Dotted line represents mean size at age for all years to 2015. Partnership Index Fishing, 1989-2016.

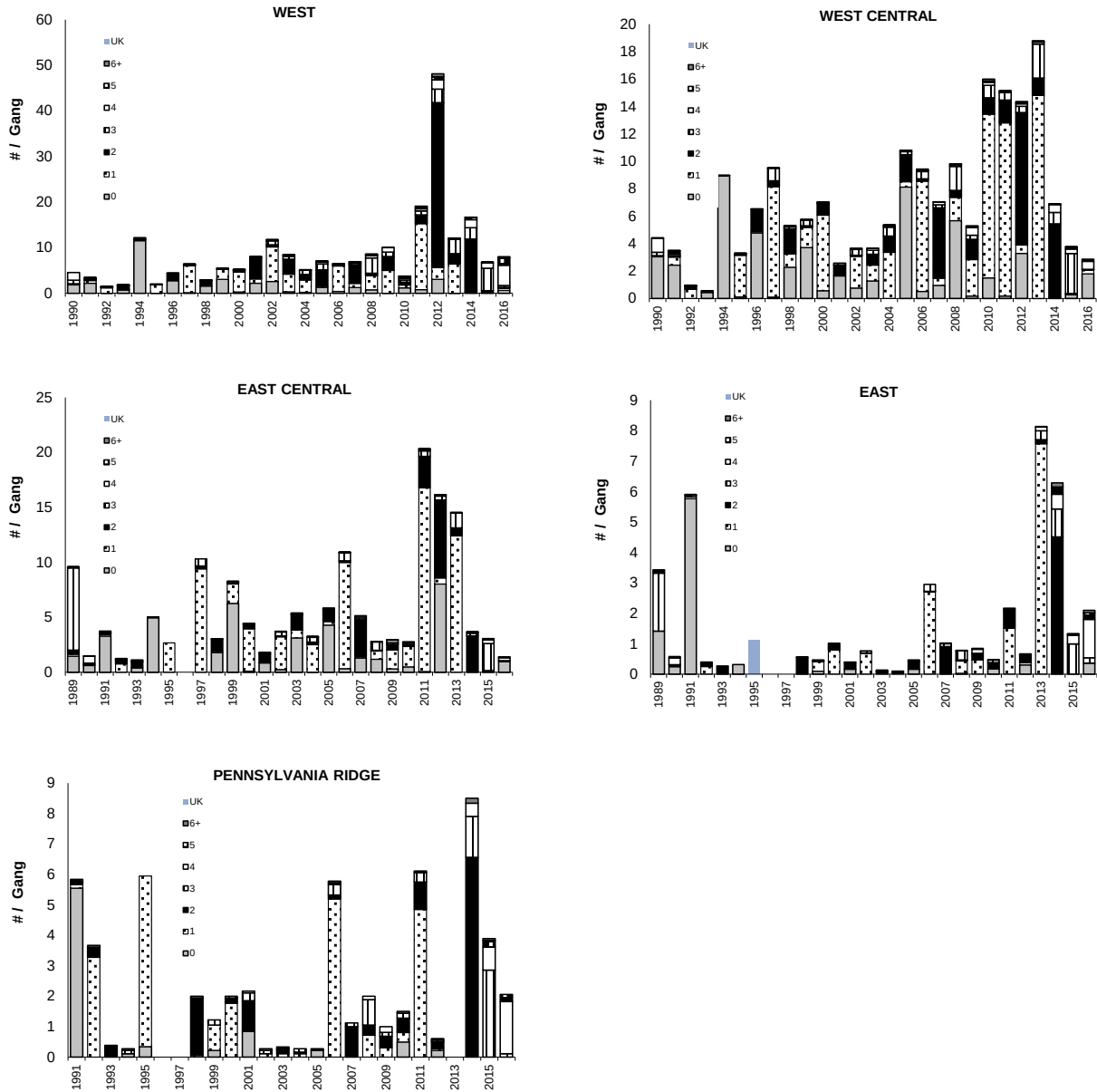


Figure 4.1.23 White Bass catch at age (number) per gang of Partnersip index gill nets, bybasin. Time frames and axes differ among basins. Absent bars indicate when studies were not done. Ages 6 and older pooled. East basin results include depths 30 metres or less. The 1995east basin survey had low sample size. The Pennsylvania Ridge survey was not done in 1996 and 2013. 'UK' indicates ages unknown.

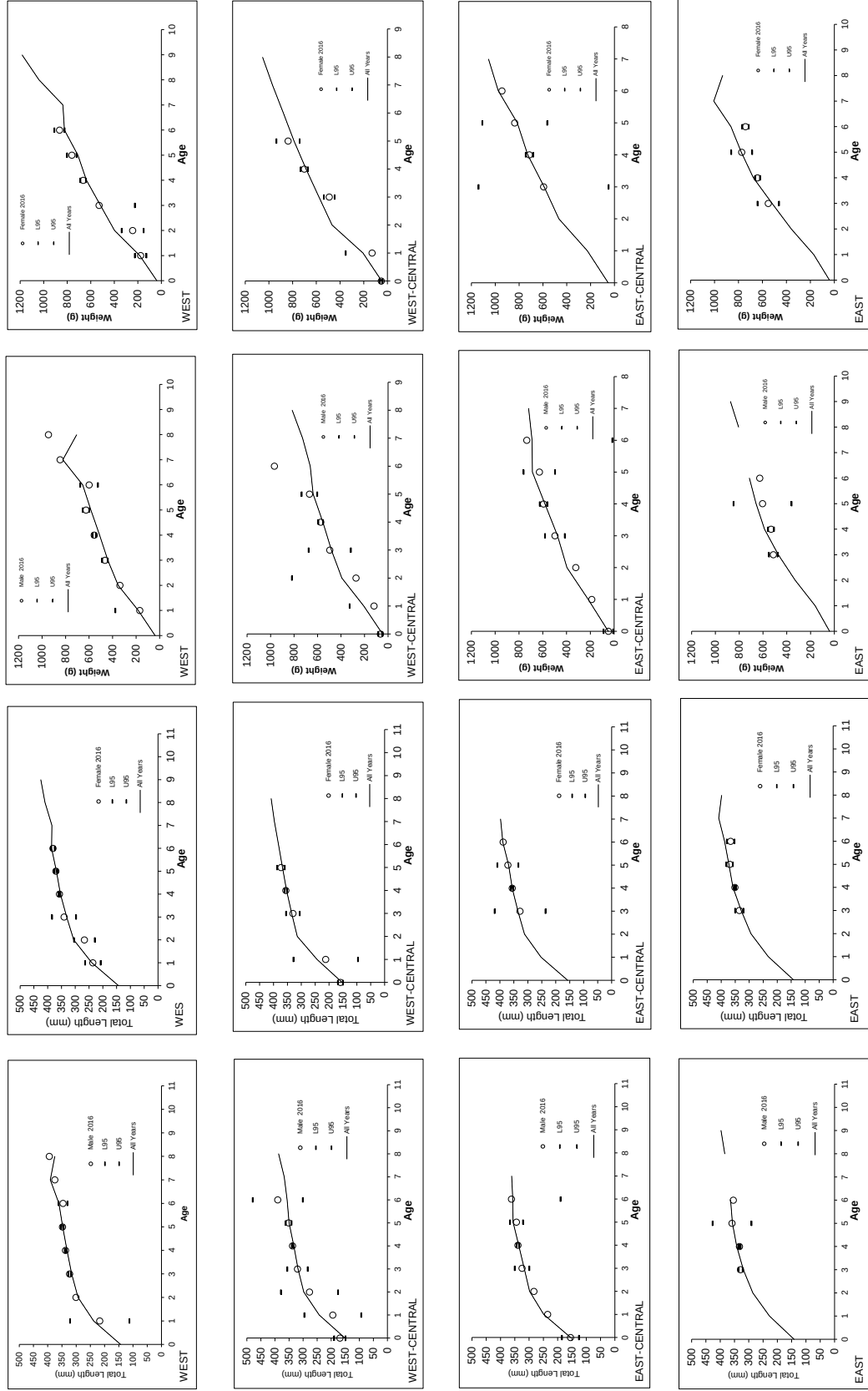


Figure 4.1.24 White Bass mean total length (millimetres) and weight (grams) at age for the east (top row), west-central, east-central and east (bottom row) basins in 2016 (circles). 95% confidence limits shown. Dotted line represents mean size at age for all years to 2015. Partnership Index Fishing, 1995-2016.

4.2 Index Trawling: Western Lake Erie

West Basin Bottom Trawling

The annual western basin interagency trawling index, conducted by Ontario MNRF and Ohio DNR, occurs during the month of August. 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 are combined into a more spatially extensive assessment, 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. These recruitment projections contribute annually to the calculation of recommended allowable harvest (RAH) for Yellow Perch and Walleye. Species composition and trends in forage abundance may also be described by index trawling. Length measurements were recorded on board, according to length-based age group criteria; since 1998, additional measurements of weight and length have occurred in the laboratory for juvenile Yellow Perch and Walleye. Age 0 fish were weighed to a precision of one milligram, whereas larger, older fish were weighed by scales to the nearest gram. Subsamples of Yellow Perch and Walleye were aged using otoliths.

The gear used was a two seam, 33 centimetre Biloxi bottom trawl (38 centimetre ground line) with a half inch cod end liner. Trawl duration was 10 minutes on bottom at 1.7 knots. Ontario field work in western Lake Erie took place at 36 stations over two weeks from August 15 to August 24, 2016 (Figure 4.2.1).

Due to concerns about 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 two milligrams per litre (i.e. hypoxic conditions) would be excluded from analyses applied retroactively from 2009. Hypoxic conditions did not occur in Ontario waters of the west basin during the 2016 trawl survey.

To address effects on fish distribution when hypoxia occurs, OMNRF continued a midwater trawl study that began in 2012. The study occurred during the last week of August 2016. Methodology and results for this study are described following the results of west basin interagency 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 1988-2016 (Table 4.2.1). Decade (2007-2016) and time series (1988-2016) means are presented for comparison. Additional summaries are presented for Yellow Perch yearlings and ages 2 and older and for yearling Walleye which used length and age data for age classification.

White Perch YOY (1183 YOY/ha) was the most abundant species at any life history stage in bottom trawls, representing 44% of all fish caught (Table 4.2.1). The YOY Yellow Perch index in 2016 (635 YOY/ha) ranked 75th percentile over the 1988-2016 time series, and 67th percentile for the recent decade (Table 4.2.1, Figure 4.2.2). Although White Perch YOY catch rates were the highest among species and age groups, the 2016 index (1183 YOY/ha) was below short and long term average catch rates, ranking 43rd and 33rd percentiles respectively. The YOY Walleye catch rate in 2016 (7.6 YOY/ha) was 67th percentile in the recent decade and 75th percentile over the 29 year time series (Table 4.2.1, Figure 4.2.5).

YOY Gizzard Shad abundance in 2016 (53 YOY/ha) was moderate (56th percentile) relative to the recent decade but weaker (29th percentile) relative to the 1988-2016 time period. White Bass YOY abundance in 2016 (15 YOY/ha) was low, attaining the 11th percentile relative to short and long time series. Smallmouth Bass young-of-the-year catch rate (3 YOY/ha) was the highest catch rate in the recent decade and 86th percentile for the entire time series. Other YOY Centrarchids catches were below short and long term means. Freshwater Drum YOY abundance was equal to the short term mean (2.8 YOY/ha) but ranked 43rd percentile over the 1988-2016 time series.

The Walleye YAO catch rate in 2016 (72.5 YAO/ha) was the highest in the 1988-2016 time series, due mainly to the strong 2015 year class present as yearlings (Table 4.2.1). YAO Common White Sucker abundance (2.6 YAO/ha) in 2016 was the highest in the time series and the 2016 yearling and older (YAO) Yellow Perch index (340.8 YAO/ha) was moderately strong (79th percentile, 1988-2016) (Table 4.2.1). Quillback Carpsuckers, White Perch, Rock Bass, and Brown Bullhead YAO catch rates in 2016 were moderate or better in magnitude. Catch rates of yearling and older Freshwater Drum (24.2 YAO/ha) and Channel Catfish (0.6 YAO/ha) were relatively low in 2016. Other species present in low catches in 2016 as yearling or older fish, which are typically less susceptible to capture in bottom trawls, included White Bass, Gizzard Shad, Common Carp, and Smallmouth Bass (Table 4.2.1).

Catch rates for yearling (YRL) and ages 2 and older (2AO) Yellow Perch (Figure 4.2.3) were parsed from YAO catches using length frequency and age data. Yellow Perch age compositions were applied to age 2 and older catch rates to produce age specific catch rates for 1998-2016 (Figure 4.2.4). The yearling Yellow Perch catch rate in 2016 was 64th percentile for the full time series (Figure 4.2.3). Yellow Perch in the age 2 and older group in 2016 ranked 89th percentile since 1988 (Figure 4.2.4). Within this group, ages ranged from two to nine, with age 2 (2014 year class) most common (70%) followed by age 3 (2013 year class) (25%).

The 2015 year class of Walleye was assessed to be strong as young of the year (96th percentile) (Figure 4.2.5) with confirmation one year later as yearlings (96th percentile) in 2016 (Figure 4.2.6).

In 2016, the composition of forage species (all ages), which remain potential prey for the duration of their life histories, was composed mostly of Troutperch (57%), Round Gobies (22%), juvenile Cyprinids (6%), Mimic Shiners (5%), Spottail Shiners (3%), Logperch (2%) and Rainbow Smelt (1%) (Table 4.2.1). Mimic Shiners (96th percentile 1988-2016), Silver Chub (89th percentile 1988-2016), and Logperch (82nd percentile 1988-2016) were abundant in 2016. Round Gobies and Troutperch indices were moderate in 2016, achieving 54th and 46th percentiles over the full time series respectively. Emerald Shiners, frequently a dominant forage species, were very low in abundance in 2016, accounting for <1% of forage species caught (Table 4.2.1). Rainbow Smelt and Spottail Shiner abundance were weak relative to the full time series; however, Spottail Shiner catches in 2016 exceeded the previous five years. Alewife were not caught in 2016, consistent with low densities observed since 2003 in western Lake Erie. Although the catch rate in 2016 (9.6 Silver Chub/ha) exceed the 1988-2016 average (5.1 Silver Chub/ha), this species has a status ranking of Threatened under Ontario's Endangered Species Act. Silver Chub were retained for genetic and morphometric analysis. 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, number per hectare < 0.2) are presented in Table 4.2.2. One Lake Sturgeon was caught in 2016 (0.11 Lake Sturgeon/ha), with a total length of 910 millimetres. Floy and PIT tags were applied and the Lake Sturgeon was released. Shorthead Redhorse Sucker catch rates (0.30 YAO/ha) in 2016 exceeded decade (0.19/ha) and time series

(0.14/ha) averages. Two tubenose Gobies were collected in 2016, representing their third year present in this survey. Johnny Darters and Brook Silversides were also caught in bottom trawls during 2016 in western Lake Erie.

In 2016, the average total length of YOY Yellow Perch (72 millimetres) was well above the 1988-2016 mean (65 millimetres) (Figure 4.2.7). The average total length of YOY Walleye during August trawls in 2015 (125 millimetres) was below the time series average (133 millimetres) (Figure 4.2.8). The average length of yearling Yellow Perch (144 millimetres) remained above average in 2016 (Figure 4.2.9). In contrast, the average total length of yearling Walleye (255 millimetres) in August was below the time series average (274 millimetres) for the second time since 2004 (Figure 4.2.10). Mean condition [$10^5(\text{Weight})/(\text{Length})^3$] for YOY Yellow Perch in 2016 (1.01) was equal to the 1998-2016 average (Figure 4.1.11) whereas YOY Walleye mean condition in 2016 (0.71) was well below the time series mean (0.77) (Figure 4.1.12).

Catches of Burbot were recorded during three early years of this survey (1988, 1992, 1993); however, this 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.

West Basin Midwater Trawling

In response to hypoxia observed during recent years of the west basin interagency trawling survey, an interim interagency protocol was implemented to exclude samples (from indices) since 2009 that exhibited hypoxia ($\leq 2\text{mg / l}$). To examine fish response to variable environmental conditions, a west basin midwater trawl study commenced in 2012. Field work took place from August 29 to September 1 in 2016.

The research vessel Keenosay fished midwater trawl gear at seven stations with replicates on bottom (benthic), suspended (pelagic) below surface, and in the middle of the water column where depths permitted (at four stations: eight metres, 12 metres, 18 metres, and nine to 24 metres) (Figure 4.2.13). A total of 19 trawls were completed in 2016. Locations were unchanged from those fished in the 2012 pilot study.

The mid-water trawl is intended to fish with a three metre square opening, with 102, 76, 51, and 25 millimetre graded mesh running from the gape to 13 millimetre mesh in the cod-end. Trawl duration was 10 minutes at 3.0 knots. Water temperature and 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.

During the midwater trawl study, bottom dissolved oxygen concentrations ranged from 0.8 milligrams per litre to 8.9 milligrams per litre and bottom temperatures ranged from 19.0 to 26.0 °C. One station (site 19) exhibited hypoxia; measured at the start (1.4 milligrams per litre) and end (0.8 milligrams per litre) of the 10 minute trawl on bottom. At site 19, more species were caught in the hypoxic bottom trawl compared to the pelagic trawl. The pelagic trawl caught YOY White Bass (one) and YOY White Perch (15) whereas the bottom trawl caught YOY White Perch (two), YOY Gizzard Shad (three), and yearling and older White Perch (224), Walleye (11), Yellow Perch (21) and Freshwater Drum (one). The extent of hypoxia in the west basin limited our ability to describe the influence of hypoxia on the vertical distribution of species and various age groups. It is possible that catches of YOY White Perch and White Bass at site 19 favoured the upper water column in the presence of hypoxic conditions on bottom.

With the exception of one site of seven that experienced hypoxia, the vertical distribution of species documented in 2016 primarily reflects catches under normoxic 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 as "All") in Table 4.2.3. Total catch rates of species and age groups combined in 2016 were highest in bottom trawls: 2095 fish per hectare) followed by catches in the middle of the water column: (666 fish per hectare) and at the top of the water column (154 fish per hectare). YOY Walleye were caught exclusively in trawls fished on bottom in 2016. Yearling Walleye were caught throughout the water column, but density was greatest in bottom (70.7 YRL per hectare) compared to mid-pelagic (3.1 YRL per hectare) and top-pelagic (1.1 YRL per hectare) trawls. YOY and yearling and older Yellow Perch were caught only on bottom in 2016 (331.3 YOY per hectare; 166.1 YAO per hectare). YOY White Perch were caught mostly in bottom trawls (373.6 YOY per hectare) but with some present in mid-pelagic (4.5 YOY per hectare) and top-Pelagic (8.2 YOY per hectare) trawls.

Emerald Shiner catch rates were low in 2016, but were still marginally higher than other species-age groups in all fishing modes combined (bottom, middle, top) (304 Emerald Shiners per hectare) (Table 4.2.3). In 2016, Emerald Shiners were most abundant in the middle of the water column (476 Emerald Shiners per hectare), followed by bottom trawls (372 Emerald Shiners per hectare) and the top of the water column (114 Emerald Shiners per hectare). YOY White Perch, YOY Gizzard Shad, YOY Yellow Perch, Yearling and older White Perch, Brook Silversides, yearling and older Yellow Perch and yearling Walleye comprised most of the remaining fish caught (Table 4.2.3). The majority of taxa and age groups (33/35) had the highest catches in bottom trawls; the exceptions were Emerald Shiners and Rainbow Smelt (Table 4.2.3).

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 1988-2016 by the OMNRF Lake Erie Management Unit. Means are presented for 2007-2016 and 1988-2016. 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	2014	2015	2016	Average 07 - 16	88 - 16	
young-of-the-year																																
White Perch	4,988.7	6,046.9	7,725.0	3,878.4	1,103.6	1,063.1	1,054.4	293.5	1,009.5	118.4	124.0	232.9	888.3	1,489.9	350.0	1,312.8	4,857.0	1,762.1	3,254.0	4,265.0	1,947.0	2,477.0	1,303.2	754.9	4,504.5	826.6	1,695.8	932.1	1,182.7	1,988.0	2,114.8	
Yellow Perch	202.1	533.7	470.9	72.4	173.9	499.3	554.8	741.4	1,944.9	71.6	388.1	468.2	46.5	655.9	14.5	2,220.6	57.7	117.6	381.0	331.7	683.0	74.8	161.2	220.7	72.5	280.8	1,550.7	1,980.9	635.1	507.1	487.1	
Gizzard Shad	956.4	1,197.1	1,099.6	59.0	260.4	826.4	103.9	81.6	2,494.9	33.8	413.3	214.0	1,046.5	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	14.7	180.6	53.3	176.0	466.9	
White Bass	23.1	67.9	64.7	13.8	14.9	124.0	36.9	51.1	125.3	327.3	24.5	136.9	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	9.9	129.6	15.5	62.8	99.6	
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	169.7	107.8	117.4	33.8	20.1	1.4	7.0	-	0.4	5.9	1.9	6.5	1.5	0.4	1.7	2.8	2.8	18.7	
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	33.9	82.6	7.6	15.7	17.9	
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	0.3	0.4	3.3	1.3	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	0.3	0.4	0.3	0.3	0.4	0.9	3.0	0.1	0.1	-	-	0.3	0.5	0.4	
White Crappie	0.5	0.1	-	8.8	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	0.3	
yearling-and-older																																
Yellow Perch	169.4	7.8	52.0	88.3	70.7	99.3	68.3	137.5	374.7	73.9	98.7	187.8	328.9	131.3	120.1	470.2	482.9	294.9	83.5	84.2	536.2	416.6	154.8	138.6	75.4	123.0	203.8	399.6	340.8	247.4	397.8	
White Perch	113.1	21.4	12.1	138.8	394.4	92.9	1.9	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	286.6	99.1	95.1	76.7	78.9	175.9	75.6	159.2	92.0	114.5	129.5	
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	20.2	30.7	24.2	37.9	44.7	
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	1.3	15.2	72.5	11.1	11.0	
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	1.3	0.2	0.3	2.4	2.3	
Gizzard Shad	1.7	-	0.2	41.2	0.1	0.2	0.1	0.7	0.2	9.7	-	0.1	0.7	0.4	0.1	0.7	-	-	0.1	0.2	0.1	-	-	0.2	0.4	-	0.1	-	0.1	2.0	2.0	
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	1.9	0.8	0.6	1.2	1.1	
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	0.9	2.0	2.6	1.3	0.9	
Carp	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	0.5	0.1	-	0.4	0.9	
Rock Bass	1.7	-	1.0	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	0.1	-	0.2	0.5	0.5	
Brown Bullhead	2.7	-	1.2	0.5	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
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	-	-	-	-	0.1	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	-	0.1	0.3	0.1	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	-	0.1	-	0.3	314.9
Troutperch	211.7	142.6	347.7	479.3	71.1	267.8	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	88.9	23.4	134.3	135.0	197.3	
Emerald Shiner	2.6	3.3	143.3	12.0	60.4	30.9	21.0	109.2	129.2	61.3	6.1	38.3	34.8	52.6	98.5	633.8	88.4	118.9	588	285.8	141.0	248.4	83.7	63.3	465.4	44.4	65.4	7.4	0.7	135.7	305.8	
Round Goboy	-	-	-	-	-	-	-	-	-	2.7	83.8	92.1	111.1	84.2	117.1	596	207.5	598	170.6	71.4	172.0	199.7	16.8	43.7	41.8	51.2	34.9	76.3	53.3	76.1	60.3	
Spottail Shiner	46.9	21.6	31.7	49.5	40.6	29.3	28.3	33.5	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	2.1	2.3	6.6	8.6	41.3	
Rainbow Smelt	1.4	3.1	10.9	0.2	64.3	18.7	0.1	2.8	1.6	2.0	6.5	-	-	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	124.9	106.8	1.4	52.3	29.2	
Cyprinidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	15.7	14.2	-	23.2	0.4	6.5	214.8	185	22.3	27.8	15.2	34.4	
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	1.6	0.4	9.6	2.2	5.1	
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	4.0	17.3	5.1	4.9	3.7	
Mimic Shiner	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21.3	-	1.0	0.7	0.3	0.6	0.2	2.4	7.5	11.2	4.5	1.6	
Total	7,688	8,296	10,350	5,095	5,600	5,254	2,147	1,989	7,218	955	1,192	1,808	4,307	5,725	1,532	7,287	6,884	3,181	4,843	5,686	3,960	5,103	2,340	1,491	5,910	1,860	3,958	3,276	2,672	3,625.6	4,401.6	
# 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	36	36	36	34.9	35.1	
CPHA (catch per hectare) = Unweighted, arithmetic mean catch per hectare CPHA were excluded 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 1988-2016 by the OMNRF Lake Erie Management Unit. Means are presented for 2007-2016 and 1988-2016. 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	2014	2015	2016	Average 07 - 16	88 - 16		
young-of-the-year																																	
Largemouth Bass	-	-	-	4.59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.11	-	-	-	-	-	-	-	-	0.02	0.17		
Quillback	1.29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.04		
Channel Catfish	-	-	-	0.31	-	-	-	0.29	-	-	-	-	-	0.11	-	-	-	-	-	-	-	-	-	-	0.26	-	-	-	-	-	0.03	0.03	
Bluegill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.22	0.12	-	-	-	-	-	-	-	0.03	0.01	
Moore sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.22	-	-	-	-	-	-	0.10	-	-	-	0.03	0.01	
Pumpkinseed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00		
Black Crappie	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.11	-	-	-	-	-	-	-	-	-	0.01	0.00		
White Sucker	-	-	0.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00		
Centrarchidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.10	-	-	-	-	0.01	0.00		
Pomoxis sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.09	0.01	0.00		
yearling-and-older																																	
Shorthead Redhorse	-	-	-	0.09	-	-	-	-	-	-	-	-	-	-	-	0.52	1.32	0.11	-	-	0.65	0.47	0.10	0.12	0.11	-	-	0.11	0.30	0.19	0.14		
Largemouth Bass	-	-	-	1.77	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.06		
Lake Sturgeon	-	-	-	-	-	-	0.18	-	-	0.12	-	-	-	-	-	0.11	-	-	-	0.10	-	-	0.11	0.12	-	-	-	-	0.11	-	0.04	0.03	
Golden Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	0.10	-	-	-	-	-	-	-	0.51	-	-	-	-	-	-	-	-	0.05	0.02	
Silver Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	0.10	-	-	-	-	-	-	-	0.13	-	0.12	0.11	-	-	-	-	-	0.04	0.02	
Black Crappie	0.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.02	0.02	
Silver Lamprey	-	-	-	-	-	-	-	-	0.09	-	-	-	-	-	-	-	-	-	-	0.25	-	-	0.21	-	-	-	-	-	-	-	-	0.02	0.02
Moxostoma sp.	-	-	-	-	-	-	-	-	-	0.12	-	-	-	-	-	-	-	0.11	-	-	-	-	-	0.23	-	-	-	-	-	-	0.02	0.01	
Yellow Bullhead	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01	0.01	
Carp-Goldfish hybrid	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.11	-	-	-	-	0.11	-	-	-	-	0.02	0.01	0.01	
Muskellunge	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.11	-	-	-	-	-	0.10	-	-	-	-	0.02	0.01	
Northern Pike	-	-	-	-	-	-	0.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.10	-	-	-	0.01	0.01	
Lake Whitefish	-	-	-	-	-	-	-	-	-	-	-	-	0.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00	0.00	
White Crappie	0.11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00	
Longnose Sucker	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.10	-	-	-	-	-	-	-	0.01	0.00	
Bluegill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.09	-	-	0.01	0.00	
all ages																																	
Johnny Darter	-	-	-	-	-	-	2.08	-	1.27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.10	0.01	0.12	0.09	
Brook Silverside	-	-	-	-	0.77	-	-	0.10	-	-	-	-	-	-	-	-	0.11	-	-	0.76	-	-	-	0.48	0.21	0.10	-	-	0.10	0.17	0.09	0.17	
Goldfish	0.11	-	0.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.11	-	-	-	-	-	0.29	0.10	0.76	-	-	0.12	0.05	0.12	
Tubenose Goby	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.12	-	-	-	0.22	0.19	0.05	0.02	0.01	
Nocomis sp.	0.21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00	0.00	
Blacknose Dace	-	-	-	-	-	-	-	0.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00	0.00	
Common Shiner	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00	0.00
Spotfin Shiner	-	0.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00	0.00	
Notropis sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	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	0.86	0.52	0.89	0.93	0.93	0.93	
# 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	36	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 number per hectare of species and age groups caught by midwater trawl depth categories in western Lake Erie. Unspecified age group indicates all ages included. Number of trawls (N), mean and minimum dissolved oxygen (mg/l) at gear depth and water temperature (°C) at gear depth are presented; 2012-2016.

	BOTTOM						MIDDLE						TOP						All					
	2012	2013	2014	2015	2016		2012	2013	2014	2015	2016		2012	2013	2014	2015	2016		2012	2013	2014	2015	2016	
YOY Yellow Perch	227.4	335.3	1305.1	1077.6	331.3		30.8	0.0	0.0	0.0	0.0		0.0	0.0	2.7	0.0	0.0		95.3	130.4	481.9	359.2	122.0	
Yearling and Older Yellow Perch	77.1	27.4	2.5	94.4	166.1		0.0	0.0	0.0	1.6	0.0		0.5	0.0	0.0	0.0	0.0		30.2	10.7	0.9	32.0	61.2	
YOY White Perch	9337.9	209.9	401.0	1120.6	373.6		19.4	0.0	0.0	0.0	4.5		0.0	0.0	0.0	0.5	8.2		3635.7	81.6	147.7	373.7	141.9	
Yearling and Older White Perch	105.3	115.9	0.8	13.5	288.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		41.0	45.1	0.3	4.5	106.1	
YOY White Bass	72.8	5.8	3.7	11.3	6.1		11.9	0.0	3.4	2.6	0.8		5.3	0.5	3.5	8.7	0.6		33.0	2.5	3.5	7.5	2.7	
Yearling and Older White Bass	1.7	5.3	4.0	2.1	0.6		0.0	0.0	1.7	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.7	2.0	1.9	0.7	0.2	
YOY Freshwater Drum	0.5	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	0.0		0.2	0.0	0.0	0.0	0.0	
Yearling and Older Freshwater Drum	53.6	10.5	1.8	1.5	23.1		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		20.9	4.1	0.7	0.5	8.5	
YOY Smallmouth Bass	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	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Yearling and Older Smallmouth Bass	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	0.0	0.0		0.0	0.0	0.0	0.3	0.0	
YOY Rock Bass	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	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Yearling and Older Rock Bass	0.0	0.0	0.0	0.5	1.1		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.2	0.4	
YOY Walleye	5.8	0.0	5.0	40.7	7.7		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		2.3	0.0	1.9	13.6	2.9	
Yearling Walleye	6.2	1.6	0.8	4.6	70.7		0.0	0.0	0.0	0.0	3.1		0.0	0.0	0.6	0.0	1.1		2.4	0.6	0.5	1.6	27.2	
Age 2 and Older Walleye	1.5	1.1	0.5	0.0	2.8		0.9	0.0	0.0	0.0	0.8		0.0	0.0	0.0	0.0	0.0		0.8	0.4	0.2	0.0	1.2	
YOY Channel Catfish	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	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Yearling and Older Channel Catfish	1.0	0.5	0.0	0.0	1.6		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.4	0.2	0.0	0.0	0.6	
Alewife	1.3	62.1	0.0	0.0	0.0		0.9	19.2	0.0	0.0	0.0		1.0	10.8	0.0	0.0	0.0		1.1	32.6	0.0	0.0	0.0	
YOY Gizzard Shad	589.8	591.3	219.7	135.1	286.6		46.1	67.0	108.9	296.6	97.6		77.1	108.4	556.7	586.3	4.9		269.6	287.0	314.7	339.3	133.1	
Yearling and Older Gizzard Shad	0.6	0.0	0.0	0.5	0.6		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.3	0.0	0.0	0.2	0.2	
Rainbow Smelt	7.5	106.4	497.3	137.7	1.7		0.9	0.9	28.7	147.3	1.5		0.0	5.1	59.3	400.1	4.1		3.1	43.6	212.6	228.4	2.5	
YOY Common White Sucker	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	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Yearling and Older Common White Sucker	0.6	0.0	0.0	0.0	0.6		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.3	0.0	0.0	0.0	0.2	
Round Goby	14.4	0.0	0.0	23.1	14.9		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		5.6	0.0	0.0	7.7	5.5	
Emerald Shiner	7040.9	3859.4	949.1	2671.3	371.5		10323.3	15892.3	4200.8	5077.0	475.6		7742.2	15672.4	3340.3	10506.6	114.1		8043.1	11127.3	2685.8	6085.0	304.1	
Spottail Shiner	0.6	0.0	0.5	1.0	2.7		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.3	0.0	0.2	0.3	1.0	
Silver Chub	5.1	6.3	0.0	0.5	5.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		2.0	2.5	0.0	0.2	1.8	
Common Carp	0.6	2.6	0.0	0.5	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.3	1.0	0.0	0.2	0.0	
Logperch	0.0	0.5	0.0	0.0	1.2		0.0	0.0	0.8	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.2	0.2	0.0	0.4	
Trouperch	89.1	55.7	0.0	11.6	19.4		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		34.7	21.7	0.0	3.9	7.2	
YOY White Crappie	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	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
YOY Black Crappie	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Lake Sturgeon	0.0	1.1	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.4	0.0	0.0	0.0	
Cyprinid	3.9	7.4	0.0	17.3	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		1.5	2.9	0.0	7.3	0.0	
Brook Silverside	44.4	2.7	61.4	23.4	118.6		1.1	0.0	0.0	27.3	82.7		69.9	3.2	16.6	20.1	21.4		44.7	2.3	28.7	23.6	73.3	
Total	17,690	5,409	3,453	5,390	2,095		10,435	15,979	4,344	5,552	666		7,896	15,800	3,980	11,527	154		12,269	11,799	3,882	7,490	1,004	
Number of Trawls	7	7	7	7	7		4	4	5	7	5		7	7	7	7	7		18	18	19	21	19	
Mean Dissolved Oxygen1 mg/l	7.0	8.0	9.7	8.8	5.9		8.1	8.7	8.5	8.8	6.8		8.3	8.6	8.8	8.8	6.8		7.4	8.2	9.5	8.8	6.0	
Minimum Dissolved Oxygen1 mg/l	5.8	7.5	7.6	7.9	1.1		8.1	8.6	8.5	8.0	5.8		8.1	7.8	8.5	8.1	3.2		5.8	7.5	7.6	7.9	1.1	
Mean Temperature1 - C	24.3	23.8	23.3	22.3	24.5		24.2	23.6	23.8	22.9	25.2		24.3	23.9	24.0	22.6	25.3		24.3	23.8	23.5	22.5	24.7	

1. At depth trawl was fished.

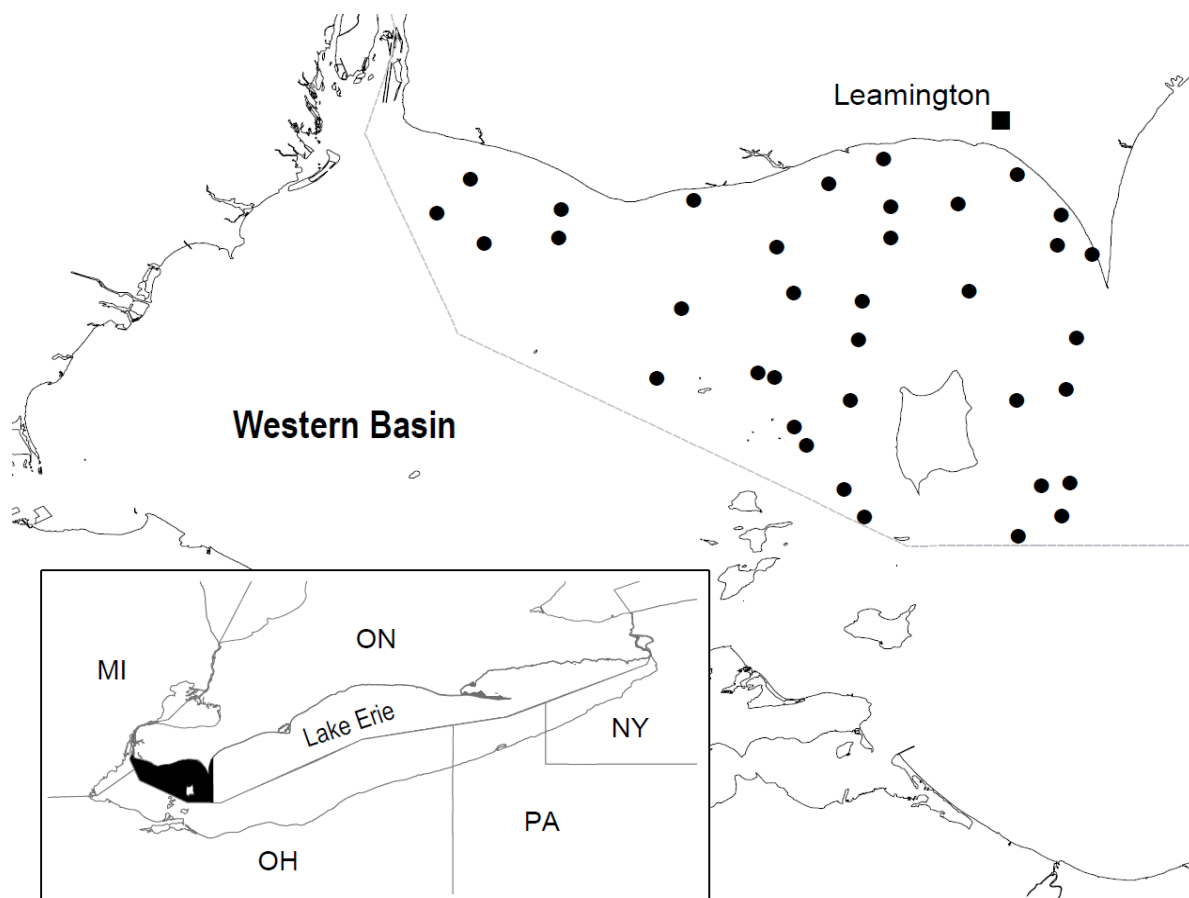


Figure 4.2.1 Ontario bottom trawl index locations fished in the western basin of Lake Erie during August 2016. Thirty-six stations were completed. No sites were excluded in 2016 due to hypoxia.

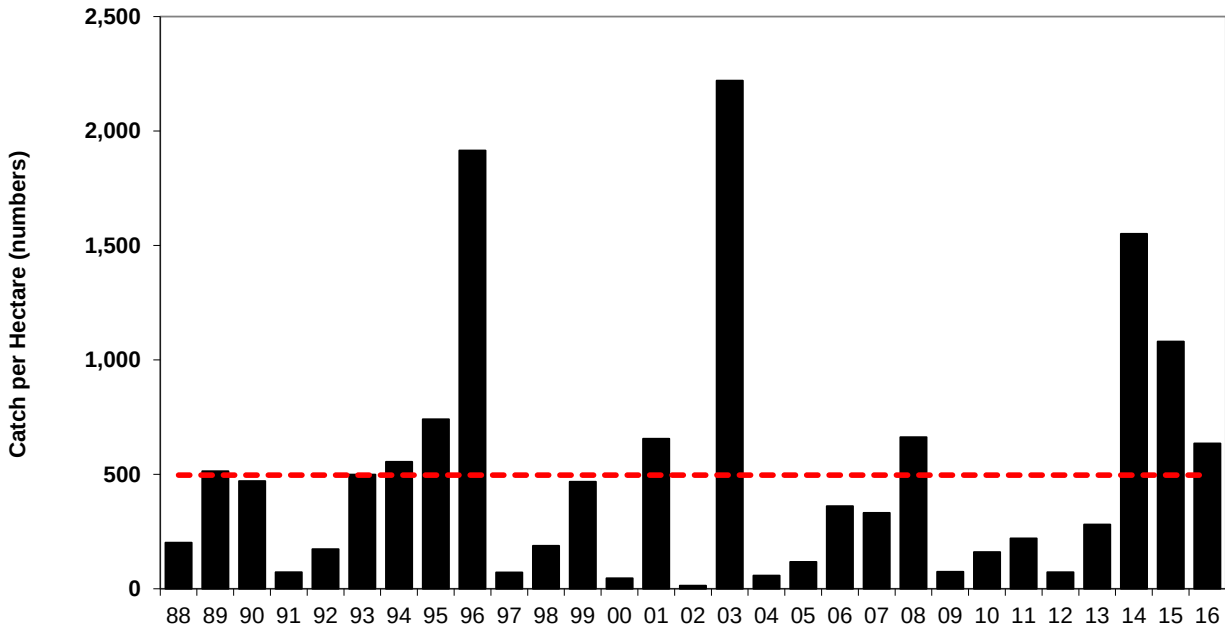


Figure 4.2.2 Number of young-of-the-year Yellow Perch caught per hectare during interagency trawling (1988-2016) in western Lake Erie. Horizontal line indicates 1988-2016 mean catch per hectare.

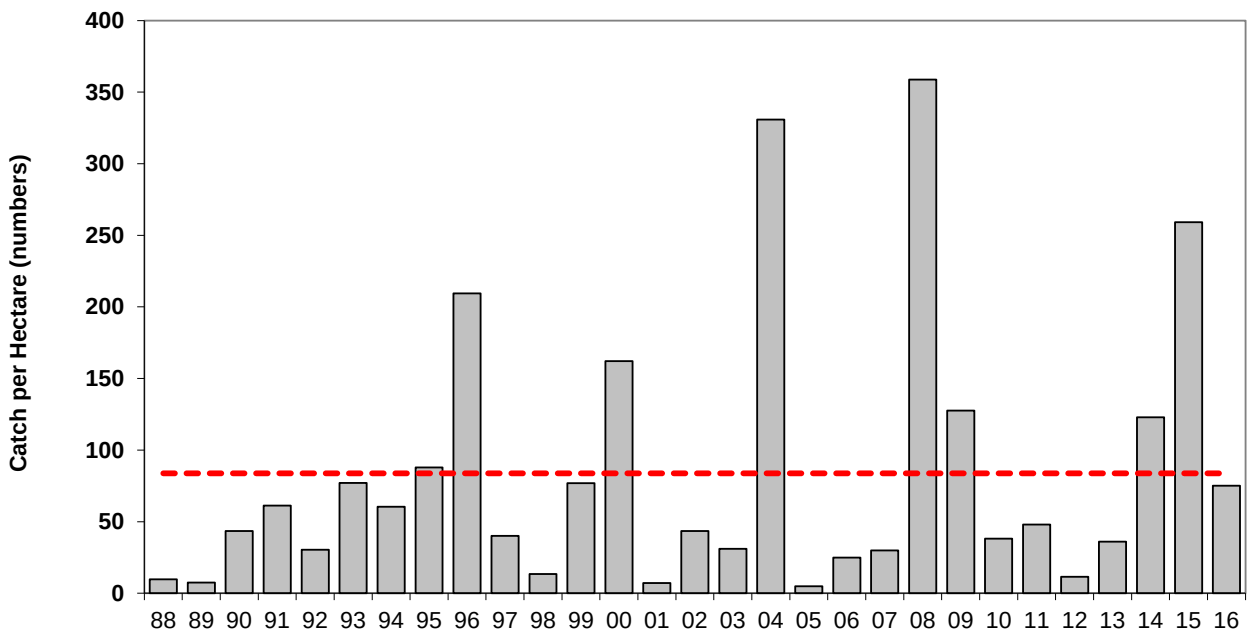


Figure 4.2.3 Number of yearling Yellow Perch caught per hectare during interagency trawling (1988-2016) in western Lake Erie. Horizontal line indicates 1988-2016 mean catch per hectare.

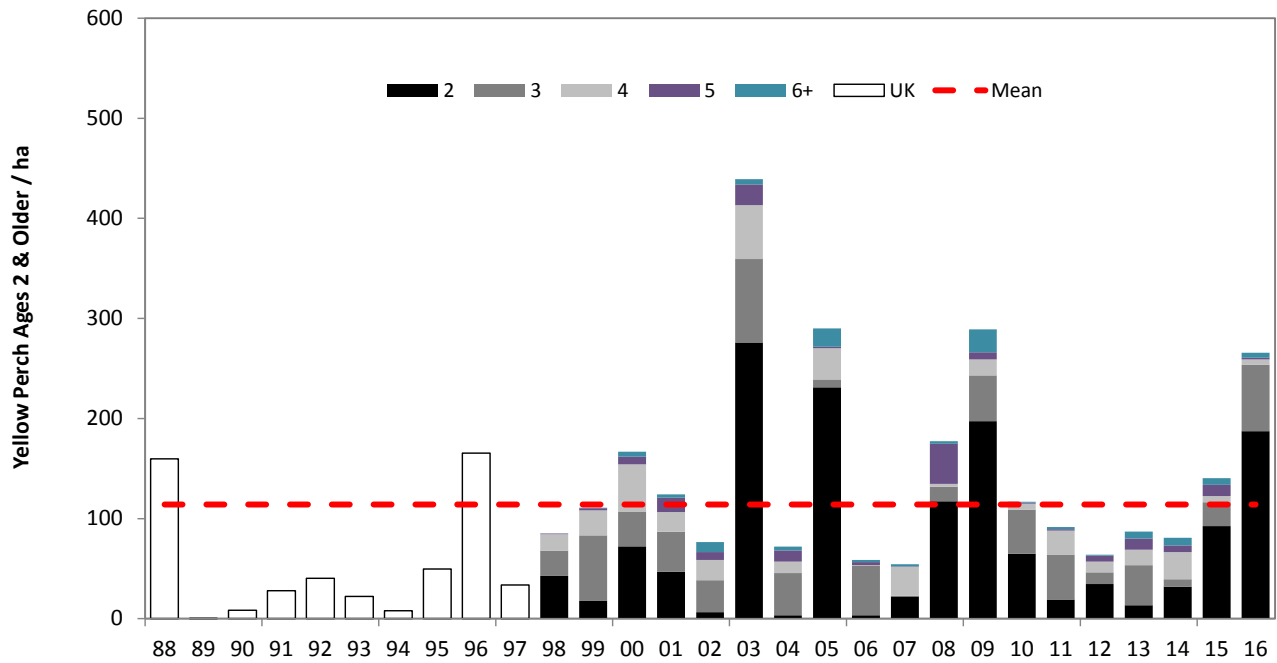


Figure 4.2.4 Number of Yellow Perch ages 2 and older caught per hectare during interagency trawling (1988-2016) in western Lake Erie. Yellow Perch were aged from 1998 to 2016. UK indicates unknown age composition within this size group. Mean catch of Yellow Perch ages 2 and older presented as dotted line (1988-2016).

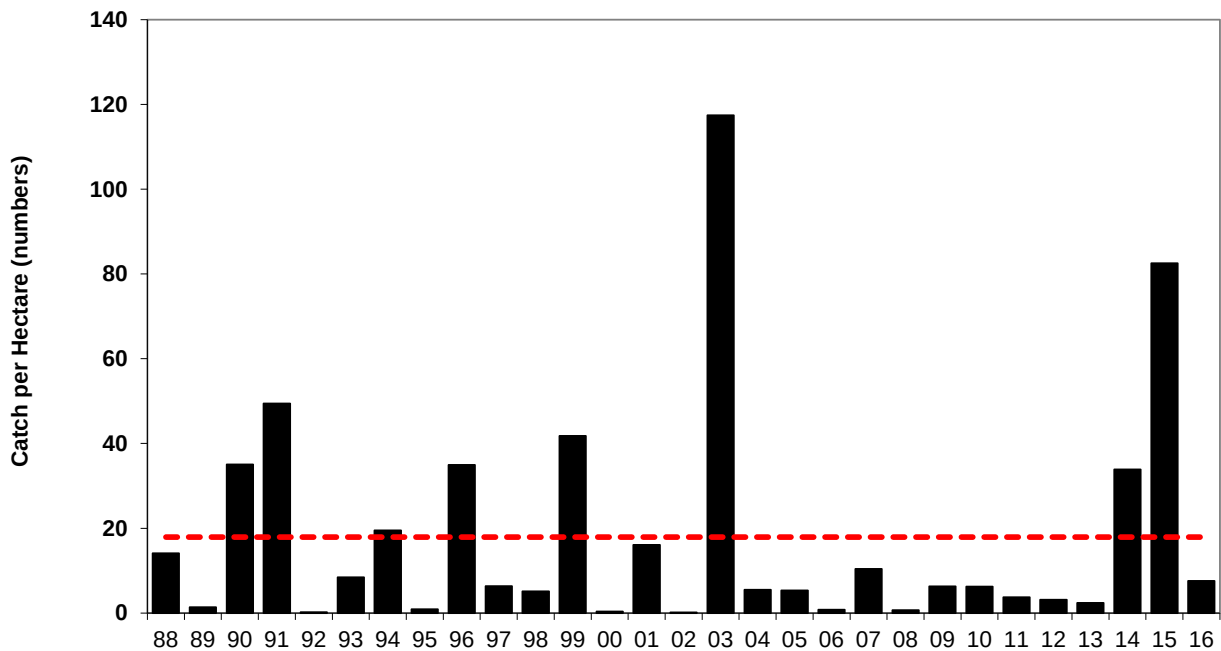


Figure 4.2.5 Number of young-of-the-year walleye caught per hectare during interagency trawling (1988-2016) in western Lake Erie. Horizontal line indicates 1988-2016 mean catch per hectare.

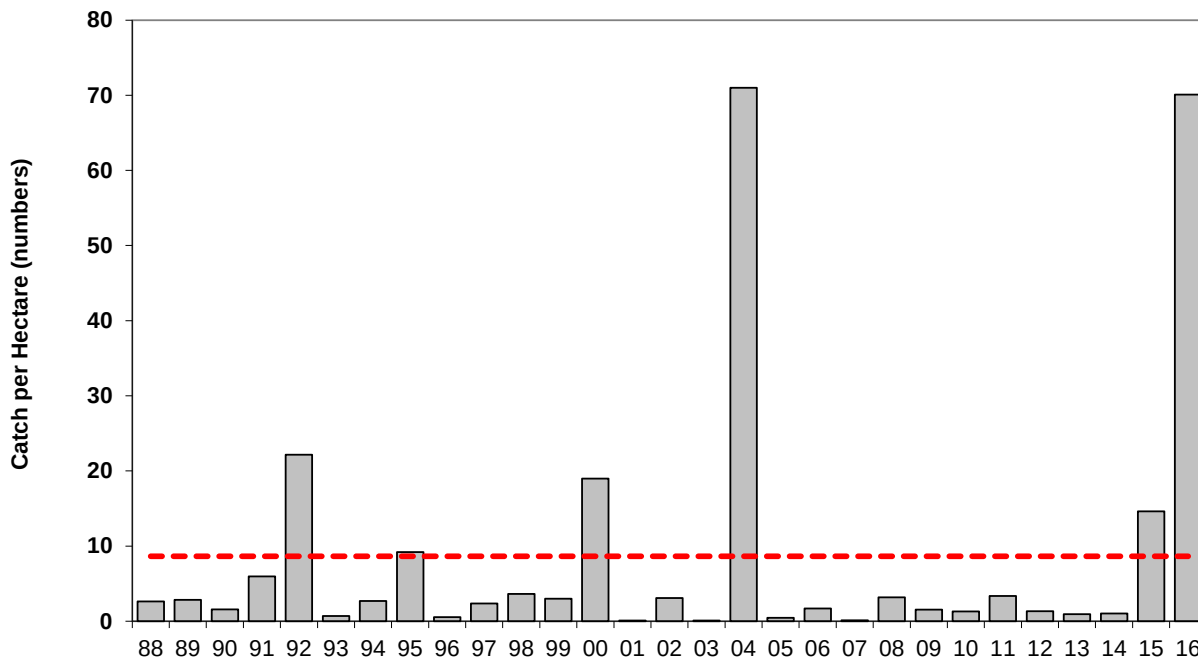


Figure 4.2.6 Number of yearling walleye caught per hectare during interagency trawling (1988-2016) in western Lake Erie. Horizontal line indicates 1988-2016 mean catch per hectare.

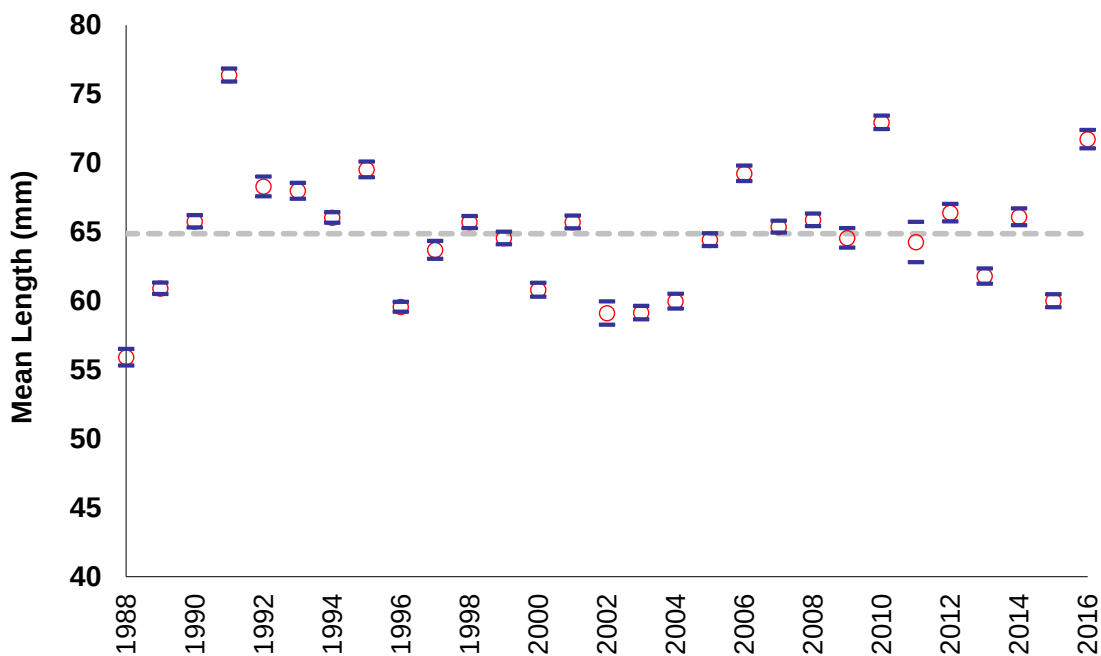


Figure 4.2.7 Mean total length of young-of-the-year (YOY) Yellow Perch with 95% confidence limits. Interagency trawling, Ontario waters of western Lake Erie, 1988-2016. Horizontal broken line indicates the average of the time series.

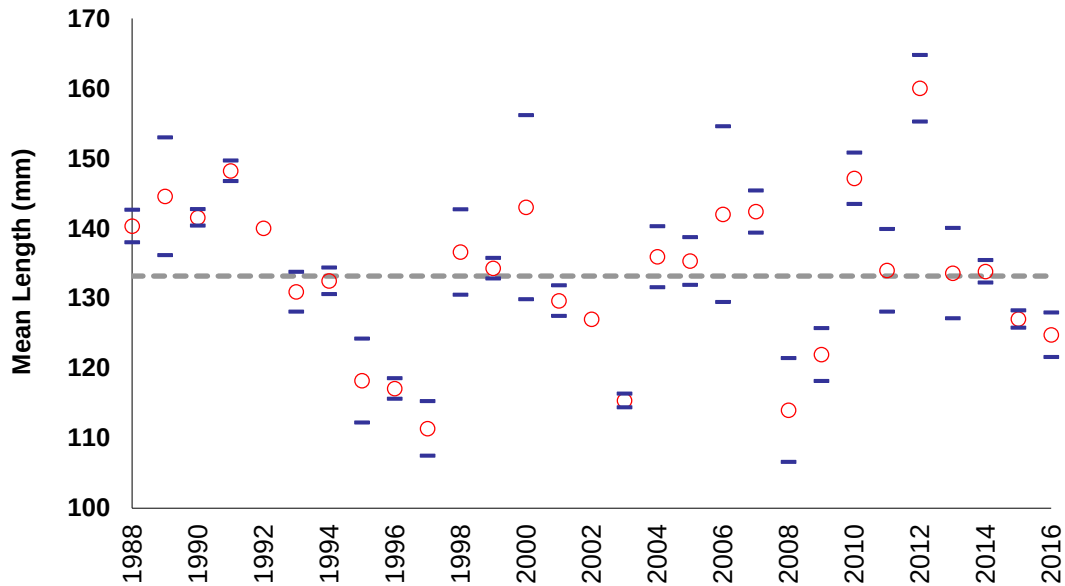


Figure 4.2.8 Mean total length of young-of-the-year (YOY) walleye with 95% confidence limits. Interagency trawling, Ontario waters of western Lake Erie, 1988-2016. Horizontal broken line indicates the average of the time series. Two YOY were caught in 1992 and one in 2002.

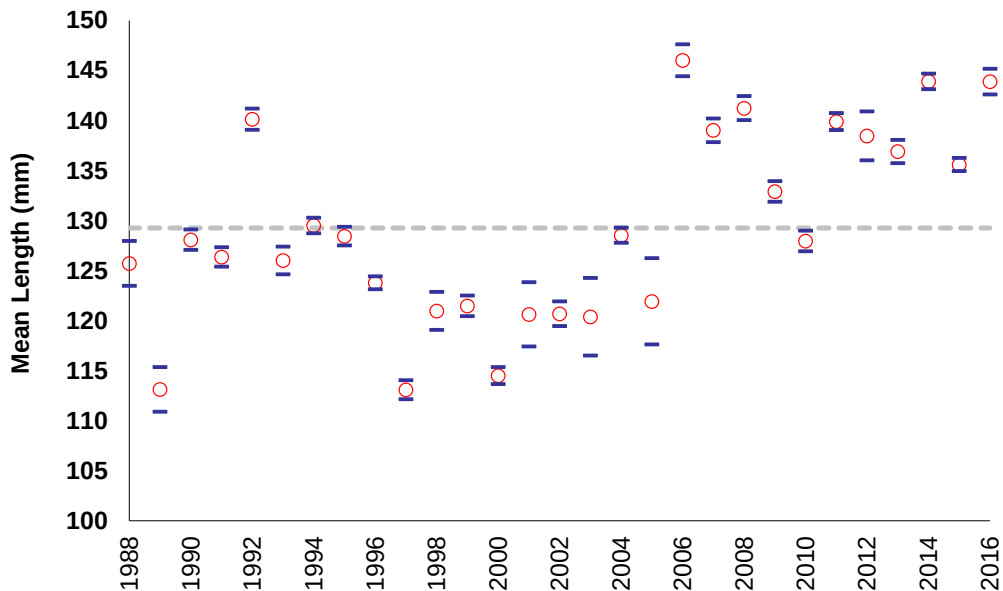


Figure 4.2.9 Mean total length of yearling yellow perch with 95% confidence limits. Interagency trawling, Ontario waters of western Lake Erie, 1988-2016. Horizontal broken line indicates the average of the time series.

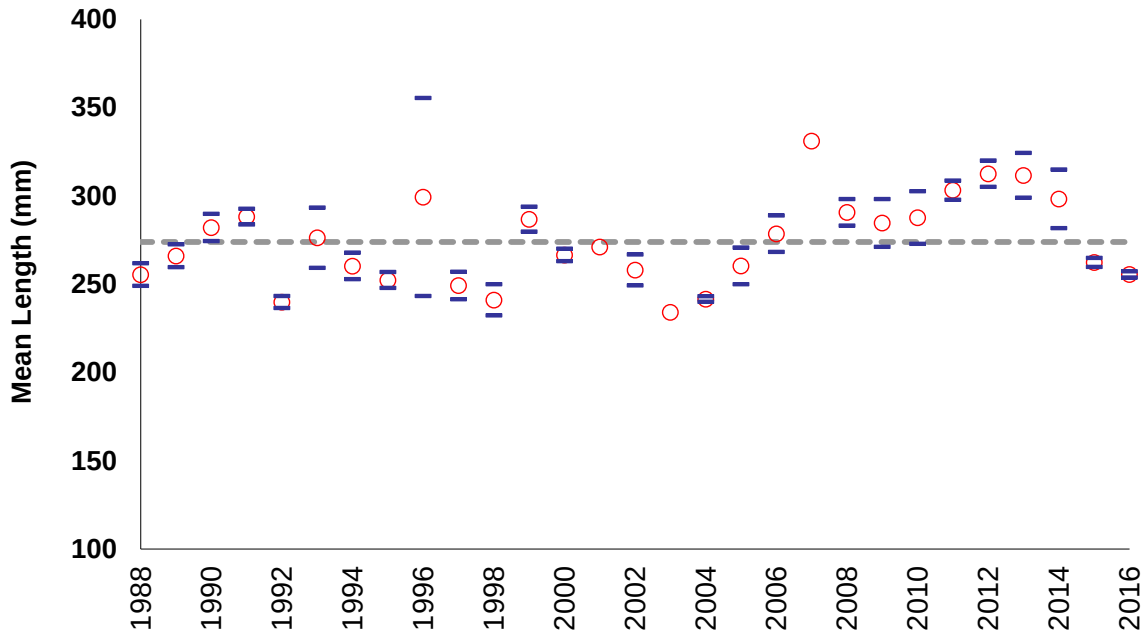


Figure 4.2.10 Mean total length of yearling walleye with 95% confidence limits. Interagency trawling, Ontario waters of western Lake Erie, 1988-2016. Horizontal broken line indicates the average of the time series. In 2007 one yearling walleye was caught.

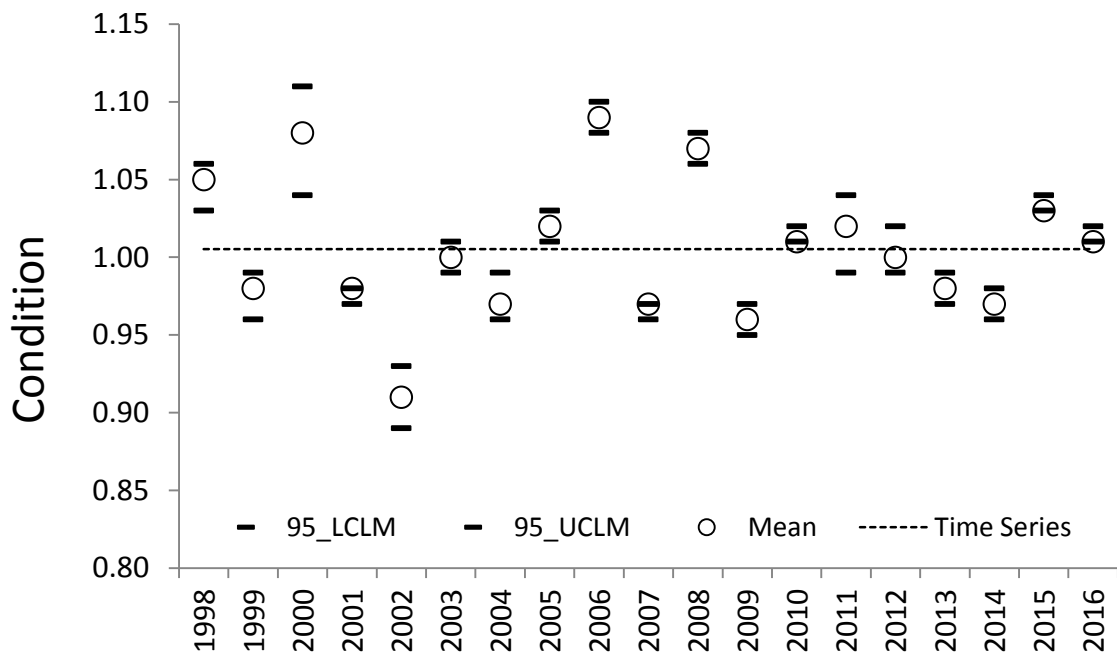


Figure 4.2.11 Mean condition of young-of-the-year (YOY) Yellow Perch with 95% confidence limits. Interagency trawling, Ontario waters of western Lake Erie, 1988-2016. Horizontal broken line indicates the average of the time series. Precision to two decimal places.

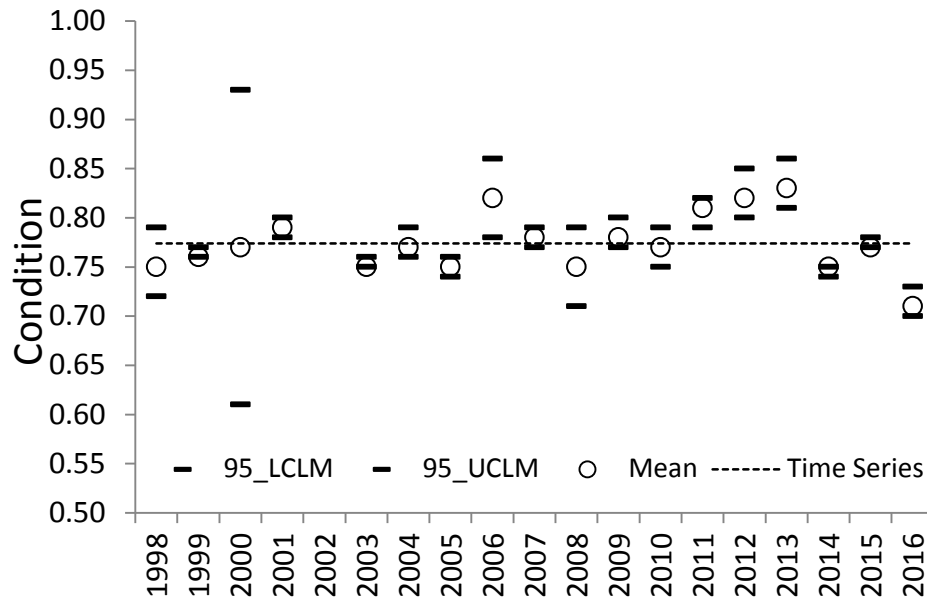


Figure 4.2.12 Mean condition of young-of-the-year (YOY) walleye with 95% confidence limits. Interagency trawling, Ontario waters of western Lake Erie, 1988-2016. Horizontal broken line indicates the average of the time series. Precision to two decimal places.

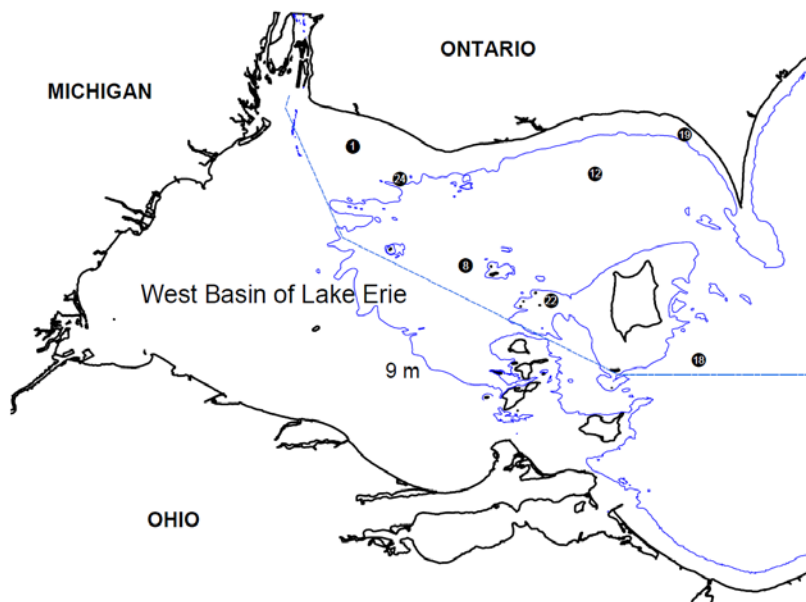


Figure 4.2.13 Ontario midwater trawl locations fished in the western basin of Lake Erie during August 2016. Seven sites were selected from the bottomtrawl survey which took place during the previous two weeks. Site numbers are visible. Trawls were fished near the surface and on bottom at all sites. At depths close to nine metres or greater, trawls were also fished in the middle of the water column.

4.3 Long Point Bay Index Trawl Surveys

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 annually since 1980 in Inner Long Point Bay (Inner Bay Trawl Assessment) at four fixed stations and the nearshore waters of outer Long Point Bay (Nearshore Outer Bay Trawl Assessment) at three fixed stations with a 6.1 metre modified Biloxi bottom trawl. A third trawl survey was initiated in 1984 to measure recruitment of Rainbow Smelt. In this survey, a 10 metre Biloxi bottom trawl was fished in the offshore waters of Outer Long Point Bay (Offshore Outer Bay Trawl Assessment) at four fixed stations. For all surveys, two consecutive trawls were towed at each station during each sample event.

In 2016, weekly trawling occurred in the nearshore areas (Outer Bay and Inner Bay) August 29 to October 3, 2016 and in the offshore area (Deepwater) October 5 to November 16, 2016. Total annual trawling effort was 400 minutes per area.

Trawl catches were sorted by species and age group (young-of-the-year (YOY) and yearling-and-older (YAO)). Random samples for selected species were measured for length and weight (YOY and YAO), sex, maturity and age (YAO).

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 one and two at each location.

Yellow Perch

An index of YOY Yellow Perch abundance was introduced in 2010 that combines annual recruitment estimates from each of three Long Point Bay trawl assessments (i.e. areas) into a single composite index series. This Long Point Bay composite index (LPBc) combines the annual mean abundance (NPHa) estimates from each of the three trawl assessments and assigns a weight to each of the area estimates based on surface area with bottom depths greater than five metres (78.3%) and less than or equal to five metres (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 YOY Yellow Perch composite index in year i , and OOB_i , IB_i , and NOB_i are the YOY 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).

The composite index (LPBc) indicated that the 2016 year class was very strong ($NpHa=447$, Figure 4.3.2) relative to the long-term dataset (1984-2015: mean $NpHa=75$, range=0-279). In 2016, YOY perch were found primarily in Offshore Outer Bay (Table 4.3.3), in moderate abundance in Inner Bay (Table 4.3.1) and relatively low abundance in Nearshore Outer Bay (Table 4.3.2). In 2015, the mean size of YOY Yellow Perch from the Inner and Outer Bay Nearshore Trawl Assessments were average (Figure 4.3.3).

Densities of YAO Yellow Perch in 2016 in the three Trawl Assessments were all below long-term averages but up from 2015. NPHa of YAO Yellow Perch for 2016 was 15.5 in the Inner Bay (mean 1984-2015 NPHa=60.6) and 2.5 in the Outer Bay (mean 1984-2014 NPHa=34.7).

Rainbow Smelt

Recruitment of YOY Rainbow Smelt in 2016 (NPHa=538) was lower than 2015 (NPHa=3245), the highest record in the time series. It was also lower than the long-term mean (1984-2015 mean NPHa=1027). YAO in 2016 (NPHa=20) were also lower than in 2015 and the long-term mean (mean 1984-2015 NPHa=411).

Other Species

Inner Bay – Trends in YOY of other species (Table 4.3.1) was generally consistent with 2015. However, noticeable changes include a decrease in Smallmouth Bass in 2016 (NPHa<1), down from six per hectare in 2015 and the long term mean of 15 per hectare. Banded killifish also decreased in 2016 (NPHa=1), down from seven per hectare in 2015 and the long term mean of 17 per hectare.

Nearshore Outer Bay – Trends in YOY (Table 4.3.2) were consistent with 2015 with the exception of Round Goby that were up to 359 per hectare in 2016 from 54 per hectare in 2015. These last two years were higher than the long term mean of 47 per hectare in this area of the survey.

Offshore Outer Bay – Trends in YOY (Table 4.3.3) were generally consistent with 2015 with the exception of a few species. White Bass were in high abundance at 96 per hectare in 2016, higher than the long-term mean of nine per hectare. The last largest pulse of White Bass was in 2001 at 19 per hectare. Emerald Shiner declined in 2016 at two per hectare relative to 347 per hectare in 2015 and the long term mean (1984-2015 mean NPHA=197). Conversely, Round Goby was up in 2016 (301 per hectare) relative to 2015 (67 per hectare) and the long term mean of 85 per hectare.

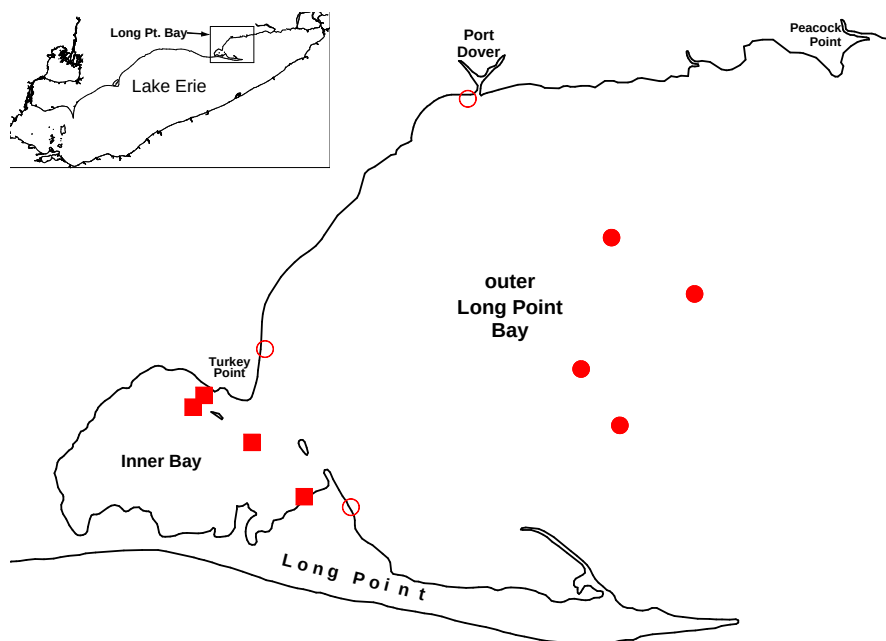


Figure 4.3.1 Location of trawl stations where bottom trawling was conducted in Inner Bay (□), and the nearshore (○) and offshore (●) waters of Outer Long Point Bay, Lake Erie.

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 index bottom trawl assessments (6.1-m trawl), September, 2016 and mean and range from 1980 to 2015.

Species	2016 NpHa	1980-2015 NpHa	
	Mean	Mean	Range
Yellow Perch	121	244	0-1859
Rock Bass	0	16	0-198
Smallmouth Bass	1	15	0-92
Largemouth Bass	1	12	0-97
Spottail Shiner	0	147	0-983
Banded Killifish	1	17	0-226
Johnny Darter	1	10	0-57
Sunfish (<i>Lepomis</i> spp.)	2	27	0-185
Round Goby ^a	161	51	0-281

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, 2016 and mean and range from 1980 to 2015.

Species	2016 NpHa	1980-2015 NpHa	
	Mean	Mean	Range
Yellow Perch	20	75	1-668
White Perch	0	14	0-121
White Bass	0	7	0-153
Alewife	0	59	0-870
Gizzard Shad	4	12	0-83
Emerald Shiner	4	14	0-258
Spottail Shiner	4	372	3-1509
Round Goby	54	47	0-359

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, 2016 and mean and range from 1980 to 2015.

Species	2016 NpHa	1980-2015 NpHa	
	Mean	Mean	Range
Rainbow Smelt	538	1027	0-7058
White Perch	0	3	0-16
White Bass	96	9	0-96
Yellow Perch	551	41	0-551
Alewife	1	106	0-707
Gizzard Shad	2	15	0-87
Emerald Shiner	2	197	0-3388
Round Goby	301	85	0-973

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.

Study Area and Sampling Design

The standard study area encompasses the nearshore waters within outer Long Point Bay, from the minimum depth (12 feet or 3.7 metres) that the gear could be set, to the 30 foot (9.1 metre) 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 two depth strata, 12-18 feet (3.7-5.5 metres) and >18-30 feet (>5.5-9.1 metres). Areas one, two and four have been sampled each year since 1986. Area three, the Inner Bay, has rarely been sampled and is not part of the standard study area.

An additional depth stratum has been sampled on an exploratory basis since 2011 to examine the distribution and abundance of fish species, especially Yellow Perch, in deeper offshore areas of Long Point Bay not covered by the standard survey design. This extra deep stratum extended sampling from the 30 foot (9.1 metre) contour to the 66 foot (20 metre) 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).

One area was sampled each week on a rotational basis. Within that area, two randomly selected grids per depth stratum were sampled each week (i.e. four grids in the standard survey; six grids when including the extra deep stratum). Sampling is targeted to run for 10 weeks, resulting in a target of 40 grids sampled in the standard survey and 60 grids sampled in the extended survey with the extra deep stratum. In 2015, the target number of grids was sampled in each depth stratum.

The survey period was from spring to fall during 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 (1986-2015) are reported below.

One monofilament net composed of single 50 foot panels of mesh sizes 1.25, 1.5 and 1.75 inches (stretched mesh) and two panels each of mesh sizes 2, 2.25, 2.5, 2.75, 3, 3.5, 4, 4.5, 5, 5.5 and 6 inches, was set in each grid. The total length of a monofilament gang was 1250 feet (381 metres). Each gang was fished overnight for approximately 24 hours. 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 CUE's as number per kilometre and biomass (grams) per kilometre of net were calculated from the total catch in gangs excluding the catch in 5.5 and 6 inch mesh sizes. Multifilament nets were used exclusively in this survey prior to 1991 and were switched to exclusively monofilament nets in 1995 after four years of using both gears. Species catches from multifilament nets (pre-1991) were adjusted to comparable efficiency of monofilament nets by conversion ratio multipliers.

Fish Community

The total catch of all species was at its lowest value in over 20 years in 2016, similar to 2015 (Table 4.4.1). Proportionally, the four most abundant species in the survey, representing 76% of the catch overall, were Yellow Perch (37%), Smallmouth Bass (21%), Freshwater Drum (9%), Gizzard Shad (9%). Species that were caught in the survey but represent less than 5% of the catch (by species) were Alewife, White Bass, Rock Bass, Smelt, Longnose Gar, Round Goby, Walleye, White Sucker and Pumpkinseed (Table 4.4.1).

Yellow perch, Freshwater Drum and Gizzard Shad catches in 2016 were similar to the long-term (1996-2015) mean. Smallmouth Bass catches were three times higher than the long-term mean, as well as the mean for the last five years. Conversely, Alewife catch was only 4%, drastically lower than the five-year (54%) and long-term (35%) means (Table 4.4.1).

Distribution of Abundant Species

Yellow Perch and Gizzard Shad were distributed relatively evenly across all three depth strata (shallow: 12-18 feet, mid-water: >18-30 feet, deepwater: >30-66 feet). Smallmouth Bass were most abundant in the shallow depth strata and decreased in abundance with increasing depth. Freshwater drum were less abundant in the mid-water depth strata than shallow and deepwater. Conversely, Alewife, although relatively low in abundance, were found primarily in the mid-water strata.

Table 4.4.1 Total numbers of each fish species caught in monofilament nets during the Long Point Bay Index Gill netting Survey, 2010-2016. Long term (1996-2015) minimum, maximum and mean values are also presented. Numbers include catch in all mesh sizes (14 mesh sizes from 32 to 152 milimetres) standardized to 40 sets at 12-30 feet (3.7-9.1 metres) bottom depths for comparison.

Species	2010	2011	2012	2013	2014	2015	2016	Minimum	Maximum	Mean
Longnose Gar	61	0	33	15	130	67	52	0	260	52
Alewife	96	36	4371	29092	0	0	87	0	29092	3598
Gizzard Shad	452	80	1788	354	3	3	195	3	1788	283
Rainbow Smelt	27	7	4	5	48	10	53	0	72	14
White Sucker	93	78	49	40	172	70	23	40	334	115
Brown Bullhead	69	75	87	89	20	108	94	0	108	41
White Perch	278	253	168	506	124	32	9	7	506	109
White Bass	71	38	90	226	80	78	65	2	226	43
Rock Bass	123	148	135	77	156	237	54	69	640	210
Pumpkinseed	12	1	54	8	11	26	15	1	139	24
Smallmouth Bass	1045	934	1209	1273	1347	833	469	132	1347	687
Yellow Perch	3120	2698	2033	1830	1601	554	823	554	11134	4452
Walleye	78	30	35	48	26	25	28	3	78	24
Round Goby	47	70	48	39	22	22	31	0	2399	257
Freshwater Drum	698	254	293	434	368	367	204	150	698	365
Actual Number of Sets	40	40	40	40	36	40	39			

5. FISHERIES MANAGEMENT PROJECTS

5.1 Lake Erie Asian Carp Surveillance Program

The Asian Carps include four species of fish: Bighead Carp (*Hypophthalmichthys nobilis*), Silver Carp (*Hypophthalmichthys molitrix*), Black Carp (*Mylopharyngodon piceus*), and Grass Carp (*Ctenopharyngodon idella*). Three of these species (Bighead, Silver, and Grass Carps) 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, Lake Erie Management Unit (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, 2014, 2015, and 2016 with water samples tested for Bighead, Silver, Black, and Grass Carp eDNA.

The LEMU Asian Carp surveillance program occurred from May to July 2016. Water samples were taken from 93 sites in Lake Erie, Lake Erie tributaries, Lake St. Clair, Thames River, Sydenham River, and Lake Huron tributaries (Figure 5.1.1). Seventy-one of these sites were sampled twice and one site was sampled three times.

Environmental DNA water sampling followed the University of Notre Dame protocol (Mahon et al, 2010). Three water samples were taken during each sampling event, for a total of 498 individual water samples, in order to verify any potential positive results. The LEMU Wheatley and Port Dover offices 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.

In 2016, one water sample was positive for Bighead Carp eDNA. This sample was collected in the Thames River on May 30th 2016. In response to this detection LEMU collected additional water samples at and near this site. Additional follow up sampling was conducted by Fisheries and Oceans Canada using trammel nets, fyke nets, trap nets, and electrofishing. There were no further eDNA detections and no Asian Carps were found during netting. 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.

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 2016 there were approximately 42,704 kilometres of gill nets deployed, 2,732 hours of trawling, and 552 trap net lifts by the commercial fishery in Lake Erie.

One grass carp was captured by a commercial fisher in a trap net in the western basin of Lake Erie. The fish was captured on August 26, 2016. It was 94.5 centimetres in length and weighed 10.1 kilograms. The fish was surrendered to Fisheries and Oceans Canada, who determined that the fish was male diploid. In response to this capture, two LEMU electrofishing crews performed 7.7 hours of electrofishing in the area, and 2000 feet of gill nets were set in the area. Fisheries and Oceans Canada also performed additional netting in this area. No Asian Carp were found during this response.

In June 2016, an angler captured a Grass Carp in Lake Gibson near Thorold. In response to this capture, Fisheries and Oceans Canada performed electrofishing and netting in Lake Gibson. Netting included trammel, hoop, and fyke nets in order to target a range of fish sizes including adult and juvenile carp. LEMU participated in the response with trammel netting and electrofishing in nearby Martindale Pond. In total, 10 adult Grass Carp were captured in Lake Gibson, ranging from 91 to 102 centimetres in length. Eight fish were triploid, one fish was diploid, and one fish was found to be diploid but had abnormal reproductive anatomy and may have had mixed ploidy. All fish were captured during the first two days of netting and electrofishing, no further Grass Carp were captured during four additional days of netting.

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.

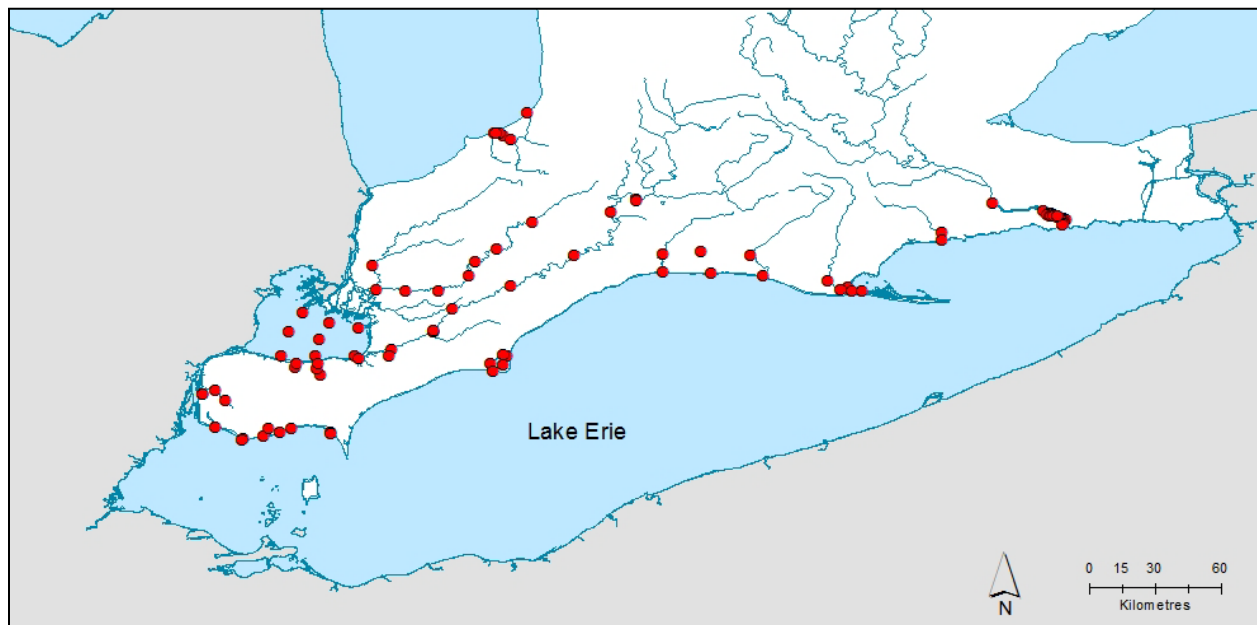


Figure 5.1.1 Location of eDNA sample sites for 2016 Asian Carp surveillance program.

5.2 Central Basin Trawl

In 2016, LEMU began a trawling survey to assess young-of-year and yearling and older fish in the Ontario waters of Lake Erie's central basin. This survey was devised as a response to a lack of recruitment data for Yellow Perch in particular. The survey was fished in coordination with the United States Geological Survey (USGS).

Forty-five sample locations were targeted using a UTM five minute grid. Three boats were used in the survey: OMNRF RV Keenosay, USGS RV Muskie II, and OMNRF RV Erie Explorer (Figure 5.2.1). The OMNRF RV Keenosay fished 15 sites in the west-central basin using a two seam 33 foot Biloxi bottom

trawl, with a 38 foot ground line and a one inch cod end with 0.5 inch liner. The trawl duration of the Keenosay was 10 minutes on bottom at 1.7 knots. The USGS RV Muskie fished 15 sites spread across the west-central and east-central basins, using a four-seam 11.2 metre headline bottom trawl, with a 14.2 metre footline, six centimetre polyethylene body mesh, and 14 millimetre mesh cod end liner. The trawl duration of the Muskie was 10 minutes on bottom at 3.0 knots. The OMNRF RV Erie Explorer fished 11 sites in the east-central basin using a 10 metre Biloxi bottom trawl with one inch cod end with 0.5 inch liner. The Erie Explorer was unable to complete four sites due to rocky substrates tearing nets. The trawl duration of the Erie Explorer was 10 minutes on the bottom at 2.5 knots. All sites were fished October 17th to 20th 2016. The survey occurred in the fall in order to fish after lake turnover and avoid hypoxia in the central basin.

Trawl catches were sorted by species and age group. Age groups were classified as young-of-year (YOY), yearling, yearling and older (YAO), age 2 and older, and all ages based on length. Catch rates by boat may not be directly comparable to each other due to differences in fishing gear and fishing method. However, relative abundance indices, for all boats, were expressed as arithmetic mean catch per hectare for the entire central basin and for the west and east central basins separately. A trawl comparison survey is planned for fall of 2017 to determine if fishing power correction factors are required when comparing catch rates by boat.

The most commonly caught species were Rainbow Smelt with 335.14 fish per hectare, followed by yearling and older White Perch with 49.10 fish per hectare (Table 5.2.1). Only 5.14 YOY Yellow Perch were caught per hectare. These fish were distributed throughout the central basin (Figure 5.2.2). Slightly more (8.72 fish per hectare) yearling Yellow Perch were caught and a greater number of age 2 and older Yellow Perch were caught (28.35 fish per hectare). Very few (0.61 fish per hectare) YOY Walleye were caught. However, several (13.03 fish per hectare) yearling Walleye were caught across the central basin (Figure 5.2.3).

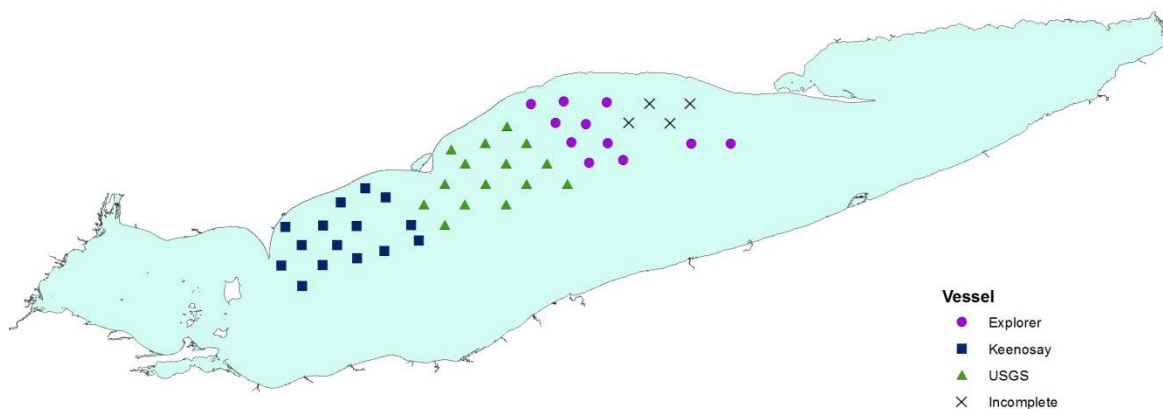


Figure 5.2.1 Central basin bottom trawl sites by boat. X's indicate incomplete trawls.

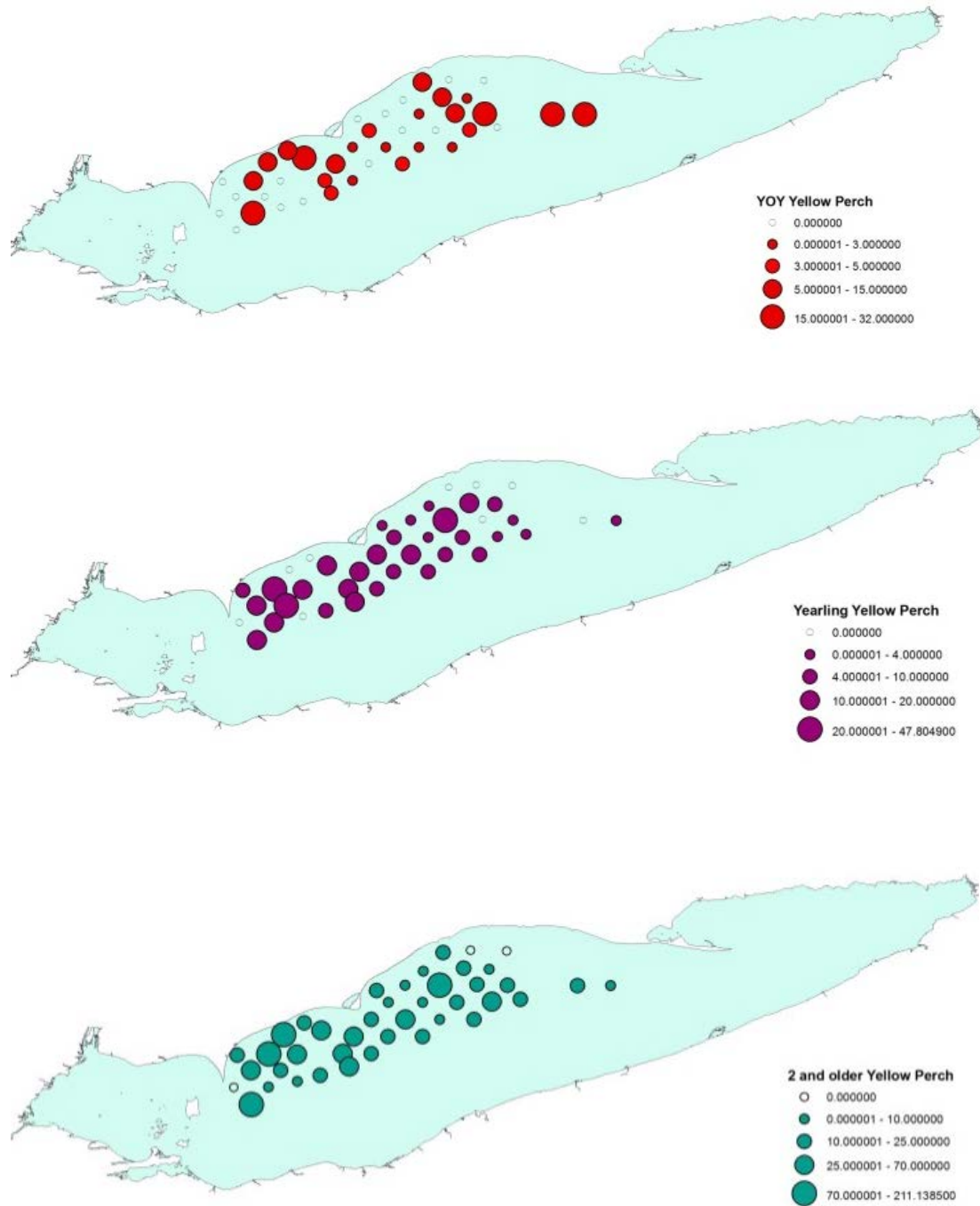


Figure 5.2.2 Catch per hectare of YOY Yellow Perch, yearling Yellow Perch, and age-2 and older Yellow Perch.

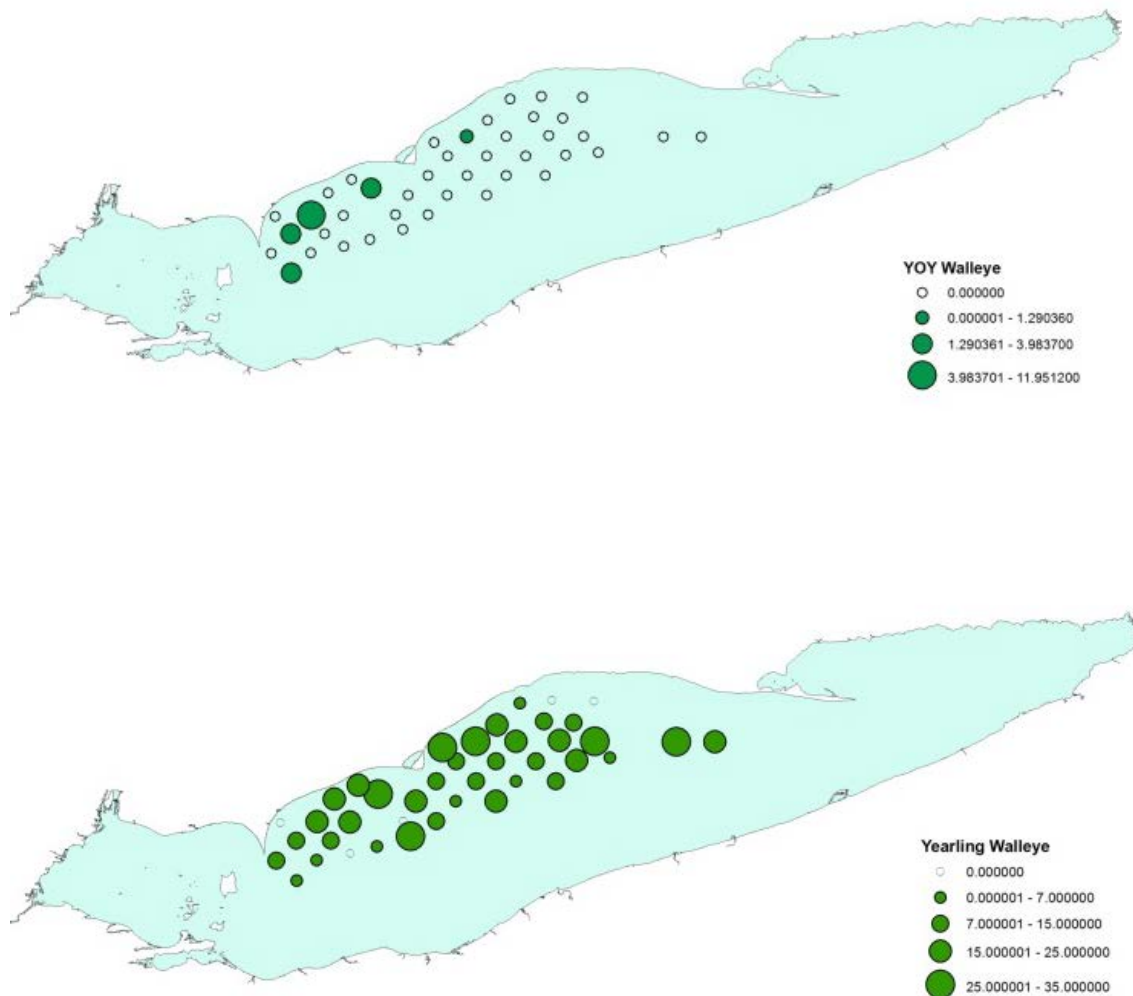


Figure 5.2.3 Catch per hectare of YOY Walleye and yearling Walleye.

Table 5.2.1 Catch per hectare of all species by basin.

Species (Life Stage)	Average Catch per Hectare		
	West-Central	East-Central	West & East Central Combined
Alewife (YAO)	0.00	0.07	0.03
Channel Catfish (YAO)	0.38	0.21	0.30
Emerald Shiner (all ages)	7.97	46.74	24.99
Freshwater Drum (all ages)	23.11	4.97	15.15
Gizzard Shad (YOY)	0.41	3.08	1.58
Gizzard Shad (YAO)	0.62	3.42	1.85
Lake Whitefish (YAO)	0.17	0.00	0.10
Mimic Shiner (all ages)	0.36	0.00	0.20
Rainbow Smelt (all ages)	243.55	452.16	335.14
Round Goby (all ages)	25.39	10.64	18.92
Silver Chub (all ages)	0.00	0.10	0.04
Trout-perch (all ages)	0.15	0.00	0.08
Walleye (YOY)	1.04	0.07	0.61
Walleye (yearling)	12.58	13.60	13.03
Walleye (age 2 and older)	5.06	6.95	5.89
White Bass (YOY)	2.84	4.12	3.40
White Bass (YAO)	1.75	2.98	2.29
White Perch (YOY)	15.63	0.00	8.77
White Perch (YAO)	65.63	27.99	49.10
White Sucker (YAO)	0.05	0.00	0.03
Yellow Perch (YOY)	4.59	5.84	5.14
Yellow Perch (yearling)	12.06	4.45	8.72
Yellow Perch (age 2 and older)	38.96	14.80	28.35

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 2016, 48 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. Ontario Ministry of Natural Resources and Forestry, Lake Erie Management Unit (LEMU) collected information from Ontario anglers, while the Michigan Department of Natural Resources collected data from Michigan anglers. In 2016, there were 33 participants in Lake St. Clair, 28 participants in the Detroit River, and 15 participants in the St. Clair River (some anglers fish in more than one area).

In total there were 803 fishing trips by angler diarists in the St. Clair System (Table 6.1.1). The total effort was 9,266 rod hours, with 61% of effort in Lake St. Clair, 29% in the Detroit River and 10% 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, 2016.

Survey Area	Number of Diarists	Number of Trips	Number of Rods per Trip	Total Rod Hours
Lake St. Clair	33	465	2.7	5,698
Detroit River	28	257	2.2	2,682
St. Clair River	14	80	2.4	854
Total	48^a	802	2.5	9,234

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

Lake St. Clair

Lake St. Clair diarists fished 5,698 rod hours of effort over 465 fishing trips (Table 6.1.1). In 2016, 36% of diary participant effort in Lake St. Clair was directed towards Yellow Perch, 35% of effort was directed towards Walleye, 21% of effort was directed towards Smallmouth Bass, and 17% 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: Largemouth Bass (4%), and Sunfishes (3%).

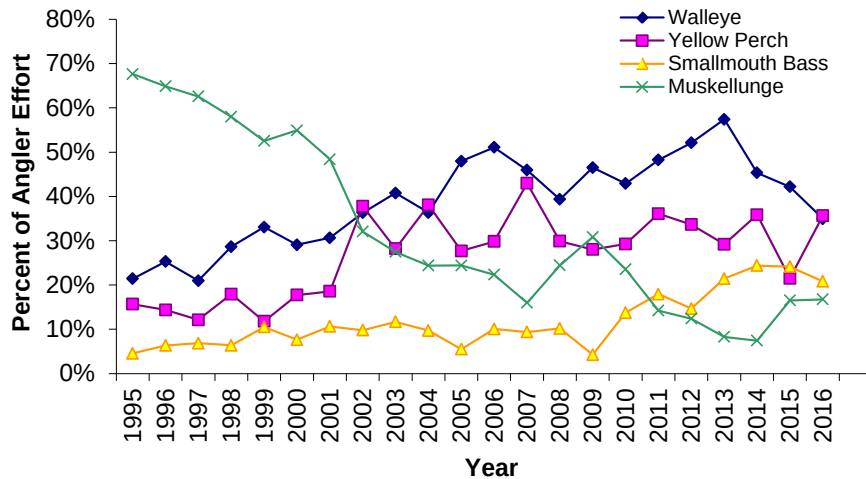


Figure 6.1.1 Percent of angler diarist effort in Lake St. Clair by species 1995-2016.

The 2016 Walleye catch rate (0.649 fish per rod hour) increased 100% percent from the 2015 catch rate (Table 6.1.2). The Smallmouth Bass catch rate (0.246 fish per rod hour) decreased 3% from 2015. The Yellow Perch catch rate (2.656 fish per rod hour) increased 16% from the 2015 catch rate. The 2016 Muskellunge catch rate (0.040 fish per rod hour) decreased 47% from 2015 (Table 6.1.2).

Detroit River

Detroit River diarists fished 2,682 rod hours of effort over 257 fishing trips (Table 6.1.1). In the Detroit River, 79% of diary participant effort was directed towards Walleye, 14% of effort was directed towards Yellow Perch, and less than 1% 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: White Bass (2%), and Largemouth Bass (1%).

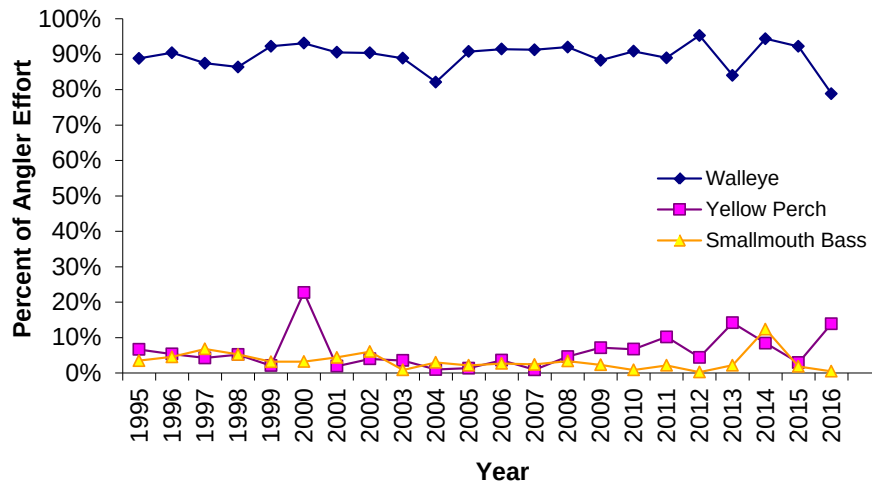


Figure 6.1.2 Percent of angler diarist effort in the Detroit River by species 1995-2016.

The Smallmouth Bass catch rate (1.077 fish per rod hour) increased 541% from 2015. In 2016, the Smallmouth Bass catch rate in the Detroit River was higher than the catch rate in Lake St. Clair (Figure 6.1.4). However, there were only 3 fishing trips targeting Smallmouth Bass in the Detroit River in 2016. The Yellow Perch catch rate (2.863 fish per rod hour) decreased 31% from the 2015 catch rate. The Yellow Perch catch rate in the Detroit River was slightly higher than the Yellow Perch catch rate in Lake St. Clair (Figure 6.1.5). The 2016 Walleye catch rate (0.761 fish per rod hour) increased 15% percent from the 2015 catch rate (Table 6.1.2). The Walleye catch rate in the Detroit River was higher than the Walleye catch rate in Lake St. Clair and the St. Clair River (Figure 6.1.6).

St. Clair River

Clair River diarists fished 854 rod hours of effort over 80 fishing trips (Table 6.1.1). In the St. Clair River, 63% of diary participant effort was directed towards Walleye, and 5% of effort was directed towards Rainbow Trout (Table 6.1.2, Figure 6.1.3). Other species targeted with at least one percent of the effort included: White Bass (3%), White Sucker (1%), and Northern Pike (1%).

The 2016 Walleye catch rate (0.643 fish per rod hour) decreased 23% from the 2015 catch rate (0.839 fish per rod hour; Table 6.1.2).

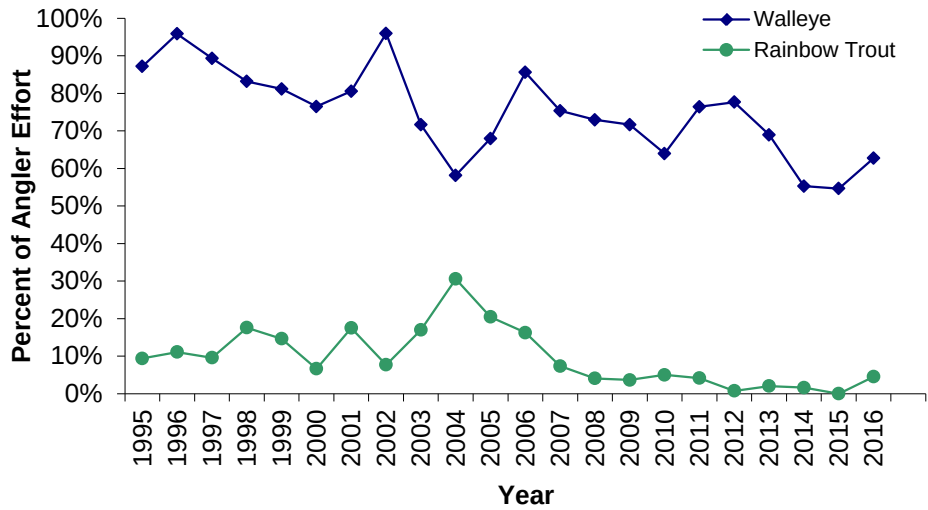


Figure 6.1.3 Percent of angler diarist effort in the St. Clair River by species 1995-2016.St.

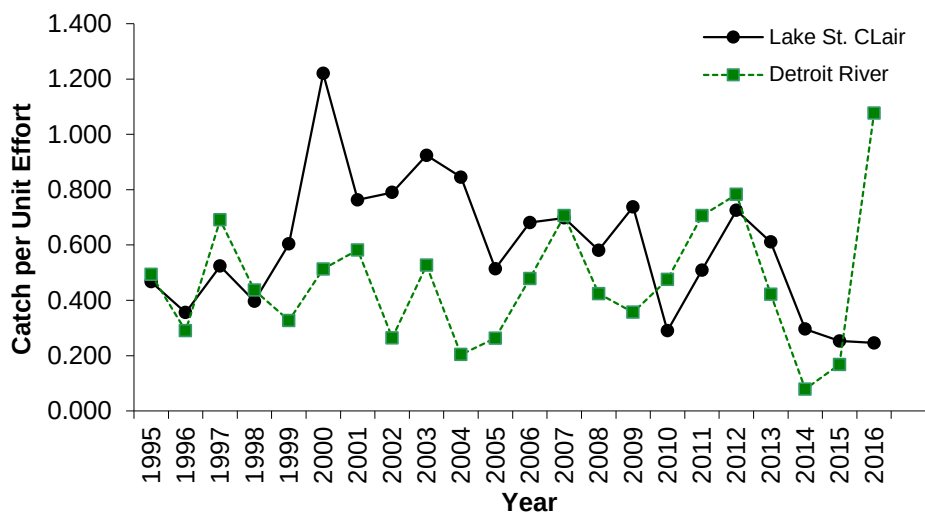


Figure 6.1.4 Smallmouth Bass catch per unit effort (fish per rod hour) in Lake St. Clair and the Detroit River, Sport Fish Diary Program 1995-2016.

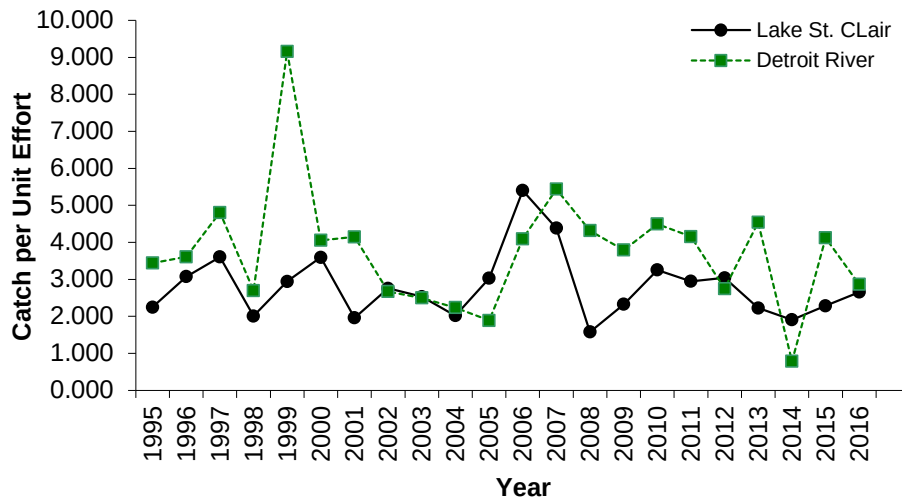


Figure 6.1.5 Yellow Perch catch per rod hour in Lake St. Clair and the Detroit River Sport Fish Diary Program 1995-2016.

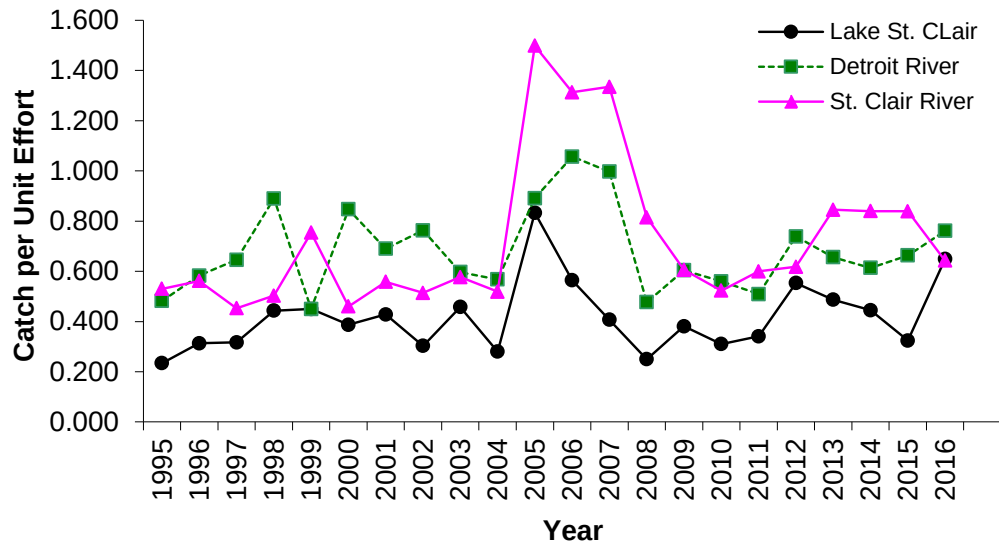


Figure 6.1.6 Walleye catch per rod hour in Lake St. Clair, Detroit River and the St. Clair River Sport Fish Diary Program 1995-2016.

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, 1995-2016^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%
2014	5,803	275	2,630	0.445	45%	134	2,081	1.907	36%	103	1,415	0.296	24%	22	431	0.044	7%
2015	5,852	236	2,469	0.324	42%	94	1,259	2.284	22%	94	1,413	0.253	24%	30	966	0.076	17%
2016	5,698	218	1,991	0.649	35%	140	2,032	2.656	36%	79	1,186	0.246	21%	39	955	0.040	17%
95-16 Avg.	12,120	402	4,167	0.416	39%	222	2,805	2.808	22%	121	1,178	0.592	8%	173	5,117	0.085	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%
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		1%
2011	2,832	364	2,519	0.509	89%	37	288	4.154	10%	9	61	0.706	2%	0	0		0%
2012	2,931	377	2,792	0.739	95%	16	129	2.750	4%	2	8	0.783	0%	0	0		0%
2013	2,830	289	2,378	0.656	84%	31	401	4.540	14%	8	62	0.422	2%	0	0		0%
2014	2,467	280	2,328	0.614	94%	18	208	0.785	8%	14	306	0.079	12%	0	0		0%
2015	2,244	243	2,069	0.663	92%	11	65	4.123	3%	4	42	0.168	2%	0	0		0%
2016	2,682	225	2,114	0.761	79%	15	372	2.863	14%	3	13	1.077	0%	1	4	0.000	0%
95-16 Avg.	3,195	398	2,852	0.684	89%	19	196	3.753	6%	14	114	0.467	3%	7	68	0.173	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%				
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%				
2012	821	70	638	0.618	78%	1	6	0.067	1%	0	0		0%				
2013	592	46	408	0.845	69%	1	12	0.000	2%	0	0		0%				
2014	818	61	452	0.840	55%	1	13	0.077	2%	0	0		0%				
2015	958	78	523	0.839	55%	0	0		0%	0	0		0%				
2016	886	65	535	0.643	60%	4	70	0.298	8%	0	0		0%				
95-16 Avg.	1,298	147	1,013	0.723	75%	11	144	0.065	10%	16	171	0.124	10%				

^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. Lukes. 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 2016, all three sites were fished each year, with the exception of 1999, 2002, and 2010 when no fishing occurred.

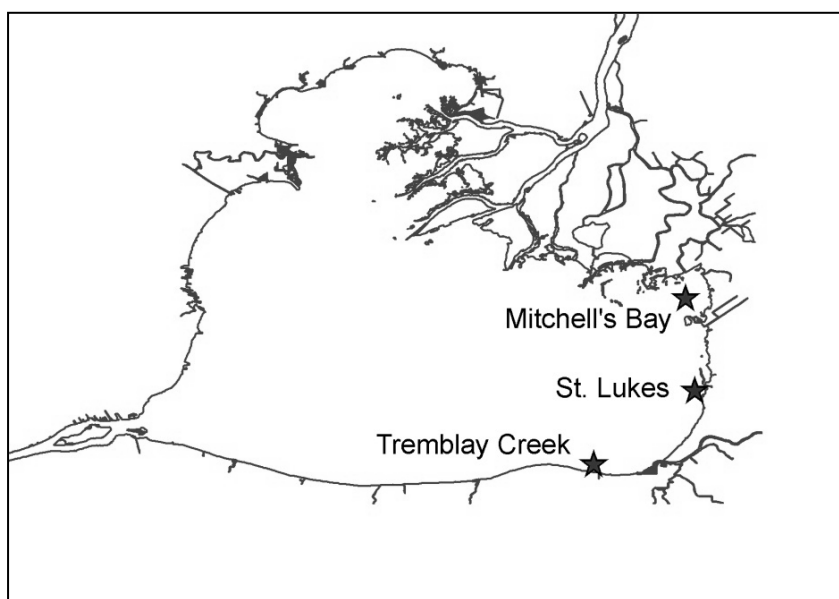


Figure 6.2.1 Lake St. Clair Fall Trap Net Index site locations.

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 feet long, with an eight foot long front end and 40 foot wings. The lead of the nets was 310 feet long with seven inch mesh. The wings and front had four inch mesh; the crib had two inch mesh. In 2016, the nets were set from October 3rd to November 7th. 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 Ministry of Environment and Climate Change (MOECC) contaminant sample preparation. Secchi disc depth and water temperature were recorded at each lift. Data for 2016 are preliminary.

In 2016, there was a total of 125 net nights of effort (Figure 6.2.2). There were 41.8 net nights of effort at Mitchell's Bay, 41.7 nights of effort at St. Lukes, and 42.0 nights of effort at Tremblay Creek.

In total, across all survey years, 44 different species have been captured during the Lake St. Clair fall trap net index. In 2016, 27 species were caught. The most commonly caught species were Freshwater Drum (31% of the catch) and Channel Catfish (27% of the catch) (Figure 6.2.3). Other species with large catches include Quillback (12% of the catch) and White Perch (11% of the catch). The majority of the Quillback were caught at St. Lukes.

The total catch per net night at all three sites combined, was 10.6 fish in 2016; this was an increase of 87% from the time series low observed in 2015 (Figure 6.2.3). At Mitchell's Bay the catch rate was 3.5 fish per net night, a decrease of 16% from 2015, and the lowest catch rate in the 1986 to present time series (when all three sites were regularly sampled) (Table 6.2.1). In 2016, the St. Lukes catch rate increased 136%, from the time series low of 2015, to 15.8 fish per net night (Table 6.2.2). At Tremblay Creek the catch rate was 17.7 fish per net night, an increase of 109% from 2015 (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 5.5 fish per net night, this decreased to an average of 1.1 fish per net night from 1991-2015 at the Tremblay Creek and Mitchell's Bay sites combined (standard north and south sites fished from 1974 to present). In 2016, the Walleye catch rate increased at all three sites, the mean Walleye CPUE was 0.41 fish per net night (at all sites combined). Walleye comprised 3.3% of the total catch in 2016. The long term (1986 to 2015) average CPUE at all sites combined was 1.8 fish per net night and Walleye comprised 8% of the catch on average. In 2016, the highest catch rate of Walleye was at the Tremblay Creek site (Figure 6.2.4).

In 2016, only five Yellow Perch were caught during the survey, compared to a 10 year average of 36 fish.. The highest Yellow Perch catch rate in 2016, was at Tremblay Creek (0.07 fish per net night) (Figure 6.2.5). The overall 2016 catch rate (0.04 fish per net night) was less than the long term average (0.28 fish per net night), and was the lowest observed in the time series. Yellow Perch comprised only 0.3% of the total catch, compared to 1.7% of the total catch observed from 1986 to 2015.

The catch rate of Smallmouth Bass decreased at all sites in 2016. The highest catch rate was observed at the St. Lukes site (0.50 fish per net night) (Figure 6.2.6). The average 2016 Smallmouth Bass catch rate at all sites combined (0.24 fish per net night) was less than the long term average (0.56 fish per net night). Smallmouth Bass comprised only 1.9% of the total catch in 2016 which was below the long term average of 3.4%.

Table 6.2.1 Catch 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).

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	Stoner Cat	Channel Catfish	Brown Bullhead	Common Carp	Shorthead Redhorse	Golden Redhorse Sucker	Silver Redhorse Sucker	Spotted Sucker	Bigmouth Buffalo	White Sucker	Quillback Carpsucker	Mooneye	Muskellunge	Northern Pike	Gizzard Shad	Bowfin	Longnose Gar	Others*	TOTAL	
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	-	0.1	0.3	-	-	0.3	0.0	0.3	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	-	-	-	0.0	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	-	-	0.6	-	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	0.0	0.2	-	-	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	0.0	0.1	0.0	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	0.0	-	0.1	0.1	-	0.0	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	0.1	-	-	0.3	0.0	0.2	-	-	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	0.0	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	-	0.0	-	-	-	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	-	0.0	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	0.0	-	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	0.0	0.0	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	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	0.9	-	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	-	0.0	-	-	-	-	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	0.1	-	-	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	0.0	-	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	0.0	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	0.1	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	0.6	0.0	0.0	0.2	-	-	-	0.0	-	0.1	0.7	0.1	0.1	-	0.0	10.7	
2014	0.4	0.1	0.1	0.1	0.6	0.0	0.4	1.3	0.1	0.1	0.0	-	-	1.0	0.2	0.2	-	0.0	0.0	-	-	-	0.0	-	0.0	0.3	-	0.2	-	0.0	5.1	
2015	0.4	0.2	0.0	0.1	0.3	0.1	0.1	0.4	0.1	-	0.0	-	-	1.7	-	0.1	0.0	-	0.1	0.1	-	-	0.1	-	0.0	0.1	-	0.1	-	0.0	4.2	
2016	0.7	0.2	0.0	-	0.0	-	-	0.1	0.1	-	-	-	-	1.8	0.0	0.1	0.1	-	0.2	-	-	-	0.0	-	-	0.0	-	0.0	-	-	0.1	3.5
Mean	2.4	0.8	0.3	1.0	0.3	0.2	1.3	1.6	0.5	0.2	0.4	0.0	-	0.8	0.2	0.6	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.0	0.0	0.6	0.1	0.2	0.0	0.1	12.3	

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

Table 6.2.2 Catch 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	Stoner Catfish	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		
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	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	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	-	0.0	-	0.1	0.5	-	0.1	-	0.0	-	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	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	-	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	-	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	0.1	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	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	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	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	0.1	0.4	-	-	0.0	-	0.0	0.1	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	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	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	0.0	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	-	-	-	0.1	0.1	0.1	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	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	-	0.0	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	0.0	17.2		
2014	4.2	0.2	0.1	-	0.0	0.3	-	0.0	0.2	0.5	0.2	-	-	1.4	-	0.1	0.0	0.0	0.0	-	-	-	1.5	-	-	0.1	-	0.0	0.1	0.1	0.0	9.1		
2015	2.0	0.2	0.3	-	0.0	0.5	-	-	0.4	0.1	0.7	-	-	1.7	-	0.1	0.0	-	0.0	-	0.0	-	0.3	-	-	0.1	-	-	0.1	-	0.1	-	6.7	
2016	6.0	0.5	0.0	-	0.0	0.5	-	0.0	0.1	0.7	0.9	-	-	2.9	-	0.2	0.0	-	0.2	-	-	-	3.5	-	0.0	-	0.0	-	0.0	-	0.1	0.1	15.8	
Mean	8.7	1.7	0.3	0.1	0.1	0.7	0.1	0.1	0.7	1.0	3.4	0.0	0.1	3.5	0.1	0.6	0.3	0.2	0.4	0.0	0.0	0.0	0.1	1.4	0.0	0.0	0.2	0.0	0.0	0.1	0.1	23.5		

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

Table 6.2.3 Catch 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).

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	Stoner Catfish	Channel Catfish	Brown Bullhead	Common Carp	Shorthead Redhorse	Golden Redhorse	Silver Redhorse	Spotted Sucker	Bigmouth Buffalo	White Sucker	Quillback Carpsucker	Mooneye	Muskellunge	Northern Pike	Gizzard Shad	Bowfin	Longnose Gar	Others*	TOTAL					
1986	136	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	-	-	0.7	1.1	-	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	-	-	0.5	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	-	-	0.4	0.5	0.0	0.0	0.1	-	-	0.1	0.0	0.0	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	-	-	-	0.1	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	0.2	1.1	0.1	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	0.4	4.5	0.0	0.0	2.9	0.0	0.4	0.4	0.3	0.8	0.0	0.0	0.1	0.5	0.0	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	-	0.0	1.1	0.3	2.4	-	0.0	2.5	-	0.6	0.6	0.0	0.9	-	0.0	0.6	0.1	0.1	0.1	0.1	0.0	0.1	-	-	-	0.0	12.3			
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	-	0.1	0.2	0.1	0.0	0.0	0.0	0.1	-	-	-	-	14.9				
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	0.2	-	0.1	0.0	0.1	-	0.0	-	-	-	12.5			
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	-	-	-	-	0.1	-	0.0	-	-	-	6.1				
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	0.1	-	0.0	0.2	0.0	-	-	-	-	26.7				
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	-	0.0	0.0	0.2	0.0	0.1	-	-	-	-	-	-	18.8				
1998	2.2	0.8	0.2	-	-	1.8	-	-	1.1	0.1	0.7	0.1	-	3.8	-	0.0	0.3	-	0.0	-	-	0.1	0.1	-	0.0	0.1	0.4	-	-	-	0.1	11.8				
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	-	-	-	0.2	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	-	0.0	-	0.2	-	0.1	0.1	0.1	-	0.0	0.1	11.0	0.1	12.0			
2005	1.3	1.4	0.4	-	-	1.3	-	-	1.0	0.2	2.5	-	-	3.2	-	0.2	0.2	-	-	-	0.0	-	0.2	-	0.1	0.1	0.0	-	-	-	-	0.2	36.1			
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	-	2.2	0.0	0.2	0.1	0.4	-	-	-	0.2	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	0.1	0.0	0.1	0.1	0.5	-	0.0	0.1	14.0	0.0	15.1		
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	-	0.1	0.2	-	0.2	-	0.1	0.1	0.1	-	-	-	0.0	15.1	0.1	15.4	
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	-	-	-	-	0.2	-	0.0	0.1	0.0	-	-	-	-	0.1	15.4	0.0	19.6	
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	0.0	13.8	
2012	2.3	0.9	-	-	0.0	0.4	-	-	0.4	0.6	1.4	-	-	4.7	-	0.0	0.2	0.3	0.7	-	0.0	-	0.9	-	0.4	0.2	0.2	-	0.0	0.1	0.0	0.1	13.8	0.0	12.6	
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	-	0.0	-	0.9	-	0.1	0.2	0.3	0.0	0.1	0.0	0.1	0.0	12.6	0.0	18.4	
2014	6.1	1.0	0.2	-	0.0	0.3	0.0	-	0.1	1.6	0.4	-	-	5.3	-	0.1	0.1	0.1	1.4	-	-	-	1.4	-	0.1	0.1	0.1	-	-	-	-	0.0	18.4	0.0	8.4	
2015	2.5	0.2	0.1	-	-	0.4	-	-	0.1	0.2	0.8	-	-	3.5	-	0.1	0.1	-	0.2	-	-	-	0.1	-	0.1	0.0	-	-	-	0.1	-	0.1	-	8.4	0.0	17.7
2016	4.7	0.6	0.1	-	-	0.2	-	-	0.0	0.9	3.3	-	-	5.3	-	0.1	0.2	-	0.3	-	-	0.0	0.8	-	0.0	0.0	1.0	-	0.0	0.0	0.0	0.0	17.7	0.0	19.7	
Mean	3.9	2.6	0.3	0.0	0.0	0.8	0.0	0.0	0.9	0.7	4.4	0.1	0.0	3.9	0.1	0.3	0.4	0.1	0.4	0.0	0.0	0.2	0.5	0.0	0.1	0.1	0.2	0.0	0.0	0.0	0.1	19.7	0.0	19.7		

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

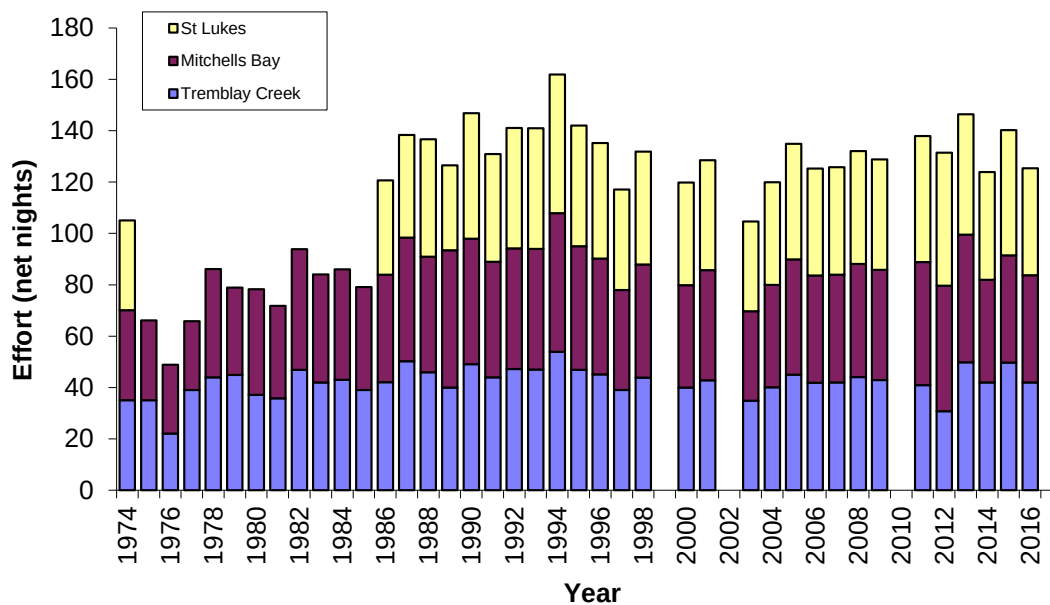


Figure 6.2.2 Total effort for the Lake St. Clair Fall Trap Net Index by site, 1974 to 2016 (St. Luke's was not fished from 1975 to 1985).

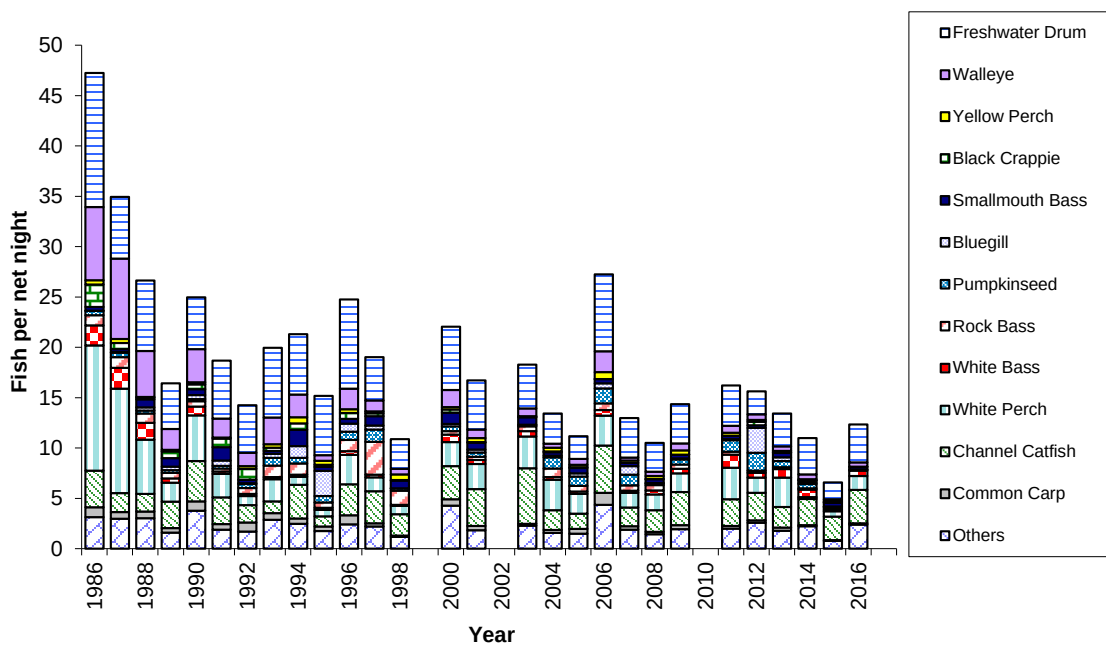


Figure 6.2.3 Catch per net night by species for all sites combined (Mitchell's Bay, St. Luke's, Tremblay Creek), 1986 to 2016.

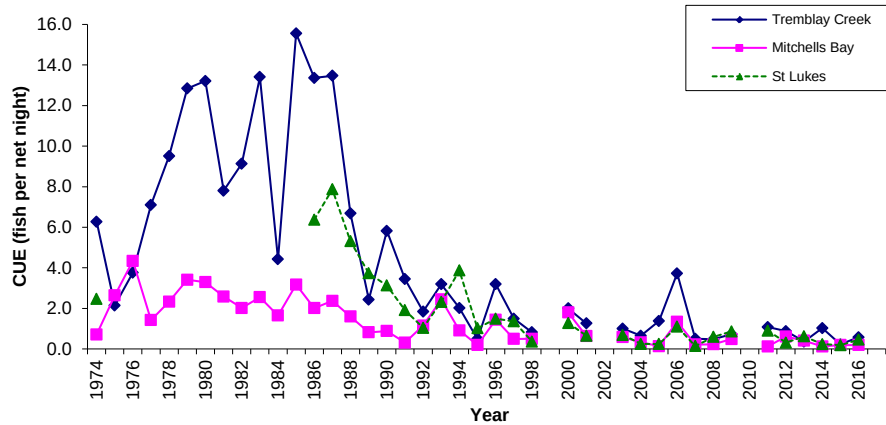


Figure 6.2.4 Catch per net night of Walleye at Tremblay Creek, Mitchell's Bay and St. Luke's sites, 1974 to 2016.

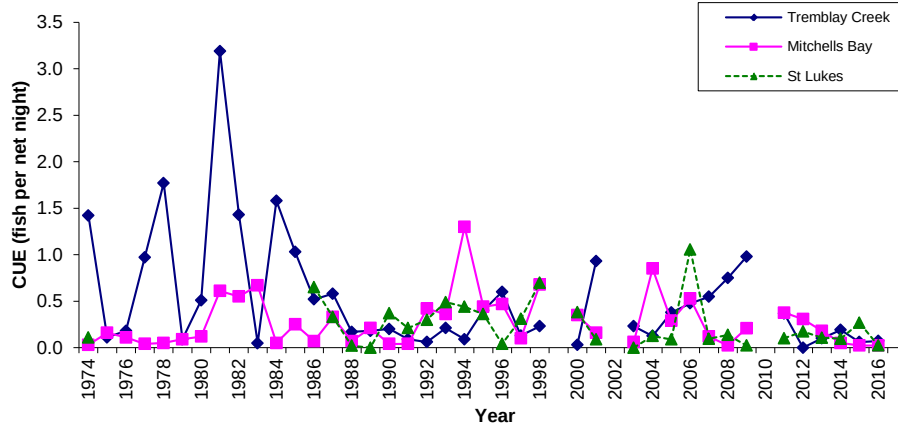


Figure 6.2.5 Catch per net night of Yellow Perch at Tremblay Creek, Mitchell's Bay and St. Luke's sites, 1974 to 2016.

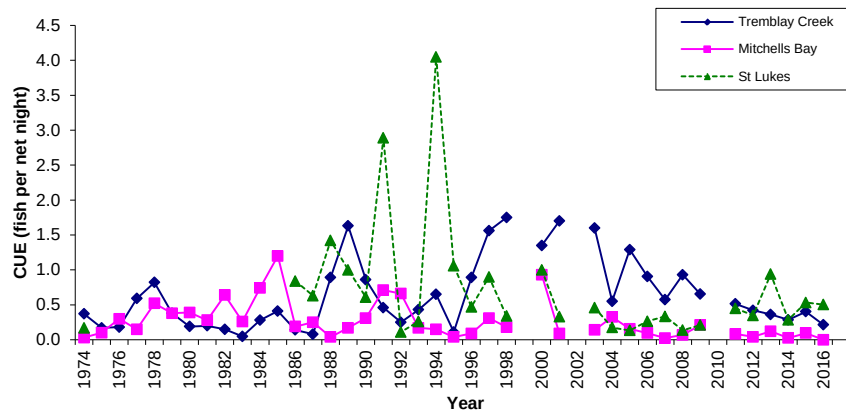


Figure 6.2.6 Catch per net night of Smallmouth Bass at Tremblay Creek, Mitchell's Bay and St. Luke's sites, 1974 to 2016.

6.3 Lake St. Clair Nearshore Assessment Program

Lake St. Clair is home to diverse populations of warm-water fish species. It provides critical spawning and nursery habitat for economically important species and some species at risk. The Lake St. Clair Nearshore index program originated when the Ontario Ministry of Natural Resources' Wheatley Fisheries Research Station conducted a juvenile fish study to generate young-of-year (YOY) index data from 1970 – 1977. Minimal sampling occurred in 1978 resulting from concerns of impacts to Walleye recruitment. In 1979, a YOY index fishing program that targeted Walleye and Yellow Perch was instituted by the Lake St. Clair Fisheries Assessment Unit (LSCFAU). This program complimented the time series data started by the Wheatley Fisheries Research Station. From 1979 to 1996 the program was carried out intermittently due to resource constraints. In 2005 the program was restarted as a pilot project and became an annual assessment activity in 2007. Although the program was originally designed to assess annual abundances of YOY fish species, this objective remains only as a secondary goal. The contemporary objective of the Lake St. Clair nearshore index is to assess and track changes in the nearshore fish community with emphasis on forage fish species. In addition to tracking long-term trends in abundances, compositions and biodiversity additional benefits of this program include detection of alien invasive species (AIS) and monitoring species at risk.

The Lake St. Clair Nearshore Assessment samples eight fixed sites along the Canadian shores from June 1 to July 31, 2016 (Figure 6.3.1). At each site, duplicate 30 metre transects are performed using a small mesh (five millimetres by two millimetres) beach seine that is 9.7 metres x 1.2 metres in dimension. This seine net is believed to retain all fish with fork lengths greater than 27 millimetres (MacLennan 1979). Catch per unit effort (CUE), species-richness, Shannon-Wiener index and Simpsons diversity index are calculated from this sampling. The Shannon-Wiener index is sensitive to changes in rare species while Simpson's index is more greatly influenced by abundant species, hence each represents a different metric of species diversity. Calculations are performed to produce daily, weekly and yearly summaries by site and annual totals for all sites. Lengths are measured for up to 30 individuals from each transect. While site-date, site-week, site-year and year summaries have been generated and are available, in this report site-specific summaries are provided for environmental data, catch rates and species diversity; a 2016 species list with catch rates of YOY and adult fish and; nine year (2007-2016) trends in temperature, species richness and catch rates for a few key species are presented. In 2016 sampling was reduced from weekly to bi-weekly sampling because analysis of 2007-2015 data showed this had little effect on numbers of species caught, species diversity indexes and the catch rates (CUE) for many species.

In 2016, 80 seine transects were performed over the sampling period. The depth of seines transects ranged from 0.4 metres to 1.2 metres with an average of 0.9 metres. Secchi disk transparency depths ranged from 0.4 metres to 1.2 metres and averaged 0.8 metres across the seine transect sites; sites viability was to the bottom for 62 (80%) seine transects. Ambient air temperatures averaged 27.4 °C which was higher than the nine year average (24.8 °C). Average water temperature of Lake St. Clair (25.0°C) was also higher than the nine year average (23.9 °C) (fig. 6.3.2).

The 2016 survey captured a total of 11,775 fish representing a minimum of 37 species from 13 families (Table 6.3.1). A minimum number of species is presented because some fish were of unknown species and/or identified to family. Species richness based on Simpson Diversity index and Shannon-Wiener index declined slightly in 2016 to 0.85 and 2.4 (respectively) from 2015 (0.86 and 2.5) and were above the 2007-2016 average (0.84 and 2.3) (fig 6.3.3). Species richness at individual sites ranged from a minimum of 11 at Mitchell's Bay inshore and offshore to 24 species at Peter Street (Table 6.3.2). Average lakewide CUE was 147 fish per seine transect, lower than the 154 fish per seine in 2015 and the 2007-2016 average 181 fish per seine.

Of the total lakewide catch, 69% (8,221 fish) were young-of-year fishes. Gizzard shad (31%), Brook silversides (17%) and spottail shiners (13%) were the predominant species caught throughout the sampling period. Although 99% of the Gizzard Shad were caught on a single date (July 25th) at the Puce River (71%) the Belle River (east) sites (28%).

Historically, this program has not captured high numbers of YOY Yellow Perch, Walleye, or Muskellunge even in years of known strong year classes. Catches of sport fish generally declined in 2016. Ten YOY Yellow Perch were caught which was approximately one fifth of 2015 captures. No YOY Walleye were caught. One YOY and two adult Muskellunge were caught. This number was the same as the number caught in 2015 despite fewer sampling events resulting in a slight increase in the catch rates (CUE) (fig.6.3.4). Muskellunge have been caught in relatively small numbers throughout the history of this survey but has been consistently caught since 2013. YOY Smallmouth Bass represented approximately 1% of the total catches and were caught at a rate of 1.8 fish per seine transect. This was 40% of the catch rate observed in 2015 and below the 2007-2016 average (2.1 fish per seine) for Smallmouth Bass. YOY Largemouth Bass were caught at a rate of 1.8 fish per seine transect and represented approximately 1% of the total catches. This catch rate was higher than 2015 (1.2 fish per seine) but below the 2007-2016 average (7.1 fish per seine) for Largemouth Bass. Five invasive species were captured; Common Carp (< 0.1%), goldfish (< 0.1%), White Perch (4.9%), and Round (4.2%) and Tubenose Goby (1%), all have previously been reported in Lake St. Clair.

The notable difference in 2016 was the significant numbers of species at risk captured (Table 6.3.3). A total of 126 Pugnose Shiners (*Notropis anogenus*) were captured at the St. Lukes site. Captures occurred throughout the season although decline from 98 (May 31st), to 23 (Jul. 13th) to five (Jul. 26th). Pugnose Shiners have been captured fairly consistently in the Lake St. Clair nearshore index at the St. Lukes site, but previously in few numbers ranging from 0-15 fish per year. Catches in 2016 not only represent the largest catch in the time series exceeding the next highest catch (2014: 15 fish) by over eight times, but also exceeds the numbers caught in all previous years combined (n = 42) by three times (fig.6.3.4). Eastern Sand Darters (*Ammocrypta pellucida*) (n = 2) were also captured for the first time at the Mitchell's Bay offshore site in 2016.

In the past the irregular sampling of the Lake St. Clair Nearshore Index has prevented reporting on time-series trends of the nearshore fish community dynamics. The temporal patchiness with limited (nine years) continuous (annual) data remains a limitation of testing or examining relationships between nearshore YOY abundances and recruitment of recreationally and commercially important fish species. Continued annual sampling might help address this information gap by providing a predictive model of year class strength for Lake St. Clair. However the current value of this program is the ability to monitor changes in this ecosystem in response to climatic condition such as climate change, while monitoring and potentially quantify changes caused by invasions of new AIS' (such as the potential threat of Asian Carps).

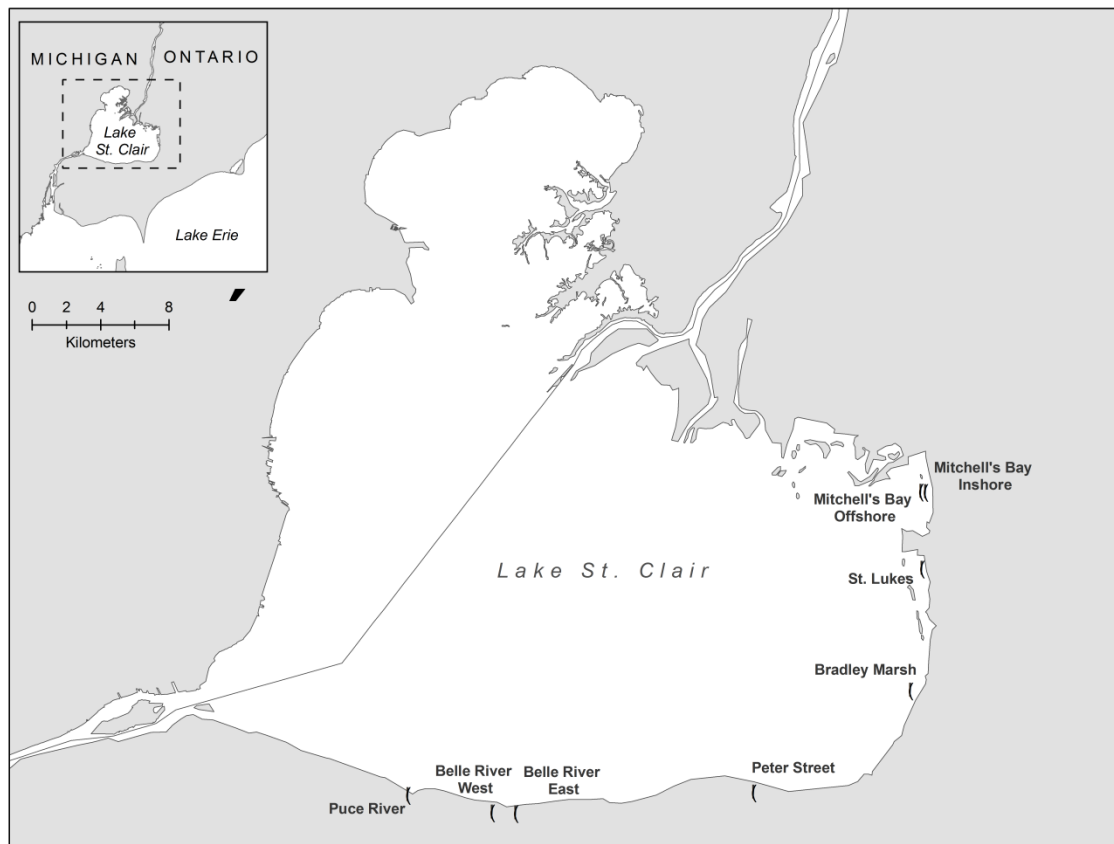


Figure 6.3.1 Location of eight fixed sites on Lake St. Clair of the Lake St. Clair Nearshore Index Fishing Program.

Table 6.3.1 Summary of Catches by species for the Lake St.Clair nearshore in 2016.

Common Name	Scientific Name	Total			CUE (fish/seine)	Relative adundance
		YOY	Adult	All		
Longnose Gar	<i>Lepisosteus osseus</i>		3	3	0.04	0.03%
Bowfin	<i>Amia calva</i>		1	1	0.01	< 0.01%
Gizzard Shad	<i>Dorosoma cepedianum</i>	3600	5	3605	45.06	30.62%
Muskellunge	<i>Esox masquinongy</i>	1	2	3	0.04	0.03%
Cental mudminnow	<i>Umbra limi</i>	1	1	2	0.03	0.02%
Quillback	<i>Cariodes cyprinus</i>		6	6	0.08	0.05%
White Sucker	<i>Catostomus commersoni</i>	42		42	0.53	0.36%
Shorthead Redhorse	<i>Moxostoma macrolepidotum</i>	5	75	80	1.00	0.68%
Carps and Minnows ¹	<i>CYPRINIDAE spp.</i>	89		89	1.11	0.76%
Goldfish	<i>Carassius auratus</i>		1	1	0.01	< 0.01%
Common Carp	<i>Cyprinus carpio</i>		1	1	0.01	< 0.01%
Pugnose Shiner	<i>Notropis anogenus</i>	1	125	126	1.58	1.07%
Emerald Shiner	<i>Notropis atherinoides</i>	380	77	457	5.71	3.88%
Blackchin Shiner	<i>Notropis heterodon</i>		1	1	0.01	< 0.01%
Blacknose Shiner	<i>Notropis heterolepis</i>	313	97	410	5.13	3.48%
Spottail Shiner	<i>Notropis hudsonius</i>	363	1209	1572	19.65	13.35%
Spotfin Shiner	<i>Cyprinella spiloptera</i>	1	36	37	0.46	0.31%
Sand Shiner	<i>Notropis stramineus</i>	2	193	195	2.44	1.66%
Mimic Shiner	<i>Notropis volucellus</i>		310	310	3.88	2.63%
Bluntnose Minnow	<i>Pimephales notatus</i>	3	15	18	0.23	0.15%
Brown Bullhead	<i>Ameiurus nebulosus</i>	1		1	0.01	< 0.01%
Channel Catfish	<i>Ictalurus punctatus</i>	2	3	5	0.06	0.04%
Tadpole Madtom	<i>Noturus gyrinus</i>	1		1	0.01	< 0.01%
Banded Killifish	<i>Fundulus diaphanus</i>	1	3	4	0.05	0.03%
Temperate Basses ¹	<i>MORONIDAE spp.</i>	5		5	0.06	0.04%
White Perch	<i>Morone americana</i>	49	521	570	7.13	4.84%
White Bass	<i>Morone chrysops</i>	19	7	26	0.33	0.22%
Sunfishes ¹	<i>CENTRARCHIDAE spp.</i>	738		738	9.23	6.27%
Rock Bass	<i>Ambloplites rupestris</i>	7	39	46	0.58	0.39%
Pumpkinseed	<i>Lepomis gibbosus</i>		110	110	1.38	0.93%
Blue Gill	<i>Lepomis macrochirus</i>		59	59	0.74	0.50%
Smallmouth Bass	<i>Micropterus dolomieu</i>	147		147	1.84	1.25%
Largemouth Bass	<i>Micropterus salmoides</i>	148	48	196	2.45	1.66%
Perches ¹	<i>PERCIDAE spp.</i>	1		1	0.01	< 0.01%
Yellow Perch	<i>Perca flavescens</i>	10	297	307	3.84	2.61%
Eastern Sand Darter	<i>Ammocrypta pellucida</i>		2	2	0.03	0.02%
Logperch	<i>Percina caprodes</i>	14	5	19	0.24	0.16%
Brook Silverside	<i>Labidesthes sicculus</i>	1785	175	1960	24.50	16.65%
Round Goby	<i>Neogobius melanostomus</i>	419	79	498	6.23	4.23%
Tubenose Goby	<i>Proterorhinus marmoratus</i>	71	46	117	1.46	0.99%
Freshwater Drum	<i>Aplodinotus grunniens</i>	2	2	4	0.05	0.03%
Total		8,221	3,554	11,775	147.19	100%

Table 6.3.2 Summary of environmental conditions, effort/catch, and species diversity by site for the Lake St.Clair nearshore in 2016. Environmental data presented as average and range; range specified in table. Species richness is presented as total which included all fish identified to species or family and the number of individually identified species in brackets (i.e. minimum number of species present).

Site	Environmental				Effort/ Catch				
	Site temp (°C) 95% C.I.	Air temp (°C) 95% C.I.	Site depth (m) min-max	Secchi depths (m) min-max	No. of Seines	No. fish caught	Species Richness (no. of species)	Simpsons Diversity Index (1-D)	Shannon- Wiener Index (H)
Puce River	24.3 21.7 - 26.9	29.3 25.7 - 32.9	0.9 0.8 - 1.0	0.8 0.5 - 1	10	4,269	19 (18)	0.6	1.2
Bell River West	24.7 23.1 - 26.3	27.9 23.8 - 32.0	0.5 0.4 - 0.6	0.5 0.4 - 0.6	10	990	21 (19)	0.8	2.0
Bell River East	24.2 21.2 - 27.2	28.1 23.9 - 32.3	0.8 0.8 - 0.8	0.6 0.5 - 0.8	10	2,199	21 (19)	0.7	1.7
Peter Street	25.3 23.6 - 27.0	25.7 22.7 - 28.7	0.9 0.7 - 1.0	0.9 0.6 - 1.0	10	1,841	24 (20)	0.6	1.3
Bradley Marsh	24.5 22.8 - 26.2	26.4 23.5 - 29.3	0.9 0.8 - 1.0	0.8 0.6 - 1	10	465	15 (13)	0.5	1.3
St. Lukes	25.0 23.2 - 26.8	26.7 24.0 - 29.3	1.0 0.9 - 1.0	1.0 0.9 - 1	10	1,548	22 (20)	0.8	2.0
Mitchell's Bay Inshore	26.0 24.2 - 27.8	26.8 25.2 - 28.4	0.7 0.7 - 0.9	0.7 0.7 - 0.9	10	191	11 (11)	0.8	1.7
Mitchell's Bay Offshore	25.6 23.8 - 27.4	27.4 25.8 - 29.0	1.1 1 - 1.2	1.1 1 - 1.2	10	272	11 (11)	0.5	1.0
Lakewide	25.0 24.3 - 25.6	27.3 26.3 - 28.2	0.9 0.4 - 1.2	0.8 0.4 - 1.2	80	11,775	41 (37)	0.8	2.4

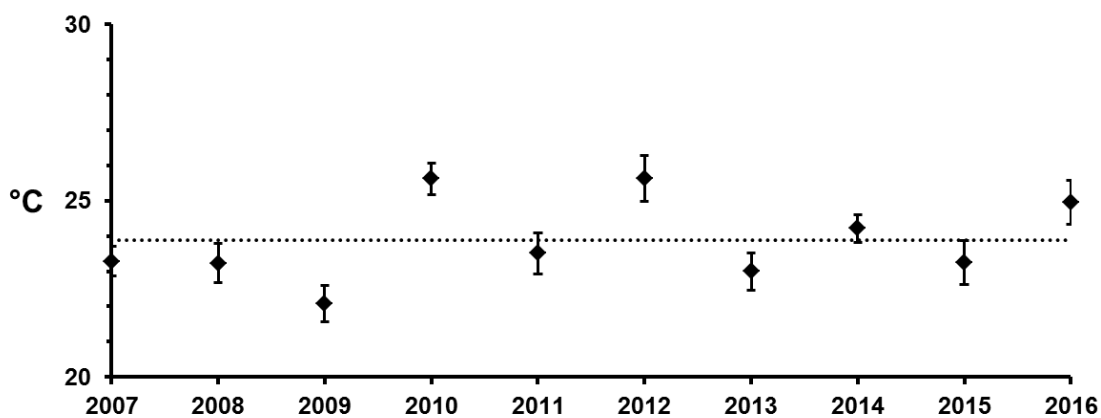


Figure 6.3.2 Average water temperatures in the Lake St. Clair nearshore from 2007-2016. Error bars represent 95% C.I.; dotted line is the long term 2007-2015 average 23.8 °C with the solid line and equation representing the long term trend.

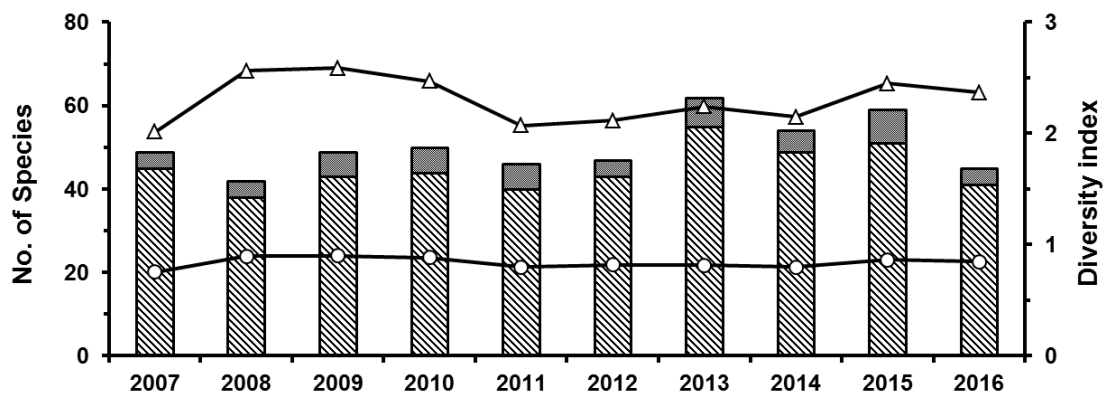


Figure 6.3.3 Species diversity in the Lake St. Clair nearshore from 2007 to 2016. Bars represent total number of species observed (species abundance); bottom portion represents actual number of species identified (i.e. minimum number of species), top portion is identified to functional/family groups. Circles represent Simpson's diversity index (1-D) and triangles represent the Shannon-Wiener Index (H).

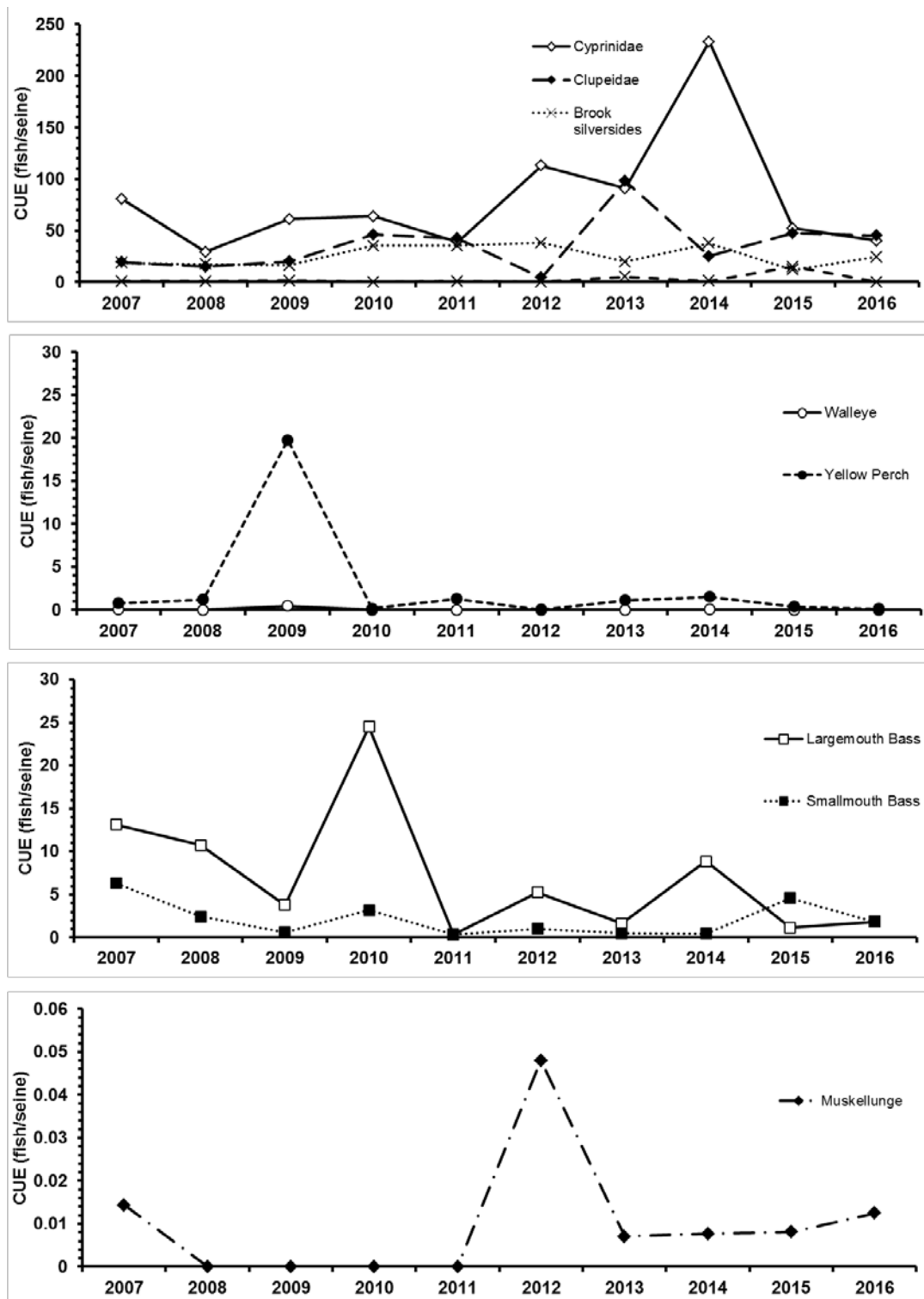


Figure 6.3.4 Catch rates (CUE) of forage fish (top graph) and YOY sport fish in the Lake St. Clair nearshore from 2007 to 2016. Note: scale differences in catch rates.

Table 6.3.3 Summary of Species-at-Risk caught in the Lake St.Clair Nearshore assessment between 2007 and 2016. Species at designation (EN = endangered, TH = Threaten, SC = Special Concern) presented Ontario, Canadian and International governing bodies.

Year	date	Site	Common Name	Scientific Name	Life stage	Caught (n fish)	Fork Length (mm)				Species as Risk designation		
							min	Mean	± SE	Max	Ontario	Canada	International (COSEWIC)
2007	10-Aug	Mitchells' Bay (offshore)	Pugnose Shiner	<i>Notropis anogenus</i>	Adult	5	30	31.8	± 0.5	33	EN	EN	TH
2010	01-Jun	Mitchells' Bay (inshore)	Pugnose Shiner	<i>Notropis anogenus</i>	Adult	1	42	42.0	± -	42	EN	EN	TH
2011	01-Jun	Bell River (East)	Pugnose Shiner	<i>Notropis anogenus</i>	Adult	2	45	45.0	± -	45	EN	EN	TH
2011	02-Jun	Mitchells' Bay (inshore)	Pugnose Shiner	<i>Notropis anogenus</i>	Adult	2	43	44.5	± 1.5	46	EN	EN	TH
2011	13-Jun	Mitchells' Bay (inshore)	Pugnose Shiner	<i>Notropis anogenus</i>	Adult	4	39	41.0	± 0.7	42	EN	EN	TH
2011	25-Jul	Puce River	Pugnose Shiner	<i>Notropis anogenus</i>	Adult	1	49	49.0	± -	49	EN	EN	TH
2012	06-Jun	Mitchells' Bay (inshore)	Pugnose Shiner	<i>Notropis anogenus</i>	Adult	1	43	43.0	± -	43	EN	EN	TH
2012	12-Jun	Mitchells' Bay (inshore)	Pugnose Shiner	<i>Notropis anogenus</i>	Adult	1	43	43.0	± -	43	EN	EN	TH
2012	16-Jul	St.Lukes	Pugnose Shiner	<i>Notropis anogenus</i>	YOY	1	25	25.0	± -	25	EN	EN	TH
2013	04-Jun	St.Lukes	Pugnose Shiner	<i>Notropis anogenus</i>	Adult	1	42	42.0	± -	42	EN	EN	TH
2014	10-Jun	Bradley's Marsh	Silver Chub	<i>Macrhybopsis storeniana</i>	Adult	1	100	100.0	± -	100	SC	SC	EN
2014	23-Jun	St.Lukes	Pugnose Shiner	<i>Notropis anogenus</i>	Adult	3	47	49.0	± 1.2	51	EN	EN	TH
2014	09-Jul	St.Lukes	Pugnose Shiner	<i>Notropis anogenus</i>	Adult	3	43	44.7	± 1.2	47	EN	EN	TH
2014	14-Jul	St.Lukes	Pugnose Shiner	<i>Notropis anogenus</i>	Adult	6	45	46.5	± 0.4	48	EN	EN	TH
2014	31-Jul	St.Lukes	Pugnose Shiner	<i>Notropis anogenus</i>	Adult	3	50	51.7	± 1.7	55	EN	EN	TH
2015	17-Jun	St.Lukes	Grass Pickerel	<i>Esox americanus vermiculatus</i>	YOY	1	74	74.0	± -	74	SC	SC	SC
2015	17-Jun	St.Lukes	Pugnose Shiner	<i>Notropis anogenus</i>	Adult	6	43	49.2	± 2.1	55	EN	EN	TH
2015	02-Jul	St.Lukes	Pugnose Shiner	<i>Notropis anogenus</i>	Adult	2	45	46.0	± 1.0	47	EN	EN	TH
2016	31-May	St.Lukes	Pugnose Shiner	<i>Notropis anogenus</i>	Adult	98	41	46.9	± 0.4	58	EN	EN	TH
2016	28-Jun	Mitchells' Bay (offshore)	Eastern Sand Darter	<i>Ammocrypta pellucida</i>	Adult	2	49	52.0	± 3.0	55	EN	S1	TH
2016	13-Jul	St.Lukes	Pugnose Shiner	<i>Notropis anogenus</i>	Adult	23	42	47.9	± 0.7	53	EN	EN	TH
2016	26-Jul	St.Lukes	Pugnose Shiner	<i>Notropis anogenus</i>	Adult	3	47	48.7	± 0.9	50	EN	EN	TH
2016	26-Jul	St.Lukes	Pugnose Shiner	<i>Notropis anogenus</i>	YOY	1	34	34.0	± -	34	EN	EN	TH
2016	26-Jul	St.Lukes	Pugnose Shiner	<i>Notropis anogenus</i>	Adult	1	50	50.0	± -	50	EN	EN	TH

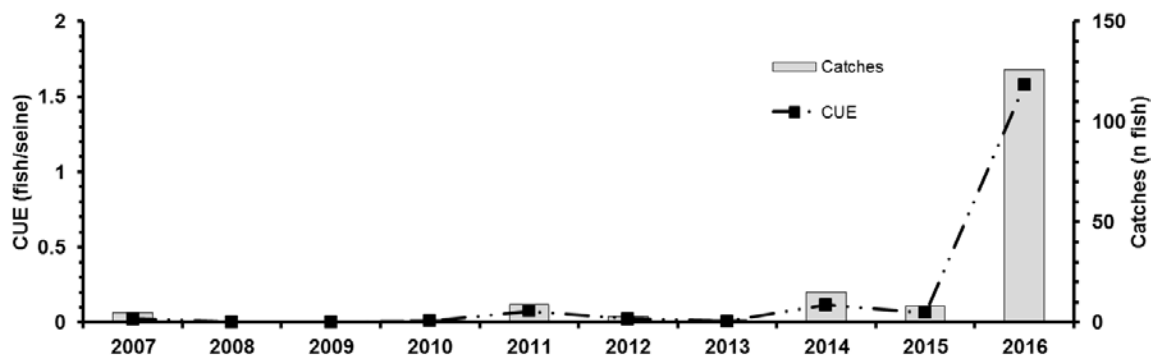


Figure 6.3.5 Catch rates (CUE) of Pugnose Shiners (*Notropis anogenus*) in the Lake St.Clair nearshore assessment from 2007 to 2016.

6.4 Walleye Tagging in Lake St. Clair Tributaries

The Thames River extends from its mouth at Lake St. Clair upstream unimpeded to London beyond which three branches occur. This large 5,825 square kilometre watershed drains agricultural and urban lands while providing habitat to a diversity of fish and wildlife. To its north, the Sydenham River is a smaller tributary of the St. Clair system which extends from the mouth at the Chancel Ecarte upstream over 100 kilometres. The Walleye that spawn in these rivers provide angling opportunities not only in the Thames and Sydenham Rivers but also in Lake St. Clair, the St. Clair River and to some degree in Lakes Huron, Erie and the Detroit River.

In 2013, a Walleye tagging study assessed the status and characteristics of the Sydenham River Walleye population. Walleye tagging continued from 2014 through 2016 on the Thames River, once considered highly productive for Walleye compared to recent decades. Movement, abundance, exploitation, survival, and biological characteristics may be described using tagging and recapture data. Sydenham River Walleye tagging methodology was described in the OMNRF's Lake Erie Management Unit's 2013 Status of Major Stocks. Results from tagging Walleye on the Thames (2014- 2016) and Sydenham (2013) Rivers are reported here.

Walleye were collected from April 8th to May 2nd, 2016 on the Thames River by electrofishing from a 21 foot Smith Root vessel operating between 10.5-17 amps (mean 13 amps) at 500 volts and 60 Hertz for 40-80 % of the time (mean 51%). Walleye were tagged with size 12 metal butt end tags crimped to the left mandible and passive integrated transponder (PIT) tags were injected ventrally posterior to the head. Four types of jaw tags were used that varied according to reward status (Reward and Non Reward) and contact information (mailing address or phone number). The Biomark HPT12 PIT tags were 12.5 millimetres in length with a frequency of 134.2 KiloHertz. PIT tags were scanned using an HPR plus (ISO 11785) reader with racket antenna. In 2016, orange Floy tags were applied in addition to jaw and PIT tags. Information printed on Floy tags was consistent with jaw tag imprinting, varying according to reward status and contact information. The additional external tag allows for jaw tag loss estimation particularly in areas where PIT scanning doesn't occur. Total lengths were measured, sex, reproductive state were recorded and the several anterior dorsal spines were removed for aging tagged Walleye. Environmental conditions and measurements were documented at locations where tagging took place.

Thames River water temperatures when tagging in 2016 ranged from 3.8 °C to 13.8 °C with a mean of 10.4 °C. Dissolved oxygen concentrations were high during tagging ranging from 8.9 to 11.8 milligrams per litre. In 2016, 321 Walleye were tagged on the Thames River (Table 6.4.1). The age composition of tagged Walleye by sex is presented in Figure 6.4.1, along with mean length at age by gender. Males represented 74% of Walleye tagged, while females and Walleye of undetermined sex accounted for 4% and 22% respectively. Ages of tagged Walleye ranged from two to 13, with age-3 (25%) most abundant. While collecting Walleye for tagging by electrofishing in 2016, 12 previously tagged Walleye were captured and released; seven were tagged in 2016.

Jaw tags and Floy tags are visible to recreational, commercial and native fisheries while PIT tags are detected solely by scanning Walleye harvest. For Walleye tagged in the Thames River, most recaptures are expected to be reported from sport fisheries that observe external tags. Scanning of Walleye for PIT tags occurs primarily on Lake Erie. Numbers of Thames River Walleye tagged and recaptured by sex and reward status are presented in Table 6.4.1, with associated recovery rates. In addition to reward and non-reward versions of external tags, they were further partitioned according to contact information on the tag: by mailing address (OMNR, 320 Milo Wheatley, ON N0P 2P0) and phone number (800-667-1940).

There were 39 Walleye recaptured in 2016 that were tagged on the Thames River; most (27) were tagged in 2016 while 11 were from 2015 and one was tagged in 2014 (Table 6.4.1). In 2016, recapture rates were higher for reward tags than non-reward tags for Walleye tagged in 2015 (reward 7.2% : non-reward 2.2%) and 2016 (reward 17.5% : non-reward 6.2%). Walleye tagged in the Thames River from 2014-2016 were recaptured in 2016 in the St Clair River, Lake St. Clair, Detroit River, western Lake Erie and in the Thames River (Figure 6.4.2). Since tagging in 2014, Thames River Walleye have been caught from Lake Erie throughout the St. Clair System to the entrance of Saginaw Bay, Lake Huron (Figure 6.4.3). All recaptures in 2016 except for three were caught by recreational fisheries. In 2016, two Walleye tagged in the Thames River were caught by commercial gill net fishers in Lake Erie and one tagged Walleye was caught by the Aboriginal gill net fishery in Lake St. Clair. One male Walleye captured while tagging in the Thames River during 2016 was previously tagged (jaw and PIT) in Van Buren Bay, eastern Lake Erie, by the New York Department of Environmental Conservation on May 9th, 2006.

Walleye were tagged in the Sydenham River during spring of 2013, with recaptures occurring in 2013 (10), 2014 (nine), and 2016 (one) but none were caught in 2015 (Table 6.4.2). A single recapture occurred in 2016; this was indicated by PIT tag scanning of commercial harvest in western Lake Erie. This represents the first instance of Sydenham River Walleye from this study appearing in Lake Erie fisheries (Figure 6.4.4). Since tagging Walleye in the Sydenham River began in 2013, marked fish were caught primarily by anglers in the Sydenham River, Chancel Ecarte, Lake St. Clair and the St. Clair River (Figure 6.4.4).

Recaptures of Thames and Sydenham River tagged Walleye took place during all seasons from 2013 to 2016, with the highest recoveries in 2016 during May and June (Figure 6.4.5). Thames River Walleye recaptured in 2016 were distributed among Michigan (49%), Ontario (41%), Ohio (5%), Wisconsin (3%) and Illinois (3%) fishers (Figure 6.4.6).

The proportion of Walleye recaptured by tag type (reward-phone, reward-address, non-reward-phone, non-reward-address) in 2016 that were tagged in 2016 is presented in Figure 6.4.7. Recapture rates were higher for Walleye tagged with reward tags than with non-reward tags (Figure 6.4.7). Recaptures were greater for tags with return address labels than for tags indicating phone contact numbers for both reward and non-reward tags (Figure 6.4.7). Reporting rate ratios (reward/non-reward) for address, phone labels and combined were 1.83, 3.61 and 2.40 respectively.

Three types of tags (Jaw, PIT, Floy) were applied to Walleye in the Thames River in 2016. Most (25/27) of these fish that were recaptured in 2016 were reported by recreational fisheries which rely on external tags for reporting, in contrast with Lake Erie fisheries which may be reported or detected by PIT tag scanning. Of these Walleye recaptured in 2016, 10 or 37% were lacking jaw tags. This observation, combined with greater visibility of orange Floy tags may account for the higher recapture rate of the 2016 tagged cohort (reward 17.5%, non-reward 6.2%) compared to 2014 (4.1%, 4.4%) and 2015 (11.6%, 4.4%) respectively. Underestimation of recapture rates for tagging in 2014 and 2015 combined with improved visibility of Floy tags in 2016 suggest that Thames River Walleye are more exploited than indicated by studies during previous years.

Future Walleye tagging will benefit from the continued use of Floy tags with incentive to implant acoustic transmitters internally to acquire enhanced descriptions of movement through the broad distribution of GLATOS telemetry receivers.

7. ACOUSTIC TELEMETRY/TAGGING PROJECTS

The spatial ecology and movement of many fish species has remained a mystery for many researchers and fisheries managers. Whether known or assumed, where, when and how fish move through their environment forms the basis of their ecological niche and the foundation for defining biological relevant management units and defining stocks in fisheries management. Contemporary telemetry technology has begun to open opportunities for tracking the movements of fish.

Acoustic telemetry shows great promise as a tool for tracking movements of fish through the aquatic environment. Acoustic telemetry systems work by implanting an acoustic transmitter (or tag) into or onto a fish and deploying acoustic receivers throughout a body of water. The transmitter emits a distinct acoustic “ping” which is picked up by receivers when the two are in proximity (Figure 7.1a). The distinct acoustic pings are then translated into distinct identifications of individual fish. By strategically placing a series of receivers throughout a water body researchers can triangulate position (Figure 7.1b) and examine movements of individual fish to answer scientific hypotheses or questions relevant for fisheries management.



Figure 7.1 How Acoustic telemetry works.

In 2010, the Great Lakes node of the Ocean Tracking Network known as the Great Lakes Acoustic Telemetry Observatory System (GLATOS) was established. This collaborative effort of Canadian and US, State/provincial federal and academic partners oversees project tagging fish, the deployment and maintenance of acoustic receivers and most importantly handling a database to handle the millions of detections created annually. To date the network of GLATOS receivers in Lake Erie has been the most extensive across the Great Lakes Basin. From 2013 to 2015, lines of receivers were deployed across the lake from the Canadian to US coast to identify movements of fish between West, Central and East Basin (Figure 7.2.a). In 2016, receiver deployment shifted to favour a grid pattern which increase coverage and detection efficiency (Figure 7.2b). In 2017, the extensive Central Basin grid of receivers will be expanded to include the East and potentially West Basin. LEMU is actively involved in several projects including Lake Erie Whitefish, Grand River Walleye, and Lake St.Clair/Thames River Muskellunge (summarized below). Other projects in which LEMU is actively involved or supports include East Basin Lake Trout stocking, and West/central Basin Walleye habitat and mixed stock analysis.

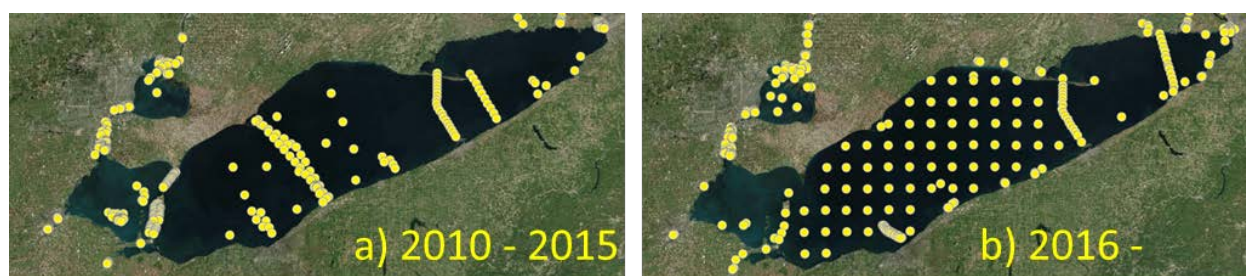


Figure 7.2 Network of GLATOS acoustic receivers from a) 2010-2015 and b) 2016 – present. (Maps retrieved from <http://glatos.glos.us/map>, May 26, 2017)

7.1.1 Lake Erie Whitefish

Lake Erie Lake Whitefish have declined in abundance over the recent decade due to poor reproductive success. Using an extensive distribution of GLATOS acoustic receivers throughout Lake Erie and connecting waters, OMNRF, ODNR, USGS, and USFWS began a Lake Whitefish acoustic telemetry study to monitor movements associated with spawning, post spawning, seasonal habitat utilization, and emigration from Lake Erie. In addition, spatial and temporal patterns of exploitation and survival may contribute to population assessment and development of management strategies. The acoustic tagging project began in Ontario waters of western Lake Erie in 2016, one year after tagging commenced in Ohio waters. From November 15th to November 24th, 2016, Lake Whitefish were captured in 4 inch to 6 inch monofilament gill nets fished four nights on bottom at depths of 2.7 metres to 4.5 metres near Little Chick – Hen Island at water temperatures that ranged from 10.7 to 7.3 ° C (mean 9° C). Lake Whitefish were anesthetized by electroanesthesia using a Smith Root portable Electroanesthesia System (PES) set at 40 volts, constant ramped DC to surgically implant Vemco V16-4x-069k-1 transmitters. External Floy tags were also applied posterior to the dorsal fin. Acoustic and Floy tags indicate \$100 US rewards if the fish and acoustic transmitter (tag) are returned to OMNRF. The Lake Erie Management Unit collected 42 Lake Whitefish and tagged 37 (35 male, two female) Whitefish that were in suitable condition. Within weeks of tagging in 2016, three fishery recaptures and one receiver detection occurred in western Lake Erie. Additional information will become available in 2017 as data are downloaded from receivers. Acoustic tagging is scheduled to continue in 2017.

7.1.2 Grand River Walleye

Eastern Basin Walleye fisheries harvest fish from different sources or stocks. While many Walleye caught in the east are migrants from the west and central basins, identifying contributions of local stocks to these fisheries is important for sustainable fisheries management. Currently the only known local eastern basin Walleye stock in Ontario spawns in the Grand River, a large tributary which empties into the lake at Port Maitland. The Grand River Walleye stock is recognized for its genetic uniqueness, its current vulnerability, and its potential for growth. In 2015, the LEMU began an acoustic tagging study in order to ask specific questions about the ability of this stock to move freely between the lake and suspected critical upstream spawning habitat. Specifically, the study would consider the effects of a lowhead dam, 7 kilometre upstream from the lake which imposes a complete barrier to upstream Walleye movement. The next upstream barrier (river kilometre 42); the location of suitable spawning substrate; the fishway in the Dunnville dam (currently deemed inoperable); the river mouth; and various other key areas were monitored with ten acoustic receivers (Fig 7.3). Secondly, the tagged Grand River Walleye would contribute to a set of larger studies, whereby spawning stocks throughout the lake were tagged with the intent of, among other objectives, determining spawning site fidelity and stock contributions to fisheries, particularly changes in the seasonal influence of eastern and western stocks to eastern fisheries. This larger scale objective makes use of the hundreds of receivers currently deployed across the entire lake basin (see GLATOS in introduction; above) and involves working with partners including NYSDEC, PAFBC, ODNR, USGS, MSU, and the GLFC. In addition to informing walleye demographics and modelling, as a traditional tag study would, stock-specific behavioural knowledge gained from these studies can inform management decisions on a more local scale. Temperature loggers implanted with the acoustic tags will provide an additional set of ecological data and hopefully explain some behaviour relative to environmental temperatures.

In each of 2015 and 2016, fish were captured via boat electrofishing, held in aerated live wells, and individually measured, sampled for aging structures, and surgically implanted with acoustic transmitter tags transmitting unique codes every two to three minutes at 69 kiloHertz. Post-surgery, fish were placed in a recovery tank and monitored for signs of distress. All implanted fish recovered and were released; half above the Dunnville dam and half below. 70 fish were tagged each year (35 of each sex) for a total of 140 fish distributed evenly between the upper and lower section of river. Receivers were retrieved and downloaded at the end of each year, with two (immediately below the dam and at the river mouth embayment) left in continuously. The acoustic tags have a projected battery life of six years and it is expected that the characterization of this stock will continue to be revised as data continues to come in. Regardless, by the end of 2016, receivers throughout the study area had registered over 1.5 million detections of Grand River Walleye, with all but one of the tagged fish being detected at least once.

Even at this early stage then, some preliminary patterns have emerged. Walleye given access above the dam in April move quickly to areas which have substrate suitable for spawning; some move as far as 42 kilometres upstream from the lake. In late May to early June, these fish move back downstream to an area immediately upstream of the dam (river kilometre seven). Walleye not given access in April move rapidly downstream to the river-mouth or estuary. Exploitation of above-dam Walleye by anglers is twice that for fish released below the dam. Walleye that are delayed immediately upstream of the dam are particularly susceptible to angler harvest. Most fish move to the river-mouth and river estuary at some point during the summer, some appear to not utilize the lake at all. Results from the larger GLATOS network of receivers show most Grand River Walleye remain in the Eastern Basin along the north shore as far as Buffalo Harbor, with a few moving as far as the western basin (Figure 7.4). More definitive answers are anticipated from analysis over the next two years however the project will continue to yield important information through the lifespan of the tags (~2011-2012).

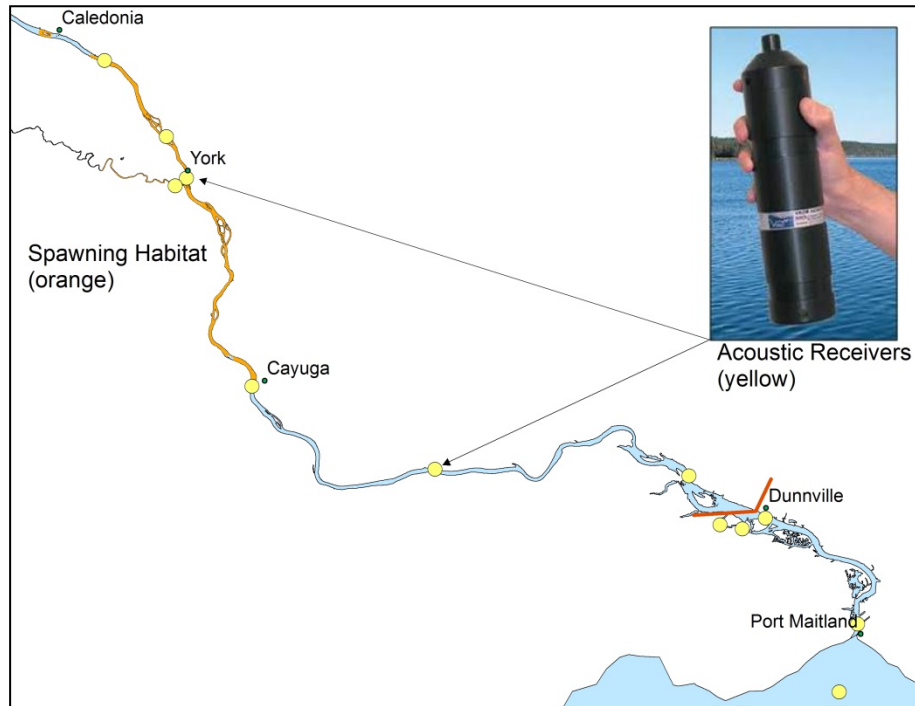


Figure 7.3 Locations of acoustic receivers in the Grand River, from the town of Caledonia to the river mouth at Port Maitland on Lake Erie. The Dunnville dam is indicated with a red line; Orange indicates areas of suitable spawning substrate.

7.1.3 Thames River Muskellunge

The St. Clair - Detroit River system (SCDRS) supports a valuable, world-class Muskellunge fishery. However, our understanding of the ecology, survival, and effects of the intensive sport fishery on this species remains limited. For example, contributions of SCDRS Muskellunge to Lake Erie are unknown and the potential metapopulation structure within the region (Lake Huron - Lake Erie) have yet to be tested. Also, since the Muskellunge fishery in the SCDRS is predominately catch-and-release, post-release mortality and the population-level effects require a better understanding so potential impacts on the fishery can be predicted.

In 2016, a collaboration of Michigan DNR, Ohio DNR, USGS and MNRF started to tag Muskellunge in the SCDRS and the Western Basin of Lake Erie with Vemco VR-16 acoustic tags. Using the Great Lakes Acoustic Telemetry Observation System (GLATOS), the objective of this project is to track movements of Muskellunge within the SCDRS and Western Lake Erie and potentially into Lake Huron. Tracking individual fish enables us to examine migratory behaviours, habitat use, mortality and population structuring to provide ecological insights of this species that are crucially important for the management of the fishery.

Progress to date:

In May 2016, 20 fish were tagged by MDNR in US waters of the Detroit River. In October, an additional 19 fish were tagged by MNRF and MDNR near the mouth of the Thames River (Ontario, Canada). From retrievals of GLATOS acoustic receivers in late 2016, the 20 Muskellunge tagged in Detroit produced over 28,000 detection records. Preliminary data analysis has revealed some interesting patterns. For example, there was fairly extensive movement of individuals within the Detroit River and one individual was recorded on a receiver in Lake St.Clair (Figure 7.1.3.1a). Another individual moved out of the river by the end of June, then down the length of Lake Erie into the Eastern Basin (Figure 7.1.3.1b). This provides evidence of greater movements by Muskellunge than previously assumed by biologist or managers.

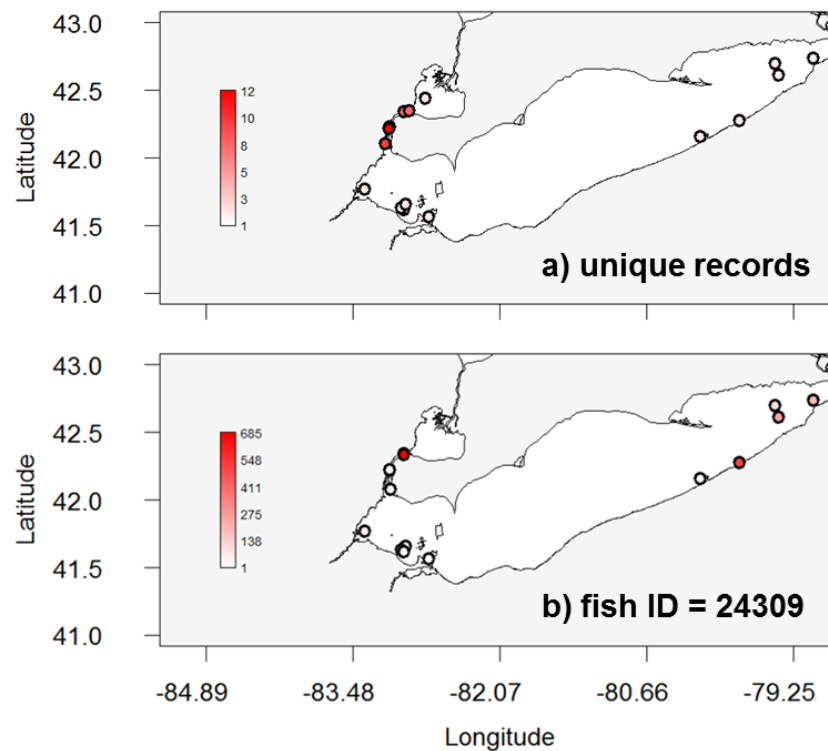


Figure 7.1.3.1 Detection records from the 20 fish tagged by MDNR in the Detroit River during May 2016. a) displays unique records (i.e., individuals) per receiver with colour indicating numbers of individuals recorded; b) displays number of records per receiver for individual (fish ID) 24309, with colour representing number of records per receiver.

For 2017, partners have secured additional funds to support this predominately agency funded project. MDNR was successful in a Hugh C. Becker foundation grant for purchasing additional acoustic receivers for deployment in US waters of Lake St. Clair. Ohio DNR was successful in a Hugh C. Becker foundation grant for purchasing acoustic transmitters to tag Muskie in the West Basin of Lake Erie. MNRF is planning on tagging an additional 20 individuals in Canadian waters of Lake St. Clair while working with Muskies Canada to purchase and deploy up to eight Vemco VR2W acoustic receivers in Canadian waters of Lake St. Clair. The project is expected to continue until approximately 2022 (life span of the acoustic tags) or until recordings of fish on receivers cease.

Project collaborators:

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APPENDIX A
Operational Field and Lab Schedule 2016

Field and Lab Projects	Dates	Species Assessed, Monitored, or Stocked	Project Lead	Location	Funding Source
Thames River Walleye Tagging	April	Walleye	Cook	Wheatley	SPA/CRF
Lake Erie Commercial Catch Sampling	Apr-Nov	Walleye, Y. Perch, R. Smelt, L. Whitefish, W. Bass, W. Perch	Before	Wheatley	SPA
Contaminant Sampling	Apr-Nov	Multiple Species	Benoit	Wheatley	SPA
Lake Erie Temperature Loggers	Apr-Nov	Limnology	Genereaux	Wheatley	SPA
Lake Erie & Lake St. Clair Sport Fishery Diary	Apr-Nov	Multiple Species	Before	Wheatley	SPA
Lake Erie Limnology	May-Oct	Limnology	MacDougall	Wheatley	SPA
Lake St. Clair Limnology	May-Sept	Limnology	Marklevitz	Wheatley	SPA
Asian Carp eDNA Monitoring	May-Jul	Asian Carp	Before	Wheatley	COA
Lake St. Clair YOY Index	Jun-Jul	Multiple Species	Marklevitz	Wheatley	SPA
Lake Erie Central Basin Hydro Acoustics	July	Multiple Species	Cook	Wheatley	SPA
West Basin Interagency Trawling	August	Multiple Species	Cook	Wheatley	SPA
West Basin Mid water Trawling	August	Multiple Species	Cook	Wheatley	SPA
Partnership Index	Aug-Nov	Multiple Species	Cook	Wheatley	SPA/CRF
Lake St. Clair Fall Index	Sept-Nov	Multiple Species	Before	Wheatley	SPA
Thames River Musky acoustic tagging (M. ODNR partnership)	Oct	Musky	Marklevitz	Wheatley	SPA
L. Whitefish Acoustic tagging	Nov	L. Whitefish	Cook	Wheatley	CRF
Age and Growth	Continuous	Multiple Species	Multiple	Wheatley	SPA
Lake Erie Limnology	May-Oct	Chlorophyll, Zooplankton	MacDougall	Pt. Dover	SPA
Lake Erie Commercial Catch Sampling	Apr-Nov	Walleye, Y. Perch, R. Smelt, L. Whitefish, W. Bass, W. Perch	Before	Pt. Dover	SPA
Contaminant Sampling- LPB & Eastern Basin	Apr-Nov	Multiple Species	Greenwood	Pt. Dover	SPA
Long Point Bay Temperature Loggers	Mar-Oct	Water temps - L. P. Bay, Pt. Dover Intake, 2 Gas Wells	Ives	Pt. Dover	SPA
Grand River Walleye Tagging	April	Walleye	MacDougall	Pt. Dover	SPA/COA/GLFC
Lake Trout Acoustic Tagging	May	Lake Trout	MacDougall	Pt. Dover	SPA
Lake Trout Stocking	May, Sept, Nov	Lake Trout	MacDougall	Pt. Dover	SPA/COA
Lake Trout Gill Netting	Oct-Nov	Lake Trout	MacDougall	Pt. Dover	SPA
Lake Trout Tag Removal	Continuous	Lake Trout	MacDougall	Pt. Dover	SPA
Cold Water Survey	August	Lake Trout, Burbot, Lake Whitefish	Penton	Pt. Dover	SPA
Niagara River Access Creel Survey	May-Oct	Multiple Species	Oldenburg	Pt. Dover	SPA
Long Point Bay Adult Index Gillnetting	Jun-Aug	Multiple Species	Penton	Pt. Dover	SPA
Long Point Bay Nearshore Trawling	Sept	Multiple Species	Penton	Pt. Dover	SPA
Long Point Bay Offshore Trawling	Sept-Nov	Multiple Species	Penton	Pt. Dover	SPA
Central Basin Trawling	October	Multiple Species	Penton	Pt. Dover	SPA
Long Point Bay Grid Trawling	October	Multiple Species	Penton	Pt. Dover	SPA
Lake Erie Eastern Basin Hydro Acoustics	July	Smelt and Other Pelagic Forage Fish	Trumpickas	Pt. Dover	SPA
Diet Study	June-Jan	Multiple Species	Harrison	Pt. Dover	SPA
Age and Growth	Continuous	Multiple Species	Multiple	Pt. Dover	SPA

Note: SPA = Special Purpose Account, COA = Canada Ontario Agreement, GLFC= Great Lakes Fisheries Commission, CRF=Consolidated Revenue Fund

APPENDIX B – 2016 LEMU DATA REQUEST LOG

APPENDIX C - 2016 LAKE ERIE MANAGEMENT UNIT STAFF

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