

2011 Status of Major Stocks

Lake Erie Management Unit
March 2012



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

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

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

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

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

Lake Erie's fishery resources are managed cooperatively by Ontario and the four U.S. states – New York, Pennsylvania, Ohio and Michigan – bordering the lake through a Management of Great Lakes Fisheries. Lake St. Clair fishery resources are managed cooperatively by Ontario and Michigan under the same process.

Cover Photos (top to bottom):

- Port Dover MNR staff working on Lake Trout Stocking Program (left to right: Larry Witzel - Assessment Biologist, Kurt Oldenburg – Fisheries Ecologist Supervisor, Wyatt Hall – Fisheries Technician, and Tom MacDougall – Rehabilitation Ecologist)
- Port Dover Assessment/Research Vessel the Erie Explorer
- Wheatley MNR staff pulling nets for Interagency Trawl Program (left to right: Stan Powell – Operations Coordinator, Andy Cook – Assessment Biologist, Sean Yardley – SEP Student, Rob Dietz – Fisheries Technician)
- Wheatley Assessment/Research Vessel the Keenosay

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FORWARD

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

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

LEMU consults regularly with resource management partners, namely the 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, LEMU participates in the Lake Erie Percid Management Advisory Group (LEPMAG), which was established to help guide future walleye and yellow perch management in Lake Erie. This group consists of LEC members, agency staff, and stakeholders from all jurisdictions bordering Lake Erie, and is facilitated by staff from the Quantitative Fisheries Centre of Michigan State University.

The purpose of the LEMU Status of Stocks report is to summarize and present Ontario's fisheries assessment, and commercial fishery data that is directly pertinent to the allocation process for lake whitefish, walleye, yellow perch, and rainbow smelt in Lake Erie. This data is incorporated with similar information from the U.S. jurisdictions and analyses are performed by various task groups to determine population status, and recommend harvest levels that are consistent with LEC objectives.

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

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

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

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

Port Dover Fisheries Station
Fisheries Ecology Supervisor
P.O. Box 429
Port Dover, Ontario N0A 1N0
519-583-3082

1. STATUS OF MAJOR SPECIES

The following is an overview of the status of major species in Ontario waters of Lake Erie for 2011. Lakewide perspectives are available in the following reports of the Lake Erie Committee (LEC) of the Great Lakes Fishery Commission:

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

Walleye

In 2011, the walleye fishery was composed mainly of the 2003 and 2004 year classes. Lakewide fall surveys also indicated a strong presence of age 4 and age 8 fish in 2011, suggesting the 2007 and 2003 year classes will contribute the most to spawner biomass in 2012. These year classes and others to a lesser degree will continue to contribute to the fishery in 2012. Interagency trawling conducted in August 2010 indicated a moderate 2010 year class, but later the 2010 year class as age 1 was present in strong numbers in fall gill net surveys in 2011. The 2010 year class will contribute to the fisheries in 2012. Interagency trawling indicated a poor 2011 year class which will not recruit to the fishery until 2013. Overall, the abundance of walleye in the west and central basins is below the long term average.

The Lake Erie Management Unit (LEMU), represented on the LEC, continued to implement the Walleye Management Plan (WMP) to determine total allowable catch (TAC) for Lake Erie. The policies and exploitation rates described within the WMP are currently undergoing a review process by the LEC. In 2010, the LEC formed the Lake Erie Percid Management Advisory Group (LEPMAG), consisting of Lake Erie managers, scientists and stakeholders, with facilitation from Michigan State University's Quantitative Fisheries Centre. The purpose of this group is to advise on objectives and management options for Lake Erie percids. In 2011, LEPMAG outlined objectives for the Lake Erie walleye population, suggested modifications to the walleye assessment model and outlined a range of possible management options. In 2012, this group will work to complete an updated harvest strategy that will promote quality and sustainable sport and commercial fisheries well into the future.

The walleye population in eastern Lake Erie consists of mixed stocks including those originating from east basin shoals, the Grand River, United States tributaries, and immigrants from the rest of the lake. Representation of older walleye is typically greater in eastern Lake Erie compared to other regions of the lake. The greater average age of walleye in the eastern basin is due in part to the contribution of older migratory individuals originating from the western basin. In 2011, the strong 2003 year class at age 8 represented 27% of the commercial harvest in Ontario statistical districts 4 and 5 combined (Figure 2.1.1). Age 8 walleye also comprised a large fraction of the walleye caught in the east basin partnership gill net survey in 2011. Age 1 fish were the largest fraction of walleye caught in lakewide partnership surveys, yearling abundance was the largest observed in the east basin survey indicating a strong 2010 year class in the eastern basin which will contribute to the fishery in 2012.

Yellow Perch

Yellow perch populations in Lake Erie have undergone large fluctuations in recruitment and survival over the last several decades. High harvest levels during the 1980s could not be sustained through the early 1990s due to low recruitment and low survival rates. A series of strong year classes have been observed periodically since the mid 1990s, culminating with the 2003 cohort. Recent moderate to strong year classes include the 2007 year class in the western and central basins (statistical districts 1, 2, and 3) and the 2008 year class in the east (statistical districts 4 and 5).

The 2007 year class dominated the west and west-central basins (statistical districts 1 and 2) fisheries in 2011, while the 2003 and the 2006 cohorts were better represented in the east-central basin (statistical district 3). The 2007, 2008 and 2006 year classes were also strongly represented in east (statistical districts 4 and 5) basin harvest. Fisheries in 2012 will benefit from the 2007 and 2008 year classes in the west and west-central basins, and from the 2008 and 2006 year classes in the east-central and east basins.

Combined interagency assessment across multiple decades indicate that age 2 and older yellow perch remains below average in the west and west-central basins and above average in the east-central and east basins. In Ontario waters, survey indices in 2011 for age 2 and older yellow perch were moderate compared to recent decades in the west and west-central basins. Ontario survey catch rates were relatively high in the east-central basin while east basin gill net indices from the walleye cap area to Long Point Bay varied between moderate and weaker status. The 2010 year class, recruiting to the fishery in 2012, was moderate or better in the central and eastern basin surveys; however, indicators ranged from weak to moderate in the western basin. The 2011 year class, recruiting to the fishery in 2013, was poor in the west but may be stronger in the east based on Long Point Bay trawl assessment. In 2012, LEPMAG will begin consultations on yellow perch fishery objectives and management options to be utilized in a management plan for yellow perch fisheries.

Lake Whitefish

While harvest trends help to describe the status of lake whitefish stocks, fishery effort is of marginal assessment value since a significant portion of the harvest is incidental from walleye or white bass effort and targeted effort varies considerably between years. General measures of year class strength come from fishery harvest and the partnership gill net survey. In 2011, only 11 lake whitefish were caught in the partnership gill net survey. These fish were mainly from the strong 2003 year class (age 8 fish). Lake whitefish recruit to the commercial harvest gear around age 4. In 2011, the majority of the commercial lake whitefish harvest came from the 2003 (age 8) and 2005 (age 6) year classes. Recent lake whitefish recruitment appears to be poor; very few age 4 and age 5 fish were harvested in the commercial fishery. The 2003 and 2005 year classes will continue to contribute to fisheries in 2012. Older lake whitefish were observed in the 2011 Ontario fisheries (up to age 20) and population assessment (up to age 16), reflecting the survival of older year classes.

2. COMMERCIAL FISHERY

2.1 Lake Erie Fishery

In 2011, total commercial landings from Ontario waters of Lake Erie were 21.6 million pounds, an increase of almost 2 million pounds (9%) from 2010 (Table 2.1.1). The value of the total commercial landings in 2011 was \$27.8 million, an increase of \$2.2 million (8%) from 2010 (Table 2.1.1). The increase in harvest and value of landings is mainly due to the increase of allocated walleye in 2011. Harvest and landed value in 2011 are presented for each species by statistical district (Ontario Erie or OE, Figure 2.1.1) in Table 2.1.2.

Rainbow Smelt

The total landings of rainbow smelt increased 82% to 5.9 million pounds in 2011 (Tables 2.1.2 and 2.1.3, Figure 2.1.4). The harvest was taken mainly from OE-2 (42%), OE-4 (40%) and OE-3 (14%). Summer harvest in OE-2 was primarily age 2 (46%) and age 3 (30%) fish. Age 1 and Age 2 rainbow smelt comprised over 76% of OE-3 and OE-4 harvests throughout the year (Table 2.1.4). The commercial fishery harvested 37% of the quota allocated for 2011. The landed value of rainbow smelt was \$1.4 million up 86% from 2010 (Tables 2.1.2 and 2.1.3).

Yellow Perch

Yellow perch landings decreased 4% to 6.4 million pounds in 2011 (Tables 2.1.2 and 2.1.3, Figure 2.1.4). The commercial fishery harvested 99% of allocated quota in 2011. 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-4 (51 to 74% combined). In the summer and fall harvest in OE-1, OE-2, OE-4 and OE-5 ages 3 and 4 were the major contributors (>78% combined). Ages 4 and 5 fish combined contributed over 69% of OE-3's summer and fall harvest. The landed value of yellow perch decreased slightly (0.2%), from 2010 to \$14.0 million in 2011 (Tables 2.1.2 and 2.1.3).

Walleye

Walleye landings increased 35% to 4.4 million pounds (Tables 2.1.2 and 2.1.3, Figure 2.1.4). Ninety-nine percent of the 2011 quota was harvested. Lakewide harvest by walleye size category was: jumbo (56%), number 1 (42%), number 2 (1%) and whitegills (1%) (see Table 2.1.6 for description of size categories). In the Number 1 category the 2007 year class, age 4, was a significant portion of the harvest in OE-1 to OE-3 (17 to 60%). Ages 2 and 3 fish of the Number 1 category became a significant part of the fall harvest in OE-1 and OE-2 (50 to 55% combined). The 2003 year class age 8 is the major contributor to the jumbo harvest throughout the year (Table 2.1.6). The landed value of walleye increased 32% from 2010 to \$9.0 million in 2011 (Tables 2.1.2 and 2.1.3).

White Bass

The total landings of white bass decreased 1.8 million pounds (49%) to 1.8 million pounds in 2011 (Tables 2.1.2 and 2.1.3, Figure 2.1.4). The majority of harvest occurred in statistical districts OE-2 (39%) and OE-1 (38%). Age 3 fish dominated spring harvest in OE-1 (70%) and OE-2 (45%). Ages 2 and 3 fish were significant contributors to OE-2 summer harvest (20 and 54% respectively) (Table 2.1.7). White bass have not been regulated by quota since 1993. The landed value of white bass decreased 36% to \$1.4 million in 2011 (Tables 2.1.2 and 2.1.3). The presence of age 1 white bass in the 2011 fishery and year class strength in surveys suggest fisheries will benefit from the 2010 year class in 2012 and later.

White Perch

The total landings of white perch increased 2% to 2.3 million pounds in 2011 (Tables 2.1.2 and 2.1.3, Figure 2.1.4). The majority of harvest occurred in statistical districts OE-2 (50%) and OE-1 (18%) and OE-3 (31%). In OE-1 and OE-2 spring harvest was from a broad range of ages (2 to 8 year olds) with age 6 the major contributor in OE-1 (54%) and age 4 in OE-2 (48%), (Table 2.1.8). White perch are not regulated by quota. The total landed value of white perch increased 3% to \$1.2 million in 2011 (Tables 2.1.2 and 2.1.3).

Lake Whitefish

The total landings of lake whitefish decreased 0.1 million pounds (12%) to 0.5 million pounds in 2011 (Tables 2.1.2 and 2.1.3, Figure 2.1.4). The commercial fishery harvested 49% of the quota allocated for 2011. Sixty-four percent of the total harvest came from OE-1. Fifteen percent (15%) was harvested from OE-2 and 19% was harvested from OE-5. The largest fraction of harvest (82%) came from fisheries targeting whitefish. The harvest was dominated by age 8 fish (55 to 63%) and age 6 fish (14 to 30%) throughout the year (Table 2.1.9). The landed value of lake whitefish increased \$0.1 million (12%) to \$0.7 million in 2011 (Tables 2.1.2 and 2.1.3).

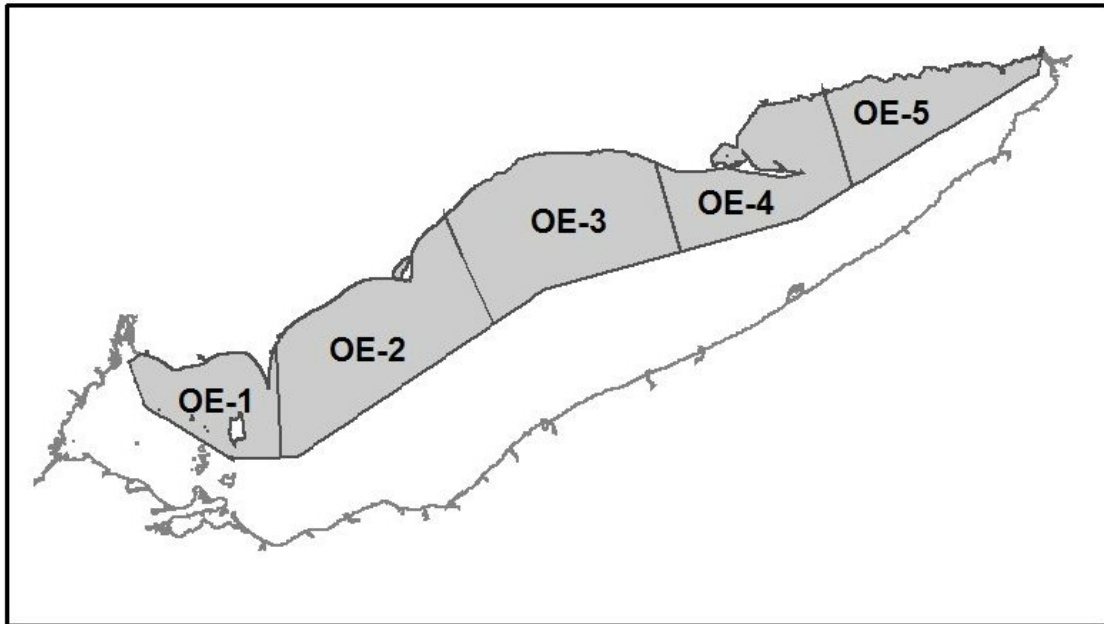


Figure 2.1.1 Spatial location of statistical districts in the Canadian Waters of Lake Erie.

Table 2.1.1 Total annual commercial fishery landings (pounds) and value (\$ CDN) from the Canadian waters of Lake Erie, 1960-2011.

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

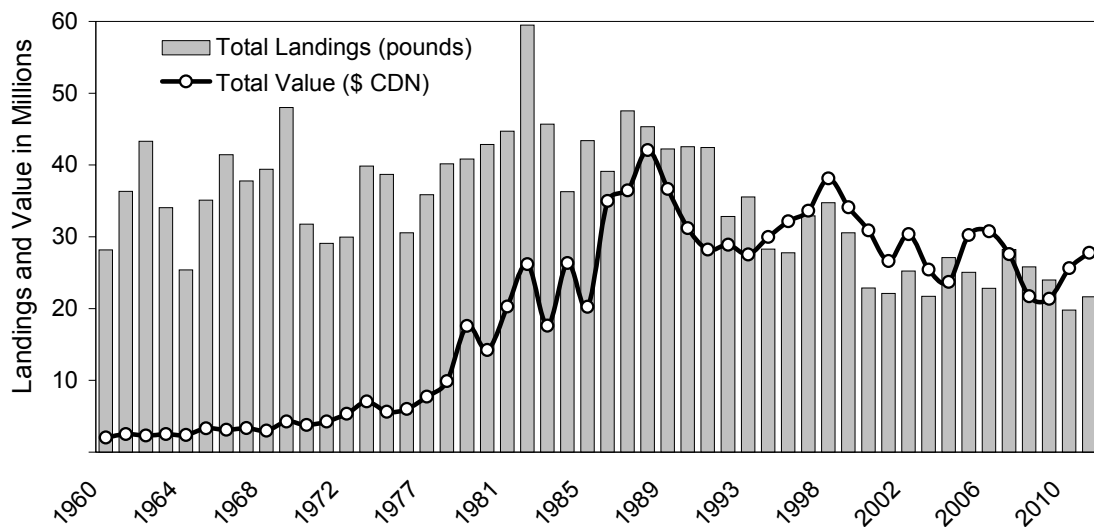


Figure 2.1.2 Commercial fishery landings (pounds) and value (\$ CDN) from the Canadian waters of Lake Erie, 1960-2011.

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, 2011.

Species	Landings by Statistical District					Total Landing	Total Value
	OE-1	OE-2	OE-3	OE-4 ^a	OE-5		
Brown bullhead							
Burbot		45	21	230	1,917	2,213	5
Carp	2,196	548	158			2,902	397
Catfish	11,641	4,461	1,683		168	17,953	5,233
Freshwater drum	45,815	85,355	144,364		136	275,670	23,108
Gizzard shad	5,227	6,359	2,757			14,343	400
Lake whitefish	339,153	79,575	4,921	4,251	102,113	530,013	717,572
Rainbow smelt		2,505,203	796,139	2,335,880	272,488	5,909,710	1,359,120
Rock bass	80		7	5		92	25
Suckers	25,568	7,073	396			33,037	7,763
Walleye	2,485,090	942,499	841,603	13,155	135,619	4,417,966	9,039,586
White bass	689,964	705,550	420,774	3,983	3,103	1,823,374	1,432,657
White perch	404,548	1,135,004	691,493	13,103	6,301	2,250,449	1,221,609
Yellow perch	870,802	1,665,258	3,326,944	129,960	377,509	6,370,473	13,966,761
Mixed ^b	65	1				66	
Total Landing (lbs.)	4,880,149	7,136,931	6,231,260	2,500,567	899,354	21,648,261	
Total Value (\$)	8,215,770	7,297,482	10,046,356	882,260	1,332,399		27,774,266

^a Excludes Inner Long Point Bay.

Preliminary March 1, 2012

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

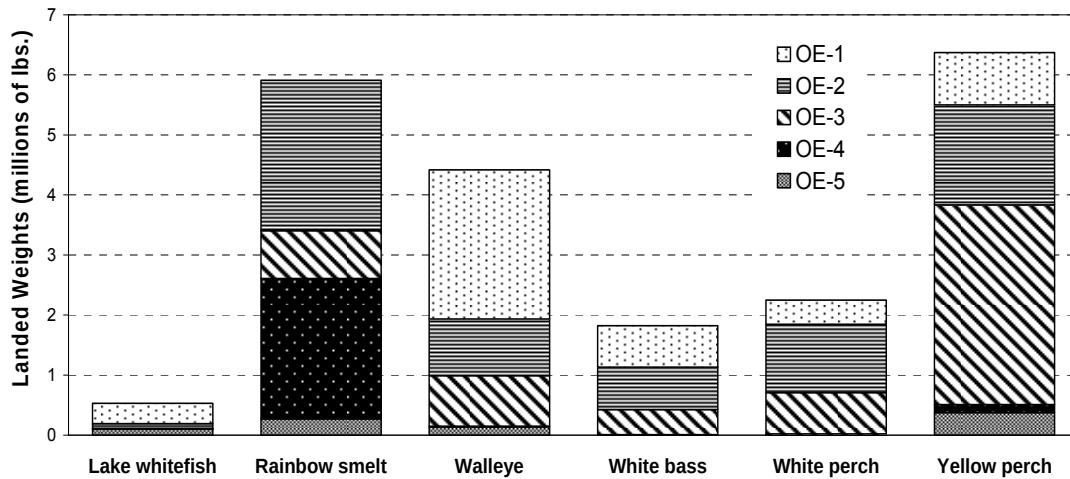


Figure 2.1.3 Total annual commercial fishery landed weights (millions of lbs.) for principle species by statistical district, Lake Erie 2011.

Table 2.1.3 Change in weight of the annual commercial fishery landed weight (pounds) from 2010 to 2011 by fish species and statistical district for the Canadian waters of Lake Erie.

Species	Landings by Statistical District					Total Landing	Total Value
	OE-1	OE-2	OE-3	OE-4 ^a	OE-5		
Brown bullhead	0	0	0	0	0	0	0
Burbot	0	45	21	-92	489	463	-34
Carp	-28	481	158	0	0	611	131
Catfish	2,266	1,547	1,447	-42	-81	5,137	1,616
Freshwater drum	-8,581	-1,331	121,882	0	-564	111,406	9,960
Gizzard shad	-8,344	-11,201	2,757	0	0	-16,788	-1,025
Lake whitefish	119,904	-147,354	-8,401	-5,150	-29,058	-70,059	75,389
Rainbow smelt	-10	777,967	-154,671	1,760,916	271,734	2,655,936	626,442
Rock bass	-123	-1	7	-5	0	-122	-32
Suckers	36	3,096	396	0	0	3,528	2,083
Walleye	662,453	258,641	190,810	1,812	31,614	1,145,330	2,212,655
White bass	-570,491	-1,241,746	31,416	-3,884	1,564	-1,783,141	-789,026
White perch	-27,188	-190,775	248,259	6,049	6,024	42,369	40,099
Yellow perch	-8,556	-223,618	102,861	-130,875	24,716	-235,472	-21,303
Mixed ^b	-221	1	0	0	-111	-331	-45
Total Landing (lbs.)	161,117	-774,248	536,942	1,628,729	306,327	1,858,867	
Total Value (\$)	1,257,132	-619,993	1,040,594	191,788	287,420		2,156,941

^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 2010 to 2011 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, 2011. n is sample size, sexes combined.

Stat. Dist.	Season*	Year Class and Age										All Ages	
		2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	Average	n
		0	1	2	3	4	5	6	7	8	9		
Age Group Composition (%) **													
OE-2	Spring	-	18	44	35	3	-	-	-	-	-	2.2	34
	Summer	-	23	46	30	1	-	-	-	-	-	2.1	159
OE-3	Summer	-	57	20	20	3	-	-	-	-	-	1.7	130
OE-4	Spring	-	18	40	37	5	0	-	0	-	-	2.3	609
	Summer	1	71	13	12	4	1	-	-	-	-	1.5	397
	Fall	1	73	15	10	2	1	-	-	-	-	1.4	157
OE-5	Fall	2	91	6	2	-	-	-	-	-	-	1.1	64
Mean Total Length (mm)													
OE-2	Spring	-	89	121	134	131	-	-	-	-	-	120	34
	Summer	-	126	132	143	156	-	-	-	-	-	134	159
OE-3	Summer	-	115	138	145	174	-	-	-	-	-	128	130
OE-4	Spring	-	91	117	127	157	161	-	242	-	-	118	609
	Summer	100	110	127	163	186	196	-	-	-	-	121	397
	Fall	75	113	133	160	177	175	-	-	-	-	122	157
OE-5	Fall	108	111	138	174	-	-	-	-	-	-	114	64
Mean Round Weight (g)													
OE-2	Spring	-	4	9	14	10	-	-	-	-	-	10	34
	Summer	-	12	14	18	21	-	-	-	-	-	15	159
OE-3	Summer	-	8	15	17	29	-	-	-	-	-	12	130
OE-4	Spring	-	4	7	11	23	26	-	104	-	-	9	609
	Summer	5	7	11	26	39	40	-	-	-	-	11	397
	Fall	2	7	14	26	37	30	-	-	-	-	11	157
OE-5	Fall	6	7	14	39	-	-	-	-	-	-	8	64

* 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, 2011. n is sample size, sexes combined.

Stat. Dist.	Season*	Year Class and Age										All Ages	
		2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	Average	n
		1	2	3	4	5	6	7	8	9	10+		
Age Group Composition (%) **													
OE-1	Spring	-	-	15	50	24	4	1	5	0	-	4.4	595
	Summer	-	1	53	41	4	1	-	0	-	0	3.6	360
	Fall	-	2	54	34	8	1	-	1	-	-	3.6	278
OE-2	Spring	-	0	17	46	21	5	-	11	-	-	4.6	519
	Summer	-	1	26	47	19	3	-	5	-	-	4.2	712
	Fall	-	0	44	42	11	1	0	1	-	0	3.8	237
OE-3	Spring	-	-	2	15	36	20	6	20	1	0	5.8	1178
	Summer	-	-	7	33	35	14	6	5	0	-	5.0	1153
	Fall	-	-	3	26	44	18	3	6	1	-	5.1	197
OE-4	Spring	-	-	6	35	37	12	6	5	1	-	4.9	197
	Summer	-	-	12	38	21	20	5	2	1	1	4.8	117
	Fall	-	-	48	38	3	10	-	3	-	-	3.9	40
OE-5	Spring	-	-	32	43	17	6	1	0	-	-	4.0	276
	Summer	-	1	37	41	15	4	1	1	-	-	3.9	544
	Fall	-	-	38	36	18	3	3	3	-	-	4.0	39
Mean Total Length (mm)													
OE-1	Spring	-	-	209	218	222	221	234	230	246	-	218	595
	Summer	-	213	209	216	216	256	-	209	-	213	213	360
	Fall	-	211	219	228	225	229	-	228	-	-	223	278
OE-2	Spring	-	173	209	215	222	234	-	252	-	-	220	519
	Summer	-	201	207	217	221	226	-	236	-	-	216	712
	Fall	-	200	228	234	235	211	218	229	-	248	231	237
OE-3	Spring	-	-	213	230	232	238	246	244	245	218	236	1178
	Summer	-	-	208	219	226	234	244	248	294	-	226	1153
	Fall	-	-	235	232	237	232	251	274	275	-	238	197
OE-4	Spring	-	-	225	231	231	257	253	256	258	-	236	197
	Summer	-	-	229	234	244	241	249	245	316	225	239	117
	Fall	-	-	243	258	235	260	-	289	-	-	251	40
OE-5	Spring	-	-	227	232	244	245	238	270	-	-	234	276
	Summer	-	223	231	239	249	270	253	268	-	-	239	544
	Fall	-	-	232	243	252	206	230	265	-	-	240	39
Mean Round Weight (g)													
OE-1	Spring	-	-	117	133	138	132	174	151	187	-	133	595
	Summer	-	126	119	132	132	249	-	128	-	120	126	360
	Fall	-	122	131	151	153	151	-	165	-	-	140	278
OE-2	Spring	-	76	119	130	146	172	-	209	-	-	142	519
	Summer	-	109	121	138	149	156	-	182	-	-	138	712
	Fall	-	106	162	181	183	137	139	171	-	175	172	237
OE-3	Spring	-	-	123	154	161	170	189	182	189	118	167	1178
	Summer	-	-	117	140	156	180	208	228	360	-	159	1153
	Fall	-	-	185	167	182	168	214	299	290	-	183	197
OE-4	Spring	-	-	155	151	155	230	215	223	181	-	169	197
	Summer	-	-	178	184	204	198	212	204	488	143	194	117
	Fall	-	-	199	259	157	276	-	396	-	-	233	40
OE-5	Spring	-	-	151	158	190	194	168	238	-	-	164	276
	Summer	-	138	163	184	217	279	234	290	-	-	186	544
	Fall	-	-	165	195	224	107	198	265	-	-	188	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 2.1.6 Walleye year class composition, average total length (mm) and weight (g) from Lake Erie commercial catch samples from large mesh ($\geq 76\text{mm}$) gill nets by statistical district and season, 2011. n is sample size, sexes combined.

Stat. Dist.	Season*	Category**	Year Class and Age										All Ages	
			2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	Average	n
			1	2	3	4	5	6	7	8	9	10+		
Age Group Composition (%)***														
OE-1	Spring	Number 1	0	6	37	44	1	2	3	6	-	1	3.9	294
	Spring	Jumbo	-	-	-	16	-	13	3	61	-	8	7.2	80
	Spring	Number 2	-	95	5	-	-	-	-	-	-	-	2.1	38
	Summer	Number 1	-	5	26	32	5	5	-	26	-	-	4.8	19
	Fall	Number 1	2	29	26	25	1	3	1	14	1	1	3.8	200
	Fall	Jumbo	-	-	3	23	3	-	-	64	-	8	7.0	39
	Fall	Whitegill	-	5	20	50	-	10	-	15	-	-	4.5	20
OE-2	Spring	Number 1	-	9	30	44	2	3	1	12	-	0	4.1	287
	Spring	Jumbo	-	-	-	5	-	-	-	85	5	5	8.0	20
	Spring	Whitegill	-	-	20	75	-	5	-	-	-	-	3.9	20
	Summer	Number 1	-	21	26	33	1	5	-	12	-	1	4.0	76
	Summer	Jumbo	-	-	-	-	5	-	10	75	-	10	8.0	20
	Summer	Whitegill	-	14	23	37	-	5	-	19	-	2	4.5	57
	Fall	Number 1	16	31	19	17	1	4	2	9	-	1	3.3	110
OE-3	Spring	Number 1	-	-	4	47	4	14	11	19	2	-	5.5	57
	Spring	Jumbo	-	-	2	8	10	8	3	51	9	10	7.4	157
	Summer	Number 1	-	3	5	60	2	2	2	23	-	3	5.1	60
	Summer	Jumbo	-	-	-	23	2	7	10	33	11	13	7.1	96
	Fall	Jumbo	-	-	3	38	-	15	5	18	5	15	6.3	39
OE-4	Summer	Jumbo	-	-	-	-	5	-	5	32	11	47	8.8	19
OE-5	Spring	Number 1	-	-	-	8	28	23	5	25	3	10	6.6	40
	Spring	Jumbo	-	-	-	3	13	33	3	25	15	10	7.2	40
	Summer	Number 1	-	-	2	34	22	14	9	9	7	3	5.6	58
	Summer	Jumbo	-	-	-	1	9	12	6	31	8	33	8.1	78
Mean Total Length (mm)														
OE-1	Spring	Number 1	380	407	470	511	540	521	519	529	-	520	491	294
	Spring	Jumbo	-	-	-	558	-	588	552	612	-	622	600	80
	Spring	Number 2	-	375	410	-	-	-	-	-	-	-	377	38
	Summer	Number 1	-	414	475	486	492	500	-	492	-	-	482	19
	Fall	Number 1	333	462	497	508	586	523	485	548	577	563	496	200
	Fall	Jumbo	-	-	497	565	560	-	-	587	-	637	583	39
	Fall	Whitegill	-	466	511	534	-	521	-	530	-	-	524	20
OE-2	Spring	Number 1	-	391	475	517	547	533	519	569	-	495	500	287
	Spring	Jumbo	-	-	-	566	-	-	-	645	637	645	641	20
	Spring	Whitegill	-	-	477	531	-	619	-	-	-	-	524	20
	Summer	Number 1	-	449	487	508	512	504	-	529	-	546	493	76
	Summer	Jumbo	-	-	-	-	550	-	561	563	-	557	561	20
	Summer	Whitegill	-	446	501	510	-	512	-	524	-	623	504	57
	Fall	Number 1	361	454	503	533	502	573	522	550	-	482	477	110

... Continued ...

Table 2.1.6 continued...

Stat. Dist.	Season*	Category**	Year Class and Age										All Ages	
			2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	Average	n
			1	2	3	4	5	6	7	8	9	10+		
Mean Total Length (mm) continued...														
OE-3	Spring	Number 1	-	-	480	538	519	530	563	562	543	-	542	57
	Spring	Jumbo	-	-	506	552	537	581	639	624	652	641	609	157
	Summer	Number 1	-	437	469	524	553	561	520	586	-	575	536	60
	Summer	Jumbo	-	-	-	547	542	575	583	602	628	632	591	96
	Fall	Jumbo	-	-	490	535	-	590	601	657	650	633	589	39
OE-4	Summer	Jumbo	-	-	-	-	611	-	635	648	670	667	657	19
OE-5	Spring	Number 1	-	-	-	467	516	529	514	552	512	581	530	40
	Spring	Jumbo	-	-	-	473	535	582	521	627	609	632	592	40
	Summer	Number 1	-	-	495	521	552	530	569	571	531	581	540	58
	Summer	Jumbo	-	-	-	551	579	590	577	610	617	672	623	78
Mean Round Weight (g)														
OE-1	Spring	Number 1	496	718	1081	1335	1613	1440	1504	1532	-	1508	1224	294
	Spring	Jumbo	-	-	-	1764	-	2104	1817	2375	-	2437	2232	80
	Spring	Number 2	-	539	681	-	-	-	-	-	-	-	546	38
	Summer	Number 1	-	668	980	1030	1099	1117	-	1097	-	-	1024	19
	Fall	Number 1	331	1025	1278	1391	2241	1516	1128	1830	2397	2105	1317	200
	Fall	Jumbo	-	-	1335	1961	1802	-	-	2300	-	3071	2243	39
	Fall	Whitegill	-	1172	1338	1663	-	1498	-	1678	-	-	1559	20
OE-2	Spring	Number 1	-	647	1202	1443	1838	1655	1400	2052	-	1467	1386	287
	Spring	Jumbo	-	-	-	2235	-	-	-	2736	2598	2610	2698	20
	Spring	Whitegill	-	-	1106	1491	-	2286	-	-	-	-	1454	20
	Summer	Number 1	-	868	1115	1259	1292	1331	-	1526	-	1470	1177	76
	Summer	Jumbo	-	-	-	-	2186	-	1985	2163	-	1984	2129	20
	Summer	Whitegill	-	816	1188	1249	-	1339	-	1468	-	1976	1234	57
	Fall	Number 1	455	938	1330	1586	1168	2109	1535	1892	-	1107	1190	110
OE-3	Spring	Number 1	-	-	1176	1575	1434	1539	1829	1738	1684	-	1611	57
	Spring	Jumbo	-	-	1448	1750	1611	2063	2858	2566	2895	2830	2414	157
	Summer	Number 1	-	918	1054	1467	1681	1921	1733	2046	-	1925	1594	60
	Summer	Jumbo	-	-	-	1731	1655	2097	2044	2295	2656	2697	2203	96
	Fall	Jumbo	-	-	1422	1747	-	2417	2501	3354	3059	2788	2396	39
OE-4	Summer	Jumbo	-	-	-	-	2397	-	2549	2810	2882	3064	2903	19
OE-5	Spring	Number 1	-	-	-	1143	1408	1552	1356	1738	1413	1840	1544	40
	Spring	Jumbo	-	-	-	1272	1578	1959	1378	2717	2443	2688	2215	40
	Summer	Number 1	-	-	1280	1426	1747	1560	1869	1946	1473	1719	1610	58
	Summer	Jumbo	-	-	-	1906	2107	2149	2034	2402	2647	3128	2577	78

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

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

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

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

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

Table 2.1.7 White bass year class composition and average total length (mm) from Lake Erie commercial catch samples from large mesh (≥ 76 mm) gill nets for marketable fish by statistical district and season, 2011. n is sample size, sexes combined.

Stat. Dist.	Season*	Year Class and Age										All Ages	
		2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	Average	n
		1	2	3	4	5	6	7	8	9	10+		
Age Group Composition (%) **													
OE-1	Spring	-	3	70	8	5	8	8	-	-	-	3.7	40
	Fall	4	17	39	29	1	9	-	-	-	-	3.3	76
OE-2	Spring	5	20	45	10	8	13	-	-	-	-	3.3	40
	Summer	3	20	54	15	3	4	1	-	-	-	3.1	117
OE-3	Spring	-	-	55	20	5	18	3	-	-	-	3.9	40
Mean Total Length (mm)													
OE-1	Spring	-	278	319	333	351	375	387	-	-	-	330	40
	Fall	280	314	342	350	347	365	-	-	-	-	339	76
OE-2	Spring	257	270	310	313	357	364	-	-	-	-	310	40
	Summer	273	313	334	353	354	358	401	-	-	-	333	117
OE-3	Spring	-	-	331	343	355	355	386	-	-	-	340	40

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

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

Table 2.1.8 White perch year class composition and average total length (mm) from Lake Erie commercial catch samples from large mesh (≥ 76 mm) gill nets for marketable fish by statistical district and season, 2011. n is sample size, sexes combined.

Stat. Dist.	Season*	Year Class and Age										All Ages	
		2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	Average	n
		1	2	3	4	5	6	7	8	9	10+		
Age Group Composition (%)**													
OE-1	Spring	-	-	-	18	10	54	18	-	-	-	5.7	39
OE-1	Fall	-	-	13	45	10	25	8	-	-	-	4.7	40
OE-2	Spring	-	1	22	58	8	9	-	3	-	-	4.1	79
OE-2	Summer	-	-	19	49	9	21	-	3	-	-	4.4	68
Mean Total Length (mm)													
OE-1	Spring	-	-	-	255	271	271	273	-	-	-	268	39
OE-1	Fall	-	-	242	265	293	284	300	-	-	-	272	40
OE-2	Spring	-	187	219	234	258	269	-	279	-	-	237	79
OE-2	Summer	-	-	236	250	264	277	-	294	-	-	255	68

* 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 ($\geq 76\text{mm}$) gill nets by statistical district and season, 2011. n is sample size, sexes combined.

Stat. Dist.	Season*	Year Class and Age										All Ages	
		2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	Average	n
		1	2	3	4	5	6	7	8	9	10+		
Age Group Composition (%)**													
OE-1	Fall	-	-	-	1	-	14	2	63	3	18	8.1	120
OE-2	Spring	-	-	-	-	-	23	3	63	-	13	7.8	40
	Fall	-	-	-	-	-	30	10	55	-	5	7.4	20
OE-5	Summer	-	-	-	-	8	15	13	56	3	5	7.5	39
Mean Total Length (mm)													
OE-1	Fall	-	-	-	501	-	532	562	563	554	600	564	120
OE-2	Spring	-	-	-	-	-	521	523	538	-	588	540	40
	Fall	-	-	-	-	-	546	575	572	-	606	566	20
OE-5	Summer	-	-	-	-	518	530	550	554	597	592	550	39
Mean Round Weight (g)													
OE-1	Fall	-	-	-	1398	-	1639	1959	1959	1753	2475	1992	120
OE-2	Spring	-	-	-	-	-	1444	1270	1683	-	2018	1661	40
	Fall	-	-	-	-	-	1782	2136	2111	-	2372	2028	20
OE-5	Summer	-	-	-	-	1611	1829	1988	2035	2321	2614	2002	39

* 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 (0.54%) by weight of the total annual commercial harvest landed in Ontario waters of Lake Erie. In 2011, total commercial landings were 117,598 pounds (Table 2.2.1). Of this value, live fish accounted for 81%. The value of the total commercial landings in 2011 was \$129,212, 0.45% of the total value of the commercial fishery in Ontario waters of Lake Erie (Table 2.2.1).

Yellow Perch

In 2011, the total landing of yellow perch was 18,161 pounds. The Inner Bay commercial fishery harvested 68% of their allocated quota in 2011. The majority of yellow perch (90%) were caught in the spring (April and May combined). The landed value of yellow perch in 2011 was \$37,447.

Northern Pike

In 2011, the total landing of Northern pike was 14,125 pounds. The Inner Bay commercial fishery harvested 52% of their allocated quota in 2011. The majority of northern pike (64%) were caught in the spring (April and May combined) and (32%) winter (March). The landed value of northern pike in 2011 was \$6,410.

Table 2.2.1 Total annual commercial fishery landings (landed weight in pounds) and value dollars by fish species for Inner Long Point Bay, 2011.

Species	Total Landing ^a	Total Value
Bowfin	27,328	32,303
Brown bullhead	23,509	10,029
Carp	7,338	2,718
Freshwater drum	126	29
Lepomis spp	16,212	26,250
Mudpuppy	4,355	4,165
Northern pike	14,125	6,410
Rock bass	4,608	5,295
White perch	355	226
Yellow perch	18,161	37,447
Mixed	1,481	4,341
Total Landing (lbs.)	117,598	
Total Value (\$)		129,212

^a Only Inner Long Point Bay.

3. SPORT FISHERY

Lake Erie Angler Diary Program

The Lake Erie Sport Fishery Diary Program is an ongoing survey that allows the Lake Erie Management Unit to track general trends in catch rates and angler activity targeting a variety of fish species. Each year diarists participate in the program by filling out diaries recording fishing activity and catch. Other information such as fish health, unusual sightings of exotic species and fish disease is also recorded in the diary.

The Lake Erie Sport Fishery Diary Program entered its 28th year in 2011. The survey area covered is illustrated in Figure 3.1. In this program volunteer anglers complete a page in a diary for each trip taken. Fishing location, fishing duration, numbers of fish kept and released and biological information are also recorded. Participants are updated on diary results through a series of Angler Outreach public presentations as well as reports describing individual and combined performance.

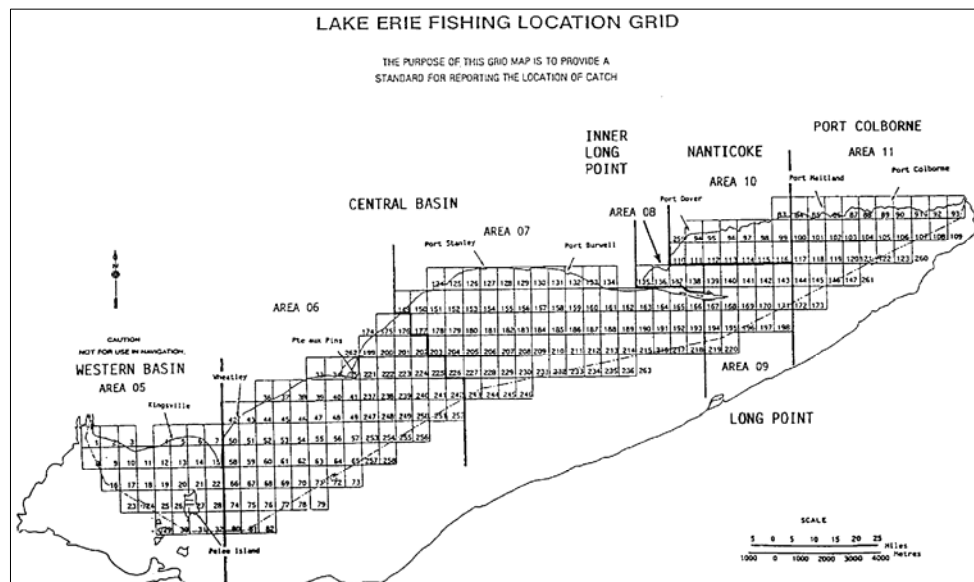


Figure 3.1 Lake Erie Sport Fishery Diary Survey Areas, 2011.

In 2011, 74 volunteers completed diaries. There were fourteen more participants than in 2010. Of these volunteers, 58 (78%) have been participating in the program for three years or more. Forty-seven participants (64%) have been involved in the program for twelve years or more and 22 participants (30%) have been involved in the program for twenty or more years. Results of the report are limited to non-charter boat anglers due to the small sample size of charter boat operator participants.

In the Sport Fishery Diary Program, Lake Erie is divided into seven areas, western basin (area 05), west-central basin (area 06), east-central basin (area 07), Inner Long Point Bay (area 08), Long Point Bay (area 09), Nanticoke (area 10) and Port Colborne (area 11). Angler catches are reported by 5 minute grid location within these areas (Figure 3.1).

Total diarist effort and catch for each area is presented in Tables 3.1, 3.2 and 3.3. Observed catch rates of selected preferred species by area, for the years 1990 to 2011, are presented in Tables 3.4, 3.5, 3.6 and 3.7. Effort may be directed at multiple species simultaneously, therefore, the percentages of annual effort directed at species may total more than 100% in figures 3.2 to 3.10.

Western Basin

Sixty-three percent of diary participant effort in the western basin was directed towards walleye, while 40% was directed towards yellow perch (Table 3.4). Walleye and yellow perch were the main species sought by diarists in the western basin during the 2011 season (Table 3.4).

The proportion of effort directed at yellow perch increased in 2011 (Figure 3.2). Yellow perch catch rates increased from 6.0 fish per rod hour in 2010 to 6.2 in 2011 (Table 3.4).

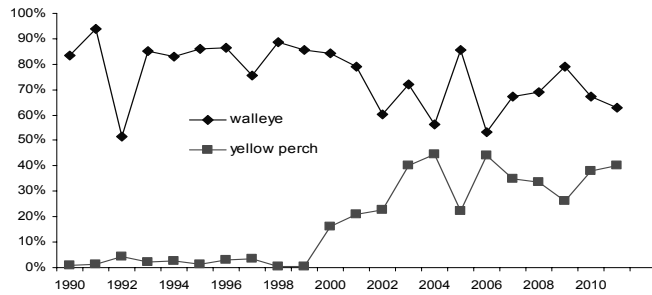


Figure 3.2 Western Basin Angler Percent Area Effort, L. Erie, Sport Diary Program, 1990-2011

The percentage of diarist effort directed at walleye decreased in 2011 (Figure 3.2). Walleye catch rates increased from 0.340 fish per rod hour in 2010 to 0.397 in 2011 (Table 3.4).

Diary participants submitted 3 walleye scale samples and 67 total lengths from their catches in the western basin. This was insufficient data to calculate age group composition of the catch. The mean total length was 23.3 inches (59.2 cm, 67 fish).

Diary participants submitted 13 yellow perch scale samples and 753 total lengths from their catches in the western basin. This was insufficient data to calculate age group composition of the catch. The mean total length was 8.8 inches (22.4 cm, 753 fish).

West-Central Basin

The majority of angling effort recorded by diarists in the west-central basin was directed towards rainbow trout (85%), walleye (80%) and yellow perch (9%), (Table 3.5). Rainbow trout and walleye effort were similar to last three years. Rainbow trout and walleye are often targeted simultaneously. Yellow perch percentage of angler effort had been increasing since 2006 but decreased in 2010 and 2011 (Figure 3.3).

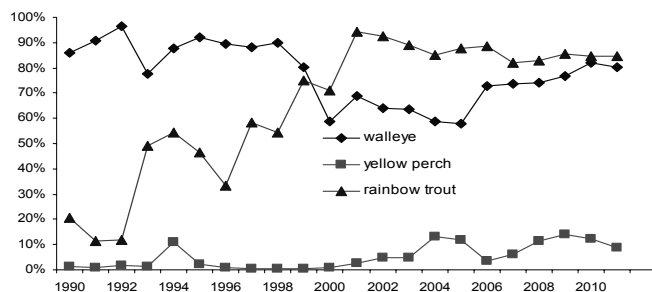


Figure 3.3 West-Central Basin Angler Percent Area Effort, L. Erie, Sport Diary Program, 1990-2011

In 2011 catch rates for walleye increased by 128%, rainbow trout decreased 30% and yellow perch increased 16% (Table 3.5).

East-Central Basin

The majority of the diary angling effort in the east-central basin was directed towards walleye (70%), rainbow trout (58%) and yellow perch (30%), (Table 3.5). Walleye and rainbow trout percentage of angler effort had been following a similar trend since 1998. Both walleye and rainbow trout increased in 2011. The fraction of effort directed at

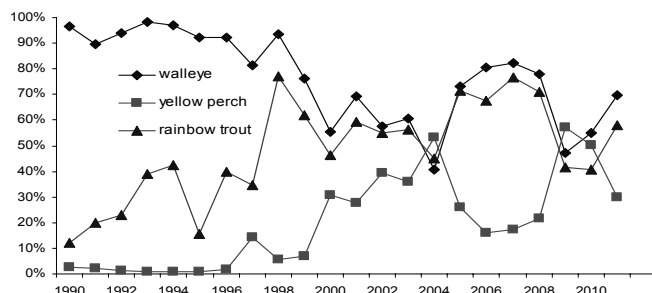


Figure 3.4 East-Central Basin Angler Percent Area Effort, L. Erie, Sport Diary Program, 1990-2011

yellow perch continued to decrease in 2011 (Figure 3.4).

Walleye catch rates decreased by 14% in 2011 (Table 3.5). Rainbow trout catch rates decreased by 24% in 2011. Yellow perch catch rates increased by 73% in 2011.

Central Basin

(West-Central and East-Central Basins Combined)

Diary participants submitted 65 walleye scale samples and 251 total lengths from their catches in the central basin for 2011. All fish were combined in a Length Age Composition Key (L.A.C.K.) for age distribution. The mean age was 6.19 and the mean total length was 58.2 cm (22.9 inches). Age 3 (2008 year class) represented 13%, age 4 (2007 year class) represented 14% and age 8 (2003 year class) represented 22% of sampled fish from the central basin of Lake Erie, (Figure 3.5).

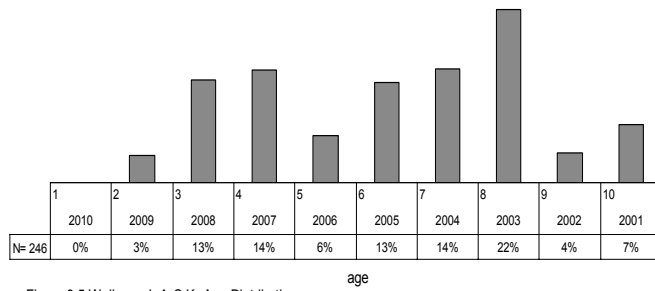


Figure 3.5 Walleye - L.A.C.K. Age Distribution
Central Basin, L. Erie Sport Diary, 2011

Diary participants submitted 15 rainbow trout scale samples and 134 total lengths from their catches in the central basin. The mean total length was 25.2 inches (64.0 cm, 134 fish).

Eighty-five yellow perch scale samples and 430 total lengths were submitted. All fish were combined in a L.A.C.K. for age distribution. The mean age was 4.7 and the mean total length was 22.8 cm (9.0 inches). Age 4 (2007 year class) represented 49% of the fish caught, age 5 (2006 year class) represented 16% of sampled fish from the central basin of Lake Erie, (Figure 3.6).

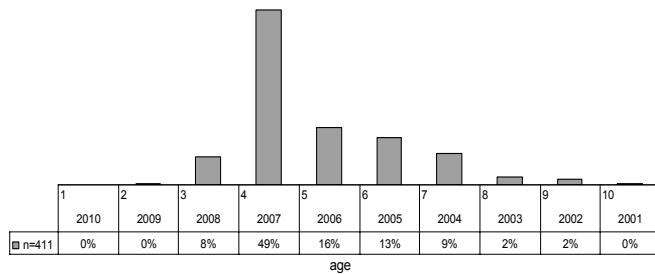


Figure 3.6 Y Perch - L.A.C.K. Age Distribution,
Central Basin, L. Erie Sport Diary Program, 2011

Inner Long Point Bay

The majority of diary angling effort in the Inner Long Point Bay was directed towards smallmouth bass (64%), yellow perch (38%), largemouth bass (17%), and northern pike (2%), (Table 3.6).

Smallmouth and largemouth bass percent angler effort increased in 2011, while yellow perch and northern pike percent angler effort decreased (Figure 3.7).

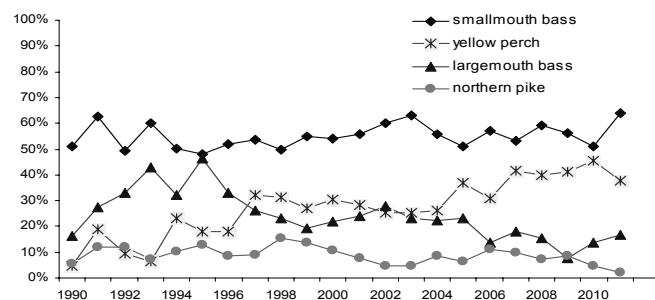


Figure 3.7 Inner Long Point Bay Angler Percent Area Effort,
L. Erie, Sport Diary Program, 1990-2011

The 2011 smallmouth bass catch rates increased 31% from those in 2010 (Table 3.5). Yellow perch 2011 catch rates decreased by 20% from 2010. Largemouth bass 2011 catch rates decreased by 26% from those in 2010. Northern pike catch rates increased by 54% from those in 2010 (Table 3.6).

Long Point Bay

The majority of diary angling effort in Long Point Bay was directed at northern pike (68%), and smallmouth bass (30%), (Table 3.6). Rainbow trout and walleye were not sought in 2011, while preference for smallmouth bass decreased and northern pike has increased since 2005 (Figure 3.8).

Smallmouth bass catch rates increased by 54% from those in 2010. Northern pike catch rates decreased 26% from 2010 (Table 3.6).

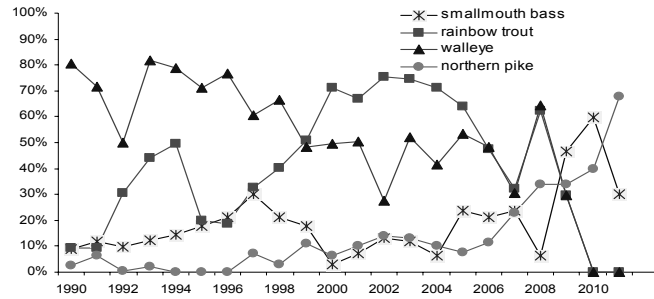


Figure 3.8 Long Point Bay Angler Percent Area Effort, L. Erie, Sport Diary Program, 1990-2011

Nanticoke

The majority of angler diary effort in Nanticoke was directed towards yellow perch (89%), smallmouth bass (17%) and walleye and rainbow trout (2% each), (Table 3.7). Yellow perch and smallmouth bass angler preference increased from 2010. Walleye angler preference has decreased (Figure 3.9).

Yellow perch catch rates increased by 4% from those in 2010, while smallmouth bass decreased by 60%. Walleye catch rates increased 41% from those in, (Table 3.7).

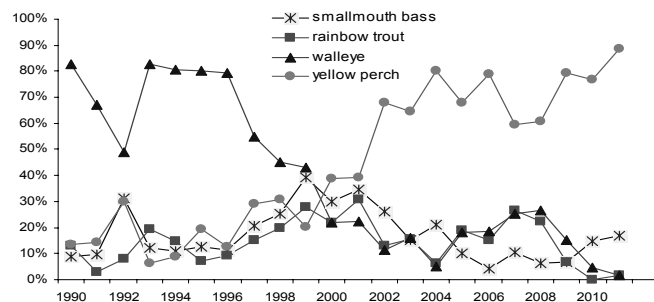


Figure 3.9 Nanticoke Angler Percent Area Effort, L. Erie, Sport Diary Program, 1990-2011

Port Colborne

The majority of diary angling effort in the Port Colborne area continued to be directed towards walleye (78%), while smallmouth bass (6%) and yellow perch (22%) were the next most sought species in this area (Table 3.7). Angler effort increased for walleye. Yellow perch and smallmouth bass switched positions from reported angler preference in 2010 (Figure 3.10).

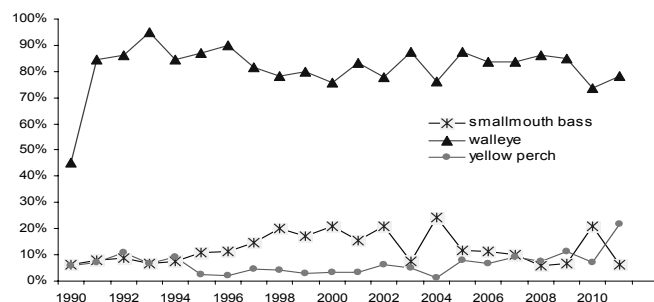


Figure 3.10 Port Colborne Angler Percent Area Effort, L. Erie, Sport Diary Program, 1990-2011

Walleye catch rates increased by .551 fish per rod hour or 176% from the observed catch rate in 2010 (Table 3.7). Smallmouth bass catch rates increased by 267% from those in 2010. Yellow perch catch rates increased by 99% from those in 2010.

*Eastern Basin**(Inner Long Point Bay, Long Point Bay, Nanticoke and Port Colborne Combined)*

Diary participants submitted 8 walleye scale samples and 61 total lengths from their catches in the eastern basin. The mean total length was 18.9 inches (48.8 cm, 61 fish).

Diary participants submitted 2 smallmouth bass scale samples and 92 total lengths from their catches in the east basin. The mean total length was 13.8 inches (35.5cm, 92 fish).

Diary participants submitted 2 yellow perch scale samples and 298 total lengths from their catches in the east basin. The mean total length was 9.0 inches (22.9 cm, 297 fish).

Table 3.1 Total effort by survey area, reported by Sport Fishery Diary Program non-charter boat participants, 2011.

Survey Area	Number of Diarists	Number of Trips	Number of Rods per Trip	Total Rod Hours
Western Basin	18	99	3.3	1,506
West Central Basin	29	148	5.1	3,937
East Central Basin	20	120	4.3	2,479
Inner Long Point Bay	23	152	2.8	1,538
Long Point Bay	4	17	2.8	139
Nanticoke	11	84	2.2	659
Port Colborne	12	76	3.3	1,202
Total	74^a	696	3.6	11,459

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

Table 3.2 Total effort by survey area, reported by Sport Fishery Diary Program non-charter boat participants, 1986-2011.

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	23	148	3,937	20	120	2,479	23	152	1,538
90-11 Avg.	26	160	1,724	34	242	4,625	33	220	3,314	49	292	2,988

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
90-11 Avg.	29	134	1,823	32	212	2,013	27	251	3,941	140	1,511	20,427

Table 3.3 Total catch and harvest reported by sport fishery diary non-charter boat participants, Lake Erie Sport Fishery Diary Program, 2011.

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	-
Coho salmon	-	-	1	1	-	-	-	-	-	-	-	-	-	-	1	1
Chinook salmon	-	-	-	-	1	1	-	-	-	-	-	-	-	-	1	1
Rainbow trout	-	-	444	388	95	95	-	-	-	-	-	-	-	-	539	483
Brown trout	1	1	-	-	-	-	-	-	-	-	-	-	-	-	1	1
Lake trout	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-
Northern pike	-	-	3	-	-	-	53	16	73	27	-	-	-	-	129	43
Muskellunge	1	-	-	-	-	-	1	-	-	-	-	-	-	-	2	-
Channel catfish	7	3	-	-	4	3	4	-	-	-	-	-	4	-	19	6
White perch	205	26	50	1	-	-	-	-	-	-	1	-	33	-	289	27
White bass	265	1	34	3	6	-	-	-	-	-	1	-	16	-	322	4
Rock bass	-	-	-	-	-	-	222	24	5	-	197	16	3	-	427	40
Pumpkinseed	-	-	-	-	-	-	17	1	-	-	54	-	-	-	71	1
Bluegill	-	-	-	-	-	-	13	-	-	-	44	1	-	-	57	1
Smallmouth bass	12	-	1	-	19	15	1,169	718	119	98	109	15	108	17	1,537	863
Largemouth bass	-	-	47	4	-	-	320	50	-	-	13	-	-	-	380	54
Yellow perch	3,826	2,752	1,808	1,335	4,965	3,824	3,635	1,982	35	23	1,963	1,394	1,136	1,009	17,368	12,319
Walleye	377	325	391	361	337	335	-	-	-	-	2	1	174	164	1,281	1,186
Round goby	32	23	34	17	189	44	-	-	-	-	33	6	48	18	336	108
Freshwater drum	261	-	343	10	83	-	26	-	1	-	5	-	51	-	770	10
Total	4,987	3,131	3,156	2,120	5,699	4,317	5,461	2,791	233	148	2,422	1,433	1,574	1,208	23,532	15,148

Table 3.4 Angler success rates (CPUE) of non-charter boat anglers targeting particular species, western basin survey area, Lake Erie, 1990-2011^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%
90-11 Avg.	1,657	120	1,251	0.511	75%	27	278	4.458	12%

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

Table 3.5 Angler success rates (CPUE) of non-charter boat anglers targeting particular species, west-central and east-central basins survey areas, Lake Erie, 1990-2011^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				Coho			
		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	5,020	328	4,326	0.642	86%	54	1,031	0.010	21%	11	59	0.659	1%	154	2,274	0.013	45%
1991	3,841	287	3,488	0.366	91%	26	441	0.032	11%	4	27	0.679	1%	146	1,854	0.002	48%
1992	6,104	410	5,886	0.501	96%	54	733	0.056	12%	10	96	0.385	2%	183	2,945	0.010	48%
1993	6,537	395	5,081	0.308	78%	231	3,217	0.118	49%	14	94	1.521	1%	146	2,112	0.028	32%
1994	4,190	279	3,670	0.373	88%	172	2,271	0.086	54%	20	466	2.923	11%	69	922	0.007	22%
1995	6,248	348	5,768	0.215	92%	150	2,893	0.055	46%	11	130	6.243	2%	74	1,223	0.001	20%
1996	6,200	244	5,543	0.213	89%	89	2,070	0.049	33%	6	50	5.500	1%	29	611	0.010	10%
1997	6,691	201	5,912	0.077	88%	122	3,909	0.083	58%	4	36	9.103	1%	45	1,229	0.018	18%
1998	5,879	224	5,298	0.076	90%	138	3,191	0.117	54%	4	18	3.611	0%	52	1,172	0.012	20%
1999	4,826	146	3,865	0.033	80%	140	3,611	0.110	75%	2	20	11.150	0%	46	1,363	0.021	28%
2000	4,251	124	2,498	0.011	59%	154	3,013	0.308	71%	5	46	2.863	1%	75	1,575	0.028	37%
2001	3,769	82	2,596	0.016	69%	131	3,554	0.136	94%	9	99	5.088	3%	0	0	0.000	0%
2002	2,594	75	1,656	0.013	64%	121	2,402	0.275	93%	14	126	3.852	5%	3	88	0.182	3%
2003	3,690	126	2,343	0.046	63%	161	3,288	0.234	89%	16	186	4.047	5%	1	29	0.175	1%
2004	3,322	74	1,951	0.037	59%	118	2,827	0.187	85%	37	442	6.117	13%	2	92	0.043	3%
2005	4,351	86	2,525	0.069	58%	132	3,812	0.185	88%	38	520	4.215	12%	0	0	0.000	0%
2006	4,207	91	3,058	0.215	73%	118	3,733	0.200	89%	9	145	5.253	3%	0	0	0.000	0%
2007	4,374	95	3,220	0.149	74%	106	3,578	0.220	82%	30	274	7.935	6%	0	0	0.000	0%
2008	3,799	98	2,814	0.160	74%	110	3,149	0.254	83%	48	433	7.277	11%	0	0	0.000	0%
2009	3,322	74	2,553	0.071	77%	85	2,841	0.132	86%	46	466	2.088	14%	0	0	0.000	0%
2010	2,990	74	2,451	0.053	82%	75	2,528	0.243	85%	40	370	4.464	12%	0	0	0.000	0%
2011	3,937	98	3,163	0.121	80%	100	3,337	0.132	85%	33	347	5.202	9%	0	0	0.000	0%
90-11 Avg.	4,552	180	3,621	0.171	78%	118	2,792	0.146	66%	19	202	4.553	5%	47	795	0.025	15%

East-Central Basin (Area 07)																	
Year	Total Rod Hours	Walleye				Rainbow Trout				Yellow Perch				Coho			
		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	4,195	385	4,045	0.559	96%	40	517	0.006	12%	11	110	1.091	3%	83	938	0.016	22%
1991	5,719	415	5,133	0.367	90%	88	1,138	0.090	20%	8	134	2.111	2%	104	1,288	0.026	23%
1992	5,070	358	4,757	0.410	94%	70	1,169	0.023	23%	12	77	0.978	2%	91	1,233	0.023	24%
1993	4,995	396	4,912	0.304	98%	153	1,945	0.055	39%	7	44	0.182	1%	126	1,391	0.017	28%
1994	3,583	310	3,475	0.309	97%	131	1,521	0.007	42%	2	37	0.270	1%	67	892	0.000	25%
1995	2,762	249	2,547	0.326	92%	39	426	0.068	15%	5	27	5.704	1%	31	349	0.017	13%
1996	3,100	190	2,853	0.176	92%	72	1,231	0.059	40%	9	57	1.035	2%	29	444	0.009	14%
1997	3,573	143	2,902	0.115	81%	54	1,241	0.088	35%	69	514	3.426	14%	21	410	0.005	11%
1998	2,953	138	2,767	0.088	94%	103	2,278	0.119	77%	24	161	0.567	5%	44	774	0.001	26%
1999	3,708	133	2,825	0.069	76%	97	2,302	0.135	62%	38	252	2.803	7%	39	864	0.013	23%
2000	1,522	52	840	0.037	55%	41	708	0.072	47%	61	470	5.291	31%	12	226	0.004	15%
2001	2,457	67	1,697	0.048	69%	58	1,455	0.056	59%	70	684	4.199	28%	8	76	0.026	3%
2002	2,108	55	1,217	0.061	58%	52	1,160	0.109	55%	91	828	4.101	39%	0	0	0.000	0%
2003	2,190	65	1,329	0.110	61%	55	1,231	0.068	56%	71	784	1.534	36%	0	0	0.000	0%
2004	1,556	38	632	0.019	41%	40	698	0.119	45%	66	831	2.475	53%	0	0	0.000	0%
2005	3,669	109	2,688	0.116	73%	101	2,617	0.123	71%	76	957	2.829	26%	1	57	0.035	2%
2006	3,803	124	3,054	0.262	80%	100	2,571	0.072	68%	47	615	3.221	16%	1	27	0.037	1%
2007	3,960	115	3,255	0.170	82%	107	3,040	0.116	77%	48	680	3.722	17%	0	0	0.000	0%
2008	2,697	81	2,102	0.186	78%	72	1,913	0.056	71%	33	583	4.431	22%	0	0	0.000	0%
2009	2,198	40	1,041	0.123	47%	34	912	0.115	41%	69	1,253	7.683	57%	0	0	0.000	0%
2010	2,561	53	1,406	0.228	55%	40	1,044	0.083	41%	66	1,287	3.856	50%	0	0	0.000	0%
2011	2,479	64	1,731	0.195	70%	52	1,438	0.063	58%	54	740	6.699	30%	0	0	0.000	0%
90-11 Avg.	3,221	163	2,600	0.194	76%	73	1,480	0.077	48%	43	506	3.100	20%	30	408	0.010	10%

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

Table 3.6 Angler success rates (CPUE) of non-charter boat anglers targeting particular species, Inner Long Point Bay and Long Point Bay survey areas, Lake Erie, 1990-2011^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%
90-11 Avg.	2,979	145	1,609	0.821	55%	73	744	4.966	27%	23	782	1.123	24%	29	286	0.390	9%

Long Point Bay (Area 09)																	
Year	Total Rod Hours	Rainbow Trout				Walleye				Northern Pike				Smallmouth Bass			
		Trips	Rod Hours	CPUE	% Total Effort	Trips	Rod Hours	CPUE	% Total Effort	Trips	Rod Hours	CPUE	% Total Effort	Trips	Rod Hours	CPUE	% Total Effort
1990	4,304	22	397	0.048	9%	265	3,456	0.205	80%	9	101	0.446	2%	32	381	0.855	9%
1991	2,793	22	266	0.098	10%	160	2,005	0.125	72%	13	174	0.189	6%	28	330	1.074	12%
1992	3,829	89	1,170	0.143	31%	141	1,909	0.046	50%	2	9	0.000	0%	28	380	0.708	10%
1993	3,685	113	1,631	0.072	44%	222	3,006	0.164	82%	6	76	0.132	2%	47	450	1.044	12%
1994	2,005	70	997	0.022	50%	112	1,581	0.089	79%	0	0	0.000	0%	29	293	1.453	15%
1995	1,949	24	390	0.067	20%	87	1,389	0.086	71%	0	0	0.000	0%	31	345	1.216	18%
1996	1,713	20	321	0.044	19%	78	1,316	0.105	77%	0	0	0.000	0%	43	361	1.528	21%
1997	1,642	24	536	0.030	33%	49	998	0.028	61%	11	116	0.586	7%	39	492	1.229	30%
1998	2,776	61	1,114	0.069	40%	101	1,849	0.051	67%	9	83	0.545	3%	40	586	0.843	21%
1999	2,008	65	1,021	0.094	51%	56	974	0.024	49%	16	224	0.869	11%	28	357	1.150	18%
2000	2,313	100	1,647	0.241	71%	73	1,148	0.017	50%	16	144	3.395	6%	8	70	0.892	3%
2001	1,791	82	1,196	0.135	67%	56	903	0.050	50%	22	182	2.764	10%	11	128	0.476	7%
2002	1,531	87	1,157	0.079	76%	35	424	0.012	28%	20	217	0.661	14%	20	200	0.802	13%
2003	979	50	729	0.064	74%	34	509	0.016	52%	16	130	0.559	13%	12	118	0.834	12%
2004	818	40	583	0.067	71%	24	338	0.012	41%	10	82	0.540	10%	8	53	1.258	7%
2005	1,030	50	658	0.059	64%	41	548	0.055	53%	8	77	0.506	7%	20	244	0.775	24%
2006	644	18	306	0.095	47%	17	310	0.132	48%	8	74	0.952	11%	16	136	1.547	21%
2007	363	8	117	0.232	32%	6	112	0.099	31%	8	84	1.485	23%	9	86	1.291	24%
2008	463	17	290	0.007	62%	15	298	0.024	64%	26	157	0.712	34%	4	29	0.655	6%
2009	390	6	115	0.000	29%	6	115	0.000	29%	11	133	0.278	34%	16	181	0.838	46%
2010	265	0	0	0.000	0%	0	0	0.000	0%	10	106	1.349	40%	12	159	1.279	60%
2011	139	0	0	0.000	0%	0	0	0.000	0%	9	94	0.786	68%	7	42	2.583	30%
90-11 Avg.	1,701	44	665	0.076	41%	72	1,054	0.061	52%	10	103	0.762	14%	22	246	1.106	19%

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

Table 3.7 Angler success rates (CPUE) of non-charter boat anglers targeting particular species, Nanticoke and Port Colborne survey areas, Lake Erie, 1990-2011^a. Effort may be directed at more than one species simultaneously.

Nanticoke (Area 10)																	
Year	Total Rod Hours	Yellow Perch				Walleye				Rainbow Trout				Smallmouth Bass			
		Trips	Rod Hours	CPUE	% Total Effort	Trips	Rod Hours	CPUE	% Total Effort	Trips	Rod Hours	CPUE	% Total Effort	Trips	Rod Hours	CPUE	% Total Effort
1990	4,123	101	548	6.812	13%	292	3,412	0.336	83%	42	534	0.021	13%	49	357	0.745	9%
1991	3,424	62	491	4.792	14%	213	2,301	0.169	67%	11	106	0.095	3%	55	330	1.011	10%
1992	2,769	98	824	2.445	30%	155	1,359	0.098	49%	24	225	0.111	8%	116	863	1.242	31%
1993	3,698	34	232	2.660	6%	270	3,062	0.229	83%	61	720	0.071	19%	54	455	1.019	12%
1994	3,201	48	288	3.824	9%	196	2,585	0.170	81%	51	476	0.013	15%	46	348	0.844	11%
1995	1,737	57	338	5.546	19%	118	1,395	0.166	80%	7	123	0.016	7%	27	221	0.862	13%
1996	3,164	71	405	4.581	13%	155	2,513	0.144	79%	28	288	0.076	9%	32	366	0.604	12%
1997	2,683	96	778	3.082	29%	91	1,476	0.041	55%	29	405	0.027	15%	55	552	1.052	21%
1998	1,846	93	571	3.641	31%	68	836	0.059	45%	34	367	0.037	20%	54	465	1.273	25%
1999	1,765	70	354	5.601	20%	62	760	0.043	43%	35	488	0.044	28%	73	696	1.495	39%
2000	1,534	91	593	6.945	39%	27	337	0.012	22%	30	339	0.121	22%	54	458	2.900	30%
2001	1,195	67	469	4.584	39%	33	269	0.007	23%	39	368	0.076	31%	49	413	2.091	35%
2002	1,329	116	901	4.849	68%	20	152	0.000	11%	23	176	0.079	13%	24	345	1.115	26%
2003	1,603	118	1,032	4.247	64%	18	257	0.047	16%	19	251	0.064	16%	22	245	1.806	15%
2004	1,298	129	1,041	4.714	80%	4	64	0.016	5%	7	80	0.075	6%	29	273	1.504	21%
2005	1,634	140	1,107	4.093	68%	21	296	0.034	18%	26	313	0.086	19%	18	165	1.706	10%
2006	1,020	108	804	4.959	79%	14	188	0.069	18%	11	156	0.019	15%	6	44	1.545	4%
2007	1,080	90	644	3.893	60%	20	272	0.048	25%	23	287	0.153	27%	12	114	1.982	11%
2008	834	68	507	4.467	61%	13	223	0.130	27%	11	187	0.048	22%	7	53	2.110	6%
2009	1,070	119	847	5.074	79%	9	163	0.012	15%	5	74	0.054	7%	10	72	1.437	7%
2010	757	87	582	3.235	77%	3	34	0.059	4%	0	0	0.000	0%	15	113	1.113	15%
2011	659	77	584	3.361	89%	1	12	0.083	2%	1	12	0.000	2%	12	110	0.444	17%
90-11 Avg.	1,928	88	634	4.428	45%	82	998	0.090	39%	24	272	0.058	14%	37	321	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%
90-11 Avg.	3,883	165	3,163	0.160	81%	52	516	1.021	12%	26	211	1.654	7%

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

4. INDEX FISHING PROJECTS

4.1 Partnership Index Fishing: Gill Netting

Partnership index gill netting is a cooperative fisheries assessment program with the Ontario Commercial Fisheries' Association (OCFA). It is funded primarily through the Commercial Fish Business Relationship (CFBR) between the province of Ontario and the OCFA. Initially the program relied exclusively on volunteer participation from the fishing industry to complete the field component up until 1997. This program has monitored abundance, age structure, size and species composition throughout Lake Erie since 1989. This community index is applied in catch-at-age analyses for estimating population abundance of yellow perch and walleye.

The lakewide survey was partitioned spatially into projects defined as the west, west-central, east-central, Pennsylvania Ridge, and eastern basins. In 2011, a total of 143 sites were fished across Lake Erie (Figure 4.1.1). In addition to randomly assigned east basin sites, nine (9) extra random sites were fished east of 79° 40' (referred to as the *walleye cap area*) to ensure that a minimum of 20 sites were fished in this area to monitor the effectiveness of management efforts. The vessel that conducted the field work in 2011 was equipped with a GPS transponder allowing verification of coordinates fished. Since 2003, gill nets 110 feet in length with a mesh size of 4.75" (121 mm), 50 meshes deep were fished canned (suspended) at the same depths as canned index nets to examine the effectiveness of index gear catching suspended walleye. These nets were approximately 17 feet deep with 3.1 times the area of the 50' index nets. Mean walleye catch and size distributions in 2011 are presented for index and auxiliary gear. Again in 2011, additional 1 fathom canned index nets were fished at 12 random sites in both the west-central and east-central basin surveys. These shallow suspended gangs were intended to provide additional information describing the vertical distribution of walleye in the central basin.

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

Nets were set at randomly selected locations among depth strata. The number of sites within each stratum was proportional to lake area. Depth strata for the western basin included 0 to 10 m and greater than 10 m. In the west-central and east-central basins, depths were grouped as 0 to 15 m, 15 to 20 m, and greater than 20 m. The eastern basin and Pennsylvania Ridge depth strata were partitioned as 0 to 15 m, 15 to 30 m and depths greater than 30 m. The number of locations fished in the west, west-central, east-central, Pennsylvania Ridge, east, and extra cap area sites were 22, 36, 36, 9, 30, and 9 respectively.

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

In the deeper study areas (Pennsylvania Ridge, and east basin including the Walleye Cap Area), index gear was fished during thermal stratification. The gear was fished in the standard manner with gill nets set on bottom and canned at 2 fathoms (3.7 m), 4 fathoms (7.3 m), or 8 fathoms (14.6 m) at all sites. Additional canned nets were fished in the thermocline in 2011 at sites with depths sufficient for a hypolimnion (cold bottom layer) to exist.

All walleye and yellow perch were scanned for passive integrated transponder (PIT) tags using a Biomark reader with a racket antenna as bags of fish caught in index gear were removed from totes. All fish were identified, counted and weighed "in bulk" by species and mesh size. Biological

sampling for selected species included determination of length, weight, sex, maturity, gonad weight and age. In addition to standard scale sample collection, sagittal otoliths were collected from yellow perch, walleye, burbot, lake whitefish and smallmouth bass greater than 30 cm in length. Otoliths were collected from yellow perch 15 cm and greater in total length caught in bottom nets, while scales were used to age smaller yellow perch. For yellow perch caught in canned nets, scales were used for aging, but otoliths were also collected and aged for fish longer than 250 mm. Otoliths were collected from all walleye 38 cm and larger, and from subsamples of catches of smaller walleye (minimum of 6 per site). Lake trout heads were retained to recover coded wire tags present in stocked lake trout. In 2011, all species were examined for lamprey scars and wounds. Salmonids were examined for the presence of fin clips. Results from surveys include total catches, mean species biomass and age specific information for yellow perch, walleye and lake whitefish. Catch rates presented have not been adjusted for selectivity bias associated with the gang configuration of mesh sizes.

Index fishing began August 30, 2011 in the Pennsylvania Ridge area, progressing eastward until eastern Lake Erie was completed on September 12, 2011. Fishing began in the western basin on September 14, 2011 and was completed by September 20, 2011. Fall turnover occurred after the first week of October, allowing the survey to commence in the west-central basin on October 9. The east-central basin survey was completed by November 2, 2011. Field work was completed lakewide aboard the LR Jackson.

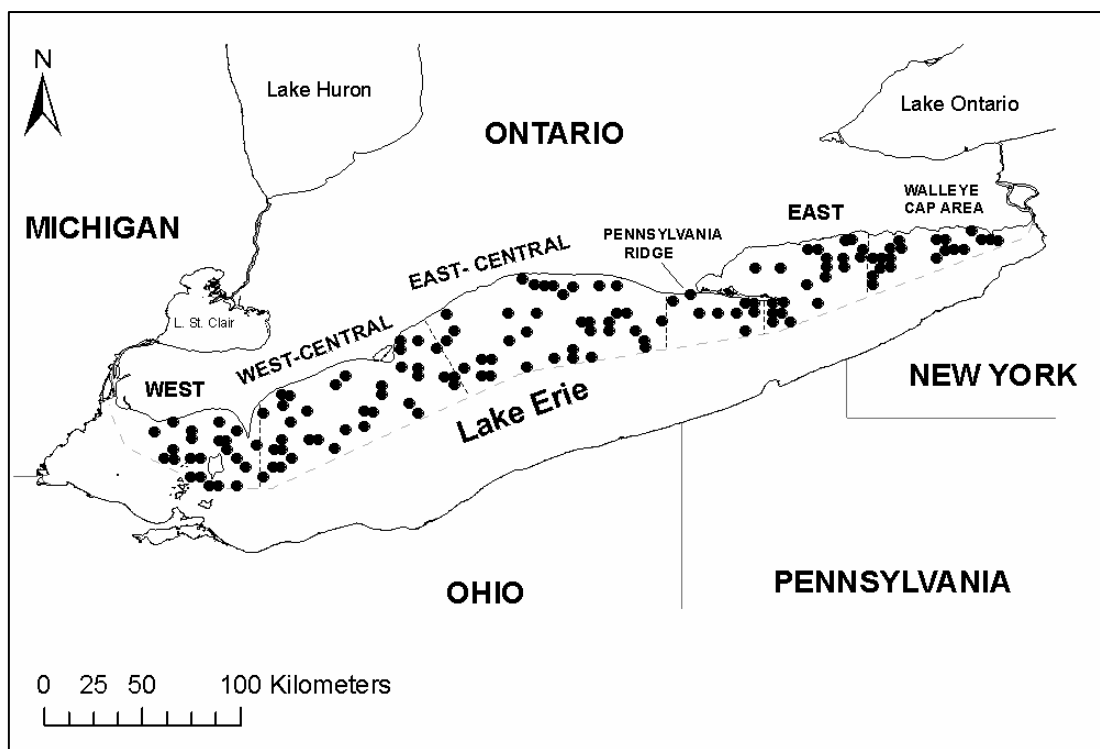


Figure 4.1.1 Lake Erie partnership index gill netting locations (dots) fished by basin in 2011. Note: the walleye cap area is within the east basin survey area.

Results

Fish Community

Catch in numbers by species over the time series is presented for the west, west-central, east-central, Pennsylvania Ridge, east basin and the eastern walleye cap area in Tables 4.1.1 to 4.1.6 respectively. Catches were standardized to an equal number of gangs as specified in Tables 4.1.1 to 4.1.6. The reference number of gangs in this report reflects the target number of gangs as targets have usually been met since the lakewide index fishing tender process began in 1999. Note that results for the walleye cap area (Table 4.1.6) include fish caught in the standard east basin survey (Table 4.1.5) at sites east of 79° 40'.

A total of 135 alewives were caught in the 2011 surveys. Alewives were caught in all surveys except the west-central basin (Tables 4.1.1 - 4.1.6). Tables 4.1.1 to 4.1.5 include only catches in standard canned and bottom nets, whereas some alewives were caught in auxiliary 1 fathom nets in the central basin while others were caught in nets fished within the thermocline in easterly surveys assessed during thermal stratification. With the exception of 2006 surveys in the eastern half of Lake Erie, alewife catches have remained low since 2003. Gizzard shad abundance was below average in surveys except for the west basin and Pennsylvania Ridge surveys (Table 4.1.1 and 4.1.4). In the west basin survey, the 2011 catch rate exceeded 18 of 22 years in the time series, with young-of-the-year representing 69% of the catch. White perch catches in 2011 were above average in all areas of Lake Erie except the east basin survey (Tables 4.1.1 – 4.1.6). The latter observation was due to low densities of white perch between Port Dover and Port Maitland, although 2011 white perch catch rates in the walleye cap area were the highest in the 12 year time series (Table 4.1.6). White bass abundance indices in 2011 were the highest observed in all surveys except for the east basin survey, for which the 2011 index was well above average. White bass catches were dominated by yearlings lakewide. Smallmouth bass are caught primarily in the east and west basin surveys. Smallmouth bass catch rates in 2011 were the lowest recorded in the east basin and walleye cap area surveys and the 4th lowest in the 22 year time series of the west basin survey. Round gobies first appeared in partnership surveys in the west-central basin during 1997. Due to their smaller size and body shape, gobies are not vulnerable to capture in index gill nets. In 2011, round goby catches were low in the west (one goby) and the catch in the east basin survey was below average. Round goby catches in the east-central and walleye cap area were above average, but were close to average in the west-central and Pennsylvania Ridge surveys. Freshwater drum abundance indices in 2011 were above average in the west basin, Pennsylvania Ridge and walleye cap area surveys. Freshwater drum catch in the west-central basin was near average, but catches were below average in the east-central and east basin surveys. Burbot catches in 2011 increased from 2010 in Pennsylvania Ridge, east basin and walleye cap area surveys but remained below average (Tables 4.1.4 - 4.1.6). No burbot were caught in the west, west-central basin surveys while only one (1) was caught in the east-central basin survey.

Lake trout are stocked in Lake Erie by U.S. agencies and OMNR as part of an effort to rehabilitate this native species. Many stocked fish are fin clipped with coded wire tags implanted in the nares. In 2011, lake trout were caught mainly in the eastern Partnership surveys (Pennsylvania Ridge, east basin and walleye Cap Area) in nets fished on bottom (90%) below the thermocline. The remainder (10%) of lake trout caught were in canned nets, divided equally between standard canned net depths and those fished in the thermocline. In 2011, lake trout catches were the second highest in the east basin time series (Table 4.1.5) and highest in the walleye cap area (Table 4.1.6). Of the 115 lake trout caught in index nets, 90% had fin clips. Clips included adipose (98), left ventral-adipose (3), left pectoral-right ventral (1), and left ventral (1). Coded wire tags revealed the strains of 42 stocked lake trout. The number of lake trout by strain was Finger Lakes (14), Slate Island (14), Klondike (9), Lake Champlain (2), Traverse Island (2), and Apostle Island (1). Among lake trout caught in index nets six (6) were less than 30 cm in length. Of these 6 juvenile lake trout that had adipose clips, 3 were of unknown strain, two (2) were Lake Champlain and one (1) was Slate Island strain. In addition to lake trout captured in index nets, there were six (6) lake trout (4 with clips) caught in auxiliary gear that included one (1) Finger Lakes strain, one (1) Slate Island strain with the remaining four lake trout of unknown strain. One of the six lake trout in the 121 mm mesh nets was captured in the west basin southwest of Pelee Island in nets suspended 1.8 m from surface where the water temperature was

20.4°C. The presence of a lake trout in the west basin at this temperature on September 16th is anomalous for this cold water species. For all lake trout caught in all partnership surveys and gear, the number of lamprey wounds per fish was 0.09 with 0.01 scars per fish. The wounding rate (wounds/fish examined) of type A1, A2 or A3 was observed to be 8/61 or (0.13) on adult lake trout with total lengths greater than or equal to 532 mm.

Two lake sturgeons were caught during 2011 partnership surveys. One juvenile lake sturgeon (38 cm total length) was caught in gill nets fished on bottom in the west basin, whereas a 61 cm sturgeon was caught in a gill net suspended 1.8 m from the surface in the east-central basin. Since the latter sturgeon was caught in auxiliary gear, it was not listed in Table 4.1.3. Both sturgeons were released alive. The Lake sturgeon in the Great Lakes is listed as *Threatened* under the Endangered Species Act of Ontario.

Silver chub occur throughout Lake Erie, with the greatest densities observed in the west basin (Tables 4.1.1 - 4.1.6). The peak catch of silver chub occurred in 1993. Since then, another spike in abundance occurred in 1999, after which catches of silver chub declined. In 2011, eleven (11) silver chub were caught lakewide in partnership surveys. Eight (8) silver chub were caught in the west basin, while 2 were caught in the east-central basin and one (1) was captured in the Pennsylvania Ridge survey. Although the catch (11) in 2011 exceeds the catch of 2 in 2010, the 2011 indices remain below average. The status of silver chub is listed as *Special Concern* under the Endangered Species Act of Ontario.

Rainbow trout (34) were caught in the Pennsylvania Ridge, east basin, walleye cap area and west-central index netting surveys. The majority of them (79%) were caught in thermocline gangs which were not included in Tables 4.1.4 to 4.1.5 due to a lack of continuity in fishing this gear. Eight rainbow trout were also caught in auxiliary canned 121 mm nets. Three (3) of the eight were caught in 121 mm nets fished in the thermocline. Rainbow trout represent the majority of more than 2 million salmonids stocked annually by Lake Erie agencies. Naturalized populations of rainbow trout also occur in Lake Erie. Although they are no longer stocked in Lake Erie, a chinook salmon (1) was caught in standard east basin canned nets (Table 4.1.5) and a coho salmon (1) was caught in standard canned nets in the Pennsylvania Ridge survey (Table 4.1.4). Five (5) brown trout were caught in the thermocline (2) and on bottom (3) in east basin and walleye cap area index nets. Brown trout continue to be stocked in Lake Erie by U.S. agencies. A 44 cm sea lamprey was caught in bottom nets (32 mm mesh) fished in the walleye cap area.

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 5% of basin averages are represented graphically. Remaining species were graphed in the "other" species category. The productivity gradient and associated species composition usually decreases from west to east. 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 the west-central and east-central basins. Trends in mean biomass per gang of all species differed among Lake Erie surveys. West basin species biomass in 2011 (113 kg / gang) was the highest observed in the time series, representing double the average (56 kg / gang). In contrast, west-central biomass (57 kg / gang) was comparable to the average (55 kg / gang) in 2011. East-central basin biomass (56 kg / gang) was 46% above average (38 kg / gang) while east basin biomass (15 kg / gang) was below the time series average (20 kg / gang). Mean biomass of all fish species caught was greatest in the west basin, followed by the west-central basin, east-central and east basins. Pennsylvania Ridge, a smaller area represented by 9 sites spanning the habitat transition between central and eastern basins, yielded a mean biomass of 54 kg / gang in 2011, 50% of which was attributed to yellow perch. This was above the Pennsylvania Ridge time series average of 34 kg / gang.

The smallest mesh size in the gear configuration is 32 mm which excludes most small bodied forage fish such as rainbow smelt, emerald shiners, and juvenile fish of most species. Round gobies are caught in index gill nets when they are larger, but due to their body shape and benthic behaviour, they are under represented in gill net assessments and accounted for less than 1% of biomass in all 2011 surveys.

West basin biomass in 2011 was four times higher than 2010, consisting of gizzard shad (29%), walleye (26%), yellow perch (13%), white perch (11%), freshwater drum (8%), and other species (12%). Over the time series, channel catfish averaged 3% of all biomass, but in 2011, channel catfish accounted for 5%. White bass (4%), shorthead redhorse suckers (1%) and white suckers (2%) also contributed significantly to biomass in the west basin. Smallmouth bass historically represented an average of 1% of all biomass but accounted for one tenth of this in 2011.

West-central basin biomass in 2011 was 26% less than 2010. Mean biomass was dominated by yellow perch (28%), white perch (22%), freshwater drum (17%), walleye (10%) and other species (10%). Although alewife represented an average of 4% of total biomass over the time series, none were caught in the west-central basin in 2011. White bass (7%), channel catfish (2%), white suckers (1%), and lake whitefish (1%) comprised the next largest fractions of biomass in 2011.

In the east-central basin survey, mean biomass per gang of all species in 2011 increased by 94 % from 2010. East-central basin biomass in 2011 consisted of yellow perch (52%), white perch (16%), freshwater drum (10%), walleye (5%), gizzard shad (5%) and other species (12%). White bass biomass was the highest for its time series, representing 10% of the mean biomass of all species caught in 2011. White suckers contributed significantly (1%) to west-central biomass in 2011. Alewife which represented an average of 6% of biomass over the time series, were present in east-central basin catches but represented an insignificant fraction of 2011 biomass.

In the east basin survey, mean biomass per gang of all species in 2011 decreased by 43% from 2010. The species composition of eastern Lake Erie consists of warm, cool, and cold water fish communities. Ten (10) species represented 95% of the fish biomass in 2011 including yellow perch (36%), walleye (19%), freshwater drum (8%), burbot (5%), white sucker (5%), smallmouth bass (4%), gizzard shad (4%) and lake trout (10%). Historically, lake trout accounted for 3% of biomass on average, but 2011 was the second highest lake trout catch in biomass in the east basin time series. White bass (3%), rainbow trout (1%) and brown trout (1%) also contributed significantly to biomass in the 2011 east basin survey. Average biomass of alewife over time series was 6% of the total but represented less than 1% of east basin biomass in 2011. Numbers were rounded to the nearest percentage.

Yellow Perch

In 2011, yellow perch catch rates (all ages) more than doubled in the west basin, increased 64% in the east-central basin but decreased in the west-central (-3%), Pennsylvania Ridge (-41%), east basin (-66%) and walleye cap area (-25%), (Figure 4.1.3). Yearling yellow perch (2010 year class) catch rates were strong in all surveys except the west-central basin where catches were moderate. Age 2 (2009 year class) catch rates were moderate in the west basin survey, weaker in the east-central basin and very weak in the west-central, Pennsylvania Ridge, east basin and walleye cap area surveys. Age 3 (2008 year class) yellow perch represented the largest proportion caught in all surveys except the walleye cap area where yearlings were the most abundant age group. Age 4 (2007 year class) yellow perch were quite abundant in all surveys, but to a lesser degree in the Pennsylvania Ridge and east basin surveys. Age 5 (2006 year class) yellow perch were abundant in all surveys, but more so in the east-central, west-central and Pennsylvania Ridge surveys. Catch rates of yellow perch ages 6 and older were among the highest in each time series in the walleye cap area, east-central, Pennsylvania Ridge, west-central and east basin surveys. Abundance of yellow perch ages 6 and older was moderate in the west basin during 2011.

The mean age of yellow perch in surveys reflects dominant year classes, recruitment, survival and possibly migration. Mean ages of yellow perch in 2011 were highest in the Pennsylvania Ridge survey, followed by the east-central basin, west-central basin with the lowest mean ages observed in the east basin and west basin surveys during 2011 (Figure 4.1.4). Yellow perch sex ratios remained relatively stable over the time series to 2011, during which females represented 48% to 58% of yellow perch ages 2 and older (Figure 4.1.5).

Mean total length (mm) and weight (g) for each sex was plotted by basin for yellow perch collected in 2011 with 95% confidence limits to compare with the time series average up to 2010 (Figure 4.1.6). Length and weight of yellow perch may be influenced by forage abundance, competition, abiotic factors, and survival. Lengths and weights of male and female yellow perch in 2011 were generally close to average across ages in the west basin and near or above average in the east basin survey (walleye cap area included) (Figure 4.1.6). Length and weight at age was at or below average for yellow perch caught in the west-central and east-central basin surveys during 2011. 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. Recent downward trajectories in mean length over time appear to be leveling off for age 2 yellow perch in the west, west-central and east-central basins. While a similar trend exists for age 3 yellow perch in these basins, patterns differed between males and females (Figure 4.1.7). In the east basin (including the walleye cap area), length at age for both sexes since the late 1990s appears to be larger compared to the earlier 1989-1993 period. Albeit with fluctuations, a trend of increasing length at age is apparent throughout the east basin time series (Figure 4.1.7).

During the fall partnership gill net survey in 2011, all 30,752 yellow perch (4,110 kg) were scanned for PIT tags as sample bags were removed from totes. No PIT tags were detected in 2011.

Walleye

Walleye catch rates in the west basin achieved a record high in 2011 for all age groups combined (Figure 4.1.8). East basin and walleye cap area catch rates were also high for the time series. Walleye abundance was assessed as moderate in east-central basin and Pennsylvania Ridge surveys. The west-central basin index had comparatively lower walleye catch rates. Yearling walleye represented the largest proportion of the catch in all surveys except for the Pennsylvania Ridge survey where age 7 and older walleye dominated (Figure 4.1.8). Yearling walleye catch rates were the highest in the time series in the east basin and walleye cap area surveys and second highest in the west basin. Relative to the time series, age 1 walleye catches in standard index gear were moderate in the 2011 west-central and Pennsylvania Ridge surveys. Young-of-the year (YOY) walleye were caught only in the west basin during 2011 at a rate comparable to average. Age 2 walleye catch rates in 2011 ranged from moderate (west, west-central, east-central, Pennsylvania Ridge surveys) to weak (east basin and walleye cap area surveys). The relative contribution from age 3 walleye varied by survey. Age 3 catch rates were fair in the west basin, east-central and east basin surveys but appeared to be moderate in the Pennsylvania Ridge and walleye cap area. The abundance of the 2007 year class (age 4) was relatively high in the west, west-central and east-central basin surveys but was assessed as moderate in the Pennsylvania Ridge and walleye cap area projects and weaker in the east basin survey. Age 5 (2006 year class) walleye were scarce in the west and central basin surveys, but appeared in moderate numbers in the Pennsylvania Ridge and walleye cap areas and relatively strong in the east basin survey. The 2005 year class was relatively strong at age 6 in the west basin survey, while catches in other surveys were moderate. Catch rates for walleye ages 7 and older were either highest or among the highest in all surveys during 2011. The 2003 year class (age 8) comprised the largest fraction of age 7 and older walleye in all surveys during 2011.

The mean age of walleye caught in 2011 was lowest in the west (1.7), followed by the west-central (2.2) and east-central basins (2.2), the east basin (3.8), and lastly by the Pennsylvania Ridge (5.4) survey (Figure 4.1.9).

The percentage of age 2 and older walleye caught that were female in 2011 surveys ranged from 53% in the east basin to 80% in the east-central basin survey (Figure 4.1.10). In 2011, the proportion of age 2 and older walleye that were female was slightly above average in all surveys except for the east basin where 53% of walleye ages 2 and older were female.

Mean total length (mm) and weight (g) with 95% confidence limits for each sex was plotted by basin for walleye collected in 2011. The average size at age for each sex across years pooled to 2010 was plotted for comparison (Figure 4.1.11). Both sexes of walleye were above or near the average length and weight at age in 2011 in most cases (Figure 4.1.11). Yearling walleye have been above

average in size during recent years in the west, central basin and for the 2010 year class, the east basin surveys (Figure 4.1.12). This trend in larger size has continued to age 2 and age 3 walleye of both sexes.

Walleye index catch rates were greater in standard canned index nets compared to bottom index gill nets in all basins (Figure 4.1.13). Catch rates in auxiliary index nets fished at 1 fathom (1.8 m) depths in the central basin were more than double the standard canned net values in the west-central basin but only slightly higher than standard canned nets in the east-central basin. In the east surveys (Pennsylvania Ridge, east basin, walleye cap area), the walleye catch rate in nets fished within the thermocline (1.9 walleye / gang) exceeded the catch rate of nets fished on bottom (1.1) but was below the catch rate in standard canned nets (3.9).

Walleye catch rates in commercial style 50 mesh 121 mm (4¾") nets fished adjacent to index canned nets were highest in the west basin (6.0 walleye per gang), followed by the west-central basin (5.3), nets fished in the thermocline in the eastern surveys (2.5), the east-central basin (2.3) and in the eastern basin at standard canned depths (1.1) (Figure 4.1.13). Central basin catch rates combined nets fished at standard depths along with canned nets fished at 1 fathom. Total lengths of walleye caught in index nets ranged from 15 to 75 cm whereas commercial style 4¾" nets caught walleye 33 cm to 77 cm in length and were generally composed of larger walleye.

Walleye catch rates in 4¾" (121 mm) nets are presented for the west, west-central, east-central basins pooled (Figure 4.1.14) and for Pennsylvania Ridge, east and walleye cap area surveys combined (Figure 4.1.15). Walleye catch rates in this gear were the 2nd highest during the 9 year period from 2003. In eastern surveys combined, 2011 catch rates were in the mid-range of the time series. The 2003 year class represented most (83%) of walleye ages 7 and older in the west-central area but a smaller fraction (60%) of the older groups in the eastern surveys.

All 3,785 walleye caught in partnership surveys including auxiliary gear, were scanned for PIT tags in 2011. Four tagged walleye were recaptured in 2011 partnership surveys. Two were tagged in Van Buren Bay, NY in 2005. One was tagged in Van Buren Bay in 2006 and the other was tagged in the Sandusky River OH in 2006. All four (4) fish had both PIT and metal jaw tags applied. One fish was missing a jaw tag upon recapture.

Lake Whitefish

Lake whitefish are a migratory cold water species caught typically in central basin surveys following fall turnover and in the hypolimnetic waters of the eastern basin while the water is thermally stratified. The west basin survey occurs in September when the water is warm, preceding the lake whitefish migration into the west basin to spawn. Lake whitefish catch rates in 2011 decreased from 2010 in the east-central (-78%) and east basin (-100%) surveys and were unchanged in the west and Pennsylvania Ridge surveys where catches were zero in both years (Figure 4.1.16). The majority (9) of (11) whitefish caught were from the west-central basin, resulting in an increased catch rate of 80% from the previous year. In 2011, a lake whitefish index (all ages) consisting of the west-central, east-central, Pennsylvania Ridge, east basin and additional walleye cap area sites pooled, dropped 87% from 2010. Lake whitefish ages ranged from 6 to 16 in gill net surveys. The 2003 year class (age 8) represented 7/11 lake whitefish caught. Other year classes, each represented by one whitefish caught, included age 6 (2005 year class), age 9 (2002 year class) age 12 (1999 cohort) and age 16 (1995 cohort). The increasing mean age in the lake whitefish population reflects the continued dominance of the 2003 cohort and weak recruitment (Figure 4.1.17). Whitefish from the 2003 cohort were not fully recruited to the aggregate survey index until age 5 (Figure 4.1.17). Estimated survival from the aggregate whitefish index using a catch curve from ages 5 to 8 was 41%. Mean lengths and weights at age with 95% confidence limits for each sex are presented in Figure 4.1.18. Although sample sizes were small (N=11), mean lengths and weights of lake whitefish appeared average or larger in 2011 surveys.

Table 4.1.1 Total numbers of each species caught during western basin Partnership Index Fishing, Lake Erie, 1990-2011. Numbers are standardized to 44 gangs. Average catch from 1990-2011 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	Average	
Silver lamprey	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0.1	
Lake sturgeon	0	0	1	1	1	1	2	0	1	0	3	0	2	5	8	0	1	9	2	0	2	1	1.8	
Longnose gar	0	0	1	0	1	0	0	0	1	7	4	1	0	0	0	0	0	0	0	1	1	0	0.8	
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	462.2	
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	4,982.5	
Pink salmon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0.0	
Chinook salmon	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	
Rainbow trout	3	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1	0	0.3	
Brown trout	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	
Lake whitefish	10	1	0	1	0	5	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0.9	
Rainbow smelt	8	1	0	37	0	1	0	1	1	0	1	95	1	0	1	1	2	2	34	1	1	0	8.5	
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	
Quillback	0	1	6	3	5	4	12	5	4	12	7	34	24	25	13	12	9	9	11	8	1	12	9.9	
White sucker	59	43	130	46	94	46	73	71	30	39	42	101	90	77	127	133	69	61	71	91	29	201	78.3	
Silver redbor	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0.2	
Golden redbor	0	0	0	0	0	0	0	19	0	1	6	0	0	0	0	0	0	0	0	0	0	0	1.2	
Shorthead redbor	1	4	22	7	15	13	14	50	17	19	23	31	6	28	33	15	10	41	34	84	31	54	25.1	
Redhorse sp.	0	0	0	0	0	0	0	0	1	0	0	0	19	0	0	0	0	0	0	0	0	0	0.9	
Goldfish	0	0	0	0	0	1	0	0	0	2	4	0	0	0	0	2	0	0	5	2	0	0	0.7	
Common carp	25	29	4	7	3	2	7	3	1	3	16	22	6	1	4	1	8	3	3	3	5	1	3	7.2
Silver chub	25	35	147	320	59	96	89	73	67	185	133	61	48	44	84	21	38	9	2	1	2	8	70.3	
Hornhead chub	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	
Emerald shiner	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	0.1	
Spottail shiner	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	1	0	0	0	0	0.3	
Brown bullhead	0	0	1	0	0	0	0	0	0	0	3	1	1	0	0	2	0	1	1	0	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	104.4	
Stoner cat	1	1	0	1	0	0	1	0	2	2	0	0	0	0	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	0.3	
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	
Burbot	0	0	0	1	0	0	0	0	0	0	0	0	1	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	0	0	0	0	0	0	0	0	0	0.5	
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	2,079.6	
White bass	158	110	65	67	288	89	135	271	102	174	225	308	460	367	218	285	277	275	357	435	134	804	254.7	
Rock bass	6	27	20	1	18	5	12	9	8	5	8	23	7	13	8	3	5	21	1	9	10	0	9.9	
Pumpkinseed	0	0	0	0	0	0	2	0	0	0	0	0	0	0	3	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	
Smallmouth bass	41	83	149	231	231	108	248	162	166	93	116	12	59	12	17	2	32	15	19	78	17	13	86.5	
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	
Black crappie	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	1	0.2	
Yellow perch	822	1,324	2,737	2,211	3,291	4,612	5,102	3,468	3,292	4,415	3,445	10,701	5,774	5,566	7,396	6,843	3,616	5,057	8,472	4,981	2,326	5,448	4,586.3	
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	1,071.3	
Round goby	0	0	0	0	0	0	0	0	5	3	5	4	4	4	10	2	0	0	0	12	5	1	2.5	
Freshwater drum	460	378	377	405	398	308	459	314	238	572	445	873	864	536	578	1,196	433	459	317	407	101	1,019	506.2	
Goldfish-carp hybrid	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	0.2	
Total	3,551	14,517	11,383	11,823	12,842	15,829	9,231	7,484	8,965	17,939	12,505	18,968	18,646	18,249	18,407	27,927	19,354	13,016	15,422	10,731	5,914	23,120	14,356	
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	
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	43	

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

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

Table 4.1.2 Total numbers of each species caught during west-central basin Partnership Index Fishing, Lake Erie, 1990-2011. Numbers are standardized to 72 gangs. Average catch from 1990-2011 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	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	0.2
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	2,085.2
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	3,489.0
Coho salmon	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.1
Chinook salmon	0	4	0	1	0	3	0	3	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0.6
Rainbow trout	2	0	1	0	0	2	0	0	0	3	1	0	3	2	0	0	3	1	0	1	0	1	0.9
Lake whitefish	5	0	5	4	10	29	15	62	31	47	49	11	17	36	15	82	40	29	50	21	5	9	26.0
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	292.5
Quillback	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2	0	1	1	1	0	0	0	0.3
White sucker	71	79	80	9	25	26	25	29	42	19	63	15	29	57	98	60	67	77	64	97	121	26	53.6
Spotted sucker	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.0
Silver redbreast	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0.2
Golden redbreast	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0.1
Shorthead redbreast	1	6	2	0	0	1	1	0	0	4	0	1	0	3	2	0	2	1	5	10	1	4	2.0
Goldfish	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	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	1.2
Silver chub	2	5	15	0	0	1	0	0	3	4	3	0	2	0	0	1	0	1	5	3	0	0	2.0
Emerald shiner	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	3	0	0.3
Spottail shiner	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0.0
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
Channel catfish	17	28	25	15	6	25	27	5	6	3	13	1	9	7	7	11	49	65	13	44	70	63	23.2
Stoneroller	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1
Burbot	3	7	5	3	5	3	2	8	9	0	2	1	0	4	0	0	0	0	0	0	0	0	2.4
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
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	3,812.7
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	391.1
Rock bass	0	1	0	0	1	0	0	0	0	0	0	0	2	0	0	0	0	0	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
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
Smallmouth bass	0	3	2	0	1	1	1	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0.6
Largemouth bass	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.1
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	7,969.4
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	499.9
Round goby	0	0	0	0	0	0	0	1	8	37	19	13	10	24	15	9	17	4	49	11	7	8	10.5
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	1,705.6
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	0.1
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	20,370
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
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	71

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

Table 4.1.3 Total numbers of each species caught during east-central basin Partnership Index Fishing, Lake Erie, 1989-2011. Numbers are standardized to an effort of 72 gangs. Average catch from 1989-2011 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	Average	
Lake sturgeon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	
Alewife	677	3,567	12,878	1,894	682	578	1,556	143	1,350	7,108	5,033	793	8,380	4	4	48	153	18	4	0	0	1	35	2,041.1
Gizzard shad	860	285	2,633	522	1,003	637	1,971	426	1,250	3,197	2,281	462	5,753	127	351	1,822	892	608	53	247	503	520	1,200.1	
Coho salmon	1	2	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.2	
Chinook salmon	0	0	0	0	0	2	0	9	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0.6	
Rainbow trout	3	0	1	2	1	0	2	2	1	1	0	2	0	1	0	0	1	0	1	1	0	0	0.9	
Lake trout	1	0	1	2	0	2	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	2	0.5	
Lake whitefish	5	2	2	4	41	21	24	142	46	33	21	11	21	27	14	43	36	13	6	13	9	2	24.4	
Rainbow smelt	320	118	525	322	375	324	1,418	309	1,329	589	248	1,450	920	307	835	423	438	758	1,083	1,088	142	834	643.3	
Northern pike	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	
Quillback	0	0	0	0	24	9	3	0	1	0	5	0	0	0	2	2	0	0	0	1	0	5	2.3	
White sucker	72	52	63	72	129	78	126	46	60	56	71	30	135	13	60	78	83	35	35	73	52	62	67.3	
Silver redbreast	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0.0	
Golden redbreast	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	1	0	0.2	
Shorthead redbreast	0	15	0	4	12	0	2	2	1	2	18	0	1	0	0	0	1	1	1	3	1	3	3.0	
Goldfish	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0.1	
Lake chub	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	
Common carp	0	0	0	1	5	0	0	0	1	0	7	4	0	0	0	1	0	0	0	0	0	0	0.9	
Silver chub	0	0	0	1	0	0	0	0	24	14	18	7	2	0	1	4	2	2	0	2	0	2	3.6	
Emerald shiner	0	0	0	0	15	2	5	0	0	0	0	0	0	2	2	0	1	0	2	4	0	0	1.5	
Common shiner	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0.1	
Spottail shiner	0	2	1	1	3	0	0	2	0	18	0	0	10	0	2	0	2	0	0	0	2	0	1.9	
Notropis sp.	9	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	
Channel catfish	12	3	11	10	43	19	12	7	6	6	26	9	23	2	17	8	11	18	0	8	8	12	12.3	
Stoneroll	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	
Tadpole mactrom	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	
Burbot	31	13	9	19	20	19	14	25	36	15	2	12	9	0	1	3	2	1	2	0	2	1	10.7	
Trout-perch	0	7	1	19	12	4	0	2	2	1	0	15	4	12	7	1	3	0	4	0	0	0	4.3	
White perch	7,621	4,449	1,929	3,480	809	392	203	268	179	529	1,086	1,225	4,046	1,967	1,777	6,905	3,674	2,364	2,688	1,713	2,440	3,009	2,397.9	
White bass	636	88	170	91	67	203	176	734	167	419	316	101	261	276	232	329	765	330	161	201	143	1,451	332.6	
Rock bass	0	0	0	0	3	0	3	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0.4	
Bluegill	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0.1	
Smallmouth bass	0	0	0	0	0	0	8	0	6	2	0	0	1	0	0	1	0	0	0	2	0	0	0.9	
Largemouth bass	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0.0	
Yellow perch	3,332	1,121	1,174	1,295	726	2,179	1,944	4,681	2,347	7,149	9,229	4,613	8,458	5,744	6,956	8,578	8,132	9,367	9,967	12,384	7,153	12,186	5,850.7	
Walleye	465	118	207	276	367	366	237	82	70	17	29	27	99	68	639	473	310	63	45	81	33	152	192.0	
Round goby	0	0	0	0	0	0	0	0	2	40	61	34	157	76	70	148	39	41	41	34	91	68	41.0	
Freshwater drum	3,612	2,443	1,876	2,380	1,323	1,184	548	956	669	985	1,304	1,304	2,399	1,077	1,890	1,123	1,227	670	799	1,156	311	907	1,370.1	
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	30,882	9,706	12,860	19,992	15,774	14,290	14,892	17,012	10,892	19,253	14,206	
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	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	65	

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

Table 4.1.4

Total numbers of each species caught during Pennsylvania Ridge Partnership Index Fishing, Lake Erie, 1991-2011. Numbers are standardized to an effort of 18 gangs. Average catch from 1991-2011 is presented for each species. The study was not done in 1996 and 1997. 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	Average
Longnose gar	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.0
Alewife	740	1,530	0	16	133	605	69	2,284	42	1,076	0	0	0	489	0	0	0	11	2	333.2
Gizzard shad	16	20	36	531	95	96	101	515	141	374	15	17	2	163	20	85	48	98	306	127.6
Pink salmon	1	0	1	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	1	0	0	1	0.5
Chinook salmon	0	0	0	1	0	0	2	0	0	1	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	5.2
Lake trout	1	2	8	5	9	3	2	0	5	4	1	10	3	4	2	1	2	3	5	3.3
Lake whitefish	13	17	33	15	53	59	1	1	14	1	9	3	12	1	115	43	11	0	0	19.1
Rainbow smelt	179	22	38	38	60	40	14	8	111	21	54	80	9	16	630	183	86	6	10	76.4
Muskellunge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.0
Quillback	0	0	0	0	0	0	1	2	6	1	0	2	0	2	0	1	2	0	12	1.4
White sucker	18	20	12	15	15	62	11	9	65	10	24	16	13	19	7	12	72	40	37	22.7
Silver redhorse	0	0	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	3	0.3
Golden redhorse	0	0	0	0	0	0	0	0	2	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	8.3
Redhorse sp.	0	0	0	0	0	0	0	0	0	2	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	0.2
Silver chub	0	0	0	0	0	0	0	0	3	0	8	0	0	1	0	2	2	0	1	0.8
Emerald shiner	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	0.1
Spottail shiner	0	3	0	0	0	0	0	0	0	0	0	3	0	1	0	0	0	0	2	0.4
Channel catfish	0	4	2	3	0	4	2	1	5	2	0	1	0	1	2	1	1	0	10	1.9
Stoner cat	0	0	0	0	1	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	28.5
Trout-perch	0	0	0	0	0	0	0	1	4	2	1	0	0	0	2	0	0	0	0	0.5
White perch	446	195	93	34	46	70	56	68	142	104	129	34	39	186	16	73	44	436	425	125.5
White bass	55	63	7	4	84	35	20	36	26	5	6	5	3	103	20	34	18	21	106	31.0
Rock bass	1	1	0	1	1	13	7	2	9	1	0	0	0	2	0	1	0	2	3	2.1
Smallmouth bass	0	0	0	0	1	2	0	0	3	0	0	0	0	0	0	0	0	0	0	0.3
Black crappie	0	0	0	0	0	0	0	1	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	2,041.4
Walleye	13	34	23	27	47	19	12	7	13	7	14	9	102	30	7	39	31	18	20	22.5
Round goby	0	0	0	0	0	0	2	19	30	38	37	4	9	146	95	67	28	25	22	24.8
Freshwater drum	285	118	43	142	88	103	41	62	74	56	39	15	9	21	14	37	127	56	98	68.0
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	2,947
Number of Sites	9	9	9	9	9	9	9	9	9	9	9	9	9	9	4	9	9	9	9	9
Number of Gangs	18	18	18	18	18	18	18	18	18	18	18	18	18	18	8	18	18	18	18	17

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

Table 4.1.5 Total numbers for each species caught during eastern basin Partnership Index Fishing surveys, Lake Erie, 1989-2011. Numbers are standardized to an effort of 60 gangs. Average catch from 1989-2011 presented for each species. Study was not done in 1996 and 1997. Low sample size in 1995 limits the value of information. Only standard gear included. Thermocline gangs and 2 m above thermocline sets were excluded.

Species	1989	1990	1991	1992	1993	1994	1995	1996	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Average
Longnose gar	1	0	0	0	0	0	0	0	1	2	0	0	0	0	1	0	0	0	0	0	0	0	0.2
Alewife	2,257	111	1,628	1,248	193	118	1,046	1,697	599	599	2,296	29	2,597	2	12	14	1,214	7	3	2	102	15	660.4
Gizzard shad	325	75	73	18	76	52	266	382	335	335	514	190	1,001	99	14	714	845	36	111	151	490	90	254.6
Pink salmon	0	0	4	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0.3
Coho salmon	0	0	4	2	2	0	0	0	0	1	0	2	1	0	0	1	1	0	0	1	0	0	0.6
Chinook salmon	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	1	0.2
Rainbow trout	1	3	5	8	0	2	4	6	2	0	0	0	4	6	1	15	1	1	2	7	4	1	3.4
Brown trout	1	0	0	0	0	0	0	3	0	0	0	0	21	2	2	1	0	0	0	1	0	3	1.5
Lake trout	15	5	8	3	26	24	4	11	11	11	18	9	15	30	8	18	24	21	15	17	58	57	17.2
Lake whitefish	15	43	35	14	0	10	8	133	6	6	0	2	18	2	2	3	45	16	39	4	45	0	19.0
Cisco	0	1	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	13	32	58	223	61	220	128	88	179	365	643	148	68	163.3
Northern pike	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1
Mooneye	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1
Quillback	4	0	0	0	0	5	0	0	0	2	4	3	0	1	0	0	4	4	0	3	2	0	1.4
White sucker	260	168	88	57	148	63	26	66	116	116	107	122	152	54	26	35	107	39	45	87	32	66	81.0
Silver redhorse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0.0
Golden redhorse	0	0	0	0	0	0	0	0	0	1	6	4	0	0	0	0	0	0	0	0	0	0	0.5
Shorthead redhorse	40	99	16	44	86	17	8	21	18	18	47	39	5	20	6	1	4	39	0	5	6	0	22.6
Redhorse sp.	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0.2
Common carp	22	3	0	2	0	0	4	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	1.4
Silver chub	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0.0
Emerald shiner	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Brown bullhead	0	1	0	0	0	2	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	1	0.0
Channel catfish	5	3	0	2	2	2	4	7	6	6	7	28	3	2	7	3	6	14	10	26	3	3	6.1
Stoner cat	12	3	6	3	7	0	0	0	0	10	2	3	0	0	0	0	0	0	0	0	1	0	2.0
Burbot	5	11	20	11	29	49	53	238	185	185	212	108	143	171	113	101	31	64	25	24	9	21	70.5
Trout-perch	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0.1
White perch	3,339	1,421	481	129	104	36	56	22	49	35	76	76	181	19	10	45	1,117	117	224	123	262	183	349.1
White bass	174	28	187	23	15	10	64	34	24	24	61	19	45	8	6	23	172	60	45	49	23	128	52.0
Rock bass	209	76	30	96	152	122	71	56	299	299	480	109	11	20	43	7	14	117	7	64	41	2	88.1
Pumpkinseed	0	1	0	0	11	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0.6
Bluegill	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0.1
Smallmouth bass	137	333	64	239	300	370	270	284	242	890	341	111	111	156	195	150	413	854	298	201	166	48	263.5
Largemouth bass	0	0	0	0	0	0	0	0	0	0	1	0	0	3	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	0.3
Yellow perch	1,180	464	382	228	135	47	146	211	679	1,306	3,160	1,321	1,321	3,608	1,983	1,643	4,650	3,796	2,936	3,948	5,524	2,131	1,716.4
Walleye	140	79	31	57	63	46	34	29	41	41	62	41	42	31	38	345	109	199	98	162	65	173	81.9
Round goby	0	0	0	0	0	0	0	0	0	0	9	19	178	93	54	23	55	27	25	26	45	11	24.6
Freshwater drum	1,063	335	178	207	404	172	266	374	142	145	303	151	183	257	319	343	74	168	270	162	173	247.3	
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	2,999	3,590	9,243	4,417	4,417	5,818	7,191	3,175	4,132
Number of Sites	27	26	26	20	19	19	8	30	30	30	29	30	30	30	30	30	30	21	30	30	29	30	26
Number of Gangs	49	45	52	40	37	38	16	60	60	60	58	60	60	60	60	60	60	42	60	60	58	60	52

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

Table 4.1.6 Total numbers of each species caught during the Partnership survey in the walleye cap area, eastern Lake Erie, 2000-2011. Thermocline samples were included in years fished. Numbers of sites and gangs (samples) are presented. The number of sites was reduced to 9 in 2007. No thermocline gangs were fished in 2007. All catches are standardized to 51^b gangs. Catches from the east basin survey sites within the walleye cap area are included in this table. Tables 4.1.5 and 4.1.6 are not mutually exclusive.

Species	2000	2001 ^a	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Average
Sea lamprey	0	0	0	0	0	0	0	0	0	0	1	1	0.2
Alewife	1,358	42	1,481	3	10	17	68	0	5	5	63	29	256.6
Gizzard shad	49	218	147	33	4	344	40	57	82	62	31	52	93.2
Pink salmon	0	0	0	0	0	0	0	0	0	0	1	0	0.1
Coho salmon	1	0	5	0	0	1	0	0	0	1	0	0	0
Chinook salmon	0	0	1	0	0	1	0	0	0	0	2	0	0.3
Rainbow trout	9	12	47	19	4	21	1	0	6	6	27	11	13.6
Brown trout	0	0	2	0	1	2	0	0	2	2	1	1	0.9
Lake trout	12	33	10	14	15	13	36	23	7	20	12	59	21.2
Lake whitefish	1	1	1	8	1	14	83	17	36	51	49	0	21.9
Rainbow smelt	55	24	10	12	155	33	56	122	188	437	135	181	117.2
Quillback	5	1	1	0	0	0	0	9	1	3	0	0	1.6
White sucker	100	72	30	33	31	80	97	40	27	106	88	193	74.6
Golden redborse	10	1	0	0	0	0	0	0	0	0	0	0	0.9
Shorthead redborse	43	19	12	12	2	2	1	71	2	5	6	0	14.6
Redhorse sp.	0	0	0	0	0	0	0	0	0	1	0	0	0.1
Common carp	0	1	0	0	0	0	0	0	0	0	0	0	0.1
Emerald shiner	0	0	0	0	0	0	0	0	0	0	0	3	0.3
Channel catfish	9	20	3	6	9	10	1	14	5	28	3	3	9.2
Stonerat	0	1	0	0	0	0	0	0	0	0	1	0	0.2
Burbot	121	54	69	110	28	76	79	17	13	8	0	16	49.4
Trout-perch	0	0	0	0	0	0	0	0	1	1	1	2	0.4
White perch	39	109	51	22	7	85	462	153	243	133	79	689	172.6
White bass	33	48	28	15	10	43	94	65	26	45	7	203	51.3
Rock bass	366	100	16	5	11	26	3	221	5	67	33	1	71.1
Pumpkinseed	1	0	0	0	0	0	0	0	0	0	1	0	0.2
Smallmouth bass	567	287	114	135	158	304	32	989	131	201	69	22	250.8
Largemouth bass	0	0	0	0	1	0	0	0	0	0	0	0	0.1
Yellow perch	3,200	1,493	521	2,003	388	1,983	2,762	4,698	4,126	5,282	3,127	2,345	2,660.7
Walleye	78	96	81	71	117	611	159	272	103	189	62	217	171.3
Round goby	1	1	12	17	38	11	14	6	13	111	19	36	23.2
Freshwater drum	157	237	101	128	167	139	13	99	114	293	97	280	152.0
Total	27,736	21,272	14,692	19,343	13,109	25,336	22,428	85,378	22,642	37,981	16,202	25,316	27,620
Number of Sites	20	21	20	20	20	20	20	9	20	21	21	20	19
Thermocline Gangs	10	12	17	15	12	3	9	-	10	7	8	10	9
Number of Gangs	50	54	57	55	52	43	49	18	50	49	50	50	48

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

^a 2001 had a site added in this report that was excluded previously.

^b catch values were standardized to the average number of gangs fished (51) excluding 2007 for comparisons between years.

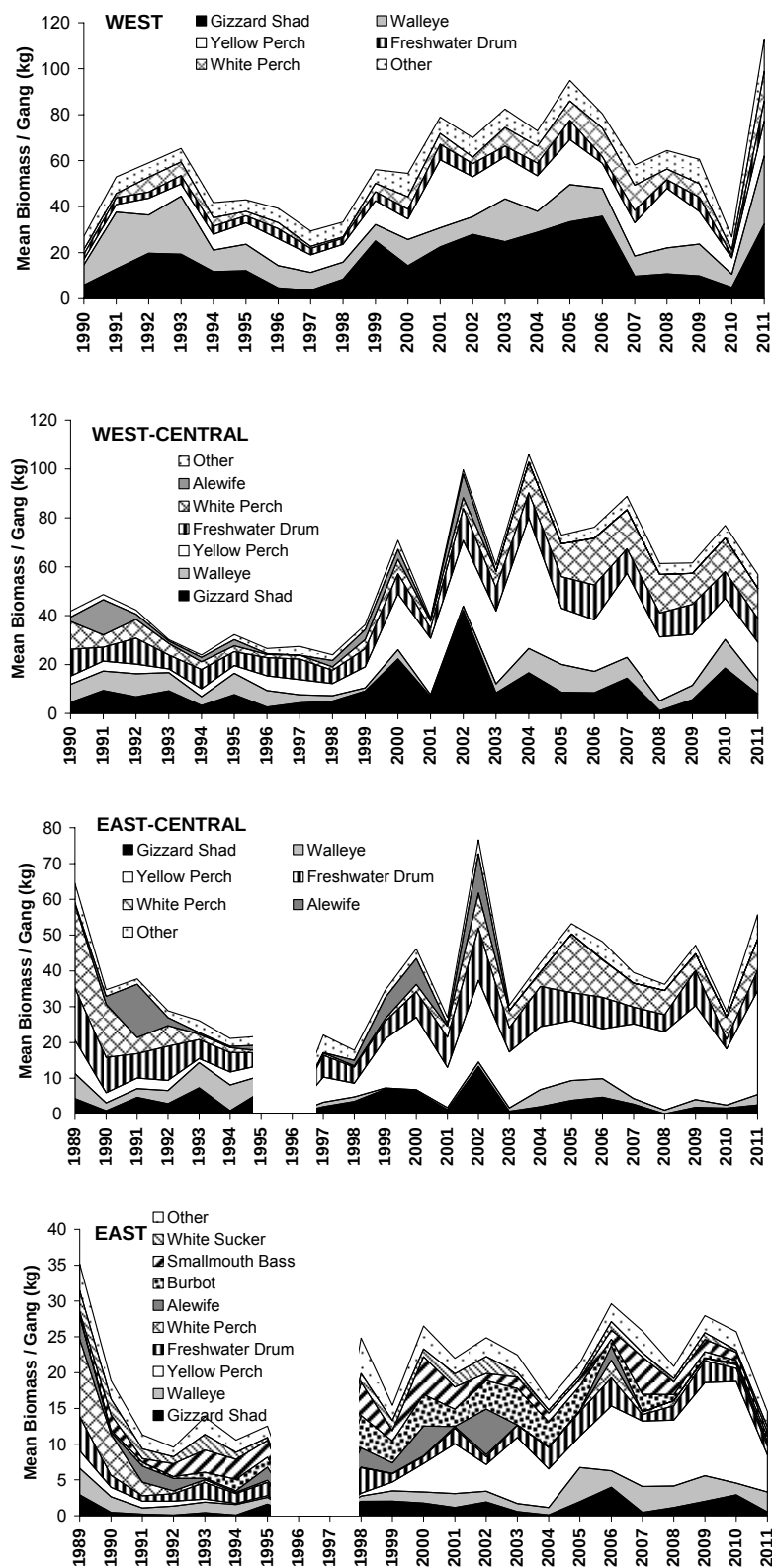


Figure 4.1.2 Mean species biomass (kg / gang) by basin, Partnership Index Fishing, 1989-2011. Species with an average biomass representing less than 5% of the average of all species combined were included in "Other" group¹. Thermocline gangs (1989, 1990, 1999-2011) were included for the east basin. Studies were not done in the east-central basin in 1996 or in the east basin from 1995-1997. Axes differ between basins. Effort was standardized across mesh sizes.

¹Alewife were retained in the individual series to illustrate continued absence or recovery to historic levels.

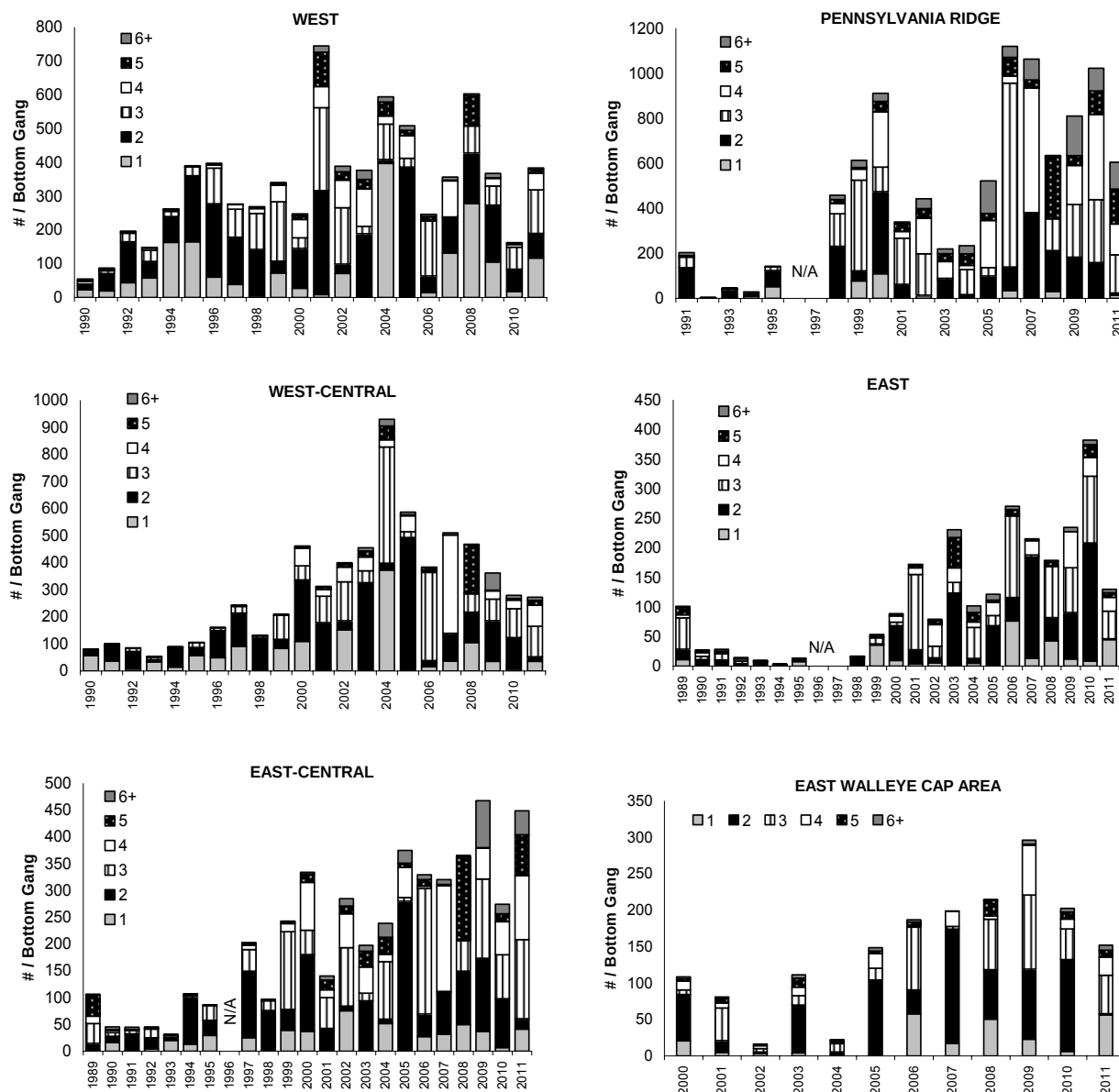


Figure 4.1.3 Yellow perch catch at age (number) per bottom gang of Partnership index gill nets, by basin. Time frames and axes differ among basins. Absent bars indicate when studies were not done. Ages 6 and older pooled. East basin, eastern walleye cap area and Pennsylvania Ridge analyses include depths 30 m or less. East walleye cap area survey and east basin survey are not mutually exclusive. 1995 east basin survey had low sample size.

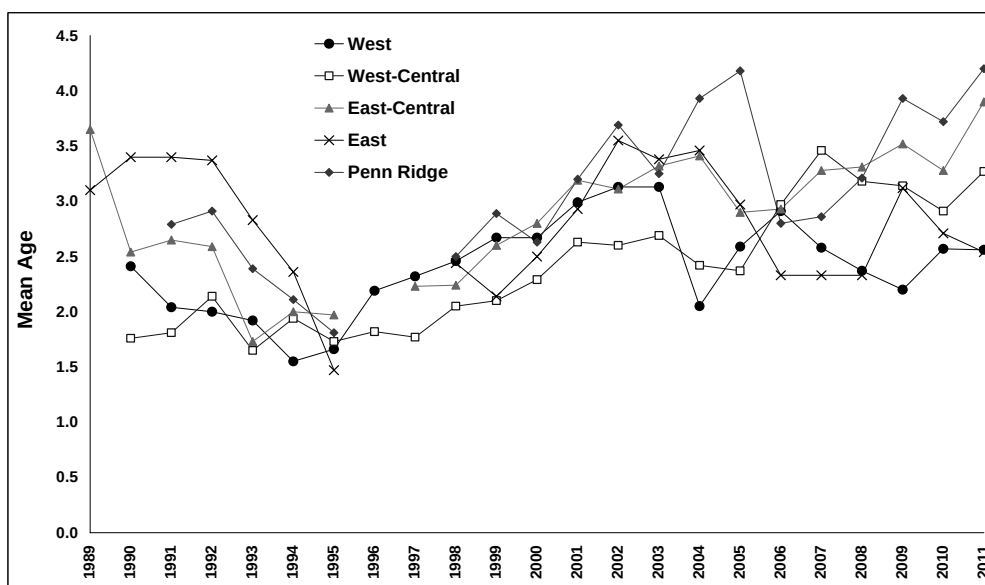


Figure 4.1.4 Mean age of yellow perch caught in Partnership index gill nets by basin, 1989-2011. All age groups included in calculations. Ages based on scales and otoliths since 2005.

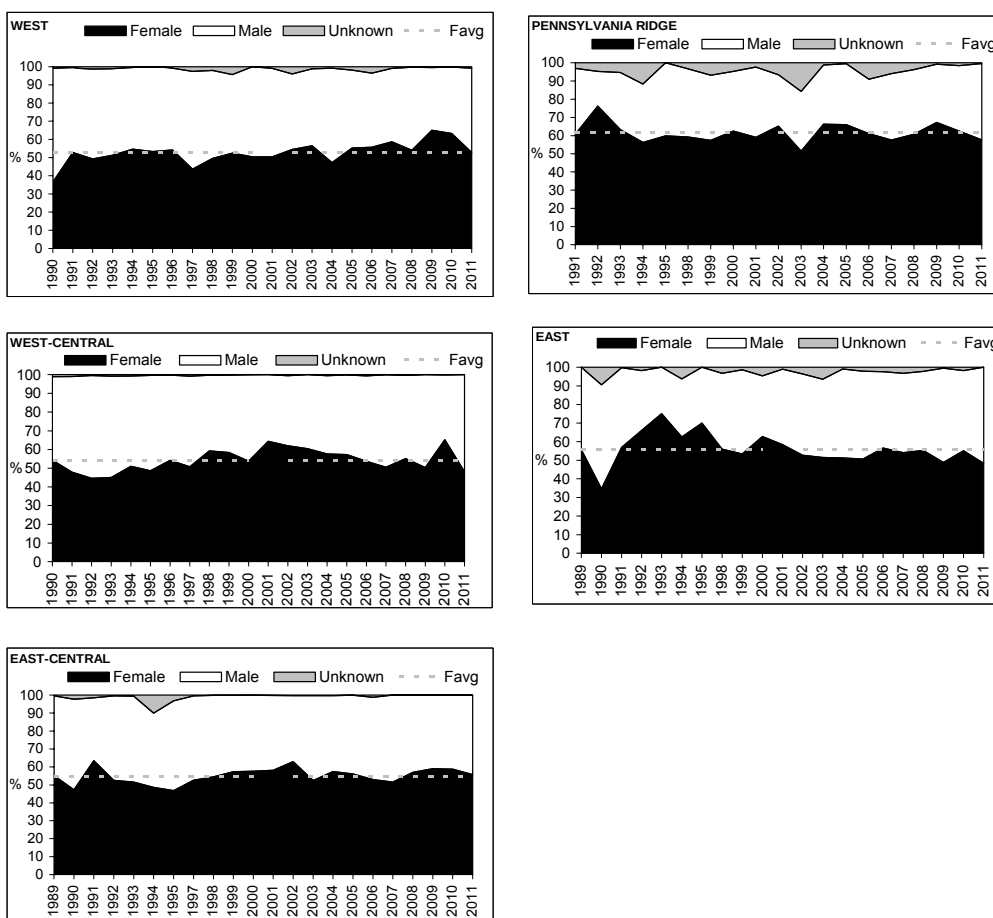


Figure 4.1.5 Proportion of yellow perch ages 2 and older represented by each sex caught in fall. Partnership index gill netting, 1989-2011. Note absent years in east-central, Pennsylvania Ridge, and east basin time series. Dashed line represents average proportion of females over the time series.

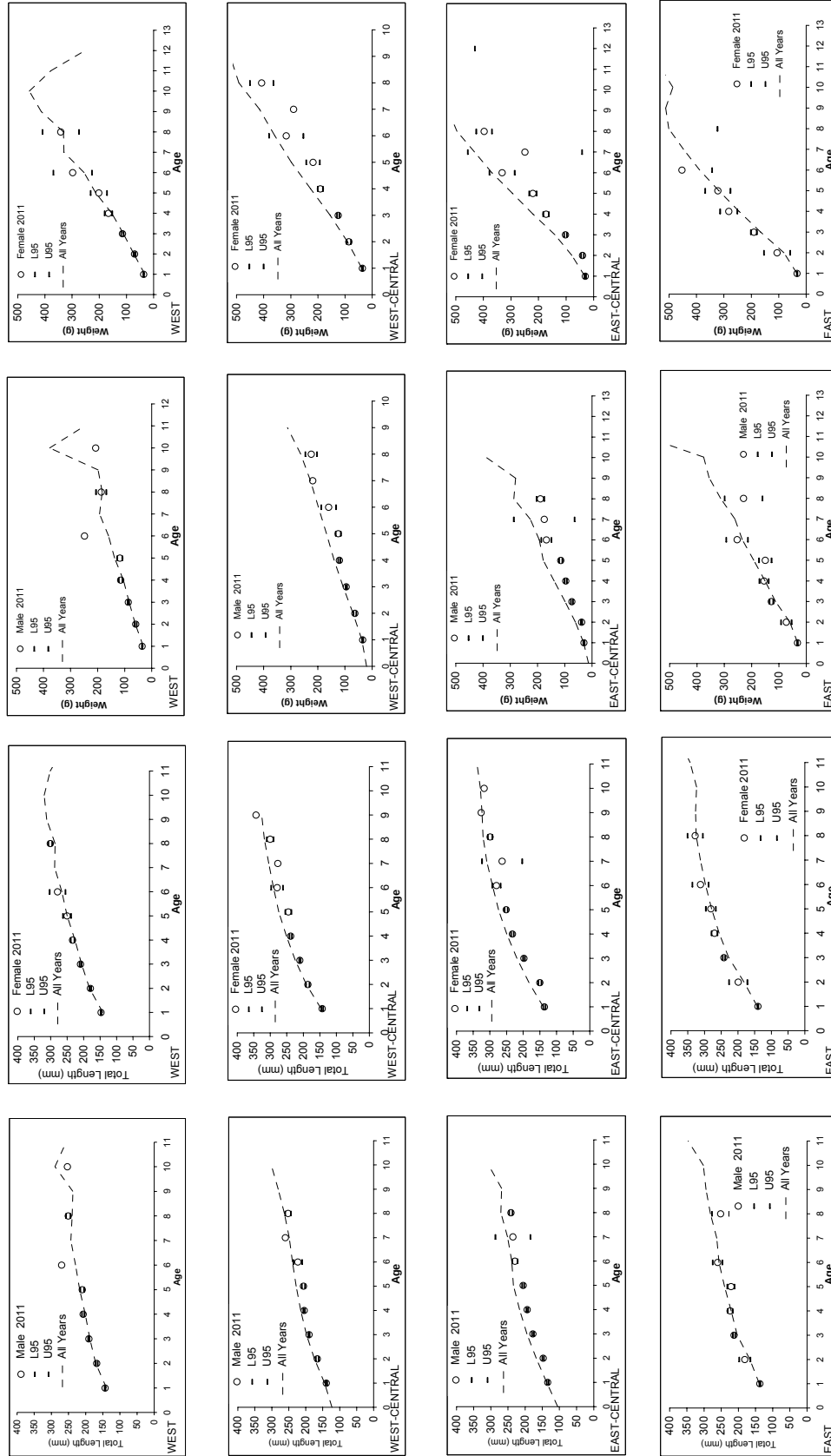


Figure 4.1.6 Yellow perch mean total length (mm) and weight (g) of males and females at age for the west (top row), west-central, east-central, and east (bottom row) basins in 2011 (circles). 95% confidence limits shown. Dotted line represents mean size at age for all years to 2010. Partnership Index Fishing, 1989-2011.

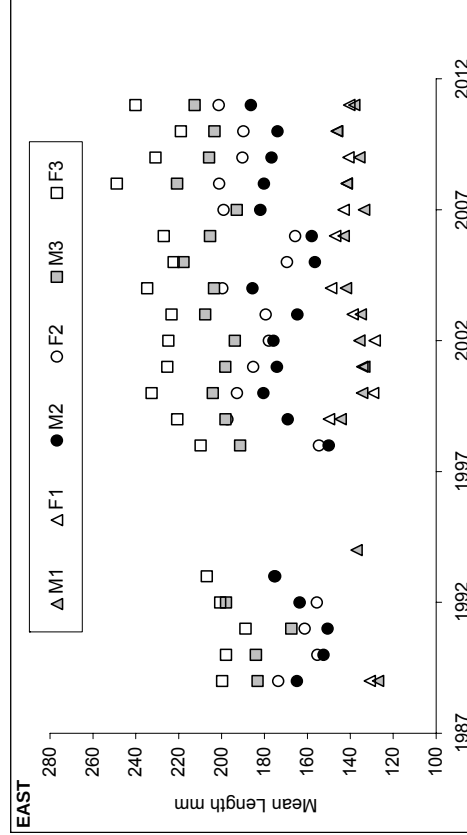
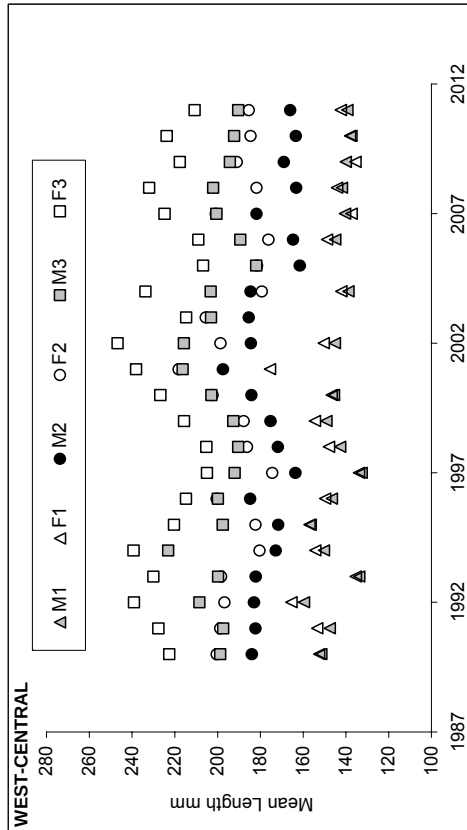
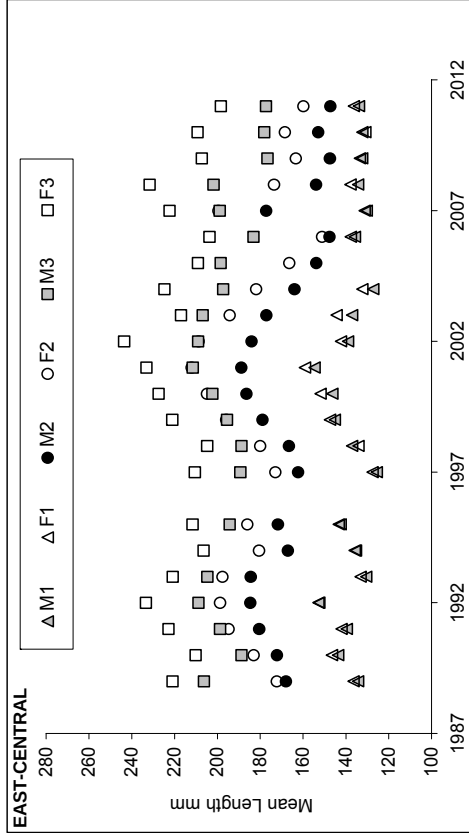
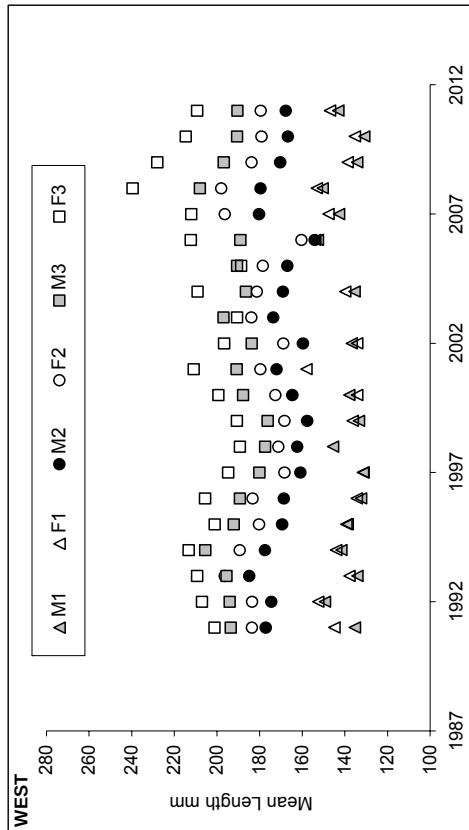


Figure 4.1.7. Mean total length (mm) of yellow perch ages 1, 2, and 3 by sex in the west, west-central, east-central and east basin surveys. East includes the walleye cap area sites. M=male F=female. Samples with less than 6 fish were excluded. Mean is weighted by relative effort among mesh sizes. Samples 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.

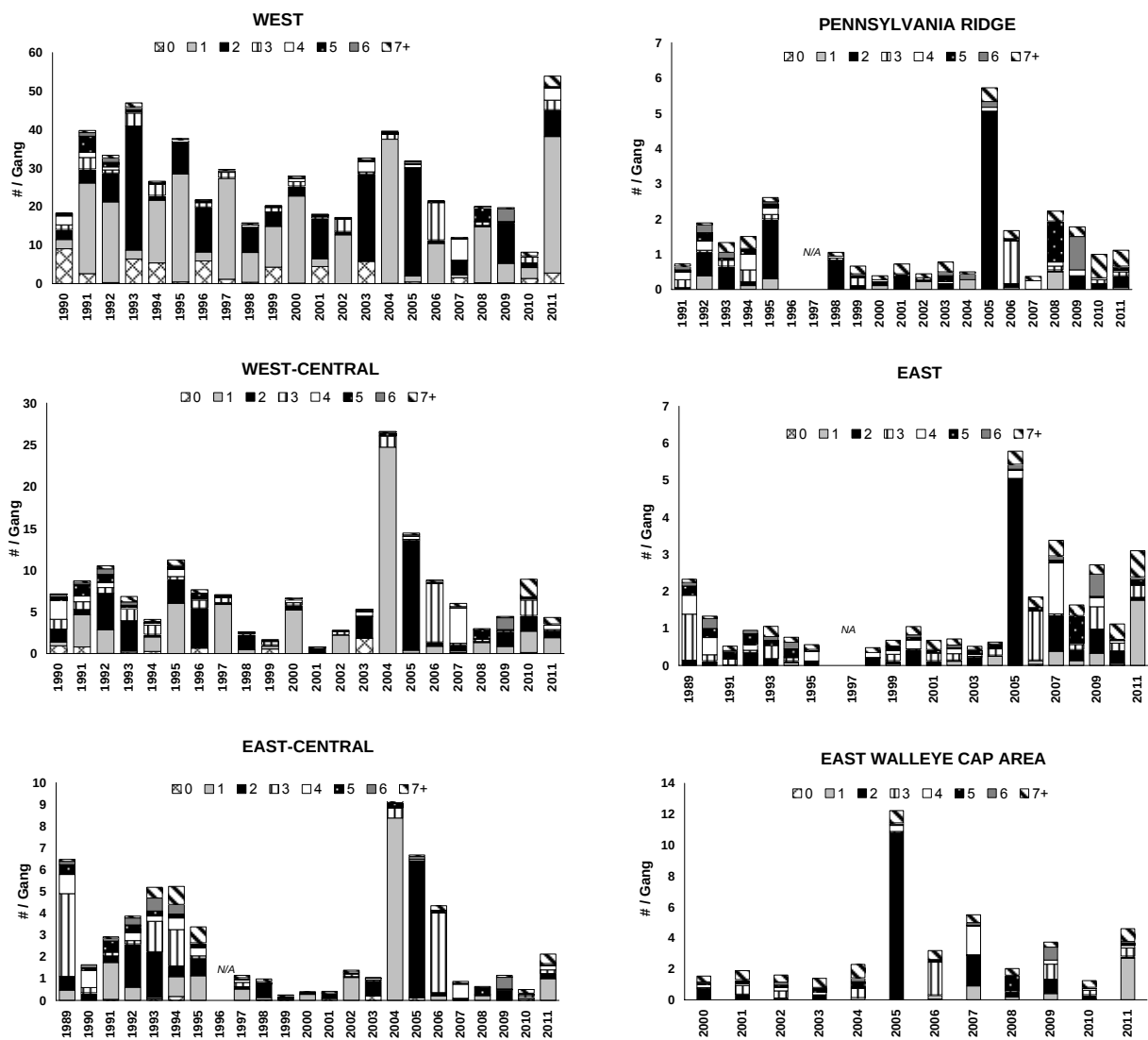


Figure 4.1.8 Walleye catch at age (numbers) per gang of index gill nets (canned and bottom), in the west, west-central, east-central, Pennsylvania Ridge and east basin Partnership surveys. Only standard canned sets are included in east basin and Pennsylvania Ridge graphs. East walleye cap area includes thermocline sets. East walleye cap area survey and east basin survey are not mutually exclusive. 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. 1995 east basin survey had low sample size.

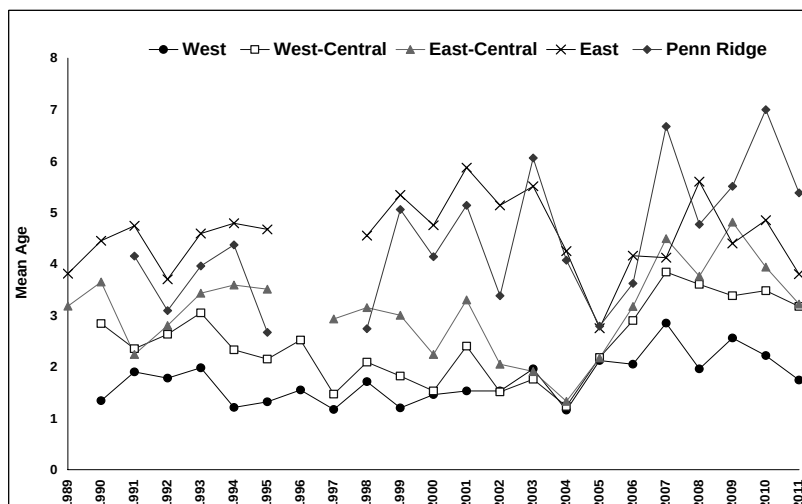


Figure 4.1.9 Mean age of walleye caught in Partnership index gill nets by basin, 1989-2011.

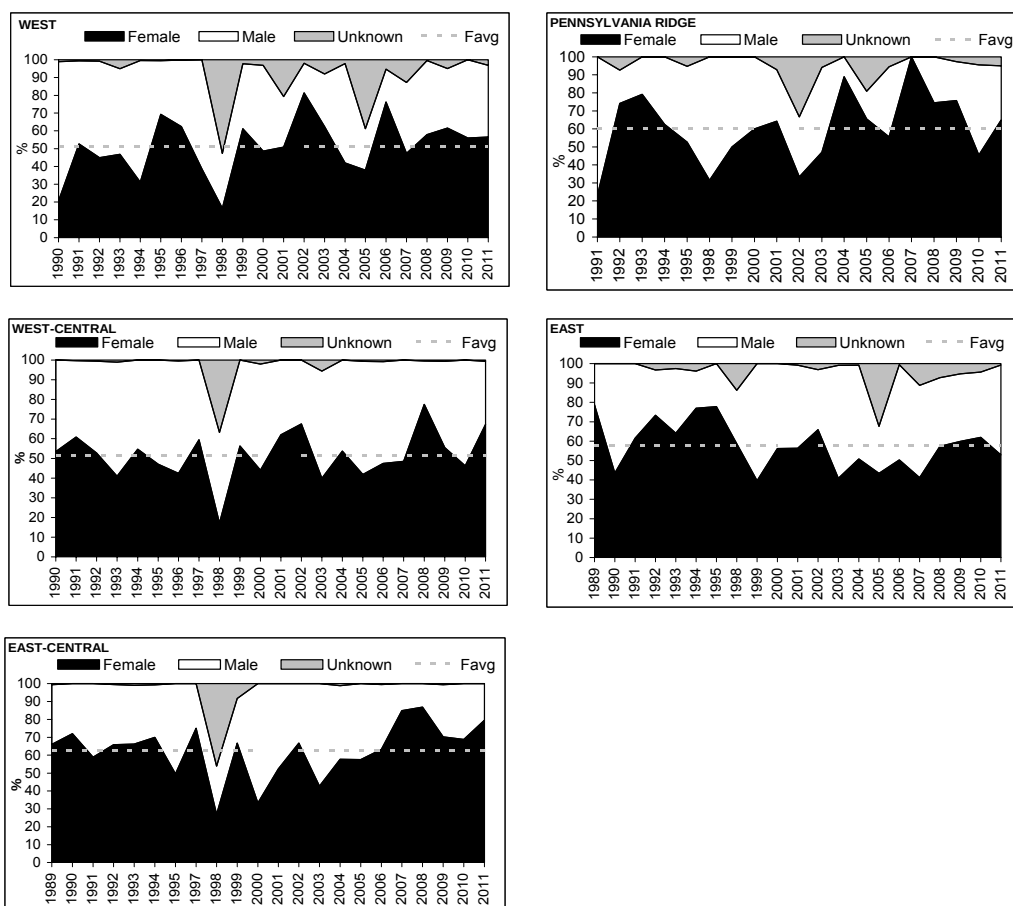


Figure 4.1.10 Proportion of walleye ages 2 and older represented by each sex caught in fall Partnership index gill netting, 1989-2011. Note absent years in east-central, Pennsylvania Ridge, and east basin time series. Dashed line represents average proportion of females over the time series.

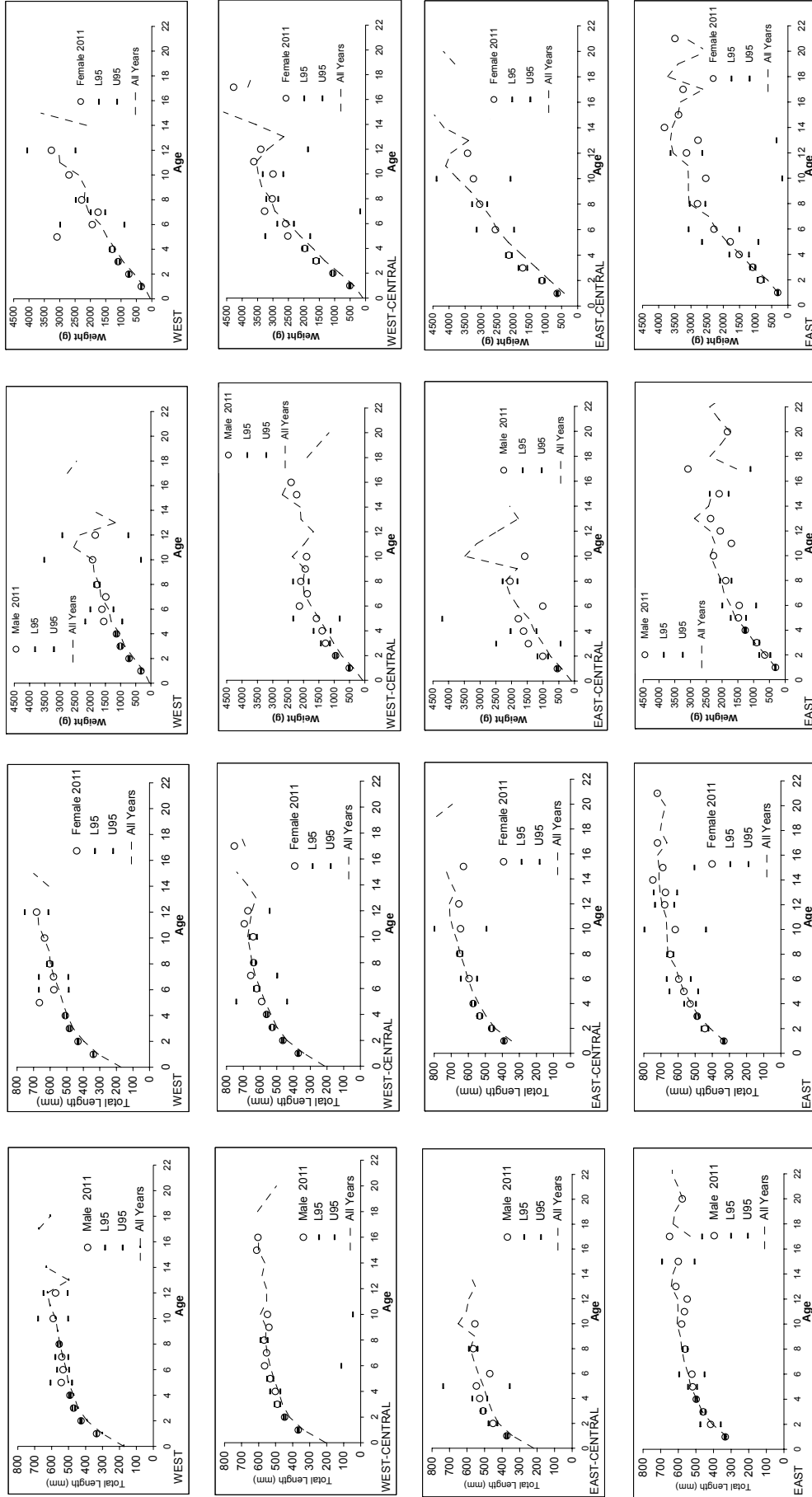


Figure 4.1.11

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 2011 (circles). 95% confidence limits shown. Dotted line represents mean size at age for all years to 2010. Partnership Index Fishing, 1989-2011.

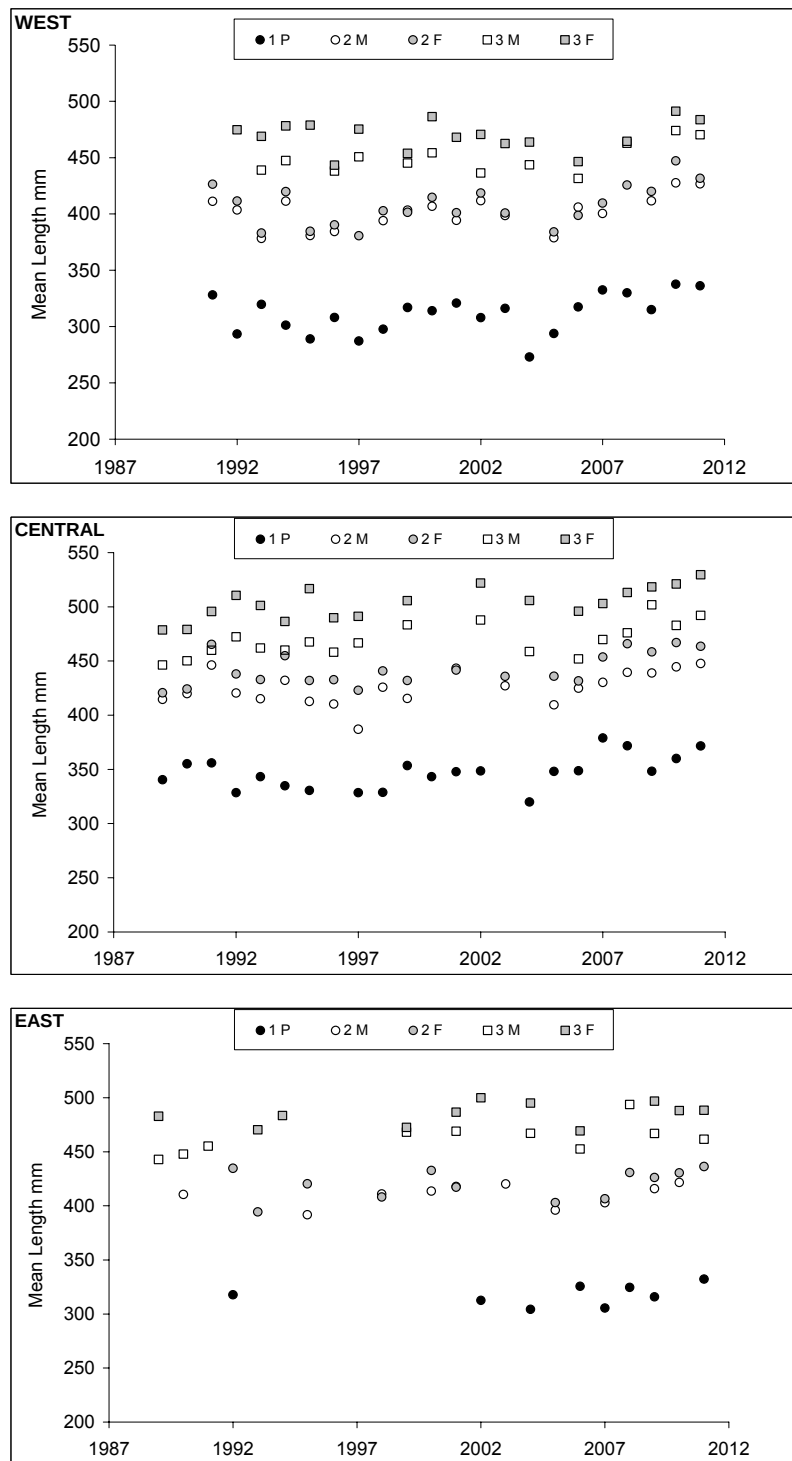


Figure 4.1.12 Mean total length (mm) of walleye ages 1, 2, and 3 by sex in the west, central and east basin surveys. Central includes west-central and east-central basin surveys. East includes Pennsylvania Ridge, east, and walleye cap area surveys. M= male F=female P=sexes pooled. Age 1 includes both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

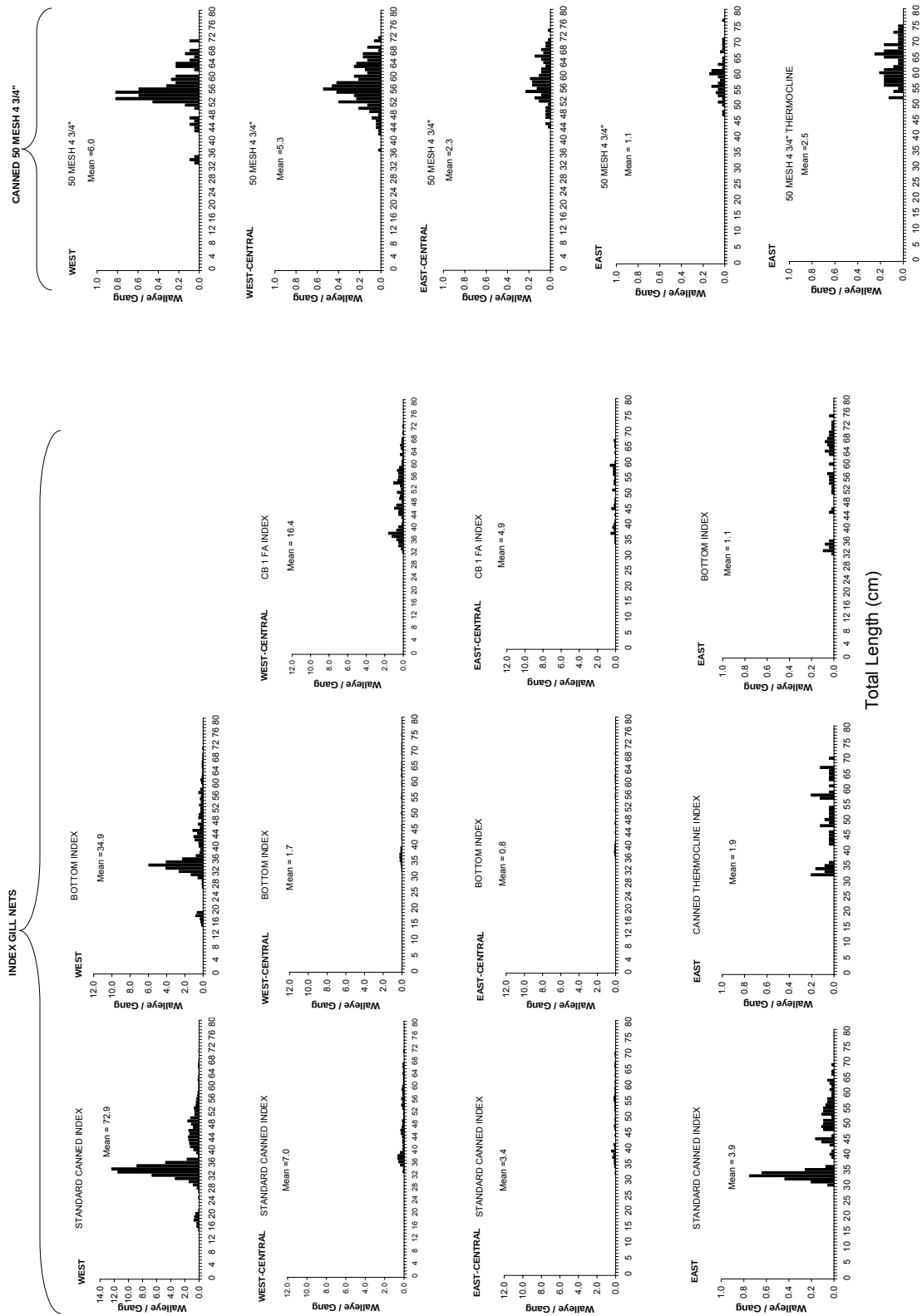


Figure 4.1.13 Walleye catch rates in 2011 by 1 cm length intervals in west basin (top row), west-central (2nd row), east-central (3rd row) and east basin (bottom row) in standard index canned gill nets, bottom nets, central basin 1 fathom canned nets, canned thermocline nets (east only) and in 50 mesh 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, 2011.

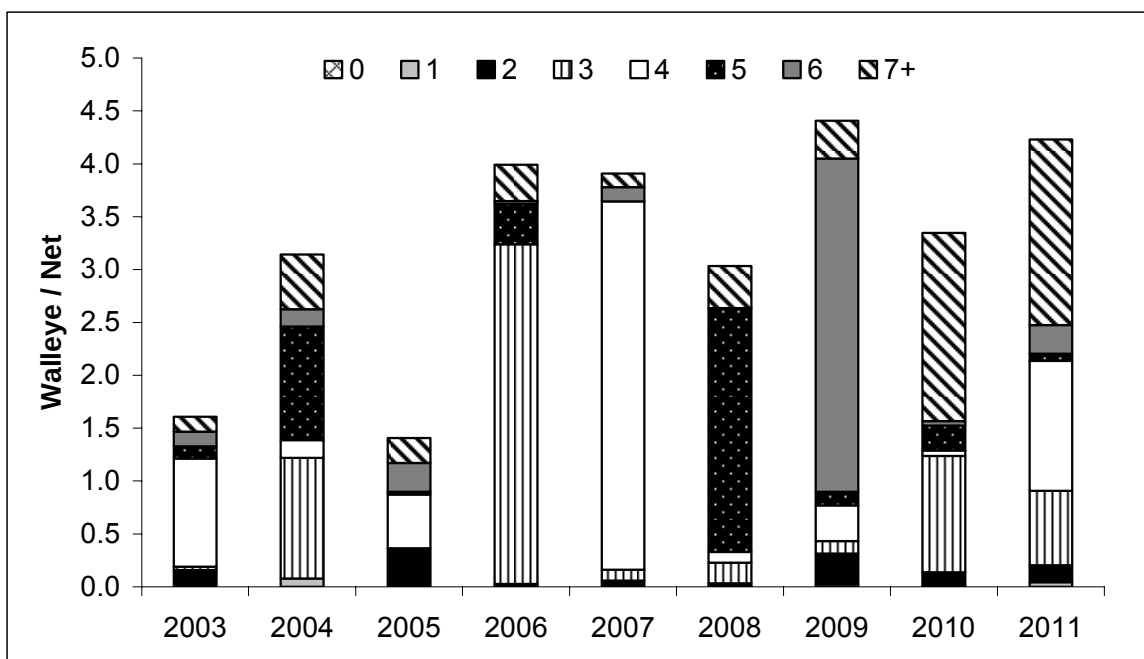


Figure 4.1.14 Walleye catch at age per 50 mesh deep 121 mm, 34 m canned gill net fished adjacent to index gill nets in the west, west-central, and east-central basins. All canned depths were included.

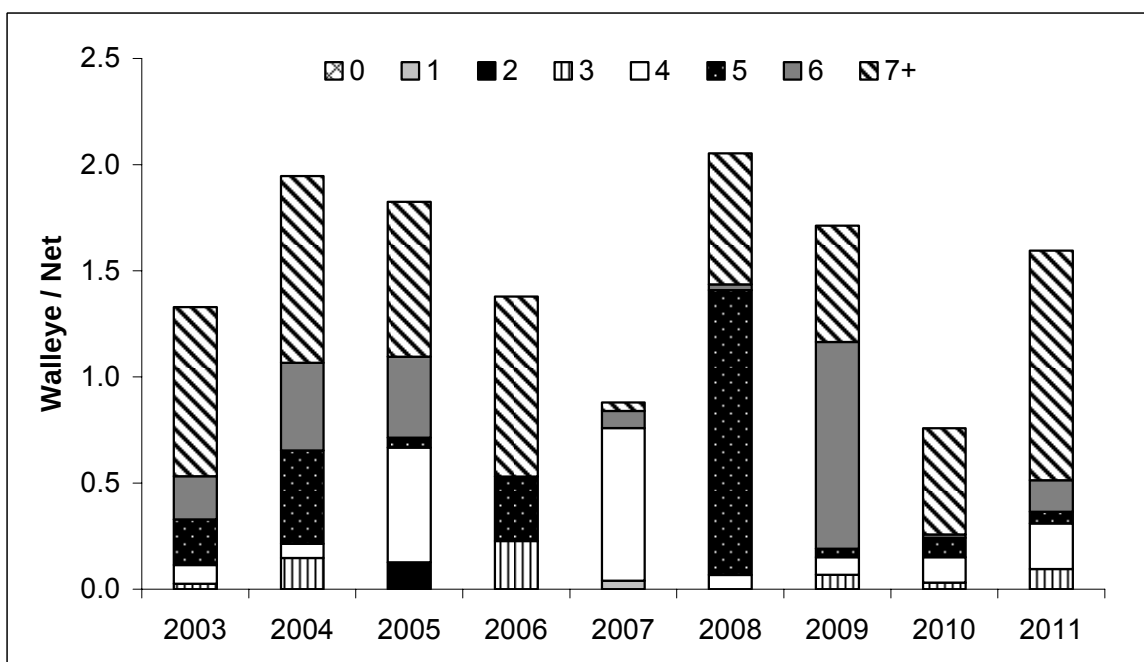


Figure 4.1.15 Walleye catch at age per 50 mesh deep 121 mm, 34 m canned gill net fished adjacent to index gill nets in the Pennsylvania Ridge, east, and walleye cap area surveys. All canned depths were included.

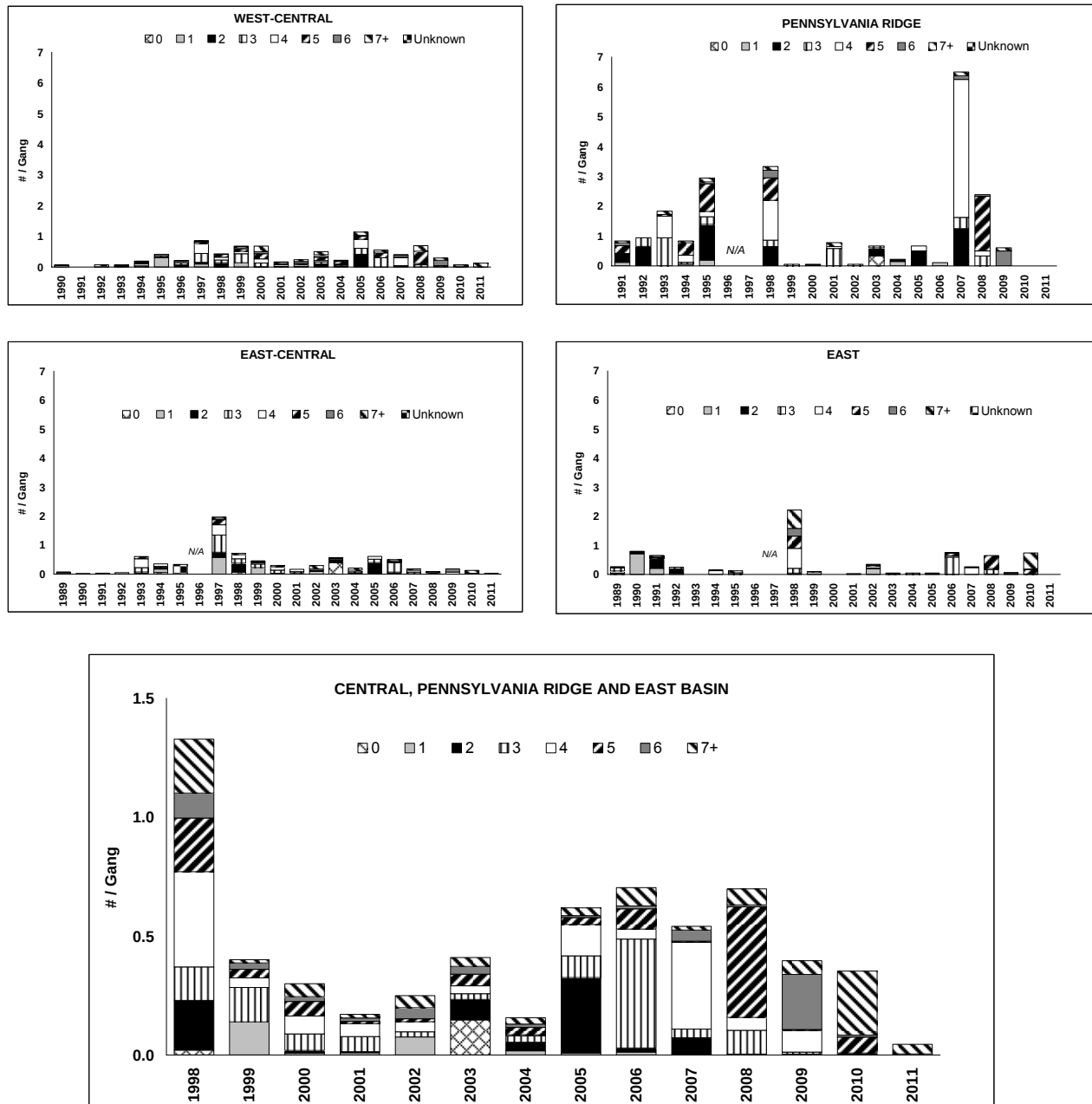


Figure 4.1.16 Lake whitefish catch at age (numbers) per gang of index gill nets (canned and bottom), in the west-central, east-central, Pennsylvania Ridge, east basin and with basins pooled. Only standard canned sets included in east basin and Pennsylvania Ridge graphs. Whitefish samples lacking age data are represented by the "unknown" series. East basin 1995 based on few sites. Pooled basins includes extra walleye cap area sites. Pooled basin series begins in 1998 to represent years in which all basins were sampled.

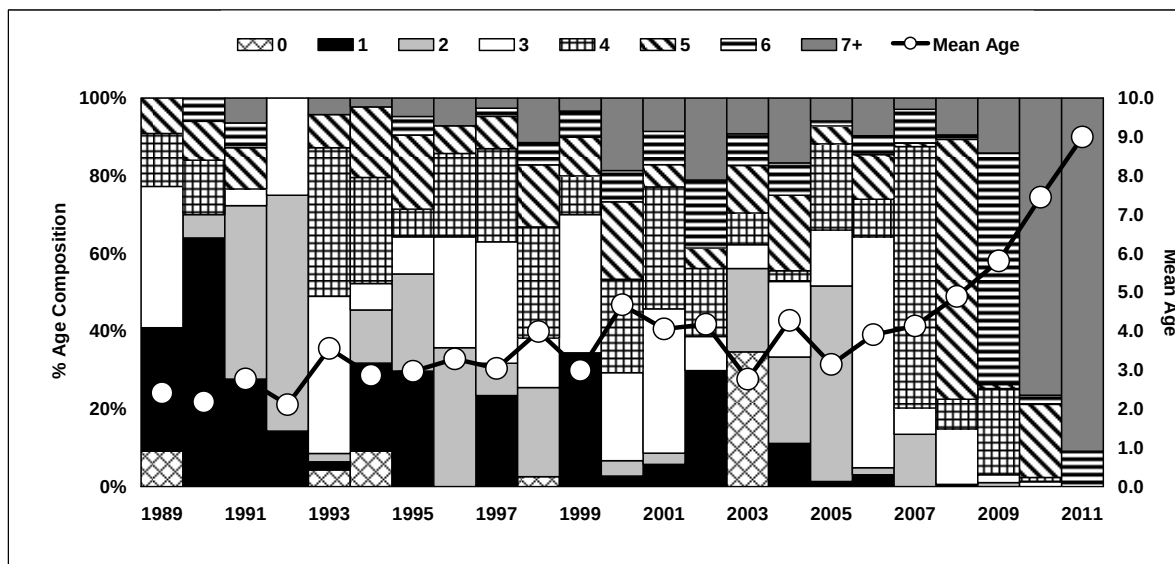


Figure 4.1.17 Whitefish age composition and mean age (line) from Partnership Index Fishing, all basins combined, all index gear included. Ages 7 and older pooled (otolith and scale ages in 2011).

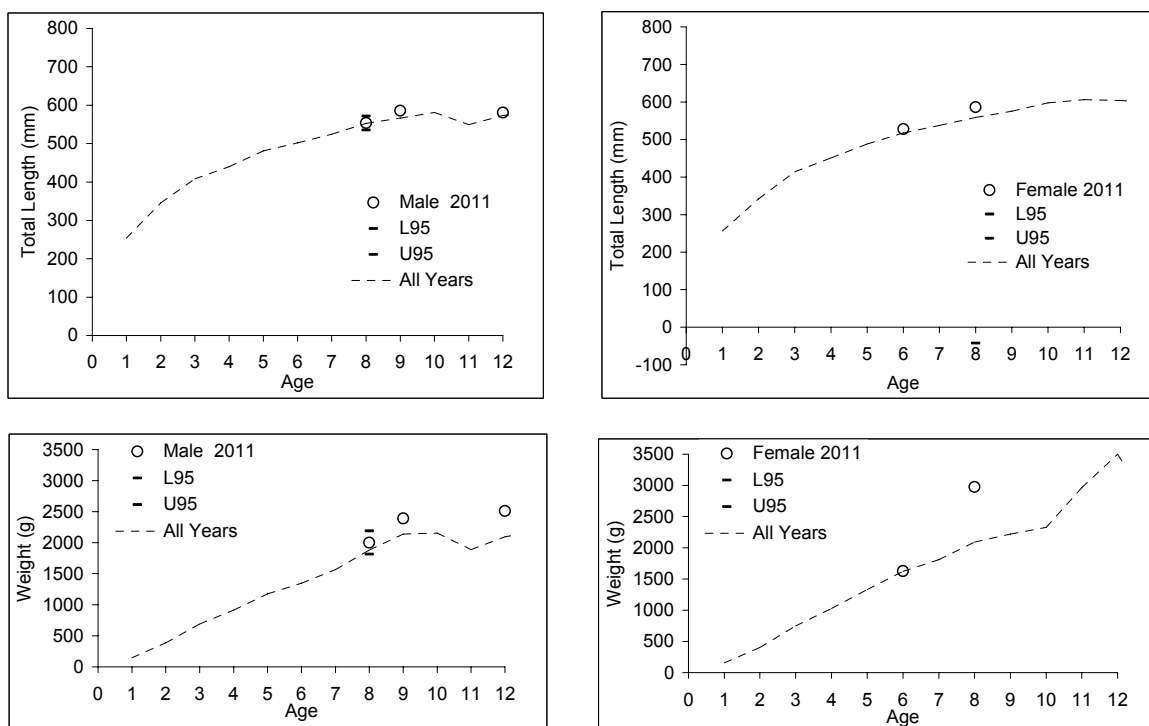


Figure 4.1.18 Mean length (top) and weight (bottom) at age for male (left) and female (right) lake whitefish, 2011 (circles). 95% confidence limits shown. Dotted line represents mean size at age 1989-2010, combined. Ages based on scales prior to 2006. Partnership Index Fishing 1989-2011, all basins.

4.2 Index Trawling: Western Lake Erie

The western basin interagency trawling index, conducted by Ontario and Ohio, was completed during August, 2011. 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, but trends may differ from pooled Ontario – Ohio indices that are more spatially extensive. Lake Erie task groups use these values to project abundance of two-year-old yellow perch and walleye in advance of recruitment to fisheries. Species composition and trends in forage abundance are also described by index trawling. Length and weight measurements were recorded to describe trends in growth. Subsamples of yellow perch were aged using scales and otoliths.

The gear used was a two seam, 33' Biloxi bottom trawl (38' ground line) with a ½" cod end liner. Trawls in Ontario waters of western Lake Erie took place over two weeks from August 16 to August 25, 2011 (Figure 4.2.1). Similar to 2009 and 2010, the 2011 field season experienced hypoxic conditions in the west basin. Hypoxic conditions (dissolved oxygen < 2 mg / l) were observed at 3 sites during this project in 2011. Due to concerns about the potential effects of hypoxia on the distribution of juvenile percids and other species, representatives from task groups, the Standing Technical Committee, researchers from the Quantitative Fisheries Center at Michigan State University and Ohio State University (OSU) developed an interim policy for the assignment of bottom trawl status. Informed by literature (Eby and Crowder 2002, Craig and Crowder 2005) and field study (Ohio DNR / OSU) concerning fish avoidance of hypoxic waters, an interim policy was agreed upon whereby bottom trawls that occurred in waters with dissolved oxygen less than or equal to 2 mg/l would be excluded from analyses applied retroactively from 2009. This interim policy will be revisited in the future following an improved understanding of the relationship between dissolved oxygen and the distribution of fish species and their various life stages in Lake Erie.

Since the 2011 report, revisions were made to Ontario data concerning age group classifications for a number of species based on interagency comparisons of length distributions. While no changes were made to yellow perch and walleye age group classifications during these revisions, exclusion of hypoxic sites from 2009-2011 altered catch rates slightly for all species and age groups including percids.

Indices of abundance 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 1988-2011 (Table 4.2.1). Additional summaries are presented for yearling yellow perch and walleye which used length and age data for age classification. Since the 2008 Status of Major Stocks Report, these indices have been expressed as number caught per hectare (CPHA), by species and age group.

For the eighth consecutive year, catches of young-of-the-year (YOY) white perch exceeded all other species and age groups combined, representing 51% of all fish caught (Table 4.2.1). Relative to young-of-the-year indices for each species, rock bass was the only species with a catch rate in 2011 (3/ha) above the 10 year (0.6/ha) and full time series (0.4) average. Rock bass are generally caught infrequently as YOY or older fish, likely due to their preference for rock substrate and avoidance of these areas in bottom trawl assessment. Abundance indices were moderate for YOY yellow perch and smallmouth bass but were weaker for YOY walleye, white bass, white perch, gizzard shad and freshwater drum. Although the 2011 catch rate was moderate, but below the long term average (Figure 4.2.2), the majority (97% or 1847) of YOY yellow perch were caught at one site near the mouth of the Detroit River (Figure 4.2.1). This clumped distribution may be related to hypoxic conditions and increases the level of uncertainty associated with year class strength designation. YOY walleye catch rates in 2011 were below the previous 2 years and below the long term mean (Figure 4.2.3). Clupeids (gizzard shad and alewife) are often suspended and bottom trawl indices for these species may be highly variable as a result. YOY gizzard shad catch rates in 2011 were second lowest in the time series (Table 4.2.1). YOY gizzard shad remain an important prey of top predators, but grow beyond prey-size and demonstrate strong trawl avoidance at older ages.

Yearling and older catch rates were high for white bass and white suckers in 2011. Based on the size distribution, most if not all of the YAO white bass were yearlings. The year class strength of

white bass from the 2010 year class appears much stronger as yearlings in 2011 than observed as YOY in 2010. Moderate catch rates of yearling and older (YAO) fish were observed in 2011 for yellow perch, white perch, freshwater drum, walleye, channel catfish, smallmouth bass, common carp, quillback and shorthead redhorse (Table 4.2.1). Abundance indices of YAO gizzard shad, brown bullhead, and rock bass were weak in 2011. Length frequency and age data for YAO yellow perch allow catch rates to be summarized for yearling yellow perch. The catch rate (48/ha) of yearling yellow perch in 2011 appeared moderate, and was below both the mean (Figure 4.2.4) and the median (72.1/ha). The yearling walleye catch rate in 2011 within Ontario waters (3.4/ha) was below the average (Figure 4.2.5) but above the median (2.7/ha).

Forage species, which remain potential prey for the duration of their life histories, were caught in low to moderate numbers in 2011 (Table 4.2.1). Catch rates of emerald shiners and round gobies were moderate in 2011 (Table 4.2.1). No alewife was caught in 2011. Logperch, mimic shiners, rainbow smelt, silver chub, spottail shiners, and trout-perch catch rates were weaker relative to each respective time series. Approximately 65% of rainbow smelt caught in 2011 were young-of-the-year. Cyprinids (minnows) are often suspended and bottom trawl indices may not accurately reflect trends in abundance. Silver chub have declined in this project since the late 1990s (Table 4.2.1) and are a species of *Special Concern* listed under the Endangered Species Act of Ontario.

Catch rates for species encountered infrequently (10 year average CPHA < 0.2) are presented in Table 4.2.2. A YOY bluegill was caught in 2011. An 80.2 cm (total length) lake sturgeon was caught in 2011, tagged with both floy and PIT (Passive Integrated Transponder) tags and released. A tubenose goby was caught for the first time in Ontario waters during the 2011 west basin trawl survey. Other observations in 2011 included a silver redhorse sucker and four (4) brook silversides.

In 2011, the average total length of YOY yellow perch (64 mm) was close to average (Figure 4.2.6). YOY yellow perch mean weight in 2011 was 2.7 g (STD = 0.9), which was close to the 1998-2010 average of 2.9 g. The average total length of YOY walleye in 2011 (134 mm) was also near the time series average (Figure 4.2.7). The mean weight of YOY walleye in August, 2011 was 19.4 g (STD = 7.3) which was slightly above the 1998-2010 mean (17.2 g). The average length of yearling yellow perch has been above average since 2006 (Figure 4.2.8). Similarly, the average total length of yearling walleye remained above the time series average since 2007 (Figure 4.2.9).

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.

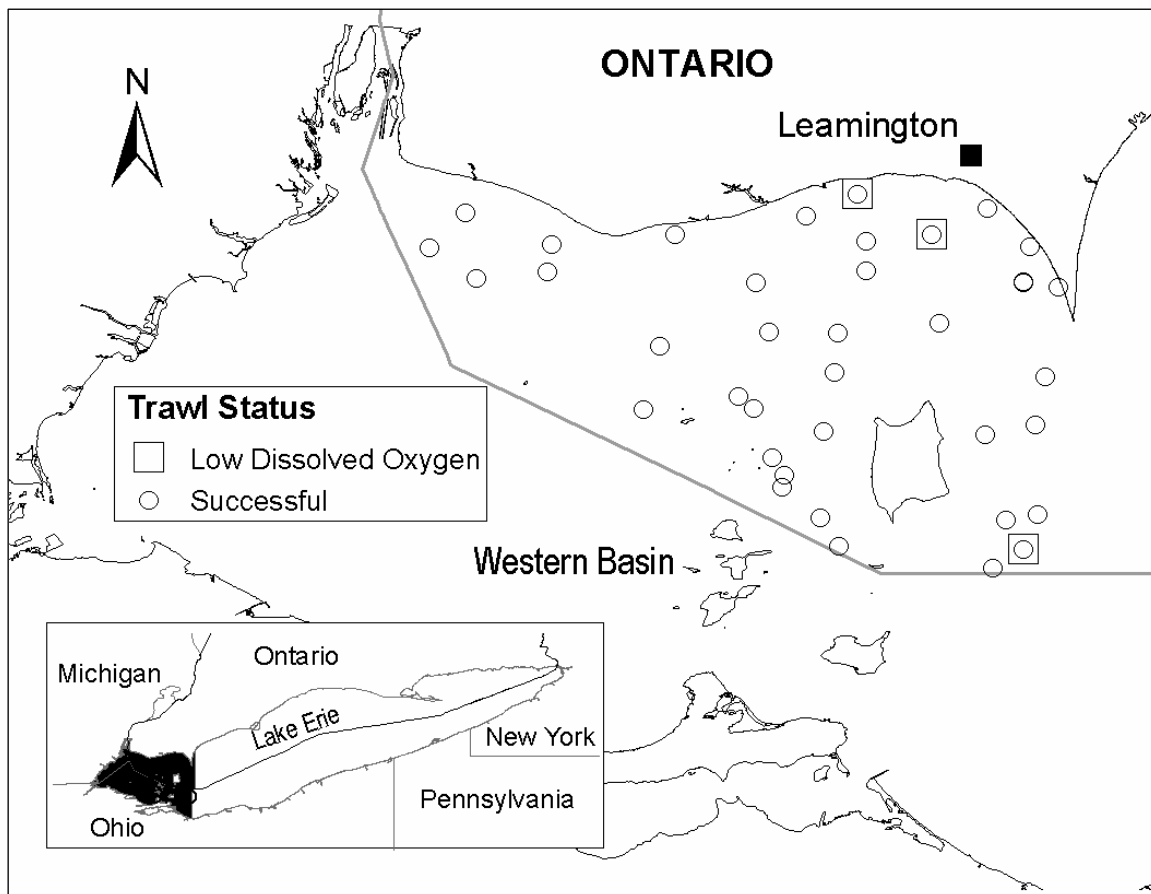


Figure 4.2.1 Ontario bottom trawl index locations fished in the western basin of Lake Erie during August, 2011. Thirty-six (36) stations were completed. Three (3) sites with low dissolved oxygen were excluded from analyses.

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 1988-2011 by the OMNR Lake Erie Management Unit. The average CPHA for each age group includes 2002-2011. Species with mean CPHA less than 0.2 were excluded.

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	Average (10 Yrs.)
<i>young-of-the-year</i>																									
White perch	4,988.7	6,046.9	7,725.0	3,378.4	1,183.6	1,063.1	1,054.4	293.5	1,009.5	118.4	124.4	232.9	888.3	1,489.9	388.0	1,312.8	4,657.0	1,762.1	3,254.0	4,265.0	1,947.0	2,477.0	1,303.2	754.9	2,209.1
Yellow perch	202.1	513.7	470.9	72.4	173.9	499.3	554.8	741.4	1,914.9	71.6	188.1	468.2	46.5	655.9	14.5	2,220.6	57.7	117.6	361.0	331.7	663.0	74.8	161.2	220.7	422.3
Gizzard shad	966.4	1,197.1	1,099.6	59.0	260.4	826.4	103.9	81.6	2,409.1	33.8	413.3	214.0	1,646.5	2,224.8	47.2	436.0	23.4	152.7	174.1	340.0	2.6	793.8	47.8	22.8	204.0
White bass	23.1	67.9	64.7	13.8	14.9	124.0	36.9	51.1	125.3	327.3	24.5	152.0	140.4	167.9	81.8	590.7	58.7	50.7	159.4	29.2	54.6	167.2	100.4	21.9	131.4
Freshwater drum	72.1	10.2	2.4	84.4	0.5	3.1	0.7	0.2	6.9	1.4	2.9	9.8	23.0	16.9	107.8	117.4	33.8	20.1	1.4	7.0	-	0.4	5.9	1.9	29.6
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	15.6
Smallmouth bass	0.1	0.2	2.1	-	-	0.8	1.6	6.6	4.8	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	2.4
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	0.3	-	0.3	0.4	0.9	3.0	0.6
<i>yearling-and-older</i>																									
Yellow perch	169.4	7.8	52.0	89.3	70.7	99.3	66.3	137.5	374.7	74.1	98.7	187.8	328.9	131.3	120.1	470.2	402.9	294.9	83.5	84.2	536.2	416.6	154.8	139.6	270.3
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	388.6	99.1	95.1	76.7	212.3
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	59.9
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	11.3
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	2.2
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	1.3
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	1.2
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	0.8
Brown bullhead	2.7	-	1.2	0.5	0.2	-	-	-	-	0.1	-	0.8	0.3	2.5	-	-	-	-	0.2	2.7	1.0	-	0.6	0.1	0.5
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	0.4
Rock bass	1.7	-	1.0	1.2	0.6	1.2	2.5	1.3	2.2	0.4	0.1	0.3	0.7	1.8	0.6	0.3	0.2	0.3	-	0.6	0.2	1.2	-	0.2	0.4
Shorthead redhorse	-	-	-	0.1	-	-	0.1	-	-	-	-	-	-	-	-	0.5	1.3	0.1	-	-	0.7	0.5	0.1	0.1	0.3
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
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	0.2	0.2
<i>all ages</i>																									
Trout-perch	213.3	142.6	347.7	479.3	71.1	267.8	182.9	63.9	335.0	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	242.2
Emerald shiner	2.6	3.3	143.3	12.0	60.4	30.9	21.0	108.2	129.2	61.3	6.1	39.3	34.8	52.6	98.5	633.8	88.4	118.9	65.8	285.8	141.0	249.4	83.7	63.3	182.9
Round goby	-	-	-	-	-	-	-	-	-	2.7	83.8	92.1	111.1	84.2	117.1	59.6	207.5	59.8	170.6	71.4	172.0	189.7	16.8	43.7	111.8
Rainbow smelt	1.4	3.1	10.9	0.2	64.3	18.7	0.1	2.8	1.6	2.0	6.5	-	39.7	0.2	6.4	29.2	82.1	2.0	52.6	45.9	84.8	65.8	0.5	8.0	37.7
Spottail shiner	46.9	21.6	31.7	49.5	40.6	29.3	28.3	331.5	40.4	81.2	87.9	75.3	23.1	66.5	13.1	15.9	16.9	94.5	17.5	31.7	5.5	4.9	29.8	1.2	23.1
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	-	21.9
Cyprinidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	15.7	14.2	-	23.2	0.4	6.5
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	3.1
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	2.7
Mimic shiner	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	21.3	-	1.0	0.7	0.3	2.3
Total	7,869	8,286	10,350	5,086	5,599	5,244	2,147	1,969	7,218	956	1,192	1,923	4,307	5,725	1,532	7,267	6,685	3,181	4,843	5,686	3,961	5,104	2,340	1,492	4,210
# 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	35

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

A revision of age code assignments based on length criteria occurred for some species for the entire time series in this report. Yellow perch and walleye age codes were not changed.

Samples collected during 2009, 2010, 2011 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 expressed as young-of-the-year, yearling-and-older and all ages, collected during interagency bottom trawling in western Lake Erie 1988-2010 by the OMNR Lake Erie Management Unit. The average CPHA for each age group includes 2002-2011. Species with mean CPHA greater than 0.2 were excluded.

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	Average (10 Yrs.)
<i>young-of-the-year</i>																									
Bluegill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2	0.1	0.0
Morone sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2	-	-	-	-	0.0
Largemouth bass	-	-	-	4.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	0.1	-	0.0
White crappie	0.5	0.1	-	8.8	-	-	-	-	-	-	-	-	-	-	0.1	0.1	-	-	0.1	-	-	-	-	-	0.0
Pumpkinseed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	0.0
Black crappie	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	0.0
Quillback	1.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
White sucker	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Channel catfish	-	-	-	0.3	-	-	-	0.3	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-
<i>yearling-and-older</i>																									
Golden redbreast	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	0.5	-	-	0.1
Lake sturgeon	-	-	-	-	-	-	0.2	-	-	0.1	-	-	-	-	-	0.1	-	-	-	0.1	-	-	0.1	-	0.0
Silver redbreast	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	0.1	-	-	-	-	0.1	-	0.1	0.0
Silver lamprey	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
Black crappie	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	0.0
Moxostoma sp.	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	0.0
Muskeelunge	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
Yellow bullhead	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	0.0
Carp-goldfish hybrid	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
Longnose sucker	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
Lake whitefish	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	0.1	-	0.1	-	-	-	0.0
Northern pike	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	0.0
Burbot	0.2	-	-	-	0.6	9.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Largemouth bass	-	-	-	1.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
White crappie	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>all ages</i>																									
Brook silverside	-	-	-	-	-	0.8	-	0.1	-	-	-	-	-	-	-	-	-	0.1	-	0.8	-	-	-	0.5	0.1
Tubenose goby	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
Goldfish	0.1	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	0.1	0.0
Common shiner	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-	0.0
Notropis sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	0.0
Spotfin shiner	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Blacknose dace	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nocomis sp.	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Johnny darter	-	-	-	-	-	-	2.1	-	1.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	2.5	0.2	0.2	15.5	0.6	10.5	2.4	0.5	1.4	0.2	0.0	0.0	0.1	0.3	0.1	0.3	0.2	0.2	0.6	1.4	0.1	0.6	0.8	1.2	0.6
# 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	35

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

A revision of age code assignments based on length criteria occurred for some species for the entire time series in this report. Yellow perch and walleye age codes were not changed. Samples collected during 2009, 2010, 2011 with dissolved oxygen ≤ 2 mg / l were excluded based on an interim interagency protocol adopted in 2012.

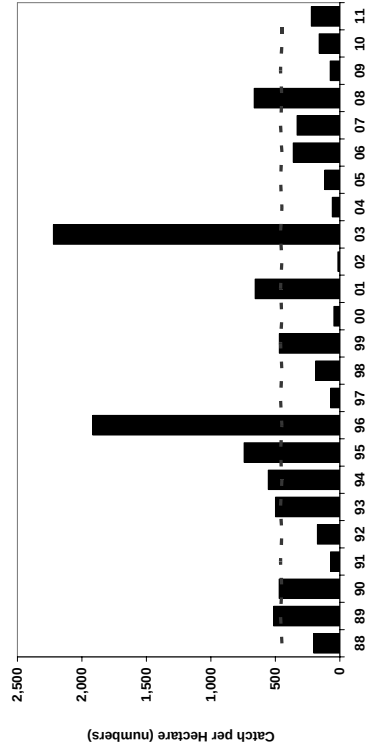


Figure 4.2.2 Number of young-of-the-year yellow perch caught per hectare during interagency trawling (1988-2011) in western Lake Erie. Horizontal line indicates 1988-2011 average catch per hectare.

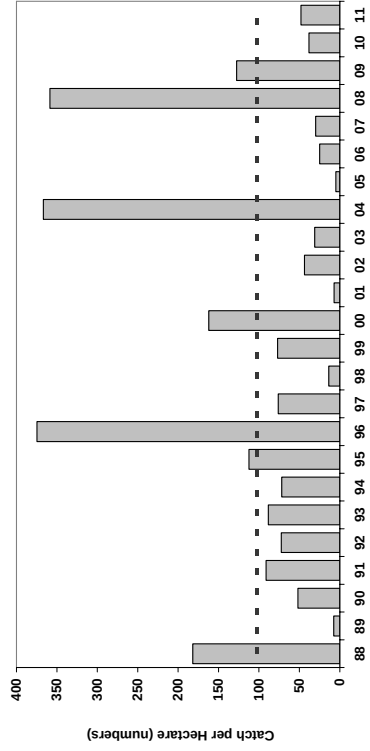


Figure 4.2.4 Number of yearling yellow perch caught per hectare during interagency trawling (1988-2011) in western Lake Erie. Horizontal line indicates 1988-2011 average catch per hectare.

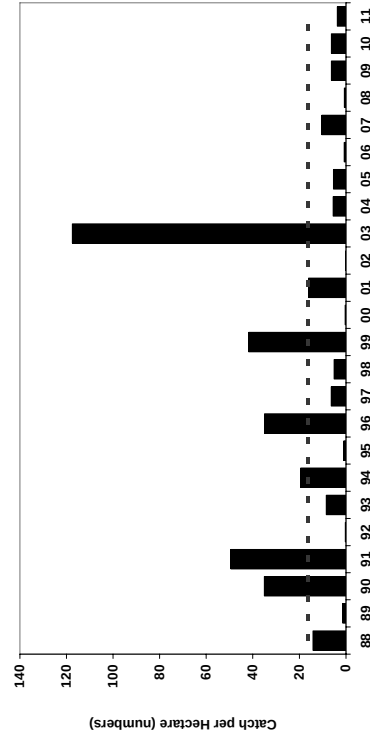


Figure 4.2.3 Number of young-of-the-year walleye caught per hectare during interagency trawling (1988-2011) in western Lake Erie. Horizontal line indicates 1988-2011 average catch per hectare.

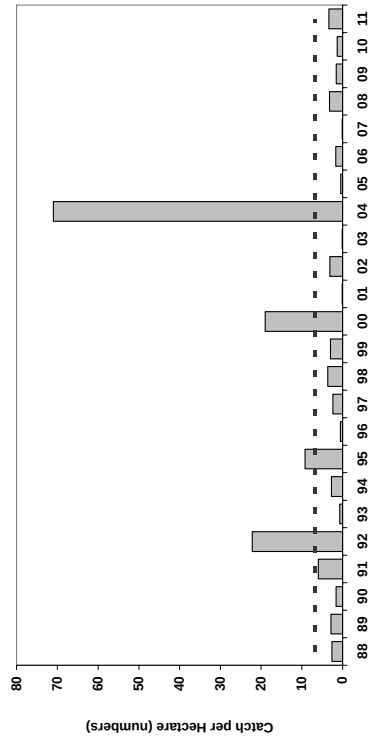


Figure 4.2.5 Number of yearling walleye caught per hectare during interagency trawling (1988-2011) in western Lake Erie. Horizontal line indicates 1988-2011 average catch per hectare.

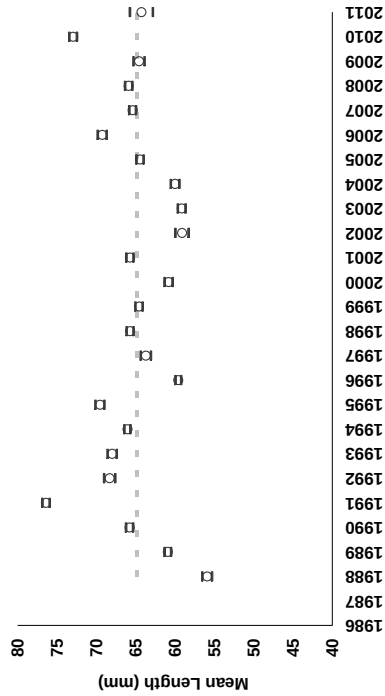


Figure 4.2.6 Mean total length of young-of-the-year (YOY) yellow perch with 95% confidence limits. Interagency trawling, Ontario waters of western Lake Erie, 1988-2011. Horizontal broken line indicates the average of the time series.

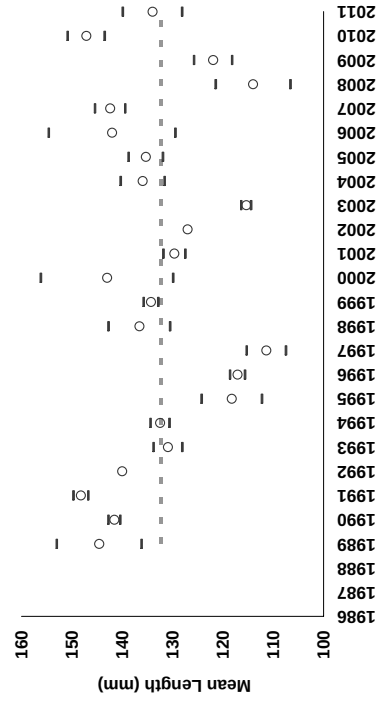


Figure 4.2.7 Mean total length of young-of-the-year (YOY) walleye with 95% confidence limits. Interagency trawling, Ontario waters of western Lake Erie, 1988-2011. Horizontal broken line indicates the average of the time series. Two (2) YOY were caught in 1992 and one (1) in 2002.

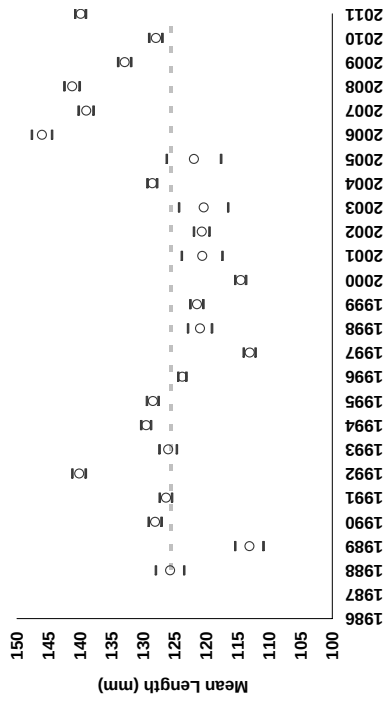


Figure 4.2.8 Mean total length of yearling yellow perch with 95% confidence limits. Interagency trawling, Ontario waters of western Lake Erie, 1988-2011. Horizontal broken line indicates the average of the time series.

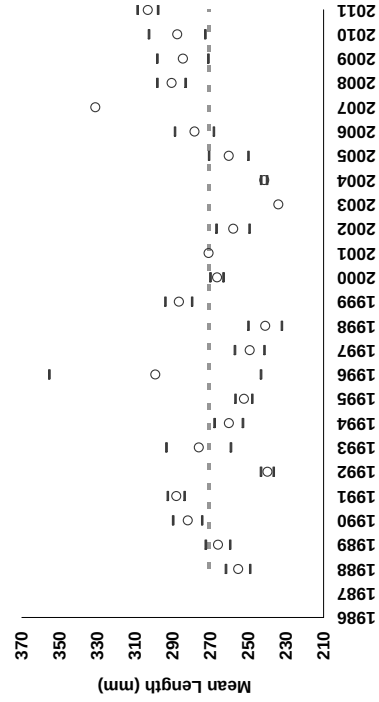


Figure 4.2.9 Mean total length of yearling walleye with 95% confidence limits. Interagency trawling, Ontario waters of western Lake Erie, 1988-2011. Horizontal broken line indicates the average of the time series. In 2007 one (1) yearling walleye was caught.

4.3 Long Point Bay Index Trawl Surveys

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

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

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

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

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

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

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

where $LPBc_i$ is the age 0 yellow perch composite index in year i , and OOB_i , IB_i and NOB_i are the age 0 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).

Smelt

Although recruitment of age 0 rainbow smelt increased from 2010 (NPHa=326.9), the 2011 year class was about average strength, ranking it in the 59th percentile among all years surveyed since 1984 (Table 4.3.3). Relative abundance of YOY smelt in the offshore waters of Long Point Bay in 2011 (NPHa=509.2) was about half of the long term average (1984-2010 avg. NPHa=971).

YAO smelt abundance increased slightly in 2011 (NPHa=277.1) from comparatively low densities observed during 2010 (NPHa=222.7). Age 1 smelt from the moderately weak 2010 year class accounted for 90% of the October 2011 YAO smelt catch in number (Table 4.3.5).

Age 0 smelt mean length and weight decreased in 2011 and both size measures were below their respective long term averages (Figure 4.3.2). Age 1 smelt were about the same mean length and weight as in 2010; however both of these size measures remained below average (Figure 4.3.2).

Yellow Perch

Index trawl assessments during 2011 once again showed that age 0 yellow perch were more abundant in offshore waters than in traditional near shore habitats of Long Point Bay (Tables 4.3.1 to 4.3.3). Age 0 perch densities in 2011 were 57 to 58 times lower in the Inner Bay and the Nearshore Outer Bay trawl assessment areas, respectively than in the Offshore Outer Bay survey area, confirming a pattern that has predominated since 2003. The two nearshore trawl assessments rank the 2011 year class as being relatively poor, whereas age 0 perch recruitment ranks as the 3rd highest during the 28 year history of the offshore trawl assessment. The Long Point Bay composite index indicates the 2011 year class was good (NpHa=176.7) compared to the long term average (1984-2010 avg. NpHa=64.3). According to the composite index, the period since 2002 has featured three of the weakest (2002, 2004, 2009) and four of the strongest (2003, 2005, 2008, 2011) perch year classes observed since 1984 (Figure 4.3.3).

Mean size of age 0 yellow perch has increased over the time series (combined nearshore trawl assessments) and this trend continued in 2011 (Figure 4.3.4). Maximum mean age 0 perch size was observed in 2005. Age 0 perch have remained larger than average during the six of the past seven years, although it should be noted that sample size in 2009 was fewer than 10 fish (Figure 4.3.4).

Although few in number, one year old fish were the dominant age class represented in the 2011 YAO perch catch from the two Long Point Bay nearshore trawl assessments (Table 4.3.4).

Smallmouth bass

Age 0 smallmouth bass abundance decreased in 2011 (NPHa=6.1), falling below the long term average density of 16.6 bass/ha for the second consecutive year (Table 4.3.1). Mean total length of age 0 smallmouth bass has fluctuated between 60 and 90 mm during the 32 year time series of the Inner Bay trawl assessment (Figure 4.3.5). Age 0 bass mean length and weight increased in 2011; in general, YOY bass have been above average size during most of the years surveyed since 1998.

Table 4.3.1 Relative abundance (mean number per hectare) of selected young-of-the-year fish species caught in Inner Long Point Bay, Lake Erie during bottom trawl assessments (6.1 m trawl) , September, 1980-2011.

Year	Effort (min.)	Yellow Perch	Rock Bass	Smallmouth Bass	Largemouth Bass	Spottail Shiner	Banded Killifish	Johnny Darter	Sunfish (Lepomis spp.)	Round ^a Goby
1980	130	167.8	7.3	4.0	3.0	364.2	0.0	1.3	6.0	0.0
1981	220	534.9	2.9	0.0	0.0	2.4	0.0	0.4	11.5	0.0
1982	400	1026.8	12.1	11.8	3.4	126.9	0.3	1.3	0.0	0.0
1983	220	125.9	7.0	7.5	5.3	0.2	1.0	1.2	16.9	0.0
1984	400	761.7	41.1	2.3	6.8	37.4	1.3	0.9	108.2	0.0
1985	480	20.8	19.0	12.9	5.2	983.2	0.9	0.9	1.5	0.0
1986	400	1859.5	10.5	5.3	6.2	932.7	0.3	0.0	2.3	0.0
1987	400	3.8	6.9	5.0	6.9	195.2	0.0	0.0	6.8	0.0
1988	400	305.0	2.3	5.6	3.8	627.8	0.1	0.3	3.4	0.0
1989	400	457.7	13.2	5.3	6.9	871.9	23.2	25.6	69.3	0.0
1990	400	202.6	4.4	4.9	7.9	55.1	12.5	17.0	143.0	0.0
1991	400	144.0	4.1	13.1	7.7	382.6	10.6	23.4	8.9	0.0
1992	400	594.0	4.2	19.1	1.6	83.7	1.1	9.9	0.1	0.0
1993	400	239.8	22.3	26.4	2.9	97.5	6.1	11.1	198.7	0.0
1994	400	84.0	5.7	40.9	39.1	51.4	11.8	47.0	9.5	0.0
1995	400	5.3	82.3	19.6	74.4	116.8	52.6	57.3	68.0	0.0
1996	400	53.6	197.6	23.9	57.6	49.7	48.0	24.3	140.4	0.0
1997	400	21.5	23.9	72.0	17.2	79.6	19.3	41.9	3.1	0.0
1998	480	1005.9	17.6	13.3	11.8	171.7	226.3	16.5	14.7	0.0
1999	480	34.0	12.8	91.7	96.6	51.0	44.0	11.1	10.9	0.6
2000	400	1.2	37.8	7.9	5.1	2.4	11.8	4.3	173.0	26.5
2001	400	463.8	1.3	21.7	3.3	0.3	12.9	4.3	1.5	183.1
2002	400	8.3	11.8	14.0	24.8	0.0	74.0	7.3	52.0	56.2
2003	320	224.0	4.2	12.8	4.4	0.4	4.2	4.5	5.1	28.6
2004	480	0.1	0.2	12.0	0.8	0.2	0.3	16.2	0.1	95.4
2005	480	8.8	9.7	9.0	7.0	1.0	3.7	0.2	16.3	21.0
2006	400	0.3	0.5	5.0	3.8	0.1	0.4	12.0	0.1	34.0
2007	400	73.9	0.3	8.2	1.6	0.5	0.3	2.1	0.0	263.0
2008	400	0.3	1.3	8.4	1.2	0.0	0.5	0.1	0.4	211.8
2009	320	0.0	1.1	19.1	0.7	0.0	0.5	0.7	0.0	280.5
2010	400	5.7	0.0	11.0	5.8	0.0	0.9	1.2	0.3	135.1
2011	400	3.9	4.1	6.1	3.5	0.0	3.7	2.0	3.0	114.6
Avg. for 1980-2010		272.1	18.2	16.6	13.6	170.5	18.3	11.1	34.6	43.1

^a Abundance indices of round goby include all ages.

Table 4.3.2 Relative abundance (mean number per hectare) of selected young-of-the-year fish species caught in the nearshore waters of Outer Long Point Bay, Lake Erie during index bottom trawl assessments (6.1 m trawl), September, 1980–2011.

Year	Effort (min.)	Yellow Perch	White Perch	White Bass	Alewife	Gizzard Shad	Emerald Shiner	Spottail Shiner	Round ^b Goby
1980	209	21.1	0.0	10.6	8.4	14.7	40.8	101.8	0.0
1981	200	137.4	0.0	1.2	0.0	4.7	0.0	2.8	0.0
1982	200	69.6	0.0	1.0	214.5	2.6	1.0	103.0	0.0
1983 ^a	0								
1984	300	283.9	120.9	153.9	4.1	22.8	12.6	140.1	0.0
1985	360	2.4	0.6	29.6	27.0	7.0	65.0	858.1	0.0
1986	300	102.0	55.5	33.1	14.0	82.8	0.3	305.0	0.0
1987	300	3.4	1.4	0.5	28.5	9.3	12.4	203.5	0.0
1988	280	667.7	98.1	0.0	0.7	17.2	5.9	861.8	0.0
1989	240	296.9	3.4	12.7	31.3	7.5	0.9	1055.4	0.0
1990	300	43.3	79.2	8.8	0.2	8.3	0.0	1098.6	0.0
1991	299	15.5	0.9	0.2	6.0	0.5	26.7	571.1	0.0
1992	300	54.3	0.5	0.0	869.7	0.2	0.0	267.9	0.0
1993	240	21.6	12.5	0.4	0.2	2.6	0.0	1339.6	0.0
1994	240	159.8	40.5	0.0	6.7	31.7	1.5	409.4	0.0
1995	300	6.0	2.1	0.2	2.2	4.6	1.8	282.6	0.0
1996	300	199.1	28.3	0.3	0.0	74.1	0.3	1508.5	0.0
1997	300	18.9	12.0	0.2	0.2	2.7	1.2	1093.7	0.0
1998	300	114.9	0.1	0.0	0.0	3.7	0.0	588.1	0.0
1999	300	2.5	0.2	0.4	0.0	5.5	0.0	999.1	0.6
2000	300	10.2	3.5	0.2	8.2	9.3	0.0	851.1	37.0
2001	300	76.7	5.0	1.1	0.4	2.9	2.3	51.8	183.4
2002	300	0.6	0.0	0.0	12.2	1.6	0.2	16.6	150.9
2003	240	93.3	14.6	0.4	17.6	5.1	0.0	74.1	114.2
2004	360	0.5	0.2	0.0	1.5	1.0	258.3	43.8	94.4
2005	360	10.3	0.4	0.7	11.0	1.9	1.1	58.7	28.0
2006	300	2.8	1.2	0.3	711.8	28.7	12.4	19.8	32.7
2007	300	6.3	0.7	0.2	44.6	22.0	1.2	35.2	73.9
2008	300	4.9	2.1	0.5	11.9	4.0	0.5	37.8	63.4
2009	240	1.5	0.0	0.0	1.9	0.0	0.0	3.7	91.2
2010	300	13.2	0.0	0.3	0.0	3.8	0.0	3.0	67.6
2011	300	3.9	0.0	0.0	6.8	3.4	1.1	2.5	103.3
Avg. for 1980-2010		81.4	16.1	8.6	67.8	12.8	14.9	432.9	31.2

^a Index trawling discontinued during 1983.

^b Abundance indices of round goby include all ages.

Table 4.3.3 Relative abundance (mean number per hectare) of selected young-of-the-year fish species caught in the offshore waters of Outer Long Point Bay, Lake Erie, during index bottom trawl assessments (10 m trawl), October, 1984-2011.

Year	Effort (min.)	Smelt	White Perch	White Bass	Yellow Perch	Alewife	Gizzard Shad	Emerald Shiner	Round ^a Goby
1984	320	2206.3	13.7	166.2	7.3	22.4	14.6	0.1	0.0
1985	394	84.0	12.9	8.1	1.6	0.5	0.4	0.8	0.0
1986	380	2979.8	0.2	32.7	0.0	16.6	77.1	2.4	0.0
1987	440	267.6	0.7	0.1	0.0	19.8	0.8	46.2	0.0
1988	480	972.8	3.5	0.1	0.4	21.8	3.1	42.8	0.0
1989	400	1158.4	1.3	5.5	0.4	36.4	0.2	9.0	0.0
1990	400	1194.3	0.9	7.9	0.0	30.6	0.6	7.4	0.0
1991	400	54.4	13.3	3.8	0.7	82.0	2.1	12.0	0.0
1992	400	1468.8	0.0	0.0	0.0	4.8	0.0	5.5	0.0
1993	400	203.6	0.3	4.2	2.9	10.2	1.0	8.9	0.0
1994	400	341.9	0.8	2.1	10.6	8.3	18.6	55.3	0.0
1995	400	84.0	0.9	0.3	4.0	0.6	0.0	9.1	0.0
1996	240	353.2	0.3	0.3	7.9	0.0	0.3	390.7	0.0
1997	400	154.4	0.0	0.0	0.0	0.1	0.0	0.1	0.0
1998	400	422.5	0.5	0.1	8.1	1.4	4.9	19.6	0.0
1999	310	40.3	1.0	40.0	15.5	2174.5	65.2	15.1	0.2
2000	400	259.9	0.0	2.0	3.0	25.6	0.3	3.3	50.8
2001	400	2633.3	6.1	19.4	13.8	81.1	16.0	12.7	69.0
2002	400	142.5	0.0	0.0	0.0	35.3	3.2	9.5	127.0
2003	400	7058.1	16.2	2.0	240.6	0.5	68.6	3388.0	158.8
2004	400	132.2	0.0	0.0	0.1	0.3	0.2	20.3	323.8
2005	400	0.9	0.1	1.1	156.2	0.1	1.7	645.7	66.9
2006	400	1256.0	0.9	0.3	38.0	78.6	1.4	452.3	93.3
2007	400	991.3	0.1	0.2	70.0	1.0	34.6	29.3	973.2
2008	400	1293.0	5.4	1.3	356.0	2.3	86.5	16.0	452.6
2009	400	148.2	0.6	0.2	0.3	0.1	0.4	54.8	43.6
2010	400	326.9	1.6	0.4	63.5	0.9	13.3	117.6	9.7
2011	400	509.2	0.0	0.2	224.6	2.1	18.9	70.3	125.4
Avg. for 1984-2010		971.4	3.0	11.0	37.1	98.4	15.4	199.0	87.7

^a Abundance indices of round goby include all ages.

Table 4.3.4 Relative abundance (mean number per hectare) of yellow perch at ages 0 to 3 caught with a 6.1 m bottom trawl in Long Point Bay, Lake Erie, September, 1980-2011.

	Year	Effort (minutes)	AGE			
			0	1	2	3
Inner Bay	1980	130	167.8	198.5	142.1	134.5
	1981	220	534.9	231.0	55.2	20.2
	1982	400	1026.8	176.2	34.7	41.3
	1983	220	125.9			
	1984	400	761.7	44.5	57.7	35.5
	1985	480	20.8	125.5	64.1	43.6
	1986	400	1859.5	61.7	192.3	39.2
	1987	400	3.8	39.7	2.6	15.5
	1988	400	305.0	2.9	41.4	1.9
	1989	400	457.7	84.6	29.4	114.3
	1990	400	202.6	21.0	46.2	4.6
	1991	400	144.0	24.5	14.5	17.3
	1992	400	594.0	32.8	6.9	1.3
	1993	400	239.8	17.9	11.9	2.2
	1994	400	84.0	29.8	10.3	13.0
	1995	400	5.3	54.3	20.5	2.1
	1996	400	53.6	6.1	22.4	9.9
	1997	400	21.5	5.4	5.0	11.9
	1998	480	1005.9	14.9	10.7	1.0
	1999	480	34.0	155.7	25.8	11.0
	2000	400	1.2	4.8	107.0	6.0
	2001	400	463.8	2.7	13.0	18.1
	2002	400	8.3	42.6	8.8	10.4
	2003	320	224.0	1.5	8.5	0.7
	2004	480	0.1	21.4	2.8	2.6
	2005	480	8.8	0.2	10.9	0.6
	2006	400	0.3	4.8	1.4	4.0
	2007	400	73.9	3.0	7.0	2.3
	2008	400	0.3	4.1	0.1	0.0
	2009	320	0.0	0.0	0.0	0.0
	2010	400	5.7	0.6	1.6	3.6
	2011	400	3.9	12.8	2.6	1.7
	Avg. for 1980-2010		272.1	47.1	31.8	19.0
Outer Bay	1980	209	21.1	61.5	23.8	22.0
	1981	200	137.4	5.0	5.1	0.8
	1982	200	69.6	22.6	6.9	5.8
	1983	0				
	1984	300	283.9	9.7	2.7	1.8
	1985	360	2.4	32.6	14.0	3.5
	1986	300	102.0	0.2	30.7	3.1
	1987	300	3.4	284.1	15.7	89.3
	1988	280	667.7	0.8	52.4	10.6
	1989	240	296.9	53.2	26.6	84.5
	1990	300	43.3	12.0	28.8	4.6
	1991	299	15.5	1.0	0.5	0.9
	1992	300	54.3	9.0	1.2	0.5
	1993	240	21.6	4.5	2.4	0.2
	1994	240	159.8	15.3	11.2	2.4
	1995	300	6.0	33.7	14.3	3.6
	1996	300	199.1	2.6	4.5	1.3
	1997	300	18.9	59.8	3.1	3.7
	1998	300	114.9	1.2	0.6	0.3
	1999	300	2.5	69.5	1.3	1.0
	2000	300	10.2	2.1	13.9	0.2
	2001	300	76.7	2.0	3.0	5.3
	2002	300	0.6	13.9	1.7	5.9
	2003	240	93.3	0.8	7.9	0.2
	2004	360	0.5	4.3	0.6	1.3
	2005	360	10.3	0.1	6.9	0.3
	2006	300	2.8	1.4	0.2	1.2
	2007	300	6.3	0.9	0.6	0.0
	2008	300	4.9	6.6	1.1	0.6
	2009	240	1.5	4.2	5.5	0.0
	2010	300	13.2	0.6	0.2	1.5
	2011	300	3.9	1.9	0.2	0.2
	Avg. for 1980-2010		81.4	23.8	9.6	8.5

Table 4.3.5 Relative abundance (mean number per hectare) of rainbow smelt at ages 0 to 3 caught with a 10 m bottom trawl in the offshore waters of Outer Long Point Bay, Lake Erie, October 1984-2011.

Year	Effort (minutes)	AGE		
		0	1	2
1984	320	2206.3	15.1	8.1
1985	394	84.0	397.8	11.8
1986	380	2979.8	32.0	356.3
1987	440	267.6	3159.0	168.8
1988	480	972.8	25.4	72.0
1989	400	1158.4	620.1	2.6
1990	400	1194.3	437.5	191.2
1991	400	54.4	514.5	0.4
1992	400	1468.8	26.6	68.2
1993	400	203.6	1395.9	76.8
1994	400	341.9	6.5	2.2
1995	400	84.0	272.9	42.3
1996	240	353.2	16.4	1.6
1997	400	154.4	168.4	14.1
1998	400	422.5	9.9	13.7
1999	310	40.3	137.1	33.6
2000	400	259.9	21.7	7.0
2001	400	2633.3	663.0	29.0
2002	400	142.5	3.5	1.9
2003	400	7058.1	165.7	32.5
2004	400	132.2	495.8	61.5
2005	400	0.9	3.7	2.9
2006	400	1256.0	28.9	40.8
2007	400	991.3	214.0	9.1
2008	400	1293.0	48.7	25.6
2009	400	148.2	1551.6	91.5
2010	400	326.9	106.0	112.0
2011	400	509.2	249.4	27.1
Avg. for 1984-2010		971.4	390.3	54.7

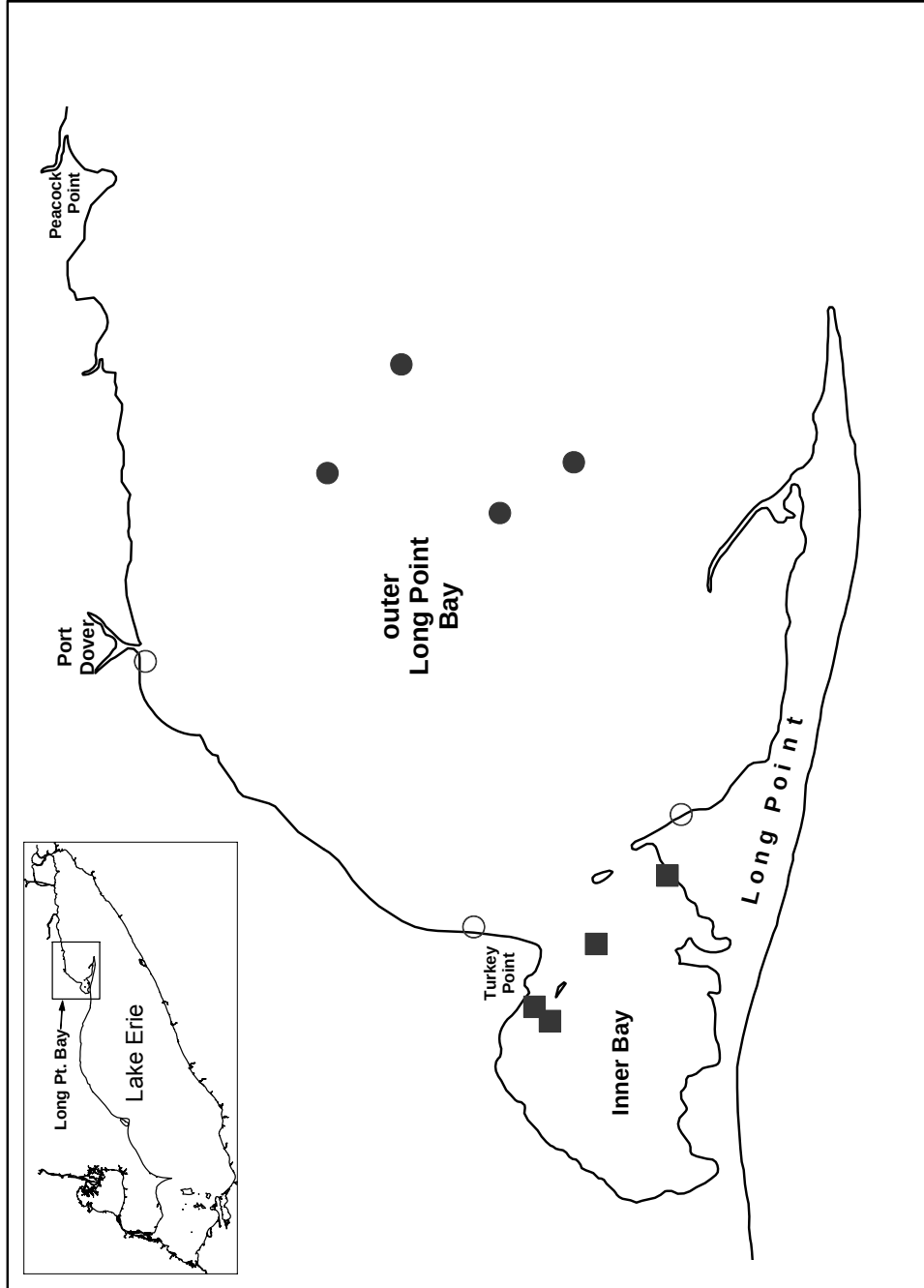


Figure 4.3.1 Location of trawl stations where bottom trawling was conducted in Inner Bay (■), and the nearshore (○) and offshore (●) waters of Outer Long Point Bay, Lake Erie.

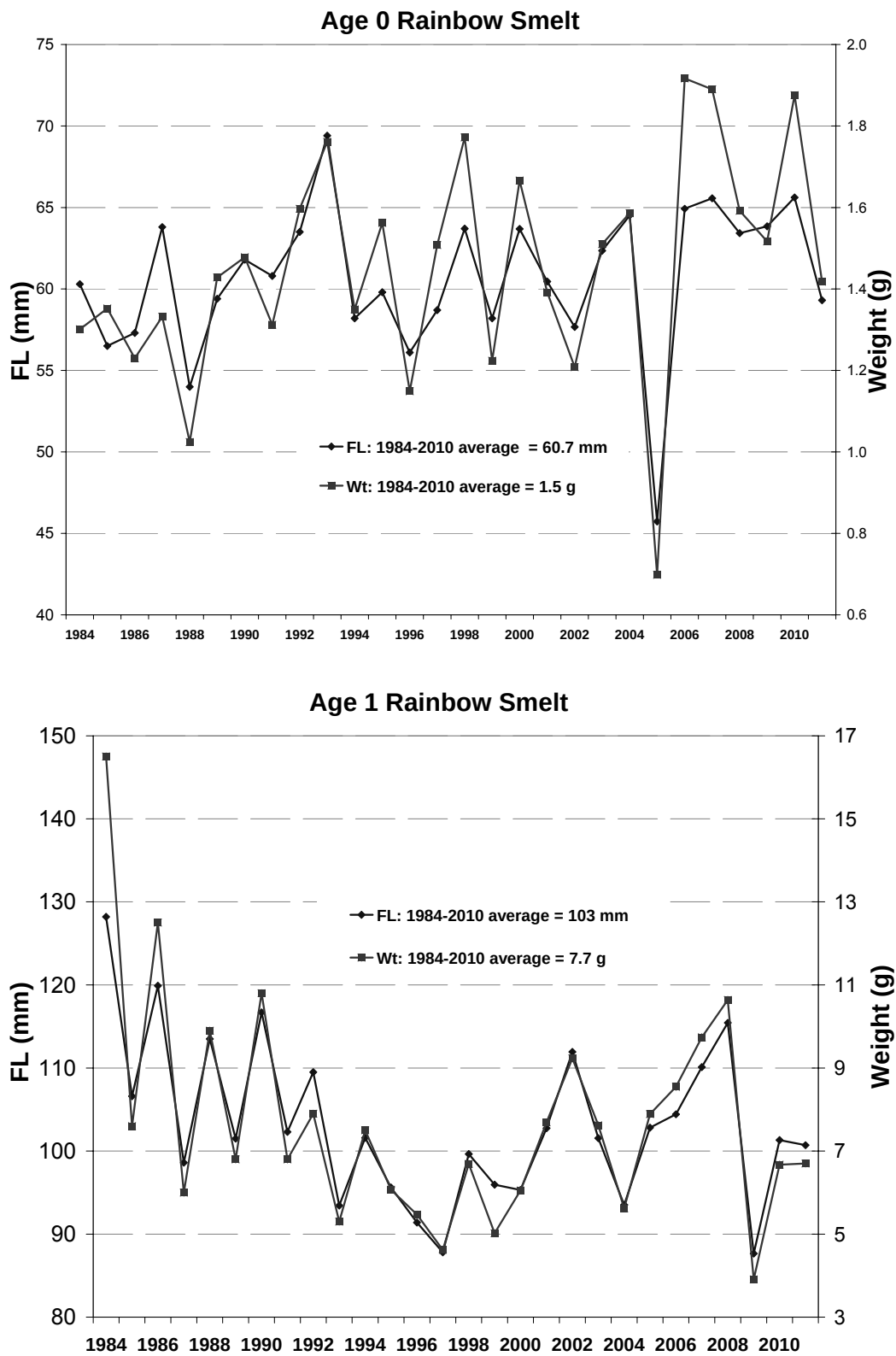


Figure 4.3.2 Mean fork length (mm) and weight (g) of age 0 (top graph) and age 1 (bottom graph) rainbow smelt from 10 m index trawl catches in the offshore waters of outer Long Point Bay, Lake Erie, 1984-2011 (October data).

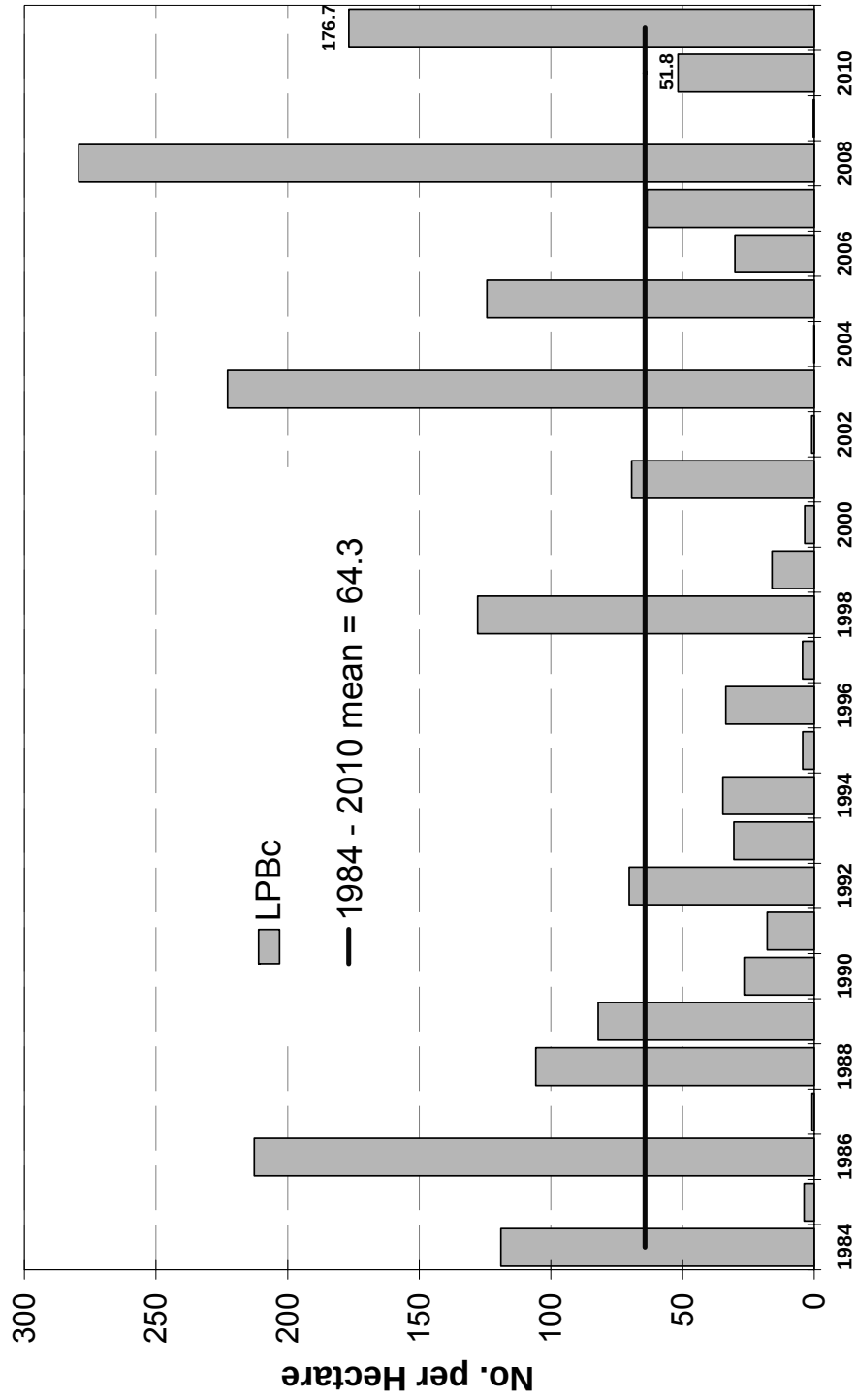


Figure 4.3.3 Relative abundance (mean number per hectare) of age 0 yellow perch from a composite index (LPBc) of three bottom trawl assessments in Long Point Bay, Lake Erie, during September-October, 1984-2011.

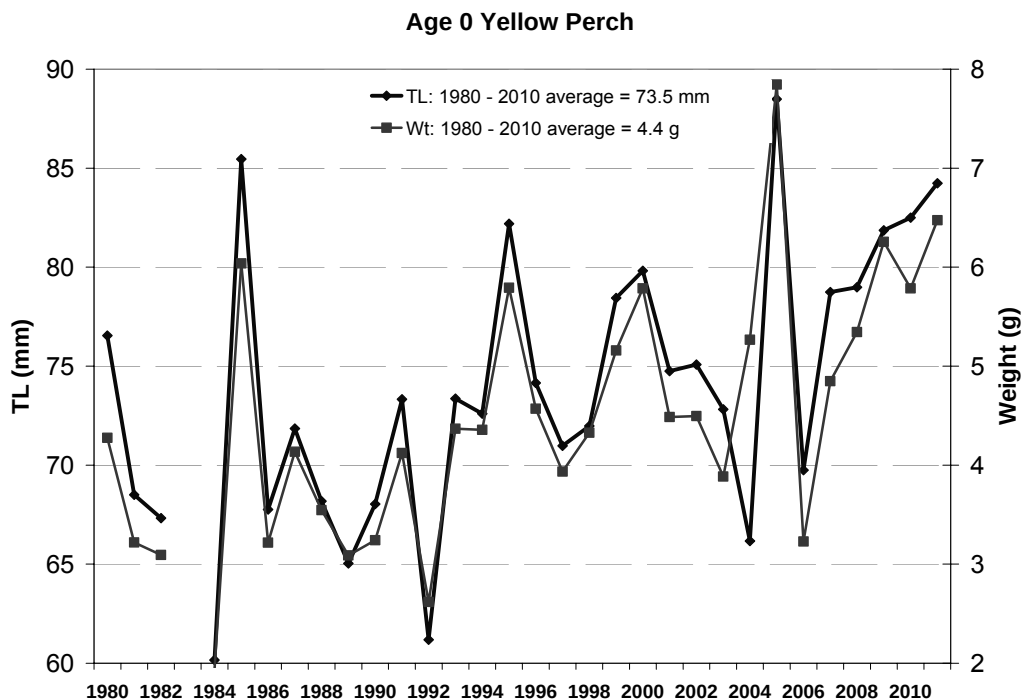


Figure 4.3.4 Mean total length (mm) and weight (g) of age 0 yellow perch from 6.1 m index trawl catches in the inshore waters of Long Point Bay (Inner and Outer Bays combined), Lake Erie, 1980-2011 (September data). No fish sampled in 1983.

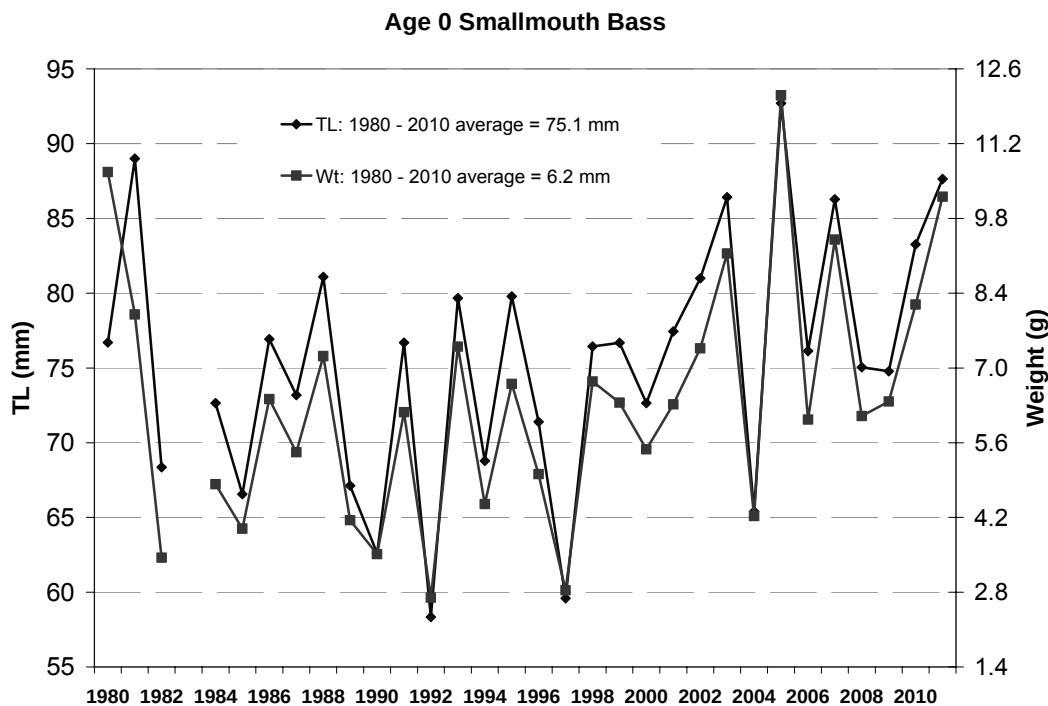


Figure 4.3.5 Mean total length (mm) and weight (g) of age 0 smallmouth bass from 6.1 m index trawl catches in Inner Bay of Long Point Bay, Lake Erie, 1980-2011 (September data). No fish sampled in 1983.

4.4 Long Point Bay Nearshore Fish Community Survey

A gill net survey has been conducted annually in Long Point Bay since 1986 to monitor the composition of the fish community, and describe the abundance and biological characteristics of important sport and commercial species over time. Between 1991 and 1994, the program was expanded to include comparisons of the effectiveness of multifilament gear (used 1986-1994) and monofilament gear (used since 1991). The later gear type has been used in the commercial fishery and, more recently, in agency gillnet assessment programs on Lake Erie. Comparisons of catches between mono and multi nets were completed in 1996, and species specific conversion ratios were computed. Species catches from multifilament nets (pre 1991) were adjusted to comparable efficiency of monofilament nets (by conversion ratio multipliers) to describe trends in abundance of major species across the entire time series (1986-2011). Monofilament nets have been used exclusively in this survey since 1995.

Study Area and Sampling Design

The standardized study area encompass the waters within outer Long Point Bay, extending from the minimum depth (12 ft.) that the gear could be set, to the depth of the 30 ft. contour (Figure 4.4.1). The bay was partitioned into three sampling areas, then further partitioned into sampling grids (0.5 X 0.5 nautical miles), and 2 depth strata (12-18 ft., >18-30 ft.). Areas 1, 2 and 4 have been sampled each year since 1986. 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 (1986-2011) are reported below.

An additional depth stratum was sampled on an exploratory basis in 2011 to examine the distribution and abundance of fish species, yellow perch in particular, in deeper offshore waters of Long Point Bay representing previously unassessed perch habitat. This extra deep stratum extended sampling from the 30 ft. (9.1 m) contour to the 66 ft. (20 m) contour and increased the number of potential sample grids and the overall surface area of the Long Point Bay study area by approximately 90% (Figure 4.4.1). An additional 20 lifts with the standard index gillnet gangs were set in the extra deep stratum, bringing the total number of gillnet sets to 60 in the 2011 survey. To maintain continuity with previous year survey results, the findings from supplementary sampling of the extra deep stratum are reported separately in Table 4.4.2.

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

Fish Community

Catch (all mesh sizes) by species from 1995 to 2011 are summarized in Table 4.4.1. Yellow perch accounted for 57% of all fish species caught during the 2011 survey. Smallmouth bass (19.6%), freshwater drum (5.3%), white perch (5.3%), rock bass (3.1%) and gizzard shad (1.6%), contributed the next highest numbers of fish species caught (Table 4.4.1). Annual estimates of alewife abundance in Long Point Bay have been episodic, accounting for approximately half of the total fish species catch in some years (1995, 1998, 2002, 2006) and almost nothing in other years (1996, 1997, 2004). Only 36 alewife representing <1% of the total catch were netted in 2011.

Table 4.4.2 summarizes species catch by depth strata and compares species catch numbers from supplementary sampling of the extra deep >30-66 ft. stratum to the two depth strata (12-18 ft., >18-30 ft.) that make up the standardized study area. The three depth strata were sampled equally in 2011 with 20 sets each. Total species catch and composition varied with depth strata (Table 4.4.2).

Some 20 fish species totaling 2848 individuals were caught in the shallowest stratum (12-18 ft.) compared to 18 species totaling 1909 fish and 16 species totaling 1167 fish in the >18-30 ft. and >30-66 ft. depth strata, respectively. Yellow perch, the most abundant species captured in all depth strata comprised 58, 55, and 69% of the total catch by depth strata from shallowest to deepest, respectively. Several other species exhibited decreased abundance with greater depth. These included white perch, freshwater drum, rock bass, gizzard shad, and white sucker. Brown bullheads were only captured in the shallowest stratum. Smallmouth bass were most abundant in the middle (>18-30 ft.) depth stratum and only a few (~2% of total) were caught in the extra deep stratum (>30-66 ft.). Catches of Lake trout, rainbow smelt, and round goby increased with depth strata; 32 of 39 total lake trout captured were taken in the >30-66 ft. stratum. Another noteworthy observation of the 2011 spatially expanded survey was the capture of a single lake sturgeon in the extra deep stratum at 20.8°C, which marks the first time this species has ever been netted during the 26 year history of the Long Point Bay survey. The sturgeon was released.

Trends in Abundance, Biomass and Growth of Yellow Perch 1986-2011

Yellow perch were abundant in Long Point Bay during the late 80's (Figure 4.4.2). Population size decreased precipitously during the early 1990's and remained at low levels throughout the decade until 2000, when two year old perch from the strong 1998 year class began to recruit into the population. The 1998 year class remained the dominant cohort of index gill net catches, contributing 88, 86, 70, and 41% of the annual survey total perch catch (in number) in successive years from 2000 to 2003. In 2002, the year of highest yellow perch abundance, the 1998 year class accounted for 70 and 74% of the total perch catch in number and biomass, respectively. In 2008, numeric catch and biomass of yellow perch decreased to its lowest level observed during the 2000's decade. In 2011, numeric perch abundance decreased (13.5%) to the lowest level observed since 2000, whereas perch biomass actually increased slightly (6.3%), (Figure 4.4.2). Age 4 fish from the 2007 year class accounted for 48% of the total number and 46% of the total biomass of perch caught in index nets in 2011. Age 3 fish (2008 year class) represented only 21% of the total catch in number, a surprising low contribution from a year class that produced one of the highest age 0 recruitment index values in the Long Point Bay composite trawl series (Figure 4.3.3).

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

Trends in Abundance, Biomass and Growth of Smallmouth Bass 1986-2011

Catch rates of smallmouth bass in Long Point Bay index gill nets has ranged between 20 to 50 bass per km during most of the survey years between 1986 and 2003, indicating a relatively stable and healthy population during this time period (Figure 4.4.3). Comparatively low smallmouth bass abundance in 1998 was followed by a period of yearly increases that peaked in 2003 at 47 bass/km. Numeric abundance and biomass of bass decreased sharply in 2004 and again in 2005. The abundance trend reversed again in 2006 with consecutive year increases that peaked in 2007 at near record high mean numbers and biomass with an unexpected large contribution (56%) of age 2 smallmouth bass (Figure 4.4.3), a surprising observation considering that full vulnerability to the gear does not occur until age 3. The 2005 year class has continued to dominate the annual total smallmouth bass catch during 2008 (79%), 2009 (59%), and 2010 (32%). In 2011, the 2005 year class (age 6 in 2011) accounted for the largest portion of the bass biomass at 32.2%, while representing only 15.2% of the total catch in number (Figure 4.4.3). Age 3 bass from the 2008 year class were the most numerically abundant cohort (36% of total) in 2011 gill net catches.

Smallmouth bass size at ages 2 through 7 has increased since about the late 90's (Figure 4.4.5). Although the mean size of ages 2 through 5 smallmouth bass decreased slightly in 2011, all of these age groups plus ages 6 and 7 bass remained above average size in 2011 (Figure 4.4.5).

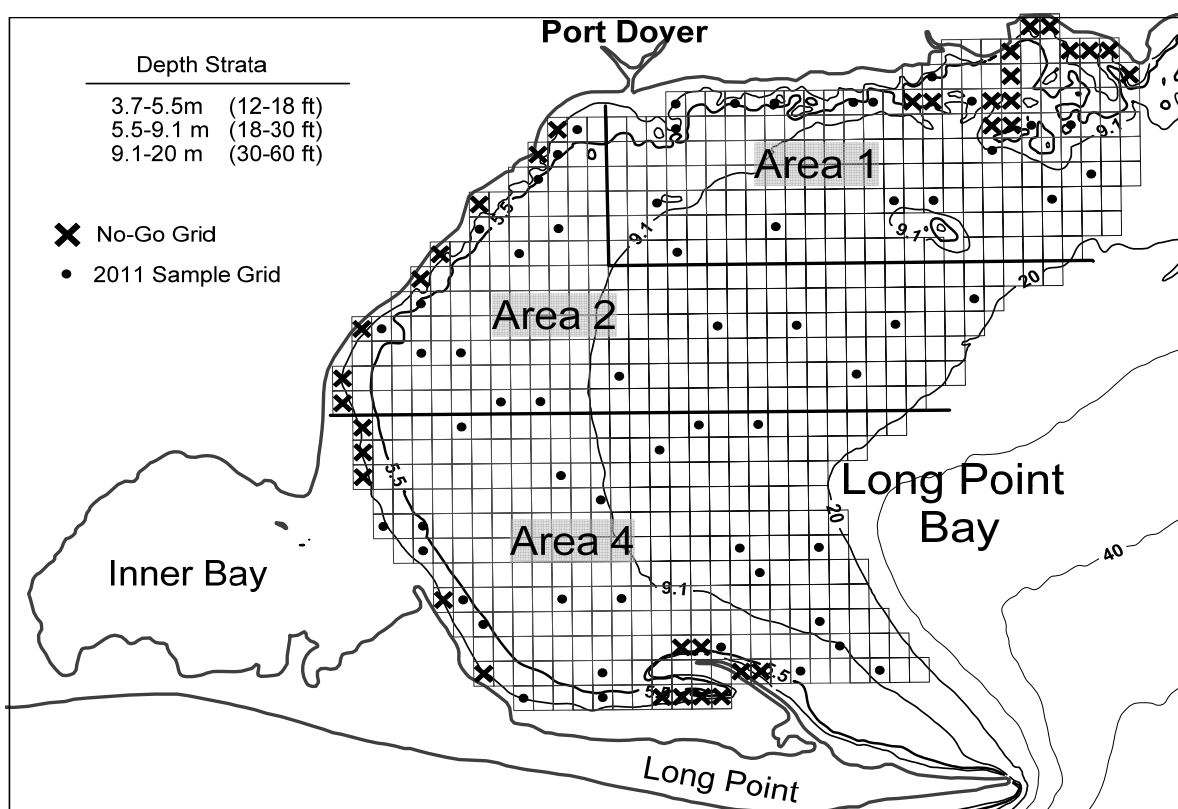


Figure 4.4.1 Long Point Bay gillnet assessment study area showing potential sample grids by Spatial (Areas 1, 2, and 4) and Depth Strata. Grids sampled in 2011 and grids considered unfishable are indicated. The standard study area encompass sample grids in the 12-18 ft (3.7-5.5 m) depth stratum and the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

Table 4.4.1 Total numbers of each fish species caught in monofilament nets during the Long Point Bay Index Gillnetting Survey, 1995-2011. Numbers include catch in all mesh sizes (14 mesh sizes from 32 to 152 mm) standardized to 40 sets for comparison.

Species	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Longnose gar	85	31	159	5	260	30	5	0	0	28	31	161	10	6	12	61	0
Bowfin	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
Alewife	6169	7	3	4215	1070	5809	28	19339	12	2	24	7776	61	22	0	96	36
Gizzard shad	56	47	114	19	185	531	81	503	227	122	60	483	447	104	53	452	80
Pink salmon	0	0	0	0	2	0	0	1	0	1	0	0	0	0	0	0	0
Rainbow trout	1	1	2	5	1	0	0	0	6	0	0	2	2	1	0	1	2
Atlantic salmon	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brown trout	4	3	3	7	1	0	2	2	6	1	1	0	9	5	1	5	4
Lake trout	0	1	0	1	0	0	0	0	0	2	1	2	0	0	0	5	7
Lake whitefish	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Rainbow smelt	1	0	9	0	0	0	12	7	0	20	13	3	20	26	72	27	7
Northern pike	5	1	9	7	47	6	7	7	19	10	1	2	4	6	6	9	4
Mooneye	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Quillback	18	0	22	8	8	12	2	5	24	16	3	10	11	9	9	46	28
White sucker	151	133	163	199	334	141	122	95	150	92	149	41	61	59	54	93	78
Northern hog sucker	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Redhorse sucker	98	40	27	51	62	41	62	21	36	22	27	13	26	13	11	13	5
Common carp	11	1	0	10	3	6	10	5	11	8	0	12	11	3	5	7	3
Golden shiner	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
Emerald shiner	0	0	0	0	0	5	0	0	0	0	2	0	0	0	0	0	0
Spottail shiner	0	0	4	0	0	2	4	2	0	2	2	2	0	0	0	0	0
Yellow bullhead	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0
Brown bullhead	4	9	1	2	36	0	1	12	24	81	35	32	50	38	53	69	75
Channel catfish	0	0	7	5	1	5	1	0	2	2	1	3	0	2	4	0	0
Stonecat	8	6	10	4	3	19	15	3	0	0	0	0	0	0	0	0	0
Burbot	1	26	10	22	19	33	5	1	0	0	0	0	0	0	0	0	0
Trout-perch	0	0	0	0	0	2	0	2	0	2	0	0	2	0	0	2	2
White perch	26	11	83	7	52	58	31	73	58	103	42	60	59	54	118	278	253
White bass	21	4	37	3	26	16	2	19	42	11	4	50	34	19	71	38	38
Rock bass	794	470	380	264	640	291	201	81	151	69	151	219	136	104	174	123	148
Pumpkinseed	85	41	52	139	62	5	16	2	7	3	9	9	25	5	2	12	1
Bluegill	11	514	2	4	1	0	1	0	0	0	0	0	3	2	0	2	0
Smallmouth bass	910	514	742	293	427	485	509	428	702	181	132	376	1129	791	396	1045	934
Black crappie	5	1	6	5	2	0	1	0	0	0	0	0	0	0	0	0	0
Yellow perch	2316	1320	1404	1577	2083	7134	9633	11134	7233	7625	7359	7183	5389	3145	4989	3120	2698
Walleye	16	11	20	4	14	3	4	5	27	40	23	18	13	31	23	78	30
Round goby	0	0	0	0	8	68	708	2399	424	391	134	275	172	222	89	47	70
Freshwater drum	569	539	577	472	412	270	225	256	537	240	150	170	495	263	282	698	254
Actual Number of Sets	32	28	36	40	40	44	40	40	36	40	40	40	40	40	40	40	40

Table 4.4.2

Total numbers of each fish species caught by depth strata in monofilament nets during the Long Point Bay Index Gillnetting Survey, 2011. Numbers include catch in all mesh sizes (14 mesh sizes from 32 to 152 mm) standardized to 20 sets per depth strata.

Species	Depth Stratum			Total
	12-18 ft	>18-30 ft	>30-66 ft	
	(3.7-5.5 m)	(>5.5-9.1 m)	(>9.1-20 m)	
Lake sturgeon	0	0	1	1
Alewife	10	26	6	42
Gizzard shad	56	24	21	101
Rainbow trout	2	0	0	2
Brown trout	2	2	2	6
Lake trout	1	6	32	39
Rainbow smelt	3	4	35	42
Northern pike	4	0	0	4
Quillback	26	2	0	28
White sucker	41	37	32	110
Redhorse sucker	0	5	0	5
Common carp	2	1	0	3
Brown bullhead	75	0	0	75
Trout-perch	0	2	6	8
White perch	190	63	60	313
White bass	30	8	3	41
Rock bass	119	29	4	152
Pumpkinseed	1	0	0	1
Smallmouth bass	430	504	21	955
Yellow perch	1653	1045	800	3498
Walleye	22	8	10	40
Round goby	32	38	109	179
Freshwater drum	149	105	25	279
Total catch (No.)	2848	1909	1167	5924
No. species	20	18	16	23
No. gillnet sets	20	20	20	60

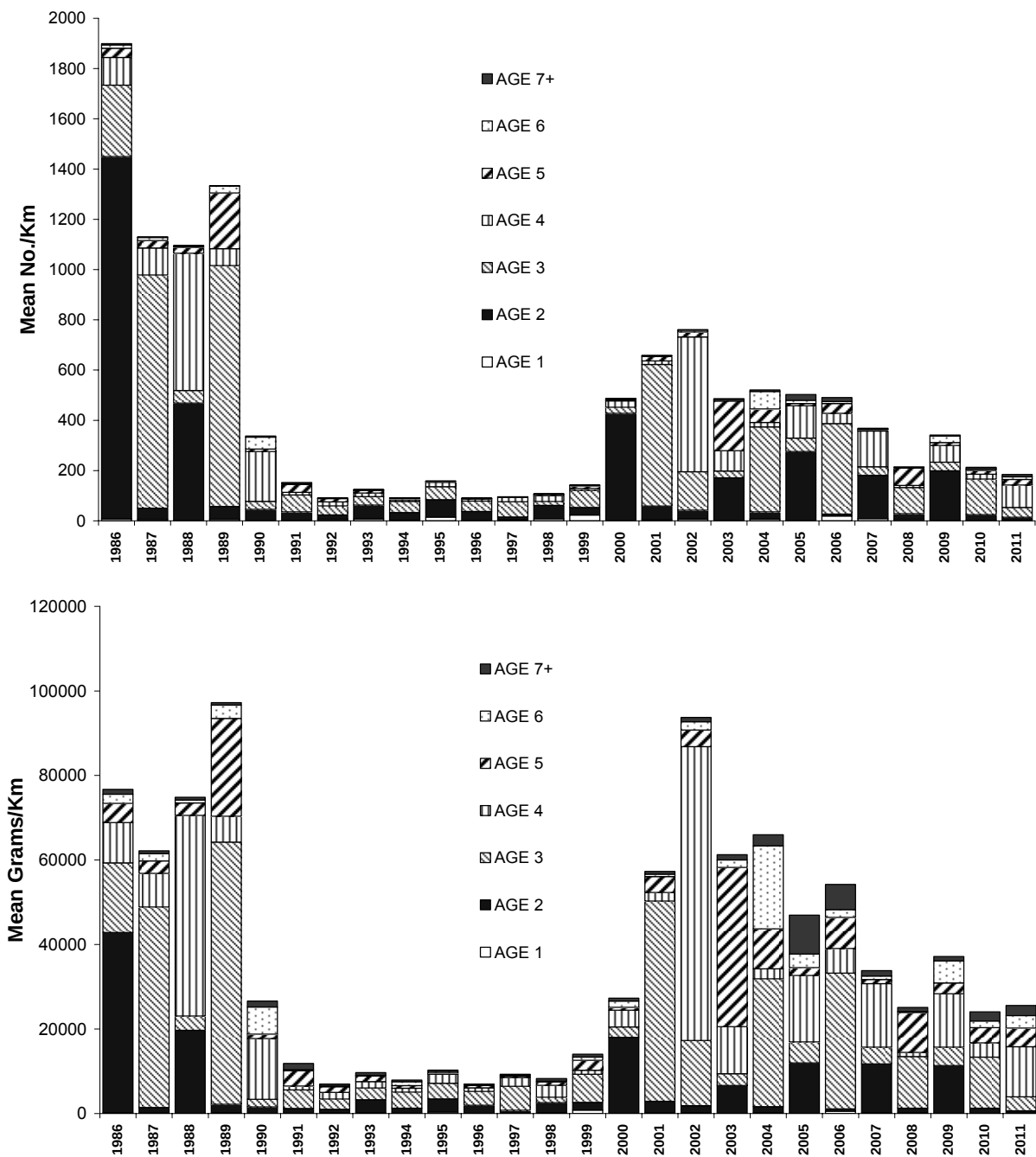


Figure 4.4.2 Catch at age of yellow perch in Long Point Bay index gill nets set overnight at 18-30 ft. depths during June-August, 1986-2011. Catch reported in arithmetic mean number per kilometer (top graph) and arithmetic mean weight (g) per kilometer (bottom graph). Age 7 and older yellow perch combined.

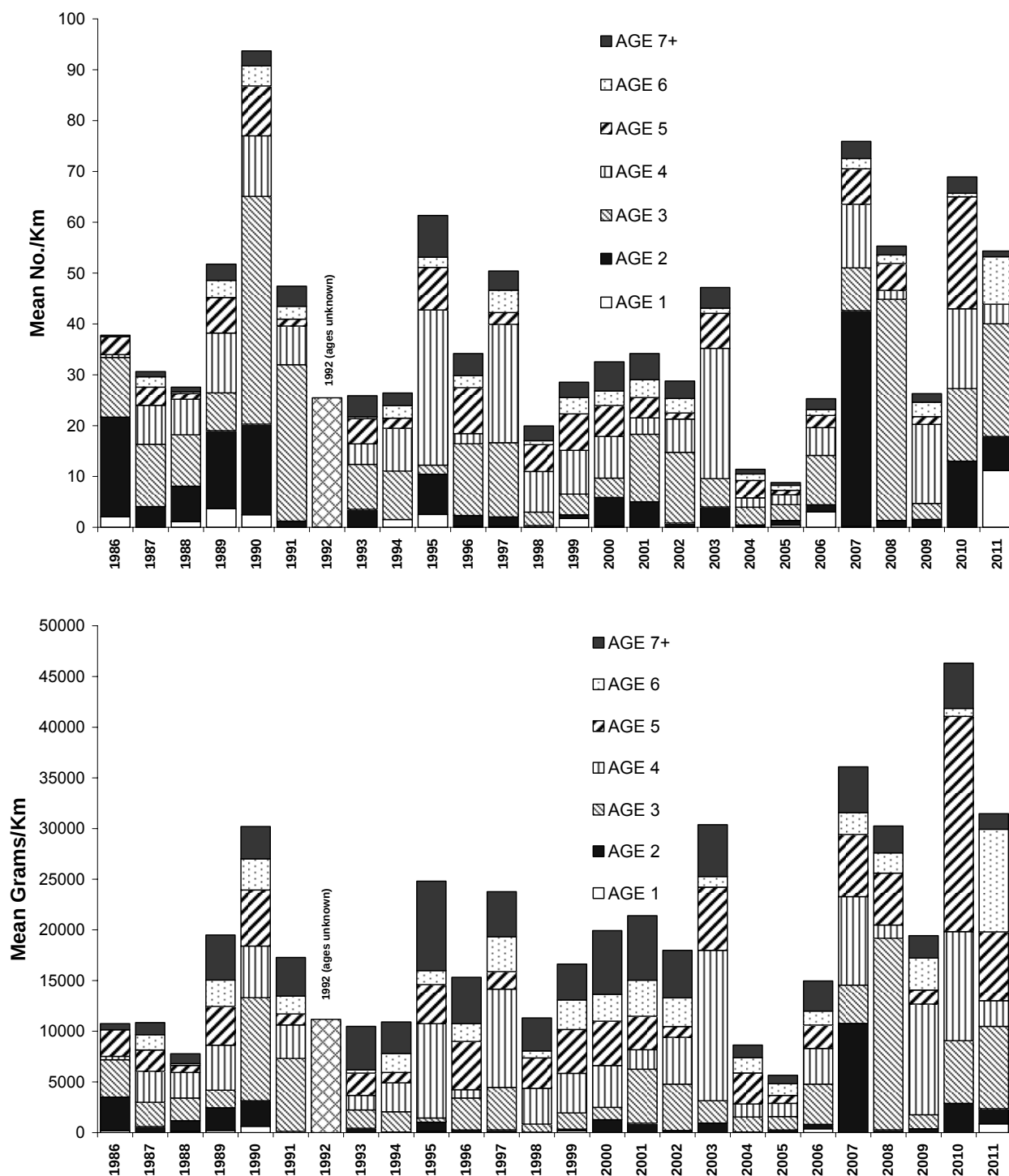


Figure 4.4.3 Catch at age of smallmouth bass in Long Point Bay index gill nets set overnight at 18-30 ft. depths during June-August, 1986-2011. Catch reported in arithmetic mean number per kilometer (top graph) and arithmetic mean weight (g) per kilometer (bottom graph). Age 7 and older smallmouth bass combined.

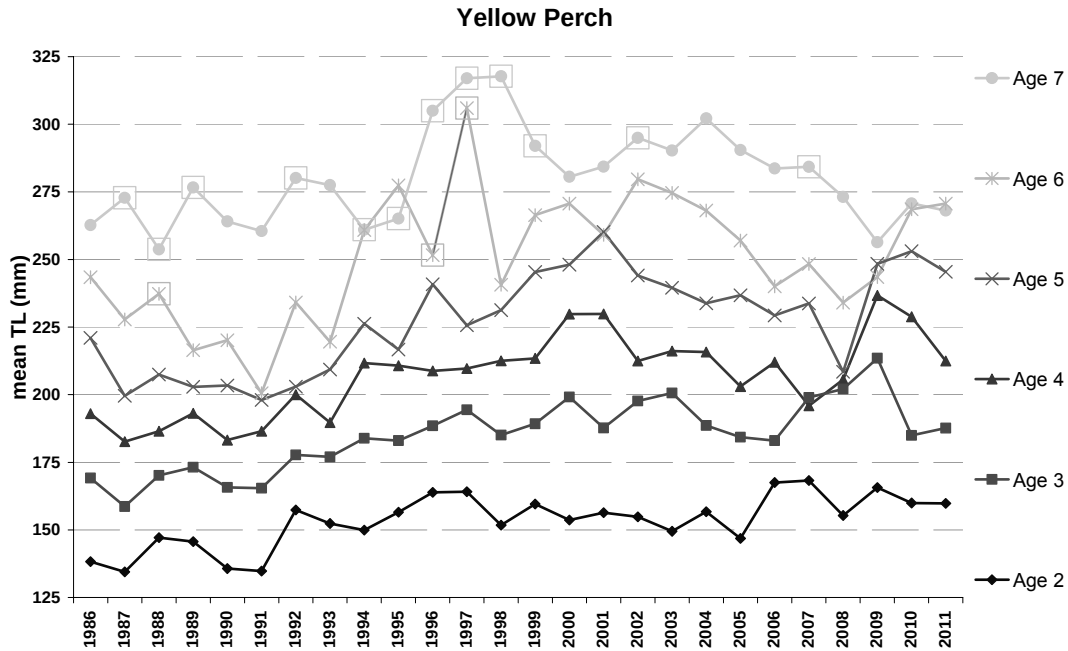


Figure 4.4.4 Yellow perch mean total length (mm) at ages 2 to 7 in Long Point Bay index gill nets set overnight at 18-30 ft depths during June-August, 1986-2011. Males and females combined. Mean values outlined with a box were estimated from $N < 10$ samples.

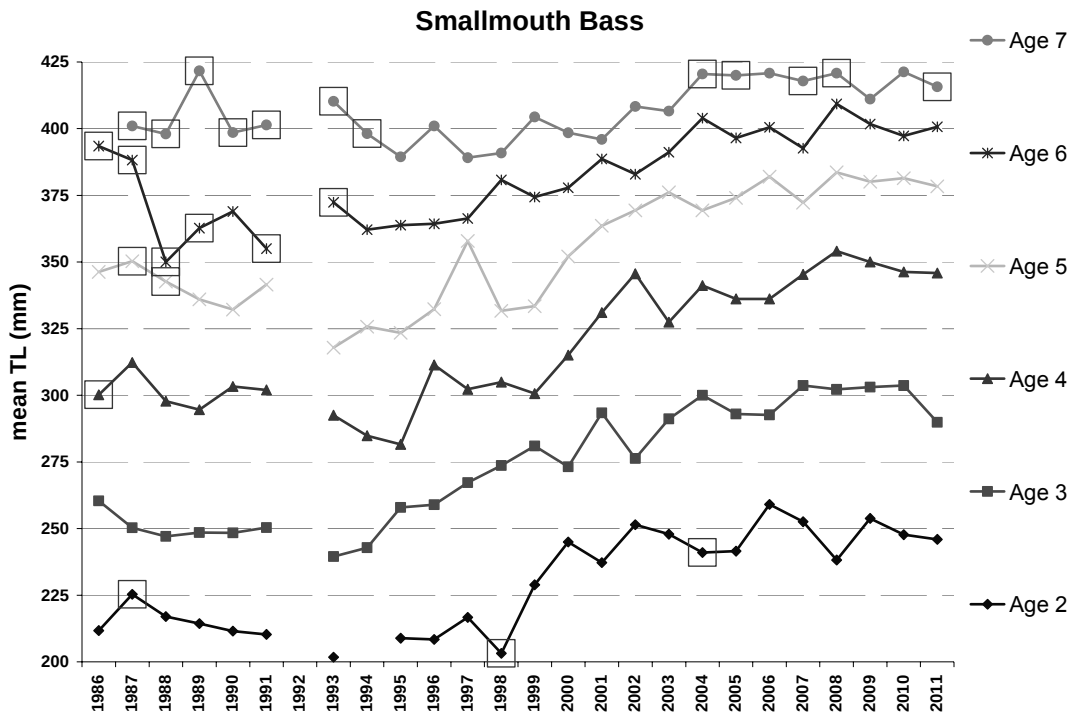


Figure 4.4.5 Smallmouth bass mean total length (mm) at ages 2 to 7 in Long Point Bay index gill nets set overnight at 18-30 ft depths during mid June to mid September, 1986-2011. Males and females combined. Mean values outlined with a box were estimated from $N < 10$ samples. Smallmouth bass ages were not available for 1992 samples.

APPENDIX A

LAKE ERIE MANAGEMENT UNIT STAFF 2011

LONDON

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

Brian Locke – A/Lake Manager
Khahy Ho – A/Lead Management Biologist and
A/C.O.A. Coordinator

Jennifer Esbjerg – C.O.A. Coordinator
Karen Pringle – Administrative Assistant
Kaela Paddick – SEP Student

WHEATLEY

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

Richard Drouin – A/Fisheries Assess. Supervisor
John Johnson – Commercial Fisheries Coordinator
- (Retired March 30, 2011)
Stan Powell – Operations Coordinator
Craig McDonald – Vessel Master
Megan Belore – Assessment Biologist
Andy Cook – Assessment Biologist
Karen Soper – A/Aquatic Ecosystem Biologist and
Systems Officer
Rob Dietz – Fisheries Technician
Bob Sutherland – Systems Officer
- (Retired June 30, 2011)
Aida Baptista – Data Entry Operator
Debbie Seili – Clerk Typist/Receptionist
David Beneteau – Enforcement Supervisor
Sean Insley – Conservation Officer
Kevin Sprague – Conservation Officer
Colin Stass – Conservation Officer
Bill Ingham – Intelligence & Investigation Officer

Seasonal Staff:

Tyler Genereaux – Fisheries Technician
Christine Scott – Fisheries Technician and
A/Aquatic Ecosystem Biologist
Allen DiMenna – Port Officer
Keith Jay – Port Officer
Sean Smith – Port Officer
Trevor Wyant – Port Officer
Aiden Bateman – SEP Student
Sean Yardley – SEP Student

AQUATIC ECOSYSTEMS SCIENCE SECTION – WHEATLEY OFFICE

Yingming Zhao – Research Scientist

Seasonal Staff:

Willi Powell – Student

PORT DOVER

P.O. Box 429, Port Dover, ON N0A 1N0
Tel: 519-583-0981 Fax: 519-583-1547

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

Seasonal Staff:

Tina Werner – Fisheries Technician
Heather Whitford – Fisheries Technician
Duncan Norrie – Port Officer
Simon Baker – SEP Student
Tavis VanLeuvenhage – SEP Student

AYLMER

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

Mark McMillan – Conservation Officer

Acronyms Reference:

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

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