LAKE ONTARIO FISH COMMUNITIES AND FISHERIES:

2003 ANNUAL REPORT OF THE LAKE ONTARIO MANAGEMENT UNIT

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Prepared for the
Lake Ontario Committee Meeting
Great Lakes Fishery Commission
Grand Island, New York
March 30-31, 2004

Printed in Picton, Ontario, Canada

March 2004

Report ISSN 1201-8449

Please cite this report as follows:
Ontario Ministry of Natural Resources. 2004. Lake Ontario Fish Communities and Fisheries: 2003 Annual Report of the Lake Ontario Management Unit. Ontario Ministry of Natural Resources, Picton, Ontario, Canada.

Report available on the following websites:
http://www.mnr.gov.on.ca/mnr/pubs/lakeontario/report/2003/report2003.html
http://www.glfc.org/lakecom/loc/mgmt_unit/index.html

Lake Ontario Fish Communities and Fisheries: 2003 Annual Report of the Lake Ontario Management Unit

Forward

The Lake Ontario Management Unit (LOMU) is a section of Fish and Wildlife Branch within the Ontario Ministry of Natural Resources (OMNR). The mission of the OMNR is to provide leadership and direction on sustainable development by maintaining and where possible enhancing the social, economic, cultural and environmental benefits of Ontario's rich natural resources. The LOMU works to achieve this mission through its annual aquatic ecosystem and fisheries assessment, enforcement, and management activities on Lake Ontario. The LOMU focuses on the Canadian waters of Lake Ontario, a large number of its tributaries, its wetlands, the lower Niagara River, and the St. Lawrence River to the Quebec border. The Unit also provides a Great Lakes Coordination function at the Peterborough office. The LOMU develops numerous partnerships with other agencies and NGO's to deliver its programs. The important efforts of our partners are greatly appreciated.

The Province of Ontario and New York State share the responsibility of managing Lake Ontario's aquatic resources. Since fish and other aquatic organisms do not recognize borders, international cooperation is essential to the health of Lake Ontario's ecosystem and the management of its fisheries. The Great Lakes Fishery Commission (GLFC) provides a structure for bi-national cooperation; New York and Ontario work together within the Lake Ontario Committee (LOC) to develop common goals for Lake Ontario's aquatic communities. The chair of the LOC rotates between MNR's Lake Ontario Manager and his/her counterpart from the New York State Department of Environmental Conservation (NYSDEC). In 2003, a representative from the NYSDEC was the LOC chair.

There are five Areas of Concern (AOCs) within the jurisdiction of LOMU. In addition, a bi-national lake-wide Management Plan (LaMP) is under development for Lake Ontario. LOMU staff are working with numerous other federal, provincial and US agencies in the development of Remedial Action Plans for the AOCs, and in the development of the LaMP for Lake Ontario.

The LOMU Annual Report provides a synopsis of all Unit activities during 2003. The report provides the results and observations of the 2003 assessment program. In addition, summaries of the enforcement and management activities are included, as are brief descriptions of current research activities.

The LOMU recognizes its many partners that have provided resources and expertise in the development and delivery of our programs, including: OMNR Research, the Great Lakes Fishery Commission, Department of Fisheries and Oceans, Ministry of the Environment, Environment Canada, numerous Conservation Authorities and local fish and game clubs.

We are pleased to share the important information, activities and findings of the Lake Ontario Management Unit from 2003.

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ISSN 1201-8449

1. Status of Major Species

The following is an overview of the status of major species in Ontario waters of Lake Ontario for 2003. The overview draws upon material presented in the chapters and sections that follow in this report, past annual reports, as well as unpublished Lake Ontario Management Unit information.

1.1. Chinook Salmon

Catch rates in the boat angling fishery (see Section 3.1) indicated that Chinook salmon abundance in Lake Ontario has been relatively stable from 1988 to 2003, despite stocking reductions in 1993 (see Section 8.1). Natural reproduction after 1995 and density dependent survival of young Chinook salmon may have contributed to these steady catch rates. Growth (in length) remains good, but observed drastic declines in the weight of spawning females in the Credit River run (see Section 2.10) are cause for concern.

1.2. Rainbow Trout

Counts of rainbow trout at the Ganaraska River fishway remain low (see Section 2.1). This may indicate that adult returns to other Ontario tributaries are low, too. The long-term harvest rates of rainbow trout from the boat fishery in Lake Ontario reflect the counts at the Ganaraska Fishway (see Section 3.1), since wild rainbow trout are a significant component of the population. Recent year-to-year variation in rainbow trout harvest rates appears to be related to spring temperature. The low rainbow trout harvest rate in 2003 was consistent with the average air temperature in April 2003 which was the lowest in at least 20 years. Condition of rainbow trout in the Ganaraska River in 2003 was similar to the long-term average (see Section 2.1). These fish were sampled during spring, and their condition reflected growth in Lake Ontario in 2002.

1.3. Lake Trout

The decline in abundance of mature lake trout appeared to continue in 2003 (see Section 2.3), although past changes in strains and geographical patterns of stocking make unbiased assessment of the status of the lake trout population difficult. Survival of young stocked fish has stabilized in the recent past after a period of decrease, and this should lead to a stable albeit low adult population. The condition of large lake trout continued to decline, and lamprey wounding remained at low levels.

1.4 Lake Whitefish

Adult lake whitefish abundance remains low with little new recruitment (see Section 2.3). Summer distribution of adult fish, as indicated by assessment gillnets, appears to have contracted to a relatively small area in the vicinity of Point Traverse. Reproduction appears to have been successful in 2003 after five consecutive very poor year-classes (see Section 2.4); this 2003 year-class will be monitored closely in the years ahead in terms of distribution, growth and survival. The commercial harvest of lake whitefish has declined significantly in recent years (see Section 4.1).

1.5 American Eel

The numbers of eel migrating upstream at the ladder, located at the R.H. Saunders Hydroelectric Dam on the St. Lawrence River, remain at a very low level (see Section 2.2). Commercial harvest of eel below the dam (Quota Zone 1-7) remain relatively stable; however, harvest above the dam (all other quota zones) has declined in an unprecedented fashion (Section 4.1). The low upstream migration suggests that the commercial harvest of eel in the upper St. Lawrence River and Lake Ontario will remain low for at least the next decade. Ontario is continuing to work with the local commercial fishery and with management agencies from other jurisdictions to address the decline in eel abundance (see Section 8.3). Sustainable management practices throughout the range of this panmictic species (Labrador to the Caribbean) will be required to restore eel abundance.

1.6 Smallmouth Bass

The eastern Lake Ontario smallmouth bass population remains at low but stable abundance. In the Bay of Quinte the abundance is low, declining further in 2003 (see Section 2.3). The current low abundance levels in eastern Lake Ontario and the Bay of Quinte are not consistent with recent mid-summer water temperatures; mid-summer water temperatures had been driving smallmouth bass abundance prior to the mid-1990s. In the St. Lawrence River (Thousand Islands), smallmouth bass abundance increased in 2003 and approached levels observed in the early-1990s (see Section 2.8).

1.7 Largemouth Bass

Largemouth bass have increased in recent years in the Bay of Quinte; their abundance now rivals that of walleye in littoral zone areas during summer (see Section 2.7). A recreational fishery (including increased tournament angling) targeting largemouth bass has developed over the last several years (see Section 3.2).

1.8 Panfish

Panfish abundance, particularly pumpkinseed, bluegill and black crappie, increased during the late-1990s. Most recently, their abundance appears to have peaked and possibly declined somewhat (see Sections 2.3, 2.7 and 4.1).

1.9 Yellow Perch

Yellow perch abundance in eastern Lake Ontario and in the Thousand Island area of the St. Lawrence River remains low but stable (see Sections 2.3 and 2.8). In the Bay of Quinte, abundance remains high but is in decline (see Section 2.3). The commercial harvest of yellow perch has declined since the late-1990s (see Section 4.1).

1.10 Walleye

Walleye remain the most important species for recreational fisheries and are valued by the First Nation's fishery and non-native commercial fishery in eastern Lake Ontario. Currently, the population comprised of fish age-3 and older appears to be in a relatively steady state, with numbers hovering around 400,000 fish. Reproduction appears to have improved slightly—the strongest two year-classes since 1995 occurred in the last three years (2001 and 2003 year-classes, see Section 2.4). Age-2 fish represented the bulk of the recreational fishery in 2003 (see Section 3.2). This 2001 year-class should cause the age-3 and older population to increase in 2004. Simulations suggest that given the most recent reproduction observations and the current level of mortality from all sources, the age-3 and older walleye population will remain at about 400,000 fish until 2006.

1.11 Prey Fish

Whole-lake hydroacoustic assessment of the two principal prey fish species in Lake Ontario, alewife and smelt, suggested record low population levels in 2003 (see Section 2.6). The abundance estimates of yearling-and-older fish of both species were approximately one-fifth of the average levels observed in recent years. Furthermore, the body condition of alewives was also the lowest observed in the recent years.

1.12 Invasive Species

Data from index bottom trawling program suggests that in 2003 the round goby has completed its spread throughout the Bay of Quinte, and may be reaching abundances that are comparable to those of all other species combined at some locations in the lower bay (see Section 2.4). Gobies have also been reported in western Lake Ontario since the late-1990s. Their presence in other areas is poorly documented, but absence of reports from the Canadian side of central Lake Ontario suggests that this area remained free of gobies in 2003.

2. Index Fishing Projects

2.1 Ganaraska Fishway Rainbow Trout Assessment

The fishway on the Ganaraska River at Port Hope has been in operation since 1974. Rainbow trout are counted and sampled for length, weight and age during the spring spawning run (Fig. 2.1.1). In 2003, the estimated run of 4,494 rainbow trout (Table 2.1.1) was lower than any counts observed during the 1980s or 1990s.

The body condition of rainbow trout in Lake Ontario was determined as the estimated weight of a 635 mm fish at the Ganaraska River. In 2003, this weight was 3,034 g and 3,151 g for males and females, respectively. These weights are similar to the long term average for the study (Table 2.1.2).

We use the repeat spawner index as an estimate of survival for Ganaraska rainbow trout (Table 2.1.3). As part of an effort to calibrate population models to assist with evaluation of fishing regulations, we have recently finished a re-interpretation of the age and repeat spawner estimates for the all years of the Ganaraska rainbow trout data back to 1974. This has resulted in major change in our understanding of mortality and survival trends in this population. The repeat spawner rate of Ganaraska rainbow trout was much lower in the 1970s and 1980s than previously thought (Fig. 2.1.2), implying that total mortality was higher. Our population models should help to partition mortality from fishing, sea lamprey, and other sources.

TABLE 2.1.1. Observed and estimated upstream counts of rainbow trout at the Ganaraska River fishway at Port Hope, Ontario during April and May.

	Upstream Count	
Year	Observed	Estimated
1974	527	527
1975	591	591
1976	1,281	1,281
1977	2,237	2,237
1978	2,724	2,724
1979	4,004	4,004
1980		
1981	7,306	7,306
1982		
1983	7,907	7,907
1984		
1985	14,188	14,188
1986		
1987	10,603	13,144
1988	10,983	15,154
1989	13,121	18,169
1990	10,184	14,888
1991	9,366	13,804
1992		
1993	7,233	8,860
1994	6,249	7,749
1995	7,859	9,262
1996	8,084	9,454
1997	7,696	8,768
1998	3,808	5,288
1999	5,706	6,442
2000	3,382	4,050
2001	5,365	6,527
2002		
2003	3,897	4,494

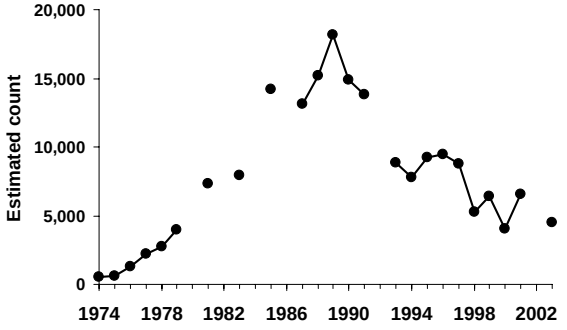

FIG. 2.1.1. Estimated upstream counts of rainbow trout at the Ganaraska River fishway at Port Hope, Ontario, during April and May, 1974-2003.

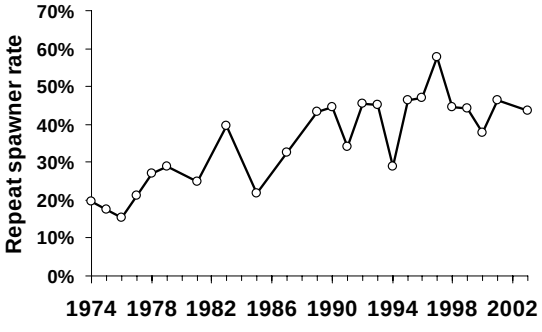

FIG. 2.1.2. The repeat spawner rate for combined sex of rainbow trout in April at the Ganaraska River fishway in Port Hope, Ontario, 1974-2003.

TABLE 2.1.2. Estimated weight of a 635 mm (25 in) rainbow trout at the Ganaraska River fishway at Port Hope, Ontario during April and May, 1974-2003.

	Male		Female	
Year	Sample Size	Weight (g)	Sample Size	Weight (g)
1974	173	3,068	231	3,212
1975	183	2,970	279	3,069
1976	411	3,170	588	3,325
1977	635	2,977	979	3,165
1978	255	3,182	512	3,341
1979	344	3,220	626	3,336
1981	252	3,175	468	3,360
1983	308	2,878	132	3,032
1985	410	3,171	154	3,205
1987	66	2,643	74	3,046
1990	259	2,868	197	3,071
1991	126	2,850	289	3,087
1992	138	2,997	165	3,113
1993	84	2,952	166	3,135
1994	109	3,247	178	3,357
1995	147	2,987	155	3,062
1997	140	3,144	127	3,270
1998	96	3,034	222	3,195
1999	173	3,062	290	3,226
2000	121	3,120	226	3,241
2001	295	2,919	290	3,040
2003	92	3,034	144	3,151
Average		3,030		3,184

TABLE 2.1.3. The repeat spawner rate of rainbow trout in April at the Ganaraska River fishway in Port Hope, Ontario, 1974-2003.

	Male		Female	
Year	Repeat spawner	Sample Size	Repeat spawner	Sample Size
1974	19.4%	36	20.0%	50
1975	16.7%	30	18.2%	55
1976	17.4%	46	13.5%	52
1977	22.9%	48	19.6%	56
1978	29.4%	34	24.3%	74
1979	31.6%	38	26.1%	69
1981	28.9%	38	20.8%	72
1983	44.1%	34	35.0%	60
1985	21.6%	37	21.7%	69
1987	22.0%	41	43.1%	58
1989	25.0%	8	61.5%	13
1990	37.9%	58	51.0%	49
1991	37.5%	32	30.7%	75
1992	40.0%	45	50.8%	59
1993	33.3%	39	57.1%	63
1994	22.0%	41	35.9%	64
1995	47.3%	55	45.5%	44
1996	50.0%	36	43.8%	64
1997	57.1%	49	58.1%	43
1998	40.0%	25	49.3%	75
1999	40.5%	37	47.6%	42
2000	26.7%	30	48.6%	70
2001	45.8%	48	47.1%	51
2003	33.3%	42	53.7%	54

2.2 R.H. Saunders Hydroelectric Dam Eel Ladder Monitoring

American eel spawn in the Sargasso Sea. A portion of the juvenile population migrates up the St. Lawrence River and into Lake Ontario. Eel reside in Lake Ontario and the upper St. Lawrence River (LO-SLR) for several years before migrating back to sea. While in LO-SLR, eel provide for a highly valued commercial fishery (see Section 4.1). Eel populations show evidence of decline in many areas of eastern Canada and particularly in LO-SLR. Declines have been attributed to habitat loss and deterioration (e.g. dams), over-fishing, and environmental change in the northern Atlantic Ocean.

An eel ladder was installed at the R.H. Saunders Hydroelectric Dam in Cornwall in 1974 to assist with the migration of the eel upstream of the dam. In this section, we provide estimates for the total number of eel ascending the ladder and update the eel recruitment index for 2003.

Eel Ladder Operation

The eel ladder was opened on June 2 and closed on October 22 (143 days). Weekly counts of eel migration activity were obtained by placing a net at the top of the ladder (Table 2.2.1). A sub-sample of 198 eel were collected and sampled for biological characteristics.

It is estimated that 2,835 eel migrated upstream during the entire period of operation. The average sized eel migrating up the ladder remained high during 2003 (average length 479 mm, range from 284 to 1,010 mm, Fig. 2.2.1). The eel recruitment index was 39.5 eel/day, based on the 31-day peak migration period occurring from July 7 to August 6. This index is similar to the values estimated since

1998, but 3-orders of magnitude lower that the peak numbers observed during the early-1980s (Fig. 2.2.2).

TABLE 2.2.1. . The numbers of eel observed in the trap at the top of the eel ladder located at the R.H. Saunders Hydroelectric Dam during 2003. The water temperature at the bottom of the ladder is also provided.

Date	Eels/day	Temperature Bottom (^{o}C)
04-Jun-03	0	10
11-Jun-03	1	10.2
18-Jun-03	1	11.5
25-Jun-03	24	16.5
03-Jul-03	6	19
09-Jul-03	87	20
16-Jul-03	22	21
23-Jul-03	30	21
30-Jul-03	12	21
06-Aug-03	64	23
13-Aug-03	26	23.8
20-Aug-03	37	22
27-Aug-03	5	20.8
04-Sep-03	5	21.5

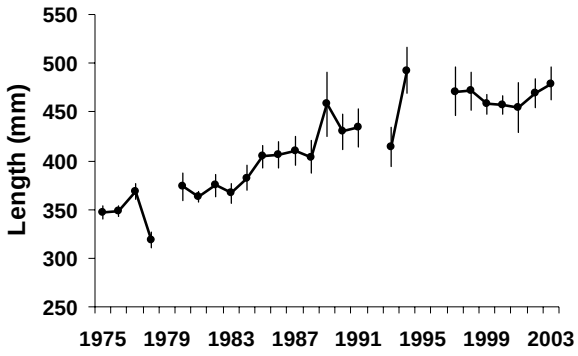

FIG. 2.2.1. Length (with error bars showing the 95% confidence limit) of eel migrating upstream through the eel ladder located at the R.H. Saunders Hydroelectric Dam, 1975-2003.

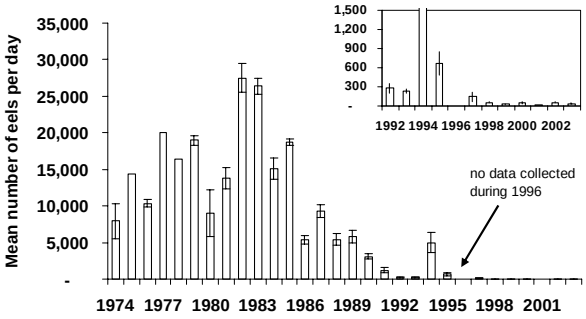

FIG. 2.2.2. . Mean number of eels ascending the eel ladder per day at the R.H. Saunders Hydroelectric Dam, Cornwall, Ontario, during a 31-day peak migration period, 1974-2001. Vertical bars indicate the 95% confidence intervals. No counts were available for 1996.

2.3 Eastern Lake Ontario and Bay of Quinte Fish Community Index Gillnetting

Bottom set gillnets have been used at fixed index netting sites (Fig. 2.3.1) in eastern Lake Ontario (ranging in depth from 2.5-140 m) and the Bay of Quinte (ranging in depth from 5-45 m) annually beginning with the Hay Bay site in the Bay of Quinte in 1958. Gillnets are multi-paneled with mesh sizes ranging from 1½-6 in stretched mesh. Monofilament mesh replaced multifilament in 1992. The gillnetting program is used to monitor the abundance of a variety of fish species in the eastern Lake Ontario and Bay of Quinte fish community.

Species-specific catches in the 2003 gillnetting program are shown for several regions in eastern Lake Ontario and the Bay of Quinte in Tables 2.3.1-2.3.6. Each gillnet catch was standardized to represent the total number of fish in 100 m of each

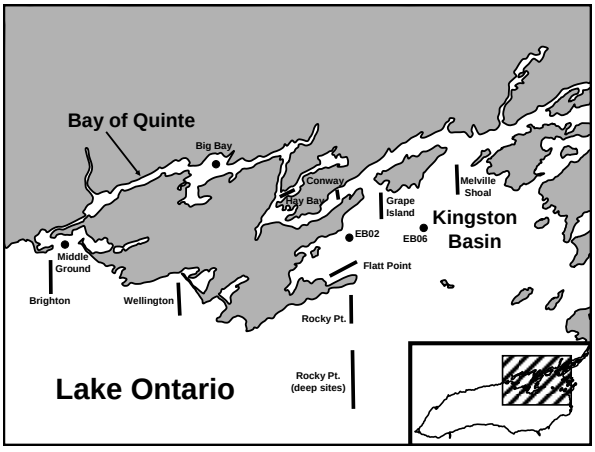

FIG. 2.3.1. Eastern Lake Ontario and Bay of Quinte fish community index gillnetting locations. Circles represent single depth sites; lines represent depth-stratified sampling areas.

mesh size and summed across ten mesh sizes from 1 1/2-6 in. Age distribution and mean fork length and weight data for walleye, lake whitefish and smallmouth bass are shown in Tables 2.3.7-2.3.9 respectively.

Middle Ground

The top three most abundant species in gillnets at the Middle Ground site near Brighton, Lake Ontario were yellow perch, brown bullhead and walleye (Table 2.3.1). Of these species, brown bullhead and walleye were more abundant in 2003 than 2002 and yellow perch were less abundant. White sucker, a relatively common species in prior years were absent in the 2003 catch.

Northeast

The top five most abundant species in Northeastern Lake Ontario gillnets were alewife, yellow perch, rock bass, Chinook salmon and lake trout (Table 2.3.2). Of these species, yellow perch, rock bass and Chinook salmon were more abundant in 2003 than 2002 while alewife and lake trout were less abundant. The cold-water benthic species, lake trout, lake whitefish and round whitefish, declined markedly over the 1992-2003 time-period. Five of eleven smallmouth bass sampled were from the 2000 year-class (Table 2.3.9). Round gobies were caught for the first time in 2003.

Rocky Point (deep sites)

Only five species were caught in Rocky Point Lake Ontario deep gillnets, alewife, lake trout, lake whitefish, lake herring and slimy sculpin (Table 2.3.3). Rainbow smelt and burbot were caught at low abundance in previous years but none were caught in 2003.

TABLE 2.3.1. Species-specific catch per gillnet set at Middle Ground, 1992-2003. Shown are the average catches in 1-3 gillnet gangs set at a single depth during each of 2-3 visits to a single site (Middle Ground). The total number of sets each year is indicated.

	Year												
Species	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Mean
Longnose gar	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.1
Alewife	30.9	5.5	76.1	90.2	0.0	10.9	0.0	0.0	0.0	5.4	5.4	0.0	18.7
Gizzard shad	0.0	0.0	0.0	6.6	13.2	3.3	0.0	0.0	0.0	0.0	0.0	0.0	1.9
Brown trout	0.0	0.0	0.0	0.0	0.0	3.3	0.0	3.3	0.0	0.0	0.0	0.0	0.5
Lake trout	21.9	0.0	0.0	3.3	0.0	26.3	0.0	0.0	1.6	0.0	0.0	0.0	4.4
Northern pike	4.4	1.1	1.6	0.0	6.6	3.3	0.0	3.3	0.0	0.0	0.0	3.3	2.0
White sucker	3.3	2.2	0.0	13.2	19.7	9.9	6.6	23.0	8.2	9.9	20.2	0.0	9.7
Common carp	0.0	1.1	0.0	0.0	6.6	0.0	19.7	6.6	0.0	3.3	0.0	4.9	3.5
Brown bullhead	4.4	2.2	1.6	32.9	0.0	0.0	52.6	13.2	3.3	13.2	3.3	14.2	11.7
White perch	1.1	2.2	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Rock bass	0.0	3.3	3.3	10.9	3.3	3.3	6.6	32.6	27.2	7.1	1.6	3.3	8.5
Pumpkinseed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.9	0.0	0.0	0.0	0.0	0.9
Bluegill	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	0.0	0.0	0.0	0.0	0.3
Smallmouth bass	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Largemouth bass	0.0	0.0	0.0	0.0	0.0	0.0	6.6	0.0	0.0	0.0	0.0	0.0	0.5
Yellow perch	539.8	267.5	455.0	332.7	129.4	281.6	1013.2	419.9	423.7	285.4	400.7	170.1	393.2
Walleye	19.0	23.0	25.7	16.4	50.3	3.3	0.0	6.6	0.0	1.6	3.3	6.6	13.0
Freshwater drum	0.0	1.1	0.0	9.9	13.2	0.0	13.2	0.0	3.3	0.0	1.6	0.0	3.5
Total catch	625.9	309.2	565.0	516.0	242.3	345.1	1118.4	522.6	467.3	325.9	436.2	204.0	473.2
Number of Sets	6	6	4	2	2	2	1	2	4	4	4	4	

TABLE 2.3.2. Species-specific catch per gillnet set in Northeastern Lake Ontario, 1992-2003. Shown are the average catches in 1-3 gillnet gangs set at each of 5 depths during each of 2-3 visits to each of 3 sites (Brighton, Wellington and Rocky Point). The total number of sets each year is indicated.

	Year												
Species	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Mean
Alewife	218.6	130.8	338.7	439.2	721.6	337.3	897.1	550.8	218.3	385.6	657.0	396.9	441.0
Gizzard shad	0.1	5.1	0.8	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7
Coho salmon	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Chinook salmon	1.5	5.5	8.3	3.3	2.6	0.9	1.4	0.6	0.0	0.4	1.4	4.1	2.5
Atlantic salmon	0.0	0.0	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Brown trout	0.5	0.3	3.0	0.2	0.0	0.7	0.5	0.2	0.7	0.3	3.3	1.2	0.9
Lake trout	80.7	37.3	69.4	60.9	28.5	29.2	28.2	7.9	22.4	11.8	8.9	3.0	32.3
Lake whitefish	5.0	9.5	4.8	7.7	2.9	3.4	0.7	0.0	0.7	0.4	0.1	0.8	3.0
Cisco (Lake herring)	1.3	1.3	1.2	1.1	0.0	0.0	0.7	0.2	0.0	0.0	0.0	0.1	0.5
Round whitefish	5.9	5.2	2.0	6.8	2.4	0.9	0.5	0.2	0.0	0.0	0.5	0.1	2.0
Chub	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0
Rainbow smelt	2.5	0.9	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.3
Northern pike	0.1	0.4	0.7	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.2
White sucker	1.8	1.1	3.8	1.1	0.2	0.4	0.0	0.2	0.2	0.1	0.2	0.0	0.8
Greater redhorse	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Lake chub	1.2	0.8	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.4	0.0	0.3
Common carp	0.4	0.4	0.7	0.0	0.7	0.2	0.2	0.0	0.2	0.0	0.0	0.1	0.2
Brown bullhead	0.0	0.1	0.0	0.0	0.0	0.2	0.5	0.2	0.9	1.2	0.7	1.9	0.5
Channel catfish	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stonecat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	1.5	0.4	0.1	0.2
American eel	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Burbot	0.6	1.4	1.3	2.0	3.3	1.1	0.9	0.0	0.9	0.7	1.3	0.3	1.1
White perch	0.1	0.0	0.3	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.1
Rock bass	1.5	2.2	2.5	3.3	2.4	1.7	9.7	4.2	2.7	1.1	1.9	4.4	3.1
Pumpkinseed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
Smallmouth bass	6.1	4.0	4.4	2.0	0.2	0.4	1.8	4.9	0.4	1.5	1.4	1.5	2.4
Yellow perch	100.4	224.4	97.6	135.7	75.6	76.4	49.9	47.2	63.9	27.8	14.7	40.5	79.5
Walleye	4.9	6.7	5.6	2.9	1.8	1.8	3.2	2.4	0.8	0.0	1.1	1.2	2.7
Round goby	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.1
Freshwater drum	1.1	1.9	3.0	0.4	2.6	1.6	0.5	1.5	0.4	0.2	0.2	0.4	1.2
Total catch	434.2	439.3	548.4	669.5	844.9	456.3	997.4	620.6	312.7	433.1	693.5	457.9	575.7
Number of Sets	90	90	40	30	30	30	29	35	36	60	60	60	

TABLE 2.3.3. Species-specific catch per gillnet set at Rocky Point Lake Ontario deep sites (60-140 m), 1997-2003. Shown are the average catches in 2-3 gillnet gangs set at each of 4 depths during each of 2 visits to Rocky Point. The total number of sets each year is indicated.

	Year							
Species	1997	1998	1999	2000	2001	2002	2003	Mean
Alewife	30.26	87.99	7.59	0.82	80.59	2.47	60.58	38.62
Lake trout	36.54	34.54	42.51	29.61	44.82	41.12	27.41	36.65
Lake whitefish	0.00	8.63	5.06	0.41	0.82	0.00	0.55	2.21
Cisco (Lake herring)	0.00	2.06	0.51	0.82	0.00	0.82	0.55	0.68
Rainbow smelt	3.95	3.29	3.54	0.82	0.00	1.23	0.00	1.83
Burbot	1.32	0.41	1.01	0.00	0.00	0.00	0.00	0.39
Slimy sculpin	0.00	1.64	0.00	0.41	0.41	0.00	0.27	0.39
Total catch	72.06	138.57	60.22	32.89	126.64	45.64	89.36	80.77
Number of Sets	15	16	13	16	16	16	24	

Kingston Basin (nearshore sites)

The top five most abundant species in the Kingston Basin, Lake Ontario nearshore gillnets were alewife, yellow perch, walleye, rock bass and lake trout (Table 2.3.4). Catches were generally quite similar to the previous year. Over the longer term, alewife, walleye, lake trout and lake whitefish showed declining catches. Round gobies were caught for the first time in 2003. The age distribution of walleye (Table 2.3.7) indicated that a broad range of age-classes (from age-4 to age-20) were present during summer in eastern Lake Ontario waters. Lake whitefish age distribution was skewed in favor of old fish—no fish less than age-7 were caught (Table 2.3.8).

Kingston Basin (deep sites)

The top three most abundant species in the Kingston Basin, Lake Ontario deep gillnets were lake trout, alewife and lake whitefish (Table 2.3.5). Catches of all species declined precipitously over the 1992-2003 time-period. As for the Kingston Basin nearshore sites, the age distribution of lake whitefish was skewed in favor of old fish—no fish less than age-9 were caught (Table 2.3.8).

TABLE 2.3.4. Species-specific catch per gillnet set in the Kingston Basin Lake Ontario (nearshore sites), 1992-2003. Shown are the average catches in 1-3 gillnet gangs set at each of 5 depths during each of 2-3 visits to each of 3 sites (Flatt Point, Grape Isalnd and Melville Shoal). The total number of sets each year is indicated.

	Year												
Species	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Mean
Lake sturgeon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.1	0.0	0.2	0.1
Alewife	838.4	469.6	186.0	538.4	508.6	351.9	1329.3	552.3	392.3	530.6	130.3	151.0	498.2
Gizzard shad	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Chinook salmon	0.3	1.9	0.0	0.9	0.0	0.0	0.7	0.2	0.3	0.0	0.0	0.0	0.3
Brown trout	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.2	0.0	0.0	0.1
Lake trout	66.5	82.5	97.3	76.0	57.7	24.7	15.7	3.4	3.3	6.3	3.0	3.8	36.7
Lake whitefish	20.5	42.6	34.6	27.1	15.1	8.4	15.9	1.4	4.8	10.7	6.8	2.9	15.9
Cisco (Lake herring)	6.9	3.7	7.1	2.6	0.7	0.0	0.2	0.0	0.0	0.0	0.0	0.2	1.8
Round whitefish	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Coregonus sp.	0.0	0.1	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1
Rainbow smelt	3.5	0.5	0.5	1.7	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.5
Northern pike	0.8	0.4	0.3	0.4	0.2	0.0	0.5	0.0	0.1	0.4	0.2	0.1	0.3
White sucker	5.6	6.0	0.5	1.8	0.0	0.9	4.8	0.3	1.5	1.1	1.0	1.8	2.1
Silver sedhorse	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Greater redhorse	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Moxostoma sp.	0.0	0.1	0.0	0.0	0.0	0.2	0.0	0.3	0.1	0.0	0.0	0.0	0.1
Common carp	0.0	0.0	0.0	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Brown bullhead	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.1	0.0	0.1	0.4	0.1
Channel catfish	1.0	0.1	0.0	0.2	0.0	1.0	0.5	0.5	0.1	0.0	0.0	0.2	0.3
Stonecat	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.5	0.4	0.8	1.4	0.9	0.4
Burbot	0.1	0.4	0.2	0.7	0.9	1.6	1.4	0.3	0.1	0.2	0.2	0.1	0.5
Threespine stickleback	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0
White perch	1.9	2.8	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.5
Rock bass	10.9	11.2	5.4	3.7	0.7	10.6	15.5	15.6	8.1	7.7	2.4	4.6	8.0
Pumpkinseed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0
Smallmouth bass	3.7	3.9	1.3	2.9	0.0	3.2	4.2	4.5	1.1	1.2	1.8	2.0	2.5
Yellow perch	319.0	306.6	96.2	60.7	58.2	97.7	147.0	118.4	117.8	46.8	112.5	103.9	132.1
Walleye	38.3	33.9	18.3	38.8	6.6	21.1	26.1	34.3	13.8	11.3	8.8	9.4	21.7
Round goby	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.9	0.2
Freshwater drum	1.6	0.6	1.2	1.3	0.0	1.1	1.4	0.8	0.5	0.2	0.0	0.5	0.8
Total catch	1319.4	967.8	449.7	757.5	649.4	522.7	1564.1	734.3	544.7	618.3	268.5	285.6	723.5
Number of Sets	86	88	40	30	29	29	29	41	48	60	60	60	

TABLE 2.3.5. Species-specific catch per gillnet set in the Kingston Basin Lake Ontario (deep sites), 1992-2003. Shown are the average catches in 4-8 gillnet gangs set at a single depth during each of 3 visits to each of 2 sites (EB02 and EB06). The total number of sets each year is indicated.

	Year												
Species	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Mean
Sea lamprey	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lake sturgeon	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Alewife	298.8	183.7	50.7	122.5	60.0	20.0	491.2	629.4	157.3	110.2	2.7	3.4	177.5
Chinook salmon	0.3	0.3	0.3	0.3	0.0	0.0	0.3	0.3	0.4	0.8	0.0	0.1	0.2
Brown trout	0.0	0.0	0.0	0.3	0.0	0.3	0.0	0.0	0.0	0.3	0.3	0.0	0.1
Lake trout	276.6	244.5	207.5	166.9	147.8	78.9	51.3	41.4	22.7	10.4	10.1	11.8	105.8
Lake whitefish	51.5	71.3	28.8	37.8	26.6	33.4	24.4	16.4	6.2	2.7	2.7	1.1	25.3
Cisco (Lake herring)	1.9	0.5	2.2	0.8	1.1	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.6
Rainbow smelt	12.9	4.4	5.5	4.9	1.6	0.3	2.7	0.0	0.0	0.0	0.0	0.0	2.7
American eel	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Burbot	0.0	0.3	0.5	0.3	0.8	1.1	0.8	0.3	1.1	0.8	0.3	0.1	0.5
Trout-perch	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
White perch	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Yellow perch	1.4	0.0	0.0	0.0	0.0	0.5	0.0	0.3	0.5	0.0	0.9	0.3	0.3
Walleye	0.0	0.0	0.5	0.3	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Freshwater drum	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Sculpin sp.	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total catch	644.7	505.2	296.1	334.4	237.9	136.0	571.3	688.0	188.4	125.3	17.1	17.0	313.5
Number of Sets	24	24	24	24	24	24	24	24	36	24	24	48	

Bay of Quinte

The top five most abundant species in Bay of Quinte gillnets were yellow perch, white perch, round goby, alewife and walleye (Table 2.3.6). Of these species, white perch, round goby, and walleye were more abundant in 2003 than 2002, yellow perch were less abundant, and alewife were similar. Round goby in particular has increased significantly since its arrival in the late-1990s. The age distribution of walleye (Table 2.3.7) indicated that age-2 fish (2001 year-class) figured prominently in the catch. Unlike most other regions, the age distribution of lake whitefish in the lower Bay of Quinte included the occurrence of young fish (i.e., fish aged 2-5 comprised 80% of the catch).

TABLE 2.3.6. Species-specific catch per gillnet set in the Bay of Quinte, 1992-2003. Shown are the average catches in 1-3 gillnet gangs set at each of 1-5 depths during each of 2-4 visits to each of 3 sites (Big Bay, Hay Bay and Conway). The total number of sets each year is indicated.

	YEAR												
Species	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Mean
Lake sturgeon	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.01
Longnose gar	0.91	5.48	0.18	3.84	0.70	1.44	0.00	5.94	0.62	1.64	1.46	0.19	1.87
Alewife	315.61	248.50	347.22	224.51	85.53	183.80	121.71	8.49	54.89	58.30	23.76	25.15	141.46
Gizzard shad	1.83	34.15	5.30	27.41	0.47	1.23	1.75	22.71	2.47	3.11	10.05	2.32	9.40
Chinook salmon	0.18	0.94	0.00	0.00	0.00	0.00	0.44	0.21	0.00	0.18	0.00	0.19	0.18
Atlantic salmon	0.00	0.00	0.18	0.00	0.00	0.00	0.00	0.21	0.00	0.00	0.00	0.00	0.03
Brown trout	6.58	4.70	1.28	1.64	0.00	0.82	0.22	0.21	0.00	0.37	0.18	1.35	1.45
Lake trout	22.30	8.77	7.13	4.11	15.27	9.15	5.04	0.64	5.35	2.74	8.41	7.16	8.01
Lake whitefish	8.04	6.58	2.56	0.00	6.11	2.06	7.24	2.12	1.23	1.83	0.91	2.90	3.46
Cisco (Lake herring)	1.10	4.70	1.46	1.92	10.81	21.59	23.25	0.85	4.52	2.19	0.18	0.00	6.05
Coregonus sp.	0.00	0.00	0.00	0.27	0.00	0.62	0.22	0.00	0.00	0.00	0.00	0.00	0.09
Rainbow smelt	1.28	0.63	1.64	0.82	0.00	0.62	1.75	1.06	0.00	0.73	0.37	0.00	0.74
Northern pike	2.74	4.07	6.76	1.92	2.58	1.23	0.88	1.27	1.64	1.64	0.37	0.77	2.16
Mooneye	0.00	0.00	0.00	0.00	0.00	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.03
White sucker	33.08	30.08	30.88	36.05	26.08	29.61	20.61	23.77	22.00	25.40	27.23	14.51	26.61
Silver sedhorse	0.00	0.00	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
Moxostoma sp.	0.00	0.31	0.00	0.00	0.00	0.62	0.00	0.00	0.00	0.18	0.00	0.19	0.11
Common carp	1.46	2.51	1.28	0.00	0.00	1.23	0.44	0.00	0.21	0.00	0.00	0.19	0.61
Spottail shiner	0.00	0.00	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
Brown bullhead	6.40	32.65	11.51	7.13	2.82	4.32	10.09	10.61	6.78	11.33	8.22	2.90	9.56
Channel catfish	0.55	3.29	1.10	0.27	0.23	0.62	0.66	0.42	0.21	0.18	0.37	0.19	0.67
Stonecat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.18	0.00	0.03
Burbot	0.00	2.19	0.00	0.27	0.00	0.21	0.66	0.00	0.00	0.00	0.00	0.00	0.28
Trout-perch	0.00	0.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04
White perch	221.67	282.88	275.95	130.76	40.18	49.55	65.28	101.02	42.97	32.89	61.22	85.72	115.84
White bass	0.55	0.00	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.08
Rock bass	14.80	24.75	4.57	8.22	3.76	8.84	11.18	11.04	5.14	1.64	3.29	0.58	8.15
Pumpkinseed	0.00	6.58	0.00	0.55	1.88	3.08	21.27	18.25	11.72	26.68	13.71	2.13	8.82
Bluegill	0.00	0.00	0.00	0.00	0.23	0.82	2.19	1.06	1.44	10.42	5.48	0.58	1.85
Smallmouth bass	2.92	3.76	0.55	0.82	2.11	7.40	3.73	4.46	1.64	1.10	0.18	0.00	2.39
Largemouth bass	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.00	0.00	0.00	0.00	0.02
Black crappie	0.37	1.10	0.00	0.00	0.00	0.00	0.66	0.00	0.00	0.37	0.55	0.39	0.29
Yellow perch	725.15	948.10	513.01	746.98	547.46	624.79	667.14	896.65	752.47	728.80	714.55	493.23	696.53
Walleye	84.25	131.86	54.46	77.44	60.15	32.89	31.36	29.50	24.47	13.89	21.93	22.25	48.70
Round goby	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.02	43.34	3.95
Freshwater drum	16.63	17.54	15.90	17.54	21.85	19.53	12.94	13.16	15.83	31.62	15.72	11.03	17.44
Total catch	1468.38	1806.56	1282.93	1293.31	828.24	1006.48	1010.83	1153.86	955.59	957.42	922.51	717.30	1116.95
Number of Sets	36	21	36	24	28	32	30	31	32	36	36	34	

TABLE 2.3.7. Age distribution and mean fork length and weight of 162 walleye sampled from summer index gillnets, by region, 2003.

	Age (years)																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
Bay of Quinte	3	32	12	9	2	1	1	0	3	0	0	1	0	0	1	0	0	0	0	0	65
Kingston Basin (nearshore)	0	0	0	5	2	2	2	1	11	6	3	12	19	4	4	10	3	1	0	1	86
Northeast	0	2	1	0	0	0	0	0	1	1	1	1	0	0	0	0	1	0	0	0	8
Middle Ground	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Total	3	36	14	14	4	3	3	1	15	7	4	14	19	4	5	10	4	1	0	1	162
Mean fork length (mm)	232	331	423	478	511	538	560	598	582	608	594	647	648	628	649	680	636	673		643	
Mean weight (g)	176	407	933	1352	1627	1923	2092	2672	2484	2916	2904	3437	3590	3072	3362	3788	3131	4069		3248	

TABLE 2.3.8. Age distribution and mean fork length and weight of 58 lake whitefish sampled from summer index gillnets, by region, 2003.

	Age (years)																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
Bay of Quinte	0	5	1	3	3	0	0	2	1	0	0	0	0	0	0	0	0	15
Kingston Basin (nearshore)	0	0	0	0	0	0	1	3	1	4	3	5	6	1	1	0	1	26
Kingston Basin (offshore)	0	0	0	0	0	0	0	0	2	2	1	0	0	1	1	1	0	8
Rocky Point (deep)	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2
Northeast	0	0	0	1	2	0	0	2	0	1	1	0	0	0	0	0	0	7
Total	0	6	1	4	5	0	1	8	4	7	5	5	6	2	2	1	1	58
Mean fork length (mm)		213	260	287	297		399	422	446	467	488	476	510	536	525	552	514	
Mean weight (g)		97	146	238	289		717	880	1126	1256	1475	1384	1730	2004	1984	2483	1246	

TABLE 2.3.9. Age distribution and mean fork length and weight of 27 smallmouth bass sampled from summer index gillnets, by region, 2003.

	Age (years)											
	1	2	3	4	5	6	7	8	9	10	11	Total
Kingston Basin (nearshore)	1	2	0	1	1	4	3	2	0	1	1	16
Northeast	1	1	5	2	1	0	0	0	0	1	0	11
Total	2	3	5	3	2	4	3	2	0	2	1	27
Mean fork length (mm)	148	190	207	276	288	366	396	431		427	455	
Mean weight (g)	46	108	140	407	381	878	1221	1606		1639	1671	

2.4 Eastern Lake Ontario and Bay of Quinte Fish Community Index Trawling

Bottom trawling at fixed index netting sites (Fig. 4.2.1) in eastern Lake Ontario (ranging in depth from 21-100 m) and the Bay of Quinte (ranging in depth from 4-23 m) has occurred annually since 1972 (except 1989). Replicate ½ mile trawl drags using a three-quarter "Yankee Standard" No. 35 bottom trawl are made at eastern Lake Ontario sites while ¼ mile drags using a three-quarter "Western" bottom trawl are made at all Bay of Quinte sites. The bottom trawling program is used primarily to monitor the abundance of small fish species and the young (e.g. young-of-the-year, age-0) of larger species.

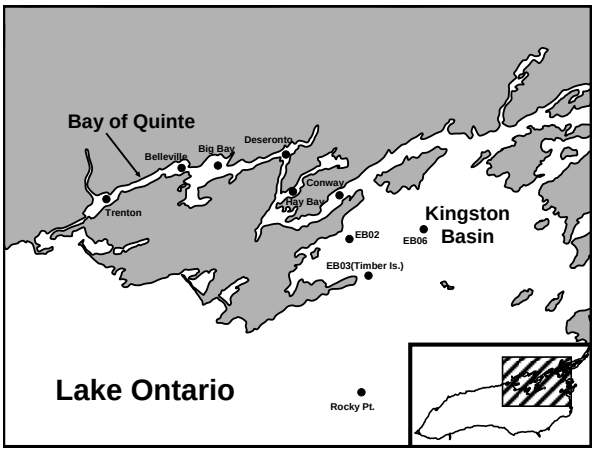

FIG. 4.2.1. Eastern Lake Ontario and Bay of Quinte fish community index bottom trawling site locations.

Species-specific catches in the 2003 trawling program are shown in Table 2.4.1. The top five most abundant species in eastern Lake Ontario trawls were threespine stickleback, rainbow smelt, trout-perch, lake whitefish and slimy sculpin, and in Bay of Quinte trawls were yellow perch, white perch, round goby, alewife and pumpkinseed. Catches of age-0 fish in 2003 for selected common species are shown in Table 2.4.2. Age-0 catch trends for lake whitefish, yellow perch and walleye are shown in Tables 2.4.3, 2.4.4 and 2.4.5 respectively. Age-0 lake whitefish catches were relatively high in 2003, especially at Timber Island, after several years of virtually zero catches. Age-0 catches of yellow perch were moderate while age-0 walleye catches were high relative to the last several years.

TABLE 2.4.1. Species-specific catches by site in the 2003 fish community index bottom trawling program in the Bay of Quinte and eastern Lake Ontario. Catches are the total number of fish observed for the number of trawls indicated. Trawls distances were 1/4 mile in the Bay of Quinte and 1/2 mile in Lake Ontario. Approximate site depths are indicated.

	Bay of Quinte					Lake Ontario					
Species	Trenton (4 m)	Belleville (5 m)	Big Bay (6 m)	Deseronto (5 m)	Hay Bay (7)	Conway (23 m)	EB02 (30 m)	EB03 (21 m)	EB06 (30 m)	Rocky Point (100)	Total
Alewife	1393	1	0	2219	14	27	234	128	1	12	4029
Gizzard shad	178	368	186	95	0	0	0	0	0	0	827
Brown trout	0	0	0	0	0	2	0	0	0	0	2
Lake trout	0	0	0	0	0	0	1	0	1	0	2
Lake whitefish	0	0	0	0	0	97	7	718	2	0	824
Cisco (Lake herring)	0	0	0	0	0	36	0	0	0	0	36
Coregonus sp.	0	0	0	0	0	1	0	0	0	0	1
Rainbow smelt	0	0	0	0	0	122	11	1748	3	33	1917
Northern pike	0	0	0	1	1	0	0	0	0	0	2
White sucker	5	4	170	10	47	80	0	0	0	0	316
Common carp	0	5	4	0	0	0	0	0	0	0	9
Spottail shiner	487	38	71	285	426	0	0	0	0	0	1307
Brown bullhead	34	43	304	172	64	0	0	0	0	0	617
Channel catfish	0	1	0	0	0	0	0	0	0	0	1
Threespine stickleback	0	0	0	0	0	1	598	8233	137	0	8968
Trout-perch	0	102	40	1	30	644	2	901	0	0	1720
White perch	1920	1334	1077	2450	118	0	0	0	0	0	6899
White bass	0	13	0	4	14	0	0	0	0	0	31
Rock bass	1	0	0	2	0	0	0	0	0	0	3
Pumpkinseed	711	15	541	540	6	0	0	0	0	0	1813
Bluegill	12	1	117	36	0	0	0	0	0	0	166
Lepomis sp.	179	117	0	0	0	0	0	0	0	0	296
Smallmouth bass	4	0	0	8	0	0	0	0	0	0	12
Largemouth bass	37	2	0	0	0	0	0	0	0	0	39
Black crappie	0	0	3	1	0	0	0	0	0	0	4
Yellow perch	4358	114	861	5468	954	2278	0	10	0	0	14042
Walleye	84	68	154	60	14	3	0	1	0	0	384
Johnny darter	61	1	0	0	0	0	0	158	0	0	220
Logperch	122	1	2	3	0	0	0	0	0	0	128
Round goby	23	536	11	129	114	3494	1	0	0	0	4308
Freshwater drum	16	167	72	123	55	3	0	0	0	0	436
Slimy sculpin	0	0	0	0	0	0	530	108	43	18	699
Total	9625	2931	3613	11607	1857	6787	1383	12004	187	63	50058
Number of trawls	8	8	8	8	8	12	12	16	12	4	96

TABLE 2.4.2. Species-specific young-of-the-year catches by site, for selected species, in the 2003 fish community index bottom trawling program in the Bay of Quinte and eastern Lake Ontario. Catches are the total number of fish observed for the number of trawls indicated. Trawls distances were 1/4 mile in the Bay of Quinte and 1/2 mile in Lake Ontario. Approximate site depths are indicated. [1]includes pumpkinseed and bluegill.

	Bay of Quinte					Lake Ontario					
Species	Trenton (4 m)	Belleville (5 m)	Big Bay (6 m)	Deseronto (5 m)	Hay Bay (7)	Conway (23 m)	EB02 (30 m)	EB03 (21 m)	EB06 (30 m)	Rocky Point (100)	Total
Alewife	1370	0	0	2219	14	1	27	18	0	0	3649
Gizzard shad	178	368	186	95	0	0	0	0	0	0	827
Lake whitefish	0	0	0	0	0	97	7	718	2	0	824
Cisco (Lake herring)	0	0	0	0	0	36	0	0	0	0	36
Rainbow smelt	0	0	0	0	0	0	0	25	0	0	25
White perch	1745	1282	758	1826	4	0	0	0	0	0	5614
Lepomis sp. [1]	179	117	0	0	0	0	0	0	0	0	296
Yellow perch	3273	56	27	148	17	0	0	10	0	0	3532
Walleye	82	66	134	15	3	0	0	0	0	0	300
Round goby	23	426	7	81	51	0	0	0	0	0	588
Freshwater drum	0	81	13	20	0	0	0	0	0	0	114
Slimy sculpin	0	0	0	0	0	0	246	5	31	0	282
Total	6850	2396	1125	4404	89	135	280	776	33	0	16089
Number of trawls	8	8	8	8	8	12	12	16	12	4	96

TABLE 2.4.3. Mean catch-per-trawl of age-0 lake whitefish at two sites, Conway in the lower Bay of Quinte and EB03 near Timber Island in eastern Lake Ontario, 1992-2003. Four replicate trawls on each of two to four visits during August and early September were made at each site. Distances of each trawl drag were 1/4 mile for Conway and 1/2 mile for EB03.

	Conway	N	EB03 (Timber Island)	N
1992	23.4	8	0.9	12
1993	3.1	8	4.7	12
1994	40.5	8	79.7	8
1995	27.1	8	17.1	8
1996	2.6	8	0.8	8
1997	5.1	8	6.0	8
1998	0.4	8	0.0	8
1999	0.0	8	0.0	8
2000	0.4	8	0.0	8
2001	0.1	8	0.0	8
2002	0.1	8	0.0	8
2003	8.1	12	44.9	16

TABLE 2.4.4. Mean catch-per-trawl of age-0 yellow perch at six Bay of Quinte sites, 1992-2003. Four replicate trawls on each of two visits during August and early September were made at each site, except that three visits were made to Conway in 2003.

	Trenton	Belleville	Big Bay	Deseronto	Hay Bay	Conway	Mean	Number of trawls
1992	3.1	1.3	0.4	0.1	0.5	0.0	0.9	48
1993	203.7	14.0	0.4	36.3	1.6	0.3	42.7	48
1994	526.6	50.6	10.3	101.5	29.3	6.9	120.8	48
1995	730.4	101.1	9.5	764.5	268.9	0.0	312.4	48
1996	2.6	2.9	4.3	2.5	8.5	0.1	3.5	48
1997	302.0	4.0	36.0	135.0	526.0	0.0	167.2	48
1998	13.1	14.0	11.5	0.1	2.9	0.0	7.0	48
1999	24.5	7.0	4.9	638.7	900.3	0.0	262.6	48
2000	0.0	5.8	5.4	0.8	6.0	0.3	3.0	48
2001	158.0	27.6	16.8	71.8	127.0	0.0	66.9	48
2002	0.0	0.3	9.2	141.8	241.1	0.0	65.4	48
2003	228.5	3.8	0.9	9.2	1.6	0.5	40.8	52

TABLE 2.4.5. Mean catch-per-trawl of age-0 walleye at six Bay of Quinte sites, 1992-2003. Four replicate trawls on each of two visits during August and early September were made at each site, except that three visits were made to Conway in 2003.

	Trenton	Belleville	Big Bay	Deseronto	Hay Bay	Conway	Mean	Number of trawls
1992	6.8	12.4	14.0	37.9	6.1	0.8	13.0	48
1993	8.8	16.0	5.0	11.3	1.1	11.9	9.0	48
1994	17.0	21.0	15.0	23.8	11.5	12.5	16.8	48
1995	14.1	8.3	2.6	8.3	5.5	0.9	6.6	48
1996	4.3	7.6	4.9	1.1	0.0	1.1	3.2	48
1997	2.8	7.6	6.1	0.3	0.1	0.0	2.8	48
1998	0.1	0.4	0.6	0.1	0.0	0.0	0.2	48
1999	1.1	0.4	0.4	1.4	9.1	0.1	2.1	48
2000	0.0	3.8	1.0	0.0	0.1	0.0	0.8	48
2001	9.5	4.5	4.8	6.8	3.3	0.1	4.8	48
2002	0.0	0.0	1.1	0.1	0.0	0.0	0.2	48
2003	10.3	8.3	16.8	1.9	0.4	0.0	6.3	52

2.5 Juvenile Salmonid Stream Assessment

Wild juvenile salmon and trout populations were assessed with 1-pass electrofishing at 38 randomly selected sites in Lake Ontario tributaries (Table 2.5.1) Streams were stratified according to their length and distribution of juvenile rainbow trout habitat. The abundance of young-of-the-year (YOY) salmonids was estimated for each species at each site using:

$$N_{species} = \text{catch} + \text{catch} / (1/(1-0.2617*(\text{mean wt})^{0.27116})-1)$$

where mean wt equals mean weight in g (OMNR unpublished data). For yearlings and older salmonids the population size was estimated according to (1) Jones and Stockwell (1995). The age of juvenile rainbow trout was determined from a length distribution. Year-class strength of wild rainbow trout in Ontario tributaries was calculated as the least-square mean density of juvenile rainbow trout by year class for age-0 to 2.

Rainbow trout were the most abundant species in this survey followed closely by longnose dace and blacknose dace (Table 2.5.1). The mean density of YOY rainbow trout was slightly lower in 2003, and year class strength was slightly lower than the long-term average (Fig. 2.5.1). Chinook salmon and coho salmon continue to show greater natural reproduction since 1995 (Fig. 2.5.2).

Atlantic salmon fry stocked by OMNR in Barnum House Creek in 2003 had a higher density and biomass than rainbow trout (Table 2.5.2). Atlantic salmon were also observed in the Little Rouge River where they were stocked by the Metro East Anglers. An Atlantic salmon was observed in the Credit River (Table 2.5.1) at a location where adults have access, but downstream of stocking locations. We were unable to confirm whether this fish was stocked or wild.

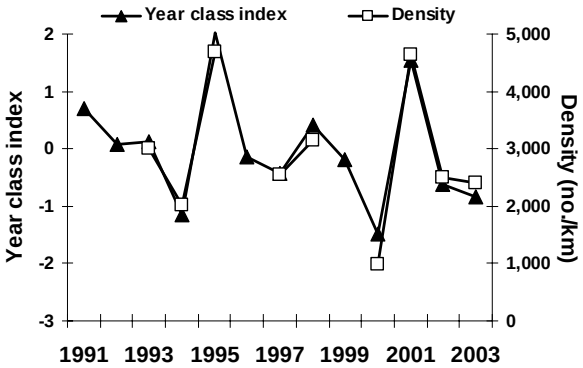

FIG. 2.5.1. Density of young-of-the-year and year-class strength of rainbow trout in Ontario tributaries of Lake Ontario, 1991-2003. Year-class strength was standardized with a mean of zero, and the scale is in units of 1 standard deviation.

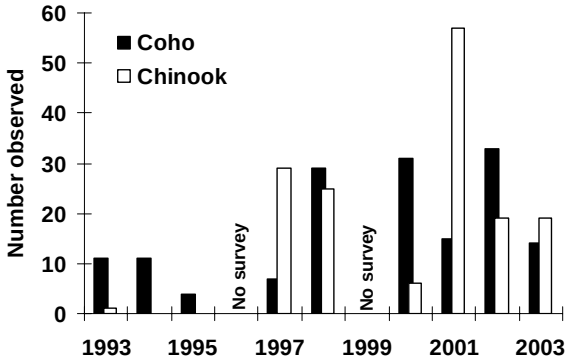

FIG. 2.5.2. Number of young-of-the-year coho and Chinook salmon observed during summer surveys of Lake Ontario tributaries in Ontario, 1993-2003. No surveys were conducted in 1996 and 1999.

(1) Jones, M.L. and J.D. Stockwell. 1995. A rapid assessment procedure for the numeration of salmonine populations in streams. N. Amer. J. Fish. Man. 15:551-562.

2.6 Lake-wide Hydroacoustic Assessment of Prey Fish

The prey fish in Lake Ontario are assessed in summer hydroacoustic surveys conducted jointly since 1991 by Ontario Ministry of Natural Resources and New York State Department of Environmental Conservation. The surveys are done in mid-summer, and cover the entire lake. The 2003 survey consisted of five shore-to-shore north-south transects in the main lake, and one U-shaped transect in the Kingston basin. Hydroacoustic data used to estimate population densities were collected using a Biosonics120kHz split beam echosounder, and eight midwater trawls were made to obtain samples of prey fish to measure additional biological parameters.

The 2003 population estimate of yearling-and-older (YAO) alewife was 123 million fish or 2360 metric tones (Fig 2.6.1). This is the lowest abundance since the start of the current data series in 1997, and the biomass only 14% of the 1997-2002 average level. The condition of the alewife was significantly poorer

TABLE 2.5.1. Catch by species of fish in Lake Ontario tributaries during electrofishing surveys in 2003. For salmon and trout: YOY = young-of-the-year, 1+ = yearlings and older.

Stream	Site	Sea Lamprey	Coho Salmon	Chinook Salmon	Rainbow Trout		Atlantic Salmon		Brown Trout		Brook Trout		Central Mudminnow	White Sucker	Northern Hog Sucker	Hornyhead Chub	River Chub	Common Shiner	Bluntnose Minnow	Fathead Minnow	Blacknose Dace	Longnose Dace	Creek Chub	Brown Bullhead	Stonecat	Brook Stickleback	Rock Bass	Pumpkinseed	Longear Sunfish	Smallmouth Bass	Largemouth Bass	Rainbow Darter	Fantail Darter	Johnny Darter	Logperch	Mottled Sculpin	Slimy Sculpin
					YOY	1+	YOY	1+	YOY	1+	YOY	1+																									
Ancaster Cr.	AN01				5																8															
Limestone Cr.	LI01	1			93	14					13	31		8							19		3								1		6			
Sixteen Mile Cr.	OA02				45	34			3	1											25		1									9	14		10	
Silver Cr.	BC04					8				1				5	10			12			97	42	23									14	38	10	14	
Silver Cr.	SI01								1	2				8	2			2			48	1	183									4				
Credit R.	CR07				21	4		1		1				32	5		14	161	11		132	591	3		6	1						234	205	15			
Little Rouge R.	LR05				13	12	3		4	3											64	17	1				1					2				14	22
Duffin Cr.	DU01				5	1								16				32			98	204	31		3					4		34		4			
Duffin Cr.	DU02				1	18								2					1		97	173	10		1							9		3			
Brougham Cr.	DU03				5	3						8		8				1	1		6	1	10					6			2					1
Lynde Cr.	LD02				10	8								3				37			148	116	86									4		7			
Lynde Cr.	LD03	1			12	7					6	12									6														2	10
Oshawa Cr.	OH02													8					4	6	84		81														
Oshawa Cr.	OH03	4			138	42			2	6				122				6	19		42	28	17												104	
Farewell Cr.	FW01	5			25	5				1				51							115	7	33			1		2	1			5		19	33	
Bowmanville Cr.	BW02	6	6		71	11			19	13																										68
Bowmanville Cr.	BW03				29	2			13		4										7		6												8	
Bowmanville Cr.	BW07			3	227	32			1	1				2							184	349														37
Soper Cr.	SO02	3	8		96	20			11	3																										32
Wilmot Cr.	WM02			2	113	26			2	9																									4	23
Orono Cr.	OR01			7	137	17			11	2																									21	
Graham Cr.	GR02				2	1								16				117	48		18	108	29	1			10					2		18		
Graham Cr.	GR04					6								2							18	9	62									2		23		19
Gage Cr.	GA02				78	23															62	3														19
Port Britain Cr.	PB01	1			18	2					8	29									10		9													38
Ganaraska R.	GN04				41	20			9	29																		6								51
Ganaraska R.	GN05					11			1		46	15																								
Ganaraska R.	GN06				16	9				1						28		20	7		118	267	8											29		
Ganaraska R.	GN07			4	93	31			1	3				1		2					50	59	6					1						7		3
Cobourg Br.	CO03				27	7								23							120	32	20											2	18	
Cobourg Br.	CO09	1			177	3			20	37				5							25	4													30	
Cobourg Br.	CO12	7			36	19					1	2									12														24	
Shelter Valley Cr.	SE02				21	11			1		1	19									1							1							4	
Shelter Valley Cr.	SE03			3	105	27				1				1							1	11										15		4	31	
Barnum House Cr.	BR01				43	23	65				1	9																								
Colborne Cr.	CL01	4			1	2						1									10	8	6			5										
Proctors Cr.	BT01				41	16						1		7							11	2	33												6	
Smithfield Cr.	SM01				4	10							1	9				1			9	11	11											27	6	8	
Grand Total		33	14	19	1749	485	68	1	99	114	80	127	1	329	17	30	14	389	91	6	1645	2043	672	1	10	7	11	16	1	4	3	334	263	168	6	331	323

TABLE 2.5.2. Estimated density (No./m) and biomass (g/m2) by species of salmon and trout in Lake Ontario tributaries during electrofishing surveys in 2003. YOY = young-of-the-year, 1+ = yearlings and older. UTM is at the upstream end of site (+/- 5m). See Table 2.5.1 for Stream name.

SITE	UTM			Date	Site width (m)	Site length (m)	Coho Salmon YOY		Chinook Salmon YOY		Rainbow Trout YOY		Rainbow Trout 1+		Atlantic Salmon YOY		Atlantic Salmon 1+		Brown Trout YOY		Brown Trout 1+		Brook Trout YOY		Brook Trout 1+	
							No./m	g/m^2	No./m	g/m^2	No./m	g/m^2	No./m	g/m^2	No./m	g/m^2	No./m	g/m^2	No./m	g/m^2	No./m	g/m^2	No./m	g/m^2	No./m	g/m^2
AN01	17	58379	478794	August 25	2.5	56.3					0.20	0.53														
LI01	17	58725	481145	August 25	3.7	81.0					3.56	2.11	0.25	1.90									0.44	0.42	0.62	8.21
OA02	17	58626	481825	August 26	7.1	50.0					2.49	1.15	1.11	4.27					0.16	0.09	0.02	0.06				
BC04	17	59029	483232	August 26	5.5	49.2							0.22	1.03							0.02	0.11				
SI01	17	58700	483307	August 25	4.0	44.4													0.06	0.05	0.05	0.29				
CR07	17	59223	483308	August 26	17.8	49.8					1.22	0.19	0.10	0.22			0.02	0.03			0.02	0.04				
LR05	17	63890	486732	August 27	2.8	51.3					0.72	0.77	0.33	2.84	0.16	0.20			0.19	0.38	0.07	0.20				
DU01	17	64838	486008	August 27	8.0	52.3					0.26	0.12	0.02	0.07												
DU02	17	65583	486064	August 28	7.0	39.7					0.06	0.04	0.68	1.98												
DU03	17	65482	486321	August 27	4.0	54.9					0.24	0.25	0.06	0.43											0.20	1.25
LD02	17	66241	487268	September 3	4.0	56.9					0.47	0.45	0.19	1.11												
LD03	17	66332	486570	September 3	4.3	45.2					0.69	0.67	0.21	0.97									0.34	0.36	0.38	2.89
OH02	17	67123	487308	September 4	1.5	33.0																				
OH03	17	66948	486824	September 4	4.6	49.3					8.31	4.63	1.43	9.34					0.13	0.06	0.16	4.46				
FW01	17	67675	486681	September 5	4.3	52.9					1.18	1.32	0.12	1.61							0.02	0.13				
BW02	17	68123	487354	August 20	5.4	59.2	0.23	0.28			3.84	1.36	0.26	1.21					0.93	0.47	0.32	6.24				
BW03	17	68252	487482	August 14	3.9	52.8					1.55	1.23	0.04	0.40					0.63	0.73			0.21	0.19		
BW07	17	68390	486610	September 8	8.4	54.7			0.12	0.11	11.22	4.77	0.94	3.21					0.04	0.03	0.02	0.32				
SO02	17	68612	487041	August 21	6.0	66.3	0.28	0.29			4.60	1.52	0.46	2.08					0.45	0.26	0.05	0.24				
WM02	17	69089	486868	September 5	6.9	52.2			0.09	0.08	6.60	2.67	0.62	2.31					0.09	0.07	0.24	5.58				
OR01	17	69102	486927	September 11	4.1	50.0			0.32	0.55	7.91	5.49	0.51	3.10					0.52	0.75	0.05	0.33				
GR02	17	69472	486554	August 21	5.1	56.8					0.10	0.05	0.02	0.11												
GR04	17	69922	487135	August 21	4.4	48.1							0.16	1.01												
PB01	17	70959	487156	August 14	3.8	53.3					0.92	0.84	0.04	0.57									0.41	0.37	0.87	9.54
GN04	17	69978	487708	August 20	5.7	69.0					1.82	0.72	0.44	2.93					0.36	0.21	0.67	9.85				
GN05	17	70139	487815	September 15	3.3	49.7							0.31	2.19					0.06	0.04			2.52	2.66	0.44	4.31
GN06	17	71673	487338	September 12	15.1	44.2					1.00	0.22	0.28	0.42							0.02	0.05				
GN07	17	70949	487505	September 10	10.4	61.0			0.15	0.09	4.18	1.37	0.82	2.19					0.04	0.02	0.06	0.89				
GA02	17	71938	487611	September 2	2.9	49.3					4.33	5.13	0.72	5.22												
CO03	17	72378	487382	September 9	4.7	63.3					1.14	0.91	0.15	0.75												
CO09	17	72732	487758	September 11	5.1	49.0					8.79	9.08	0.07	0.21					0.93	1.23	1.24	0.00				
CO12	17	72260	487798	September 9	2.7	50.5					2.09	2.09	0.57	5.00									0.05	0.09	0.04	0.73
BR01	17	73662	487572	September 2	4.6	59.3					2.43	0.86	0.60	2.23	2.99	2.26							0.05	0.02	0.21	1.57
SE02	18	26038	488106	August 13	5.2	57.0					1.18	0.44	0.27	1.19					0.05	0.03			0.05	0.03	0.50	7.58
SE03	17	74024	487321	August 13	7.2	55.3			0.15	0.07	6.05	1.63	0.77	2.67							0.02	0.28				
CL01	18	26394	487646	August 13	3.4	46.6					0.08	0.02	0.05	0.62											0.02	0.34
BT01	18	28019	488056	August 12	4.6	55.3					2.20	1.22	0.43	2.45											0.02	0.07
SM01	18	28596	487954	August 12	3.3	48.0					0.24	0.21	0.29	3.22												
Average							0.01	0.01	0.02	0.02	2.41	1.42	0.36	1.87	0.08	0.06	0.00	0.00	0.12	0.12	0.08	0.77	0.11	0.11	0.09	0.96

than in any year since 1997 (Fig. 2.6.2).

The 2003 population estimate of YAO rainbow smelt was 90 million fish or 602 metric tones (Fig. 2.6.3). This is also the lowest abundance observed since 1997, and represents approximately 23% of the average biomass observed during the recent low-abundance period starting in 1999. The condition of smelt was not assessed in 2003 due to insufficient sample size.

Threespine sticklebacks are not currently assessed from the acoustic data, but midwater trawls conducted during the hydroacoustic surveys provide some information on their population trends. In 2003 the catches of threespine sticklebacks were among the lowest since the mid 1990s when this species came into prominence (Fig.2.6.4)

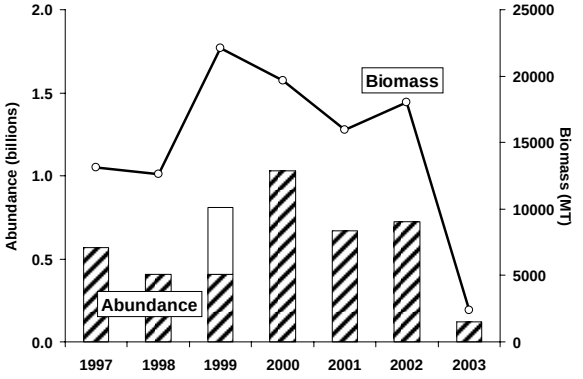

FIG. 2.6.1. Abundance and biomass of yearling-and-older alewife. Abundance estimates were derived directly from hydroacoustic surveys, biomass estimates were obtained by applying average weights measured in midwater trawls to hydroacoustic abundance estimates. The abundance estimate for 1999 (dark plus light bars) was obtained by doubling the 1999 half-lake estimate (dark bar). Average weights used in biomass calculations in 2002 were based on pooled data from other years.

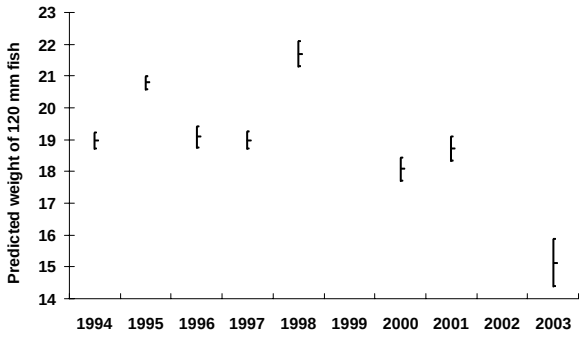

FIG. 2.6.2. . Predicted weights of 120 mm (fork length) alewife calculated from length-weight regressions of fish larger than 100 mm captured with mid-water trawls in summer surveys. 95% confidence intervals on predicted weights are also indicated.

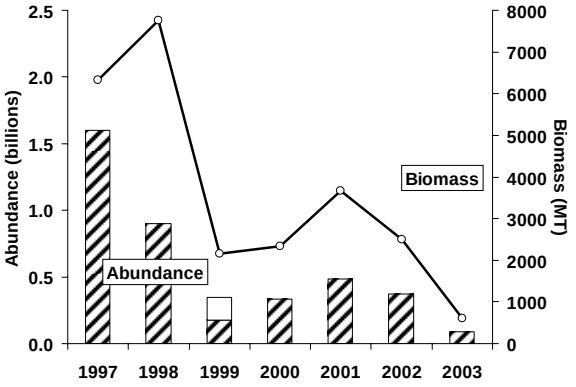

FIG. 2.6.3. Abundance and biomass of yearling-and-older rainbow smelt. Abundance estimates were derived directly from hydroacoustic surveys; biomass estimates were obtained by applying average weights measured in midwater trawls to hydroacoustic abundance estimates. The abundance estimate for 1999 (dark plus light bars) was obtained by doubling the 1999 half-lake estimate (dark bar). Average weights used in biomass calculations in 2002 and 2003 were based on pooled data from other years.

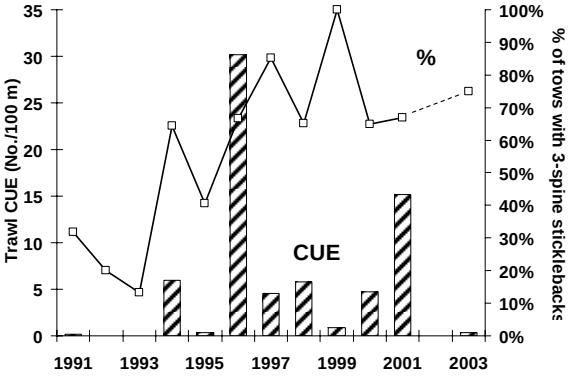

FIG. 2.6.4. Catches of threespine sticklebacks in midwater trawl conducted during summer hydroacoustic surveys. Bars represent yearly catch per unit effort; line shows proportion of tows that contained sticklebacks. No trawls were done in 2002.

2.7 Bay of Quinte Nearshore Community Index Netting

The provincially standardized nearshore community index netting (NSCIN, Stirling 1999) program was initiated on the Bay of Quinte in 2001. The NSCIN program utilized 6-foot trapnets and was designed to evaluate the abundance and other biological attributes of fish species that inhabit the littoral area. Suitable trapnet sites were chosen from randomly selected UTM grids containing shoreline in the upper Bay of Quinte (Hoyle 2001).

Seventy-two trapnet sites were sampled from September 9 to October 1 in a variety of nearshore habitat types and with water temperatures ranging from 15.0 to 22.0 ^{o}C (Table 2.7.1). Nearly 12,000 fish comprising 25 species were captured (Table 2.7.2). The top five species by number were brown bullhead (4188), bluegill (2638), pumpkinseed

TABLE 2.7.1. Survey information for the 2003 NSCIN trapnet program on the Bay of Quinte.

	Upper Bay	Lower Bay
Survey dates	Sep 9 to Oct 1	Sep 9 to Sep 30
Water temperature (^{o}C)	Mean = 18.8 (range = 15.0-21.0)	Mean = 19.9 (range = 17.0-22.0)
No. of trapnet lifts	36	36
No. sites by depth (m):		
Target (2-2.5 m)	19	18
> Target (max)	17 (4.0 m)	14 (3.5 m)
< Target (min)	0 (2.0 m)	4 (1.8 m)
No. sites by substrate:		
Hard	26 (72%)	16 (44%)
Soft	10 (28%)	20 (56%)
No. sites by cover:		
None	0	2 (6%)
1-25%	11 (31%)	8 (22%)
25-75%	17 (47%)	22 (61%)
>75%	8 (22%)	4 (11%)

TABLE 2.7.2. Species-specific catch in the 2003 NSCIN trapnet program on the Bay of Quinte. Statistics shown include total catch, arithmetic mean catch-per-trapnet (number and weight) and percent relative standard error of the mean log10(catch by number + 1). %RSE = 100*SE/Mean.

	Upper Bay				Lower Bay				Total Bay of Quinte			
	Number			Weight	Number			Weight	Number			Weight
Species	Total	Mean	RSE (%)	Mean (kg)	Total	Mean	RSE (%)	Mean (kg)	Total	Mean	RSE (%)	Mean (kg)
Brown bullhead	1344	37.33	12	10.6	2844	79.00	10	22.4	4188	58.17	8	16.5
Bluegill	2385	66.25	10	5.3	253	7.03	13	0.6	2638	36.64	9	2.9
Pumpkinseed	970	26.94	11	2.0	745	20.69	10	1.5	1715	23.82	8	1.7
Black crappie	368	10.22	8	2.0	187	5.19	14	1.0	555	7.71	8	1.5
White perch	277	7.69	26	1.2	270	7.50	21	1.2	547	7.60	16	1.2
Freshwater drum	137	3.81	20	3.8	252	7.00	16	7.0	389	5.40	12	5.4
Largemouth bass	285	7.92	12	1.8	92	2.56	19	0.6	377	5.24	11	1.2
Walleye	80	2.22	15	3.0	295	8.19	14	12.1	375	5.21	11	7.5
White sucker	62	1.72	19	1.5	141	3.92	12	3.6	203	2.82	11	2.6
Rock bass	23	0.64	23	0.1	149	4.14	22	0.4	172	2.39	17	0.2
Yellow perch	70	1.94	29	0.2	50	1.39	23	0.1	120	1.67	18	0.2
Channel catfish	54	1.50	23	4.1	50	1.39	19	4.8	104	1.44	14	4.5
Gizzard shad	72	2.00	28	0.7	18	0.50	30	0.2	90	1.25	21	0.5
Northern pike	31	0.86	17	1.3	36	1.00	21	1.8	67	0.93	13	1.6
Longnose gar	41	1.14	29	1.1	16	0.44	39	0.4	57	0.79	23	0.8
Bowfin	21	0.58	29	1.4	36	1.00	22	2.4	57	0.79	18	1.9
Smallmouth bass	13	0.36	38	0.3	38	1.06	39	0.9	51	0.71	28	0.6
Silver sedhorse	25	0.69	40	1.4	3	0.08	72	0.2	28	0.39	36	0.8
Common carp	10	0.28	36	1.7	11	0.31	36	2.0	21	0.29	25	1.9
White bass	4	0.11	48	0.0	6	0.17	49	0.1	10	0.14	34	0.1
Greater redhorse	8	0.22	51	0.5	0	0.00		0.0	8	0.11	52	0.3
American eel	0	0.00		0.0	6	0.17	49	0.4	6	0.08	50	0.2
River redhorse	5	0.14	49	0.5	0	0.00		0.0	5	0.07	50	0.2
Shorthead redhorse	3	0.08	56	0.1	0	0.00		0.0	3	0.04	57	0.1
Moxostoma sp.	3	0.08	100	0.1	0	0.00		0.0	3	0.04	100	0.1
Golden shiner	1	0.03	100	0.0	1	0.03	100	0.0	2	0.03	70	0.0
Total Catch	6292				5499				11791			

(1715), black crappie (555) and white perch (547), and by weight were brown bullhead, walleye, freshwater drum, channel catfish and bluegill. The centrarchid family of fish (bluegill, pumpkinseed, black crappie, largemouth bass, rock bass and smallmouth bass) comprised a total of 47% by number and 15% by weight of the catch.

Mean length and weight statistics for all fish species caught in the 2003 NSCIN trapnet program on the Bay of Quinte are shown in Table 2.7.3. A summary of species-specific trapnet catches, for all years since initiation of the NSCIN program (2001-2003), is shown in Table 2.7.4

TABLE 2.7.3. Mean fork length and weight statisitics for fish species caught in the 2003 NSCIN trapnet program on the Bay of Quinte.

	Total Catch	Mean Fork Length (mm)	N	Mean Weight (g)
Brown bullhead	4188	268	1002	283
Bluegill	2638	147	811	81
Pumpkinseed	1715	140	1024	73
Black crappie	555	214	530	197
White perch	547	199	328	163
Freshwater drum	389	436	341	1005
Largemouth bass	377	224	376	228
Walleye	375	481	373	1458
White sucker	203	417	203	914
Rock bass	172	155	161	92
Yellow perch	120	188	101	100
Channel catfish	104	553	104	3123
Gizzard shad	90	195	90	369
Northern pike	67	605	67	1686
Longnose gar	57	745	57	1002
Bowfin	57	596	57	2384
Smallmouth bass	51	324	51	822
Silver sedhorse	28	473	28	1949
Common carp	21	632	21	6240
White bass	10	271	10	428
Greater redhorse	8	516	8	2410
American eel	6	928	4	2126
River redhorse	5	554	5	2549
Shorthead redhorse	3	450	3	1428
Moxostoma sp.	3	477	3	1695
Golden shiner	2	165	2	54

TABLE 2.7.4. Species-specific NSCIN trapnet catches in the upper and lower Bay of Quinte, 2001-2003. No netting was completed in the lower Bay of Quinte in 2001. The numbers of trapnet sets are indicated.

	Upper Bay			Lower Bay		Total	
Species	2001	2002	2003	2002	2003	2002	2003
Longnose gar	9	12	41	13	16	25	57
Bowfin	13	5	21	24	36	29	57
Gizzard shad	40	52	72	27	18	79	90
Northern pike	37	21	31	42	36	63	67
Mooneye	1	0	0	0	0	0	0
White sucker	37	53	62	107	141	160	203
Silver sedhorse			25	0	3		28
Shorthead redhorse			3	0	0		3
Greater redhorse			8	0	0		8
River redhorse	2		5	0	0		5
Moxostoma sp.	23	15	3	0	0	15	3
Goldfish	0	0	0	1	0	1	0
Common carp	3	4	10	12	11	16	21
Golden shiner	1	0	1	3	1	3	2
Rudd	0	0	0	1	0	1	0
Brown bullhead	6036	3450	1344	2501	2844	5951	4188
Channel catfish	78	78	54	41	50	119	104
American eel	16	5	0	6	6	11	6
White perch	79	104	277	39	270	143	547
White bass	2	5	4	1	6	6	10
Rock bass	33	24	23	51	149	75	172
Pumpkinseed	3218	2631	970	4087	745	6718	1715
Bluegill	6105	5135	2385	453	253	5588	2638
Smallmouth bass	34	60	13	28	38	88	51
Largemouth bass	89	220	285	181	92	401	377
Black crappie	353	540	368	209	187	749	555
Yellow perch	135	123	70	117	50	240	120
Walleye	114	89	80	164	295	253	375
Freshwater drum	229	119	137	186	252	305	389
Effort (Number of net sets)	36	36	36	36	36	72	72

2.8 St. Lawrence River Fish Community Index Netting – Thousand Islands

The St. Lawrence River fish community is dominated by a rich assemblage of warm-water species; over 85 fish species have been reported. Smallmouth bass and northern pike are the most abundant top predators, while other important members of the fish community include yellow perch, rock bass, brown bullhead, and pumpkinseed. Other less abundant, but important, fish species inhabiting the St. Lawrence River include walleye, lake sturgeon and muskellunge.

This section summarizes index gillnetting catches for all fish species in 2003 and updates trends in abundance for yellow perch, smallmouth bass and northern pike.

The fall gillnetting program is designed to detect long-term changes in the fish communities and has been established in four distinct sections of the river; Thousand Islands, Middle Corridor, Lake St. Lawrence and Lake St. Francis. These programs have been coordinated with the New York State Department of Environmental Conservation (NYSDEC) assessment programs to provide 'river-wide' coverage of fisheries resources.

The 2001, 2002 and 2003 netting programs differed from previous years in that a new gillnet standard was introduced. Due to insufficient stock from the supplier, mono-filament nets were used during the 2001 field program in addition to the multi-filament nets used in previous years. The netting program in 2003 continued to use both old multi-filament and mono-filament. In order to compare the catches of the new and old net designs, half of the gillnet sets were made with multi-filament nets and the other half of the sets were made with mono-filament nets. The 2003 netting in the Thousands Islands was conducted between September 8 and October 3, 2003. This program maintained the database established in 1987 and represented the ninth netting program in the Thousand Islands section of the St. Lawrence River.

Fish Species Update

The overall catch from 48 gillnet sets in the 2003 Thousand Islands project was 1,574 fish comprising 20 species (a complete summary of standardized gillnet catch-per-unit-effort is listed in Table 2.8.1). The average number of fish captured per net set during 2003 (39.9 fish per net, both netting types combined) was higher than was observed in the 2001 survey, however the numbers of fish remain lower than those observed during the late 1980s (Fig. 2.8.1).

As was the case in 2001, average catches were higher in mono-filament nets than in multi-filament nets. For this reason, a correction factor of 1.58 was applied. See the 2001 annual report for discussion of the statistical treatment of the two net types.

Yellow Perch

Yellow perch continue to be the most abundant fish captured in the Thousand Islands gillnet program. The total catch in 2003 increased from 2001 levels (Fig. 2.8.2). Age analysis of fish sampled during the 2003 netting program estimated the average age of the yellow perch community to be 3.5 years (Fig. 2.8.3).

Centrarchids

Six centrarchid species were captured in the netting program: rock bass, pumpkinseed, bluegill, smallmouth bass, largemouth bass and black crappie. Rock bass catches were lower in 2003 than 2001, yet still very high relative to other species. Pumpkinseed and smallmouth bass populations appear to have followed similar trends until 2003, where smallmouth numbers increased and pumpkinseed declined slightly (Fig. 2.8.4). Smallmouth bass catches increased in 2003 to levels previously seen in the early-1990s. Strong age-1 and age-4 age groups were likely responsible for the upward smallmouth bass abundance trend observed in 2003 (Fig. 2.8.5). Although catches of pumpkinseed increased during 1999, they resumed their overall declining trend in 2001 and 2003.

Northern Pike

For the first time since 1989, the catch of northern pike increased (Fig. 2.8.6). A decline in northern pike catches through the 1990s has also been reported over the same time period in the New York waters of the Thousand Islands, with weak fluctuations since 1997.

TABLE 2.8.1. Species-specific catch-per-standard-gillnet lift. Thousand Islands area, St. Lawrence River 1987 to 2003. All catches prior to 2001 have been adjusted by a factor of 1.58 to be comparable to the new netting standard initiated in 2001.

	1987	1989	1989	1991	1993	1995	1997	1999	2001	2003
Lake Sturgeon	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.02
Longnose gar	0.00	0.00	0.00	0.03	0.00	0.00	0.03	0.00	0.00	0.07
Bowfin	0.08	0.13	0.09	0.00	0.06	0.03	0.07	0.00	0.02	0.07
Alewife	0.49	0.00	0.00	0.09	0.03	0.03	0.00	0.00	0.00	0.00
Gizzard shad	0.00	0.41	0.36	0.46	0.00	0.00	0.00	0.03	0.06	0.00
Chinook salmon	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.03	0.02	0.00
Brown trout	0.00	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rainbow trout	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00
Lake trout	0.00	0.13	0.16	0.00	0.16	0.13	0.13	0.00	0.00	0.00
Lake herring	0.00	0.00	0.03	0.00	0.00	0.06	0.00	0.00	0.00	0.00
Northern pike	4.46	6.73	6.26	4.35	3.62	2.61	2.40	2.14	1.33	2.05
Muskellunge	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.02	0.04
Esocidae hybrids	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00
Mooneye	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
White sucker	1.09	2.10	2.04	1.39	1.49	1.37	1.25	1.78	0.75	0.93
Moxostoma sp.	0.00	0.08	0.13	0.06	0.13	0.33	0.00	0.23	0.08	0.11
Common carp	0.05	0.13	0.09	0.09	0.03	0.09	0.36	0.13	0.08	0.12
Chub	0.00	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Golden shiner	0.05	0.05	0.03	0.00	0.06	0.03	0.00	0.03	0.00	0.00
Brown bullhead	2.56	1.79	1.79	2.46	1.06	0.95	1.91	3.85	3.00	2.66
Channel catfish	0.81	0.08	0.13	0.55	0.16	0.30	0.30	0.56	0.25	0.35
White perch	0.08	0.00	0.00	0.36	0.03	0.06	0.00	0.07	0.10	0.02
White bass	0.05	0.60	0.73	0.43	0.24	0.00	0.07	0.00	0.00	0.00
Rock bass	4.14	4.46	4.87	5.44	4.77	5.56	4.87	7.54	9.48	7.23
Pumpkinseed	4.61	6.19	5.80	5.81	3.89	2.80	2.40	3.23	1.40	1.21
Bluegill	0.65	0.88	0.76	0.43	0.06	0.00	0.16	0.07	0.02	0.14
Smallmouth bass	3.16	5.67	5.44	4.31	2.34	1.55	1.48	3.19	1.67	3.97
Largemouth bass	0.13	0.36	0.40	0.13	0.16	0.16	0.03	0.23	0.08	0.22
White crappie	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Black crappie	0.13	0.16	0.13	0.09	0.06	0.03	0.03	0.10	0.06	0.07
Yellow perch	27.79	17.62	17.02	15.41	16.23	22.67	21.33	22.22	18.06	20.32
Walleye	0.21	0.60	0.55	0.33	0.33	0.27	0.59	0.07	0.19	0.23
Freshwater drum	0.00	0.00	0.03	0.09	0.00	0.03	0.10	0.00	0.06	0.04
Total Catch	50.56	48.25	46.94	42.39	34.90	39.11	37.56	45.49	36.75	39.87

2.9 Walleye Mark-Recapture

Walleye in eastern Lake Ontario were marked to determine population size and migration patterns. Marking and recapture sessions have been conducted each fall, since 1998. Walleye were captured in trapnets throughout the Bay of Quinte and eastern Lake Ontario. Walleye were marked with double dorsal fin ray punches, and then released. Various combinations of fin ray punches provided a binary code that uniquely identified year and location. Some walleye were tagged with Floy tags. All walleye were measured and scales were taken from a subset for age interpretation.

Walleye dominated the trapnet catches, followed by bullheads and lake whitefish (Table 2.9.1). Completion of population estimates from the 2003 recapture awaits completion of age determination. The distribution of marked and unmarked walleye differed (Table 2.9.2). This violates the assumptions of the traditional Petersen or Jolley-Seber population models previously used. LOMU plans to customize the model for population estimation to account for the movements and distribution of walleye in eastern Lake Ontario.

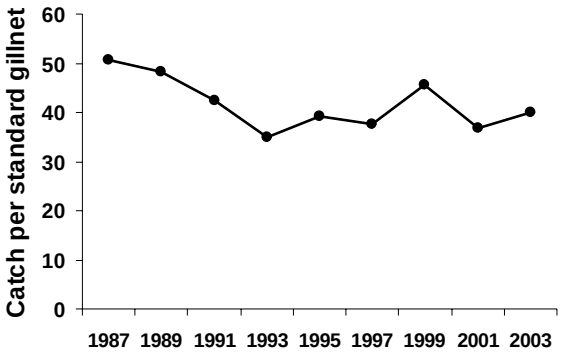

FIG. 2.8.1. Total number of fish captured in standard gillnets in the Thousand Islands area, St. Lawrence River, 1987-2003.

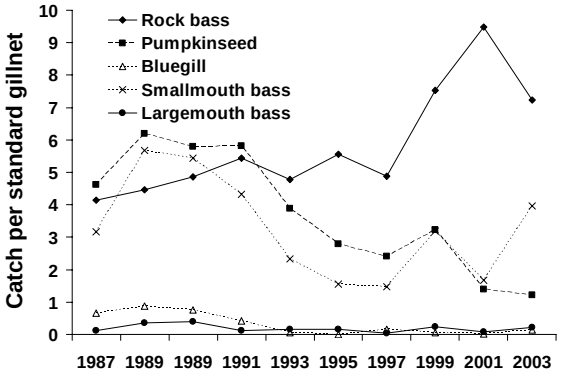

FIG. 2.8.4. Centrarchid catches in standard gillnets set in the Thousand Islands area, St. Lawrence River, 1987-2003.

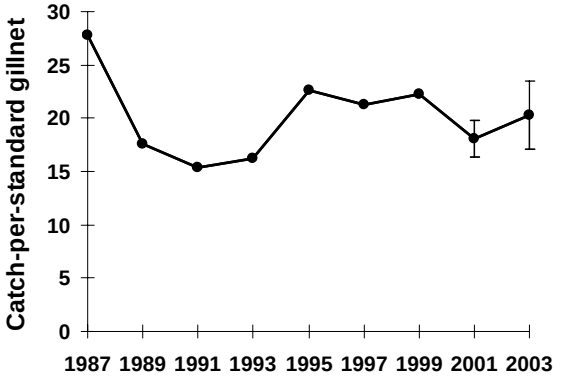

FIG. 2.8.2. Yellow perch catch in standard gillnets set in the Thousand Islands area 1987-2003. 95% confidence intervals were not applied to corrected historical data.

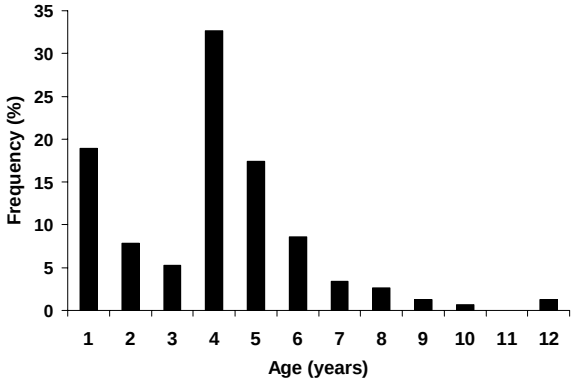

FIG. 2.8.5. Smallmouth bass age frequency determined from gillnets set in the Thousand Islands area in 2003.

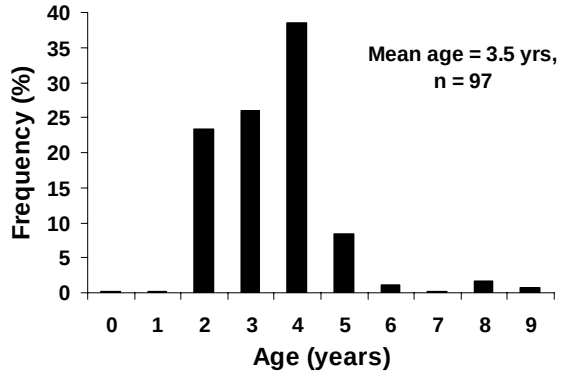

FIG. 2.8.3. Yellow perch age frequency determined from gillnets set in the Thousand Islands area in 2003.

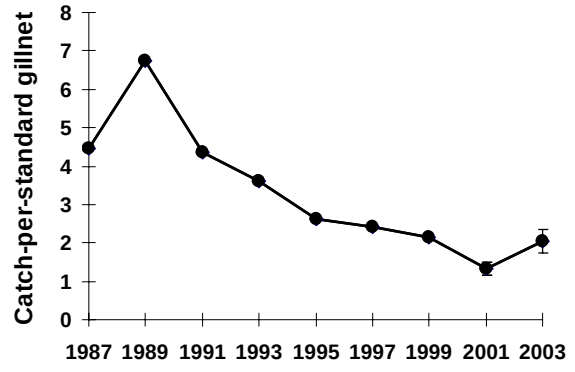

FIG. 2.8.6. Northern pike catch in standard gillnets set in the Thousand Islands area, St. Lawrence River, 1987-2003. 95% confidence limits were not applied to corrected historical data.

TABLE 2.9.1. Catch by species of fish at trapnet locations in the Bay of Quinte and West Lake during 2003.

Species	ONDERDONK POINT	PINE POINT	REDNERSVILLE	COW ISLAND	WALLBRIDGE POINT	BAYCREST	TRIDENT POINT	NORTHPORT CANNERY	TYENDINAGA	PETERSON WHARF	DESERONTO	BETHANY	FORESTERS ISLAND #1	FORESTERS ISLAND #2	GREEN POINT	SHERMANS POINT	HAY BAY #1	HAY BAY #2	WITLOW POINT	TRUMPOUR POINT	HIGH SHORE	MCFARLANDS PARK	WAGNERS	COLE POINT	SPEARINGS PT	CONWAY
Longnose Gar	3			45			1													1		1				6
Bowfin										3	16	2	1				1			2				2	5	3
Alewife		1																								
Gizzard Shad	2	4	46	1	1		3		14			1	3	4		2	3			2	2	9		4	2	8
Chinook Salmon										1																
Rainbow Trout																										3
Brown Trout																						1				1
Lake Trout	1												2				1	1		3		11	4	9	9	48
Lake Whitefish	192	13	60	270	108	133	615	367	196	484	31	102	106	4	2	28	112	58	15	22	8	3	9			
Lake Herring	37	1	17	12		13	45	31	36	5	2	8	8			1	10	6		3	6		1			
Northern Pike	10				22		9		1		6		3	1	2		19	3	3	4		4	1	7	20	2
Mooneye			1																							
Common White Sucker	24	4	5	2	9	12	38	40	8	14	9	23		27	3	6	31	18	19	4	2	6	10	19	33	18
Silver Redhorse	12																						1	1		2
Greater Redhorse	13		1		2																					
Moxostoma sp.	2			3		2	3	2		1	1	2														
Common Carp				1	1						1		1		1	1										
Golden Shiner															1											
Brown Bullhead	783	45	20	24	40	66	738	487	49	252	161	115	58	1		6	72	81	134	4	2	34	16	7	22	130
Channel Catfish	4				1	2			4	3		88	11		1	16	9	5	6	7	13	4	1	5	9	10
American Eel																						1				9
Burbot	1								1							1		1	1							
White Perch	146	474	18	15	1	10	8	4	4	29		80	2			43	9	29	25	67	1	14	5			
White Bass						1		1	1			1	2			3	3	2	2	20	1	5	5	3		
Rock Bass	3	27	6	2		3	6	11		3	37	8	3	1		5	16	1	3	1	1	3	6	1		6
Pumpkinseed	1	18			1			5			24			1				1					3			4
Bluegill	9	4	2	2	2		1				19														1	2
Smallmouth Bass			1		1		10	1	7	5	2	5								1				4	1	11
Largemouth Bass		2			1				1	1	4	1										11	4	7	2	5
Black Crappie					2	1	1	3			24	1					4	1	1			2	1		3	8
Yellow Perch	1	86	21	1		2	1	5	2	8	22	7	5		1		4		2			4				2
Walleye	209	24	18	190	89	88	163	143	268	97	90	198	54	1		226	525	413	327	283	184	697	280	384	30	21
Round Goby																										1
FreshwaterDrum		3		1	4	10	4	1	29	21	2	11	11	1		446	29	115	109	332	26	47	14	310	12	35
Grand Total	1,453	706	216	569	285	343	1,646	1,101	621	927	451	653	270	41	11	784	848	735	647	756	246	857	361	763	149	335
Effort total (net nights)	14	8	14	11	11	8	10	9	11	6	7	11	8	5	5	13	13	10	8	12	5	14	10	13	10	13

TABLE 2.9.2. Walleye marking, tagging, and recaptures at trap net locations in the Bay of Quinte and West Lake during 2003.

	Catch	Number marked	Number tagged	Recaptures from current session	Recaptures from past sessions
ONDERDONK POINT	209	189		3	3
PINE POINT	24	15			
REDNERSVILLE	18	16			
COW ISLAND	190	166		4	8
WALLBRIDGE POINT	89	80			2
BAYCREST	88	75		2	5
BIG BAY - COMMERCIAL FISHERMAN	1,525	1,323		71	49
TRIDENT POINT	163	147		2	5
NORTHPORT CANNERY	143	129		3	5
TYENDINAGA	268	239		10	12
PETERSON WHARF	97	80		3	10
DESERONTO	90	82		1	3
BETHANY	198	173		4	9
FORESTERS ISLAND #1	54	46		1	5
FORESTERS ISLAND #2	1	1			
GREEN POINT					
SHERMANS POINT	226	194		6	12
HAY BAY #1	525	456		11	27
HAY BAY #2	413	371		12	9
WITLOW POINT	327	297		4	9
TRUMPOUR POINT	283	249		8	11
HIGH SHORE	184	168		3	5
MCFARLANDS PARK	697	579		12	60
WAGNERS	280	245		5	15
COLE POINT	384	326		18	17
SPEARINGS PT	30	22		1	5
CONWAY	21	18			1
SANDHURST	14	13			
WEST LAKE - SHEBA'S ISLAND	37	25	11	1	1
WEST L - CARRYING PLACE BAR	81	74	69	1	
Grand Total	6,659	5,798	80	186	288

2.10 Credit River Chinook Assessment

Chinook salmon growth and condition were monitored during the fall spawning run in the Credit River at the Reid Milling dam in Streetsville. Chinook salmon were electrofished in the Credit River for spawn collection by the Ringwood Fish Culture Station. LOMU crews measured fish for length and weight, and collected otoliths. The body condition of Chinook salmon in the Credit River was determined as the estimated weight of a 900 mm fish. Age was determined by length distribution, but in 2003 age-groups were less apparent in the length distribution. Accordingly, otoliths are being prepared for age determination, and growth will be estimated when age data are available (see Section 3.1 for growth of Chinook salmon in Lake Ontario).

Condition (weight of a 900 mm fish) of female Chinook salmon in the Credit River declined to the lowest weight observed (Fig. 2.10.1). Condition of males was also low but did not parallel the decline of the females.

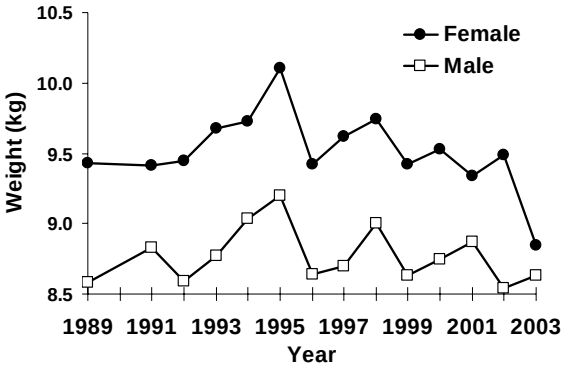

FIG. 2.10.1. Mean weight of a 900 mm Chinook salmon in the Credit River during the spawning run; about October 1.

3. Recreational Fishery Surveys

3.1 Western Lake Ontario Boat Fishery

The portion of the salmon and trout fishery that launches boats from ramps (launch daily fishery) in western Lake Ontario was monitored in 2003. The design was based on seasonal stratification by month from April to September, and spatial stratification into six sectors from the Niagara River to Wellington. Anglers were interviewed at selected high-effort ramps after fishing was completed. Boat trailers were counted to estimate effort at all ramps from the Niagara River to Wellington, and these counts were used to scale up effort, catch and harvest. Estimates for the total fishery were made using the ratio of effort, catch and harvest between launch daily and marina based fisheries in 1995.

During 2003, Chinook salmon dominated the catch and harvest in the boat angler fishery in Lake Ontario, followed by rainbow trout (Table 3.1.1). Together they represented over 90% of the catch and harvest. Declines in catch over the past decade have paralleled a decline in effort. The effort of launch daily anglers and all boat anglers was estimated at 190,015 and 346,766 angler-hours, respectively. This is the lowest effort in all of the years surveyed since 1977 (Table 3.1.2), and continues a long-term gradual decline.

Catch rates for the time series from 1977 to 2003 show major shifts in the salmon and trout population in Lake Ontario (Fig. 3.1.1). Coho salmon was the dominant salmonid in Lake Ontario during the 1970s. Catch rates of rainbow trout and Chinook salmon increased as more were stocked in the 1980s.

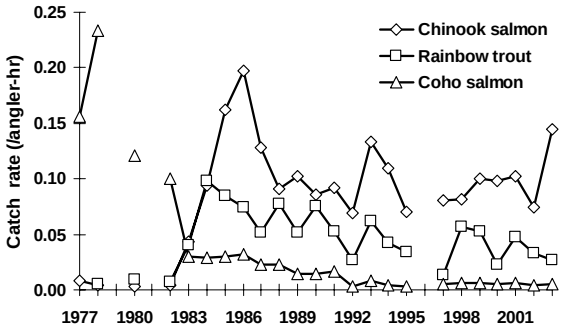

FIG. 3.1.1. Catch rate of Chinook salmon in the western Lake Ontario salmonid boat fishery (Ontario portion), 1977-2003.

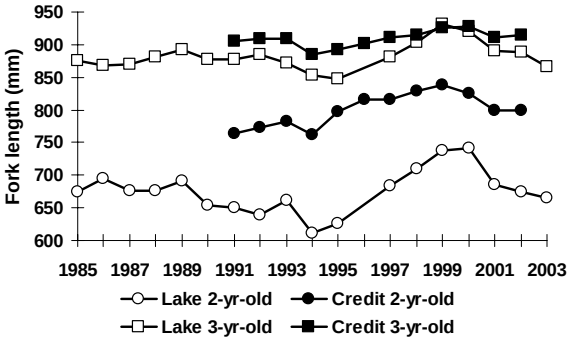

FIG. 3.1.2. Fork length of Chinook salmon in the Lake Ontario during summer and the Credit River during the spawning run in September and October.

Growth of Chinook salmon declined slightly in Lake Ontario in 2003 (Fig. 3.1.2). However, 2 yr-olds and 3 yr-olds were just 10 mm and 16 mm smaller, respectively, than the long-term average length at age.

TABLE 3.1.1. Angling statistics for salmonid boat fisheries in western Lake Ontario (Ontario portion) during April-September, 2003.

	Launch Daily Anglers					All Boat Anglers				
Species	Catch	Harvest	Catch rate (fish/anger-hour)	Harvest rate (fish/anger-hour)	Release Rate (%)	Catch	Harvest	Catch rate (fish/anger-hour)	Harvest rate (fish/anger-hour)	Release Rate (%)
Chinook salmon	28,066	9,048	0.1477	0.0476	68	50,290	17,659	0.1450	0.0509	65
Rainbow trout	3,615	1,580	0.0190	0.0083	56	9,137	4,928	0.0263	0.0142	46
Coho salmon	1,406	695	0.0074	0.0037	51	1,784	1,297	0.0051	0.0037	27
Brown trout	819	230	0.0043	0.0012	72	931	311	0.0027	0.0009	67
Lake trout	1,701	373	0.0090	0.0020	78	2,244	480	0.0065	0.0014	79
Atlantic salmon	24	12	0.0001	0.0001	50	24	12	0.0001	0.0000	50
Unidentified salmonine	158	51	0.0008	0.0003	68	193	82	0.0006	0.0002	58
Total salmonines	35,789	11,989	0.1883	0.0631	67	64,603	24,769	0.1863	0.0714	62

TABLE 3.1.2. Catch statistics for the salmonid fishery in western Lake Ontario (Ontario portion), 1977-2003.

	Catch					Harvest					
Year	Chinook salmon	Rainbow trout	Coho salmon	Brown trout	Lake trout	Chinook salmon	Rainbow trout	Coho salmon	Brown trout	Lake trout	effort (angler-hr)
1977	4,047	NA	72,718	NA	NA	3,972	NA	72,586	NA	NA	465,137
1978	1,928	2,109	97,924	450	72	1,892	2,096	97,746	450	72	418,895
1980	1,774	5,769	79,326	86	317	1,774	5,756	79,129	86	273	656,086
1982	2,730	5,435	74,854	129	1,512	2,447	4,126	66,998	129	1,172	744,802
1983	23,303	21,774	16,049	1,566	4,627	17,083	17,190	13,546	1,190	3,537	534,473
1984	41,764	43,774	12,867	5,224	9,259	32,906	35,627	10,458	3,991	6,242	444,448
1985	187,686	98,471	34,203	7,032	42,147	125,322	83,530	22,239	4,108	25,305	1,157,073
1986	268,877	100,824	43,294	2,831	24,775	157,675	73,377	29,200	1,471	9,013	1,363,082
1987	155,796	62,565	27,380	2,905	21,225	108,024	44,977	12,262	1,399	8,391	1,215,219
1988	112,289	96,008	27,983	5,542	9,307	74,606	73,561	16,180	3,100	3,012	1,233,013
1989	103,796	52,545	15,082	3,029	11,868	71,025	35,230	11,315	1,548	3,856	1,010,516
1990	94,786	84,229	15,906	2,817	12,201	60,701	67,529	10,516	1,040	2,832	1,112,047
1991	99,841	57,281	17,643	7,151	41,277	66,079	38,712	14,574	3,119	6,843	1,082,287
1992	69,959	26,742	3,222	4,010	7,891	50,182	18,381	1,826	1,761	2,997	1,012,822
1993	111,852	51,733	6,845	2,174	6,332	64,444	28,738	4,643	1,208	3,434	836,572
1994	66,031	25,227	2,254	3,983	13,623	38,170	14,382	1,517	2,251	5,443	601,325
1995	35,783	17,345	1,366	1,911	9,965	21,055	10,625	745	1,049	4,025	512,738
1997	43,032	7,011	2,620	1,820	17,075	23,655	3,985	1,474	1,035	2,322	531,072
1998	38,845	26,815	3,173	1,561	1,712	23,363	16,976	1,682	829	667	473,843
1999	49,843	26,539	3,305	904	5,366	28,925	18,463	3,211	428	1,408	499,159
2000	47,536	11,171	2,354	1,560	3,183	28,430	5,884	1,304	537	789	484,727
2001	41,227	19,095	2,506	1,840	2,874	19,624	11,393	1,582	1,002	357	404,368
2002	30,313	13,503	1,568	639	567	15,840	8,756	1,382	277	117	405,730
2003	50,290	9,137	1,784	931	2,244	17,659	4,928	1,297	311	480	346,766

3.2 Bay of Quinte Recreational Fishery

Recreational angling surveys are conducted annually on the Bay of Quinte, from Trenton in the west to Glenora in the east, during the walleye angling season (January 1 to February 28 and first Saturday in May to December 31). Angling effort is measured using aerial counts during ice fishing surveys, and a combination of aerial counts and on-water counts during open-water surveys. On-ice and on-water angler interviews provide information on catch/harvest rates and biological characteristics of the harvest. There are two major components to the recreational fishery, a winter ice fishery and an open-water fishery.

Ice fishery

Maximum numbers of on-ice anglers and ice huts observed during aerial flights were 151 anglers on February 2 and 205 huts on February 16, respectively. Over the survey period, 284 anglers were interviewed by field crews. Forty-four percent of anglers interviewed were local, 41% were from Ontario (outside the local area), 14% were from the US and 1% was from elsewhere in Canada (Fig. 3.2.1). Only five different species were observed to be caught during the ice fishery (Table 3.2.1). All angling effort was targeted at walleye (Table 3.2.2). Fishing effort in 2003 (16,237 angler hours) decreased by more than 50% from the previous year. Numbers of walleye caught and harvested were 321 and 70 respectively. Walleye fishing success (number of walleye caught and harvest per hour were 0.020 and 0.004 respectively) was very low compared to most previous years. Too few walleye were sampled to report biological statistics.

Open-water fishery

Over 3,000 anglers (1,386 boats) were interviewed by field crews. Thirty-five percent of anglers interviewed were local, 56% were from Ontario (outside the local area), 8% were from the US and 1% was from elsewhere in Canada (Fig. 3.2.1). Seventeen different species were caught during the open-water fishing season (Table 3.2.1). Angling effort was targeted primarily at walleye (Table 3.2.3). Fishing effort in 2003 (219,648 angler hours for all anglers and 194,168 hours for anglers targeting walleye) increased by about 25% over the previous year. This increase reversed the 6-year trend of declining angler effort. Numbers of walleye caught and harvested were 70,471 and 34,905 respectively. The walleye catch was more than double that of the previous year and the highest since 1998. Walleye fishing success (number of walleye caught and harvest per hour by anglers targeting walleye were 0.344 and 0.178 respectively) was the highest in about eight years. About 50% of harvested walleye were age-2 (Table 3.2.4) from the 2001 year-class. Other species caught included over 125,000 yellow perch and 15,000 largemouth bass. The number of walleye harvested and released by size-class during the Bay of Quinte open-water fishery is shown in Fig. 3.2.2.

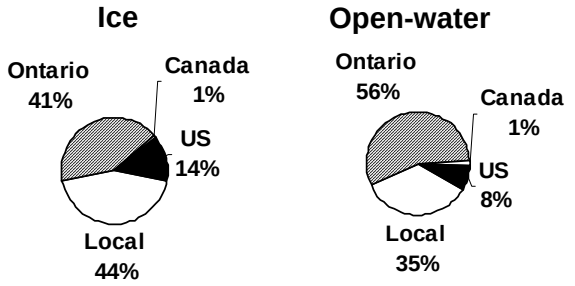

FIG. 3.2.1. Origin of anglers participating in the Bay of Quinte ice and open-water fisheries, 2003.

TABLE 3.2.1. Numbers of fish caught during Bay of Quinte ice and open-water fisheries, 2003.

Species	Ice	Open-water
Bowfin		115
Lake trout		8
Northern pike	98	5,134
Muskellunge		25
Carp	3	
Brown bullhead		3,276
Channel catfish		930
White perch		8,479
Sunfish sp.		2,460
Rock bass		1,239
Pumpkinseed		9,434
Bluegill		907
Smallmouth bass		3,453
Largemouth bass		15,002
Black crappie		609
Lepomis sp.		5,551
Yellow perch	21,915	125,129
Walleye	321	70,471
Round goby		18,253
Freshwater drum	42	7,743

TABLE. 3.2.2. Summary of fishing effort (virtually all fishing effort is targeted at walleye), numbers of fish harvested and caught, and walleye angling success (CUE and HUE are the numbers of walleye caught and harvested, respectively, per hour) during the Bay of Quinte ice fishery (first ice formation to February 28), 1993-2003.

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Fishing Effort (angler hours):											
Total All Anglers	271,088	300,049	215,518	392,602	220,263	117,602	140,363	139,047	77,074	37,129	16,237
Number of Walleye:											
Caught	21,326	31,060	28,939	58,468	42,315	11,167	23,293	9,949	982	2,601	321
Harvested	14,816	8,557	17,445	20,972	22,631	6,089	15,285	9,240	938	2,468	70
Walleye Angling Success:											
CUE	0.079	0.104	0.134	0.149	0.192	0.095	0.166	0.072	0.013	0.070	0.020
HUE	0.055	0.029	0.081	0.053	0.103	0.052	0.109	0.066	0.012	0.066	0.004

TABLE 3.2.3. Summary of fishing effort (expressed in angler hours separately for all anglers and those targeting walleye), numbers of fish harvested and caught, and walleye angling success (CUE and HUE are the numbers of walleye caught and harvested, respectively, per hour by anglers targeting walleye) during the Bay of Quinte open-water recreational fishery (first Saturday in May, opening day of walleye season, to November 30), 1993-2003. [1]The number of smallmouth and largemouth bass are for the last Saturday in June (opening day of bass season) to November 30, and are only available for the past three years.

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Fishing Effort (angler hours):											
Total All Anglers	644,477	693,731	519,276	665,436	544,476	481,553	379,012	309,259	247,537	177,092	219,684
Anglers Targeting Walleye	637,401	689,543	512,054	660,005	539,276	475,678	374,128	296,841	222,052	154,570	194,168
Number of Fish Harvested:											
Northern Pike	2,279	1,717	375	1,228	1,501	1,539	1,413	2,561	1,658	7,084	818
Smallmouth Bass[1]									778	519	704
Largemouth Bass[1]									4,890	2,340	4,333
Yellow Perch	8,205	5,226	14,587	33,609	31,462	41,313	35,102	17,630	7,768	3,876	4,588
Walleye	145,383	145,642	98,537	117,931	82,790	52,844	33,575	22,811	28,078	17,903	34,905
Number of Fish Caught:											
Northern Pike	10,318	11,691	2,964	5,884	7,912	7,950	11,577	15,809	10,835	7,084	5,134
Smallmouth Bass[1]									6,347	2,884	3,453
Largemouth Bass[1]									19,675	11,387	15,002
Yellow Perch	141,424	80,699	102,433	298,677	402,216	620,849	391,708	260,029	143,530	104,071	125,129
Walleye	266,638	262,760	166,229	209,280	134,651	70,527	47,562	28,024	40,734	29,459	70,471
Walleye Angling Success											
CUE	0.417	0.378	0.320	0.317	0.250	0.148	0.127	0.094	0.182	0.186	0.344
HUE	0.227	0.209	0.189	0.179	0.154	0.111	0.090	0.077	0.126	0.113	0.178

TABLE 3.2.4. Age-specific walleye harvest during the Bay of Quinte open-water recreational fishery, 1993-2003.

	Age						
Year	2	3	4	5	6	7+	Total
1993	25,311	51,389	42,373	10,474	6,184	9,653	145,383
1994	14,816	74,746	29,598	15,192	5,907	5,383	145,642
1995	2,493	51,808	28,592	8,527	2,136	4,982	98,537
1996	4,986	36,636	35,628	23,451	8,185	9,044	117,931
1997	22,536	35,639	10,206	8,908	3,270	2,231	82,790
1998	2,733	15,793	24,296	4,859	2,126	3,037	52,844
1999	2,763	8,500	8,925	7,225	2,550	3,613	33,575
2000	2,570	10,924	2,249	2,249	2,570	2,249	22,811
2001	14,649	2,442	6,453	1,395	1,570	1,570	28,078
2002	5,182	11,072	236	236	-	1,178	17,903
2003	18,422	8,034	4,017	139	-	4,294	34,905

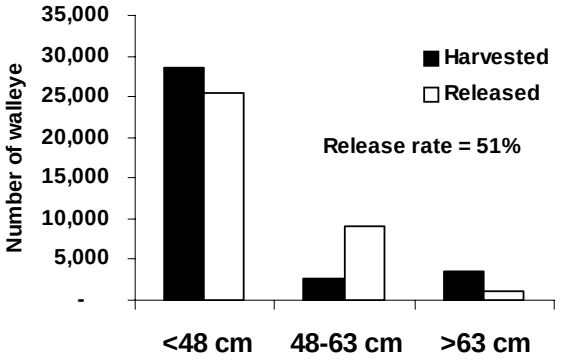

FIG. 3.2.2. Number of walleye harvested and released by size-class (corresponding to walleye angling size restrictions) during the Bay of Quinte open-water fishery.

3.3 Lake St. Francis Recreational Fishery

The Ontario portion of Lake St. Francis is approximately 7,380 ha in size, and is relatively shallow and eutrophic compared to the rest of the St. Lawrence River. These conditions are favourable for yellow perch production, the most popular species in the Lake St. Francis fishery.

The yellow perch fishery in Lake St. Francis is significant to the local area in terms of both recreation and commerce. This is the only area in Ontario where anglers can legally sell their catch. Fishing regulations for yellow perch caught in Ontario waters of Lake St. Francis (Division 12A) changed in the summer of 1997 and spring of 1998. Regulations were made more restrictive (spring season closure and catch limits) in order to increase yellow perch abundance. This survey provides data to help evaluate the effectiveness of the regulation changes.

Other species represented in the fishery include pike, walleye, smallmouth bass, largemouth bass and black crappie.

For the purposes of the 2003 angler survey, Lake St. Francis was divided in 2 sectors, with each sector further sub-divided into 7 areas. The survey used both on-water boat counts and on-water angler interviews to determine angler activity and catch. Shore anglers were not surveyed. The open-water survey consisted of three seasons: spring (May 10 to June 27), summer (June 28 to September 1), and fall (September 2 to September 30).

TABLE 3.3.1. Numbers of fish caught and harvested during the Lake St. Francis open-water fishery, 2003.

Species	# Caught	# Harvested
Northern pike	3,231	942
Muskellunge	150	-
Brown bullhead	259	52
American eel	84	-
Rock bass	399	-
Pumpkinseed	40	-
Smallmouth bass	3,713	1,618
Largemouth bass	919	152
Black crappie	145	145
Yellow perch	687,251	312,698
Walleye	4,088	3,393
Freshwater drum	22	-

Fisheries Update

Over 1,100 anglers were interviewed (667 boats) by field crews. Eighty percent of anglers interviewed

TABLE 3.3.2. Summary of fishing effort (expressed in angler hours separately for all anglers and those targeting yellow perch). Numbers of fish caught and harvested are given for the open-water fishery on Lake St. Francis. Fishing success for these years is also given in terms of the number of fish either caught or harvested per unit time (hour). This value is termed catch-per-unit effort (CUE) or harvest-per-unit effort (HUE). Note that creel methodologies are not exactly the same for all years, so comparisons should be considered general in nature.

	1982	1986	1988	1993	2003
Fishing Effort (angler hours):					
Total All Anglers	376,639	132,184	66,549	155,363	78,245
Anglers Targeting Perch	296,404	80,072	52,376	105,172	51,467
Number of Fish Harvested:					
Yellow Perch	555,383	148,400	173,179	465,764	312,698
Northern Pike	12,383	3,722	986	4,142	-
Smallmouth Bass	3,758	2,141	431	3,511	1,618
Walleye	6,635	4,046	1,867	-	3,393
Number of Fish Caught:					
Yellow Perch	678,933	168,039	224,612	764,482	687,252
Northern Pike	16,668	9,957	2,784	18,481	3,231
Smallmouth Bass	3,798	2,427	741	7,345	3,642
Walleye	6,635	4,394	2,202	2,268	4,088
Yellow Perch Angling Success:					
CUE	2.3	2.1	4.3	7.3	13.4
HUE	1.9	1.9	3.3	4.4	6.1

were local, 15% were from Quebec, 4% were from Ontario (not local), and 1% were from the U.S. Twelve species of fish were caught (Table 3.3.1).

Angling effort was targeted mainly at yellow perch, typical of the Lake St. Francis sport fishery over the past 20 years (Table 3.3.2). Angling effort (all species) in 2003 was 50% that seen in 1993. Catch per unit effort values were lower in 2003 than 1993 for pike and smallmouth bass (Fig. 3.3.1). Walleye catch per unit effort values in 2003 were the highest estimated during the reporting period (Fig. 3.3.1).

In 2003, anglers caught approximately 690,000 yellow perch, harvesting approximately 113,000 fish. The total weight of the harvested fish equalled approximately 31,600 kilograms. Anglers released 55% of the perch catch in 2003. This release rate was the highest observed in any angling survey (1982-2003). Release rates were the lowest in the 1980s with as little as 12% of the perch catch being released (Fig. 3.3.2). Of the five surveys conducted since 1982, the angling effort for yellow perch during 2003 was the lowest (Table 3.3.2, Fig. 3.3.3). Despite this decrease in effort, the catch per unit effort (CUE) for yellow perch was nearly double that of 1993 (Fig. 3.3.2). The CUE and HUE values calculated for the 2003 yellow perch fishery were the highest recorded during any survey during the past 21 years (Table 3.3.2).

Sale of perch taken in Division 12A by angling is permitted only within the counties of Stormont, Dundas and Glengarry (SD&G). Angler interviews conducted during 2003 indicated that fewer than 5% of harvested perch were being sold (3.6% and 0.7% sold to restaurants and fish processors, respectively), the rest (95.7%) being kept for personal consumption.

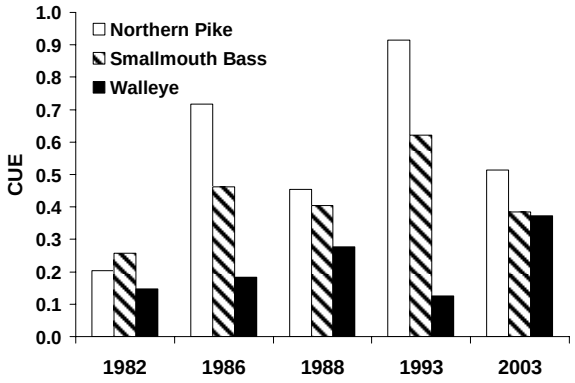

FIG. 3.3.1. Catch per unit effort values compared for popular species on Lakes St. Francis (except yellow perch), for the years 1982, 1986, 1988, 1993 and 2003.

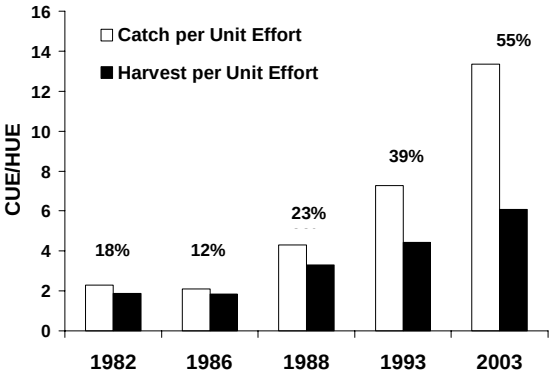

FIG. 3.3.2. Catch per unit effort values compared for yellow perch on Lakes St. Francis for the years 1982, 1986, 1988, 1993 and 2003. Values above the bars indicate release rate, or the percentage of fish caught that were not harvested.

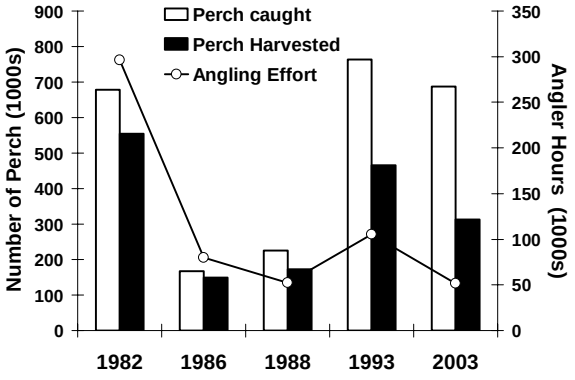

FIG. 3.3.3. Numbers of yellow perch caught/harvested and number of angling hours estimated for the 2003 open water fishery on Lake St. Francis. Angler hours represent effort spent specifically on yellow perch.

4. Commercial Fishery

4.1 Quota and Harvest Summary

Lake Ontario supports a locally important commercial fish industry. The commercial harvest comes primarily from the Canadian waters of Lake Ontario east of Brighton (including the Bay of Quinte) and the St. Lawrence River (Fig. 4.1.1). Commercial harvest statistics for 2003 were compiled from daily catch report (DCR) records managed by the Ministry of Natural Resources in partnership with the Ontario Commercial Fisheries Association (OCFA).

Commercial fish quota and harvest statistics for 2003 are shown in Tables 4.1.1 and 4.1.2 respectively.

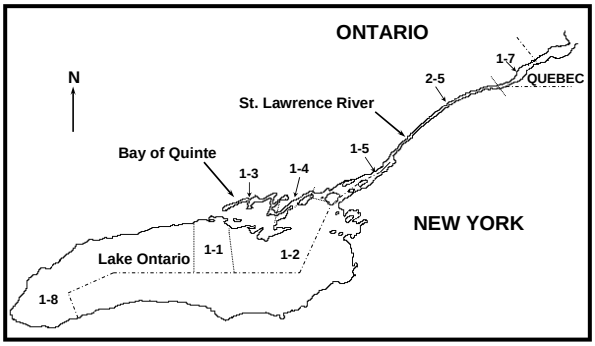

FIG. 4.1.1. Map of Lake Ontario and the St. Lawrence River showing commercial fishing quota zones in Canadian waters.

Lake Ontario

The total harvest of all species was 447,643 lb ($324,320) in 2003, and has declined 65% since 1996 (Fig. 4.1.2, Table 4.1.3). The majority of this decline can be accounted for by a decline in lake whitefish harvest (see below). The top five species in terms of landed value in 2003 were yellow perch, lake whitefish, brown bullhead, sunfish and eel; compared to lake whitefish, yellow perch, eel, brown bullhead and walleye in 1994 (Fig. 4.1.2).

Lake whitefish
Lake whitefish harvest was 124,748 lb, 61% of the quota. The annual lake whitefish harvest has declined over 80% since 1996.

Eel
Eel harvest was 7,452 lb, 8% of the quota. Eel harvest has declined dramatically in the last decade, while the value (price per lb) has increased.

Yellow perch
Yellow perch harvest was 99,919 lb, 22% of the quota. Yellow perch harvest had increased significantly from 1996 to 1999 but declined by over 60% between 1999 and 2003.

Walleye
Walleye harvest was 6,063 lb, 12% of the quota. In 2003, the walleye harvest was the lowest it has been since commercial fishing for this species was re-established in 1989.

Other species
Commercial harvest of brown bullhead, sunfish, black crappie, freshwater drum and suckers declined in 2003, while that of white perch and rock bass increased.

TABLE 4.1.1. Commercial harvest quotas (lb) for the Canadian waters of Lake Ontario, 2003. See Fig. 1 for a map of the quota zones.

	Quota by quota zone (lb)								Quota by waterbody (lb)	
Species	1-1	1-2	1-3	1-4	1-8	1-5	2-5	1-7	Lake Ontario	St. Lawrence River
Alewife	-	-	-	-	-	-	600	-	-	600
American eel	10,406	55,805	17,412	7,799	1,800	8,661	6,130	31,359	93,222	46,150
Black crappie	4,540	2,500	15,410	450	2,800	18,340	18,140	4,840	25,700	41,320
Bowfin	-	-	-	-	500	-	-	-	500	-
Brown bullhead	36,200	-	-	-	-	-	-	-	36,200	-
Common carp	-	-	1,000	-	-	-	-	-	1,000	-
Lake whitefish[1]	7,575	219,893	36,763	17,910	216	-	-	-	205,000	-
Sunfish	28,130	-	-	-	-	-	-	-	28,130	-
Walleye	4,265	37,884	-	5,907	800	-	-	-	48,856	-
Yellow perch	35,585	182,506	96,128	126,168	13,000	66,675	83,173	5,760	453,387	155,608
Total	126,701	498,588	166,713	158,234	19,116	93,676	108,043	41,959	891,995	243,678

[1] Sum of individual quota zones is greater than the total quota for Lake Ontario. Commercial harvest was to be ceased when a harvest of 205,000 lb was reached.

TABLE 4.1.2. Commercial harvest (lb) and value ($) for fish species in the Canadian waters of Lake Ontario and the St. Lawrence River, 2003. See Fig. 1 for a map of the quota zones.

	Harvest by quota zone (lb)									Harvest (lb) and value by waterbody			
										Lake Ontario		St. Lawrence River	
Species	1-1	1-2	1-3	1-4	1-8	1-5	2-5	1-7	Price per lb	Harvest (lb)	Value	Harvest (lb)	Value
American eel	1,102	2,890	1,407	1,528	526	4,503	386	16,804	$2.49	7,452	$ 18,568	21,693	$ 54,054
Black crappie	181	60	5,180	-	50	4,596	894	674	$2.29	5,471	$ 12,512	6,164	$ 14,096
Bowfin	2,334	287	2,275	-	128	2,565	-	-	$0.33	5,023	$ 1,680	2,565	$ 858
Brown bullhead	16,112	4,208	63,688	5,188	5,436	21,545	11,305	51,995	$0.45	94,632	$ 42,890	84,846	$ 38,454
Burbot	-	10	-	-	-	-	-	-		10	$ -	-	$ -
Channel catfish	-	-	9	-	1,522	18	10	-	$0.50	1,531	$ 764	28	$ 14
Common carp	-	1,884	823	7,631	3,582	30	-	-	$0.14	13,921	$ 1,960	30	$ 4
Freshwater drum	250	1,779	7,015	2,472	11,073	102	-	-	$0.10	22,589	$ 2,207	102	$ 10
Lake herring	9	39	768	198	-	-	-	-	$0.32	1,014	$ 321	-	$ -
Lake whitefish	387	103,194	15,403	5,756	9	-	-	-	$0.54	124,748	$ 67,122	-	$ -
Rock bass	2,306	2,397	2,717	422	475	424	309	-	$0.51	8,317	$ 4,253	733	$ 375
Suckers	24	33	2,997	47	2,485	50	-	1,936	$0.10	5,586	$ 575	1,986	$ 204
Sunfish	4,228	1,302	39,659	27	3	15,594	14,549	6,784	$0.79	45,218	$ 35,772	36,926	$ 29,211
Walleye	612	1,172	-	3,979	299	-	-	-	$1.99	6,063	$ 12,049	-	$ -
White bass	-	1	-	47	83	-	-	-	$0.88	131	$ 115	-	$ -
White perch	20	45	3,157	2,521	274	2,035	-	-	$0.42	6,017	$ 2,533	2,035	$ 857
Yellow perch	2,268	39,751	20,037	37,268	595	32,399	18,036	3,714	$1.21	99,919	$ 121,000	54,148	$ 65,572
Total	29,833	159,052	165,135	67,084	26,540	83,860	45,488	81,906		447,643	$ 324,320	211,255	$ 203,710

TABLE 4.1.3. Commercial harvest (lb) and landed value ($) trends for the Canadian waters of Lake Ontario, including the Bay of Quinte, 1960-2003.

	Harvest (lb)	Value ($)		Harvest (lb)	Value ($)
1960	1,834,000		1982	1,999,000	
1961	2,026,000		1983	2,263,000	
1962	1,620,000		1984	2,050,000	
1963	1,847,000		1985	1,497,000	$ 906,879
1964	1,814,000		1986	1,759,000	$ 1,577,086
1965	2,226,000		1987	756,000	$ 993,609
1966	1,347,000		1988	1,190,000	$ 896,481
1967	1,617,000		1989	1,211,000	$ 989,563
1968	1,829,000		1990	1,165,000	$ 907,409
1969	2,130,000		1991	1,210,000	$ 1,003,909
1970	2,798,000		1992	1,191,000	$ 1,039,892
1971	2,804,000		1993	1,103,000	$ 746,892
1972	2,455,000		1994	1,243,097	$ 1,277,262
1973	2,279,000		1995	1,218,508	$ 1,322,557
1974	2,299,000		1996	1,284,022	$ 1,456,736
1975	2,664,000		1997	1,078,250	$ 996,383
1976	2,935,000		1998	973,006	$ 1,059,212
1977	2,456,000		1999	964,743	$ 1,067,904
1978	2,469,000		2000	914,014	$ 990,544
1979	2,042,000		2001	840,557	$ 861,978
1980	1,982,000		2002	602,338	$ 475,262
1981	2,387,000		2003	447,633	$ 324,320

TABLE 4.1.4. Commercial harvest (lb) and landed value ($) trends for the Canadian waters of the St. Lawrence River, 1989-2003.

	Harvest (lb)	Value ($)
1988	318,000	
1989	273,800	$217,000
1990	305,100	$237,000
1991	247,600	$328,100
1992	292,700	$257,300
1993	237,000	$171,900
1994	262,240	$257,900
1995	375,763	
1996	445,052	$399,856
1997	353,838	$397,494
1998	378,729	$424,111
1999	368,035	$438,581
2000	341,672	$407,647
2001	272,523	$352,551
2002	266,817	$241,817
2003	211,254	$203,710

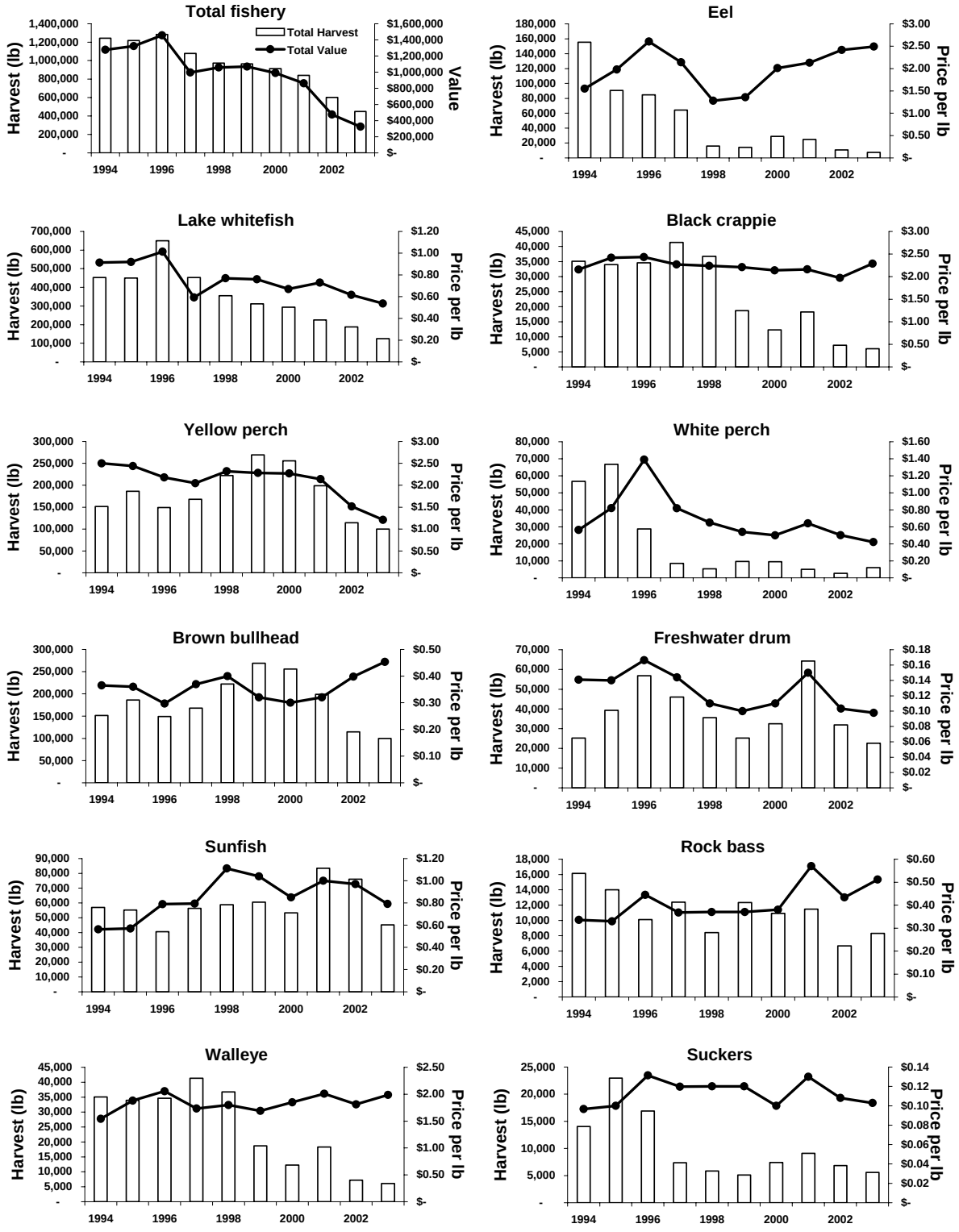

FIG. 4.1.2. Harvest (bars) and value (lines) trends for several common species and the total for all species in the commercial fishery on Lake Ontario, 2003.

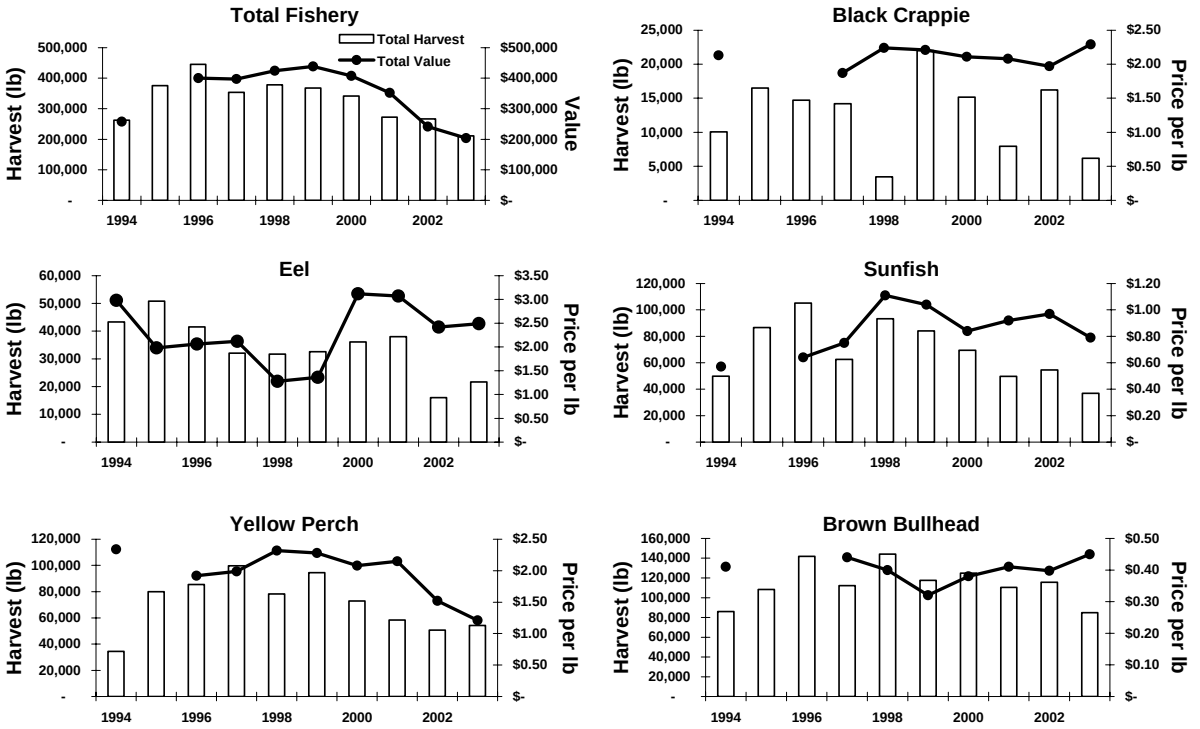

FIG. 4.1.3. Harvest (bars) and value (lines) trends for several common species and the total for all species in the commercial fishery on the St. Lawrence River, 2003.

St. Lawrence River

The total harvest of all species was 211,255 lb ($203,710) in 2003, and has declined 44% since 1998 (Fig. 4.1.3, Table 4.1.4). The top three species in terms of landed value in 2003 were yellow perch, eel, and brown bullhead compared to eel, yellow perch, and brown bullhead in 1994 (Fig. 4.1.3).

Eel

Eel harvest was 21,693 lb, 47% of the quota. Of note, 58% of the total eel harvest from Lake Ontario and the St. Lawrence River was taken in Quota Zone 1-7. This quota zone has only 23% of the total quota.

Yellow perch

Yellow perch harvest was 54,148 lb, 35% of the quota.

Other species

Commercial harvest of black crappie, sunfish and brown bullhead declined in 2003.

4.2 Lake Whitefish Commercial Catch Sampling

Sampling of commercially harvested lake whitefish for biological attribute information occurs annually. Sampling generally focuses on the largest components of the commercial lake whitefish fishery—November gillnet fishery on the south shore of Prince Edward County (Quota Zone 1-2) and the October/November impoundment gear fishery in the Bay of Quinte (Quota Zone 1-3). In 2003, biological sampling also took place in late-April/early-May to obtain samples for a lake whitefish bioenergetics study (see Section 9.3), and in summer during a lake whitefish commercial test netting project (see Section 8.6).

The lake whitefish sampling design involves obtaining large numbers of length tally measurements and a smaller length-stratified sub-sample for more detailed biological sampling (Table 4.2.1). In total, fork length was measured for 5,134 fish and age was interpreted (otoliths) for 414 fish.

Lake Ontario

Mean fork length and age were 490 mm and 10.8 years, respectively (Fig. 4.2.1). Fish ranged from age-7 to age-17 years. Age-11 (1992 year-class) fish were the most abundant. Fish age-8 to 12 comprised over 90% of the harvest. Mean age of the commercial lake whitefish harvest increased steadily after 1995 as the strong 1991 and 1992 year-classes "moved through" the fishery, and as age-at-first-recruitment to the fishery increased over the same time-period (Table 4.2.2).

Bay of Quinte

Mean fork length and age were 488 mm and 10.6 years, respectively (Fig. 4.2.2). Fish ranged from age-4 to age-20 years. Age-12 fish were the most abundant. This represents the 10th consecutive year that the 1991 year-class was the most numerous year-class in Quota Zone 1-3 commercial harvest. Age-8 and age-9 fish also figured prominently in the harvest. As for Lake Ontario, mean age of the commercial lake whitefish harvest in the Bay of Quinte increased steadily after 1995 as the 1991 year-class "moved through" the fishery, and as age at first recruitment to the fishery increased over the same time-period (Table 4.2.3).

TABLE. 4.2.1. Number of lake whitefish sampled for length and age, by quota zone and month, in the 2003 commercial catch sampling program.

Quota Zone	Month	Number Lengthed	Number Aged
1-2	April	398	78
	May	147	60
	November	3,474	139
1-3	October	483	132
	November	632	5
		5,134	414

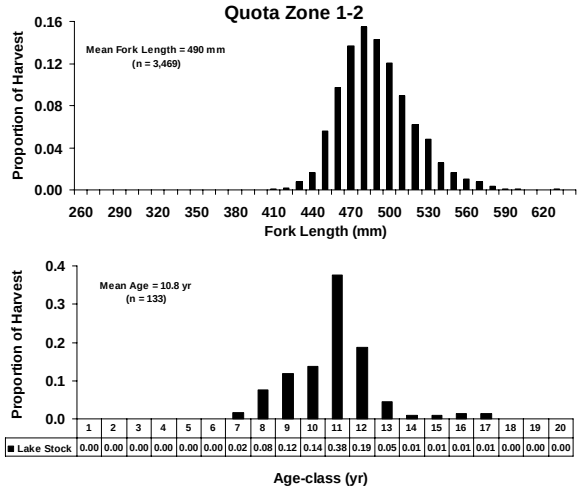

FIG. 4.2.1. Size and age distribution (by number) of lake whitefish sampled in Quota Zone 1-2 during the 2003 commercial catch sampling program.

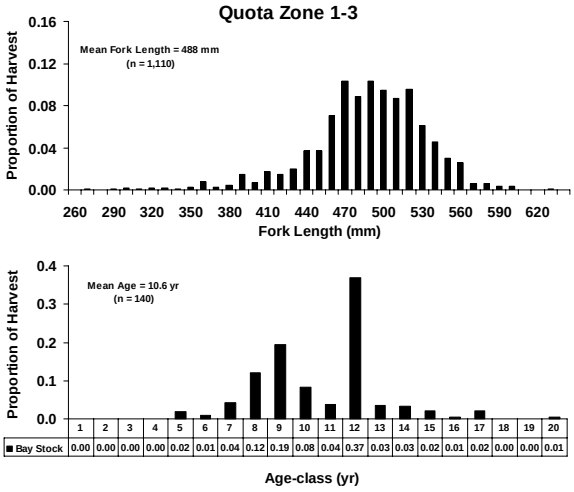

FIG. 4.2.2. Size and age distribution (by number) of lake whitefish sampled in Quota Zone 1-3 during the 2003 commercial catch sampling program.

TABLE 4.2.2. Age distribution (proportion by number) of lake whitefish harvested in Quota Zone 1-2, 1993-2003.

Age	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3	0.000	0.071	0.015	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.000
4	0.050	0.206	0.093	0.158	0.001	0.030	0.000	0.000	0.000	0.000	0.001
5	0.282	0.193	0.220	0.136	0.075	0.066	0.000	0.001	0.002	0.000	0.019
6	0.342	0.246	0.197	0.296	0.179	0.247	0.067	0.020	0.054	0.008	0.010
7	0.249	0.220	0.212	0.093	0.270	0.205	0.238	0.156	0.093	0.163	0.044
8	0.068	0.014	0.222	0.102	0.096	0.090	0.238	0.267	0.166	0.096	0.122
9	0.000	0.006	0.028	0.159	0.140	0.060	0.067	0.253	0.292	0.132	0.194
10	0.000	0.003	0.002	0.034	0.133	0.108	0.076	0.105	0.219	0.338	0.084
11	0.000	0.004	0.000	0.009	0.094	0.060	0.067	0.063	0.070	0.134	0.037
12	0.008	0.004	0.000	0.000	0.003	0.060	0.210	0.033	0.034	0.074	0.369
13	0.000	0.007	0.001	0.003	0.000	0.030	0.029	0.070	0.018	0.024	0.035
14	0.000	0.002	0.006	0.000	0.000	0.018	0.000	0.013	0.031	0.012	0.032
15	0.000	0.003	0.000	0.003	0.002	0.006	0.000	0.018	0.020	0.011	0.021
16	0.000	0.000	0.004	0.003	0.001	0.006	0.000	0.000	0.000	0.007	0.005
17	0.000	0.000	0.000	0.001	0.003	0.000	0.000	0.000	0.000	0.000	0.021
18	0.000	0.021	0.000	0.001	0.004	0.006	0.010	0.000	0.000	0.000	0.000
19	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000
20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.005
Mean	6.0	5.9	6.4	6.6	7.9	8.1	9.1	9.2	9.3	9.7	10.6

TABLE 4.2.3. Age distribution (proportion by number) of lake whitefish harvested in Quota Zone 1-3, 1993-2003.

Age	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3	0.014	0.293	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4	0.093	0.232	0.617	0.079	0.000	0.000	0.039	0.012	0.000	0.000	0.000
5	0.106	0.069	0.161	0.385	0.104	0.088	0.070	0.010	0.000	0.000	0.000
6	0.306	0.122	0.016	0.145	0.527	0.140	0.109	0.055	0.101	0.017	0.000
7	0.237	0.115	0.040	0.047	0.075	0.390	0.101	0.179	0.150	0.094	0.016
8	0.119	0.093	0.053	0.047	0.087	0.081	0.450	0.172	0.068	0.133	0.076
9	0.057	0.031	0.066	0.119	0.058	0.015	0.062	0.409	0.178	0.141	0.118
10	0.014	0.009	0.028	0.097	0.057	0.037	0.008	0.051	0.448	0.176	0.137
11	0.027	0.031	0.013	0.044	0.058	0.074	0.031	0.000	0.000	0.314	0.376
12	0.013	0.004	0.000	0.004	0.015	0.096	0.023	0.011	0.005	0.027	0.186
13	0.014	0.001	0.002	0.017	0.010	0.066	0.054	0.021	0.033	0.013	0.045
14	0.000	0.000	0.000	0.006	0.000	0.015	0.031	0.068	0.004	0.014	0.010
15	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.001	0.008	0.032	0.009
16	0.000	0.000	0.002	0.000	0.009	0.000	0.000	0.001	0.000	0.039	0.013
17	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.008	0.000	0.000	0.013
18	0.000	0.000	0.000	0.003	0.000	0.000	0.016	0.001	0.004	0.000	0.000
19	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.003	0.000	0.000	0.000
20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mean	6.7	5.2	5.2	6.9	7.1	8.2	8.3	8.8	9.0	10.1	10.8

5. Age & Growth Summary

Biological sampling of fish from Lake Ontario Management Unit field projects routinely involves collection and archival of structures used for such purposes as age interpretation, origin determination (e.g. stocked versus wild), life history characteristics and other features of fish growth. In 2003, a total of 4,720 structures were processed for these purposes (Table 5.1).

6. Contaminant Monitoring

Lake Ontario Management Unit cooperates annually with the Department of Fisheries and Oceans (DFO) and the Ministry of the Environment and Energy (MOE) by collecting fish samples for their Contaminant Surveillance and Sport Fish Monitoring programs respectively.

The majority of samples are obtained from existing fisheries assessment programs on Lake Ontario, Bay of Quinte, St. Lawrence River and the Ganaraska River. In addition, fish samples are supplied to LOMU for MOE by the Port Whitby Sport Fishing Association and local commercial fisherman.

In 2003, 519 contaminant samples were collected for the two contaminant monitoring agencies (Tables 6.1 and 6.2).

TABLE 6.1. Number of fish samples collected for contaminant analysis by the Department of Fisheries and Oceans (DFO), 2003.

Species	Eastern Basin of Lake Ontario
Rainbow smelt	30
Lake trout	16
Total	46

TABLE 6.2. Number of fish samples collected for contaminant analysis by the Ministry of Environment and Energy (MOE), 2003.

Species	Upper Bay of Quinte	Lower Bay of Quinte	Thousand Islands	Ganaraska River
Walleye	20	20		
Yellow perch	20	18	20	
Northern pike	20	20	20	
Largemouth bass	20		8	
Smallmouth bass	2		20	
Black crappie	20			
Rainbow trout				20
Pumpkinseed	17	20	20	
Bluegill	20			
Rock bass	18		20	
White perch	20	20		
Brown bullhead	20		20	
Common carp	7			
Channel catfish	3	20		
Total	207	118	128	20

TABLE 5.1. Species-specific summary of structures interpreted for age and growth characteristics in support of Lake Ontario Management Unit field projects, 2003.

Species	Age Structure	Field Project	Sample Size
Lake whitefish	otoliths	2003 Commercial Catch (Wellington sample)	100
Lake whitefish	otoliths	2003 Community Index	58
Yellow perch	scales	2003 Community Index	281
Smallmouth bass	scales	2003 Community Index	27
Walleye	otoliths	2003 Community Index	216
Walleye	scales	2003 Bay of Quinte Open-water Creel	250
Walleye	otoliths	2003 NSCIN	100
Lake whitefish	otoliths	2003 Commercial Test-netting	140
Multi-species (sunfish, bass, black crappie)	scales	2003 NSCIN	800
Yellow perch	scales	2003 Lake St. Francis Creel	200
Multi-species (yellow perch, bass, pike)	scales/spines	2003 1000 Island Gillnetting	500
Lake trout	coded wire tags	2003 Community Index & Test-netting	100
Chinook salmon	otoliths	Multi-year Western Basin Creel & Credit River Chinook Assessment	190
Rainbow trout	scales	Multi-year Ganaraska Fishway Monitoring & Western Basin Creel	1,108
Lake whitefish	otoliths	2003 Lake Commercial Catch sample	135
Lake whitefish	otoliths	2003 Bay Commercial Catch sample	135
Walleye	otoliths	2003 Mark/Recapture	380
Total			4,720

7. Enforcement Update

Since this is the first time an enforcement update has been included in the Lake Ontario Management Unit Annual Report, some background information will be provided about the enforcement program.

The Lake Ontario Management Unit Enforcement Program consists of six full-time staff positions. The Enforcement Supervisor and three Conservation Officers are based out of Glenora. Two other Conservation Officers are based out of Darlington Provincial Park in Bowmanville.

The Glenora Conservation Officers are primarily responsible for commercial fish management and enforcement, sport fish enforcement, and other enforcement duties as required. Commercial fish management involves the issuance and maintenance of approximately 175 commercial fishing licences for Eastern Lake Ontario, Western Lake Ontario, the Bay of Quinte and some Inland Lakes and waters. Commercial fish duties also include inspecting commercial fish documents from both fishers and local wholesalers to ensure compliance with seasons, quotas, size limits and compliance with legislation governing the purchase and sale of commercial fish.

The Darlington Conservation Officers are primarily responsible for the management and enforcement of commercial fish wholesale and retail outlets in the Greater Toronto Area. The Officers inspect documents from both retail and wholesale outlets to ensure compliance with the Fish and Wildlife Conservation Act and O. Reg 664 as they relate to the purchase and sale of fish.

All Lake Conservation Officers are responsible for Sport Fish Enforcement on Lake Ontario from Cornwall to the Niagara River. The Lake Ontario Management Unit Enforcement Section usually enters into an agreement with Kemptville District to cover the sport fish enforcement on the St. Lawrence River.

In 2003, the Lake Ontario Enforcement Program entered into joint forces work with Fisheries Officers from the Federal Department of Fisheries and Oceans (DFO). The joint forces work included vessel patrols, market inspections, and intelligence and investigative work. The joint forces work provides a training opportunity to DFO Fisheries Officers and provides additional manpower to MNR. The joint forces work will continue into 2004.

Other enforcement duties for Lake Unit Conservation Officers involve supporting Provincial enforcement initiatives, assisting other Districts / Lake Units and enforcement of ancillary legislation such as the Off Road Vehicles Act, the Motorized Snow Vehicle Act, etc.

In future years this update will include enforcement statistics.

8. Management Activities

8.1 Stocking

In 2003, OMNR stocked about 1.8 million salmon and trout into Lake Ontario (Table 8.1). Just over 500,000 Chinook salmon spring fingerlings were stocked at various locations to provide put-grow-and-take fishing opportunities. A shortfall of 35,000 Chinook was attributed to higher than normal stream temperatures during the early part of the 2002 egg collection, that resulted in a lower rate of eye-up.

About 20,000 Chinook salmon were held in pens at two embayment sites in eastern Lake Ontario for a short period of time prior to stocking. This project was done in partnership with a local community group to determine whether these fish would successfully imprint on the embayments. It is hoped that pen-imprinting will help improve returns of mature adults to this area in the fall, thereby enhancing local nearshore and shore fishing opportunities. Follow-up monitoring is planned.

About 95,000 coho salmon yearlings were stocked into the Credit River. A poor run of coho in the fall of 2002 resulted in a shortfall of 55,000 fish this year, although we were able to hold all coho in the hatchery to yearling stage; these fish were stocked out at over 19 g, on average.

OMNR stocked about 112,000 Atlantic salmon spring fingerlings and 84,000 fall fingerlings, in support of an ongoing program to restore self-sustaining populations of this native species to the Lake Ontario watershed. Partners stocked out about 39,000 Atlantic salmon eggs in incubation boxes, as well as about 15,000 fry.

About 410,000 lake trout yearlings were also stocked as part of an established, long-term rehabilitation program. Problems experienced in the hatchery resulted in a 30,000 fish shortfall of lake trout (Seneca Lake and Mishibishu Lake strains). Lake trout stocking is focused in eastern Lake Ontario where most of the historic spawning shoals are found.

About 146,000 rainbow trout yearlings were stocked by OMNR. In addition, local community groups reared about 186,000 rainbow trout fry and 31,000 fall fingerlings. About 181,000 brown trout yearlings were stocked at various locations to provide shore and boat fishing opportunities.

TABLE 8.1. Salmon and trout stocked into Province of Ontario waters of Lake Ontario, 2003, and target for 2004.

		Number Stocked	
Species		**2003**	**2004**
Atlantic salmon	Eggs	38,979	
	Fry	5,610	
	Spring fingerlings	121,851	200,000
	Fall fingerlings	84,128	
	Adults	460	
		251,028	**200,000**
Brown trout	Spring yearlings	**181,276**	**165,000**
Chinook salmon	Spring fingerlings	**503,610**	**540,000**
Coho salmon	Fall fingerlings	0	75,000
	Spring yearlings	94,792	75,000
		94,792	**150,000**
Lake trout	Spring yearlings	**409,558**	**440,000**
Rainbow trout	Fry	186,381	
	Fall fingerlings	30,513	
	Spring yearlings	145,879	140,000
		362,773	**140,000**
Salmon & trout total		**1,803,037**	**1,635,000**

Detailed information about OMNR's 2003 stocking activities is found in Appendix C. Fig. 8.1 shows trends in salmon and trout stocking in Ontario waters, 1968-2003.

The New York State Department of Environmental Conservation (NYSDEC) also stocked 3.6 million salmon and trout into Lake Ontario in 2003.

8.2 Recreational Fishing Regulations

There were a number of important fishing regulation changes made within the Lake Ontario and St. Lawrence River basins in 2003. Many of the changes were associated with the provincial effort to streamline Ontario's fishing regulations. This was done to simplify the regulations and develop an effective regional approach to fisheries management.

One part of the streamlining initiative is to look at each species individually, rationalize existing regulations, remove redundancies, streamline regulations, and develop a standard for managing stressed or exceptional fisheries. This in essence is the "tool kit" process. The outcome of this process will reflect our knowledge of the best available

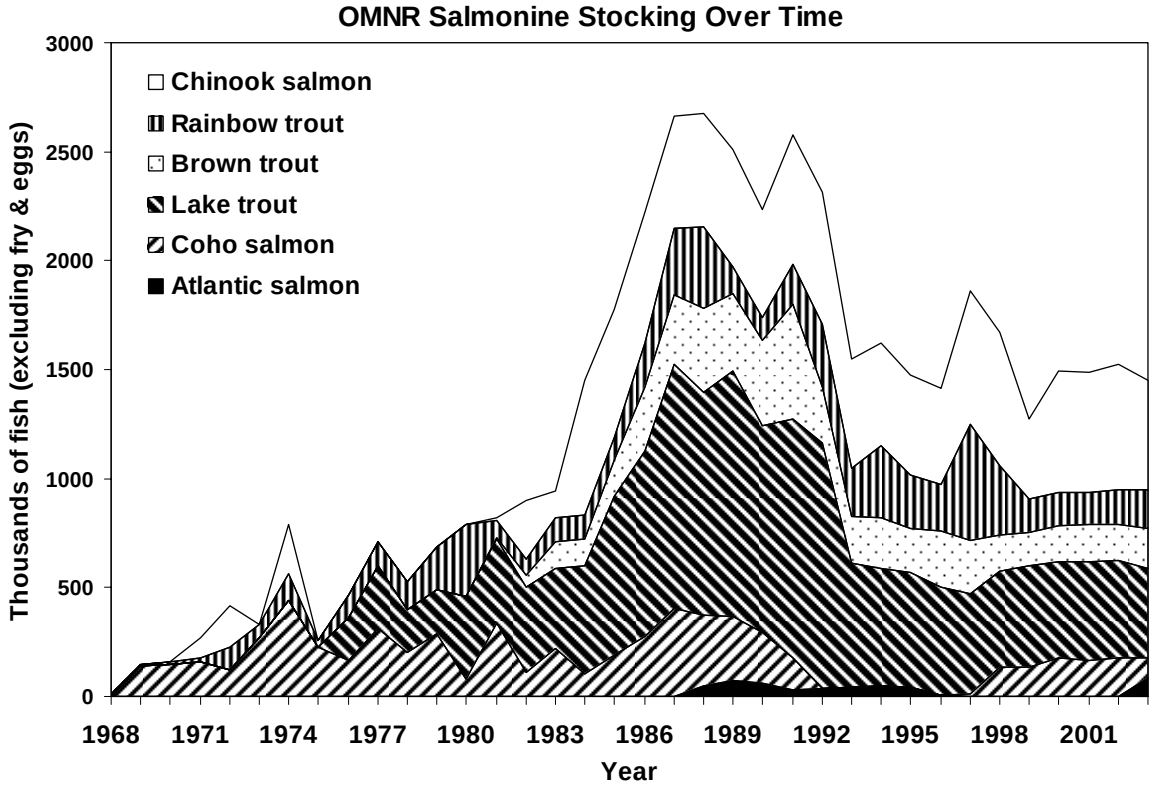

FIG. 8.1. Trends in salmon and trout stocking in Ontario waters, 1968-2003.

management practices and science, in addition to stakeholder consultation and socio-economic considerations. In 2003, the recommendations of the musky tool kit were implemented into the Recreational Fishing Regulations Summary (2003) and with it, came a number of alterations to musky regulations. Catch and possession limits were standardized across the province to eliminate the possession of 2 musky by holders of a sport fishing licence. The seasons in Divisions 8, 9, 10, 11 and 12A were all streamlined to close on December 15 from there previous closing date of Nov 30th. The opening date for musky in Division 10 also changed from the 3rd Saturday in June to the first Saturday in June. And finally, the Niagara River now has a 112 cm (44 inch) minimum size limit in place for the harvest of musky.

The rationalization of fishing divisions and division boundaries is another aspect of the provincial streamlining initiative. Although much of the work in this area needs to be completed, in 2003, Lake Ontario was made into a single division (Division 8) from its previous two divisions (Divisions 2 and 8). This single division allows better management of Lake Ontario's fish populations and fisheries and standardized regulations across the lake in order to simplify regulations for fisherman and enforcement staff alike.

The final regulation change that came into affect in 2003 was the complete season closure for Atlantic salmon in Division 6. This closure however does not affect the year-round open season for Atlantic salmon available in Division 6 south of the C.N.R. railway right-of-way in certain tributaries of Lake Ontario.

8.3 Native Species Rehabilitation

Atlantic Salmon

Atlantic salmon was an important member of the original Lake Ontario fish community. This species was extirpated from Lake Ontario in the late-1800s, primarily as a result of the loss of spawning and nursery habitat in the streams. A plan to investigate the feasibility of restoring self-sustaining Atlantic salmon populations to Lake Ontario was revised by OMNR in1995.

An Atlantic salmon workshop was hosted by the Lake Ontario Management Unit in Peterborough in February 2003. The workshop was facilitated by ESSA Technologies Ltd. The workshop brought twenty-nine science and management staff from MNR and other partner agencies together to:

- review results of research studies on Atlantic salmon in Lake Ontario and its tributaries
- evaluate outstanding issues, with respect to restoration
- determine future science and assessment priorities
- discuss management options
- identify partnership opportunities.

Some of the key points which emerged from the workshop include:

- Benchmarks specified for the first five years of the program have been met. Research has demonstrated that stream habitats can support juvenile Atlantic salmon.
- Assessing the rate of adult return and spawning success was identified as a priority. This will require higher levels of stocking than in earlier phases of the program. Production requirements and logistics need to be addressed, in context with the overall Lake Ontario stocking program. There was considerable interest in considering alternate strains of Atlantic salmon.
- The program is at a logical point to move into a phase which combines both research and rehabilitation efforts. There was agreement that these efforts should be focused on a small set of “best-bet” streams.
- Thiamine deficiency, which results from a diet of alewife or smelt, was considered a serious challenge to Atlantic salmon restoration. Both of these non-native prey fish contain thiaminase, an enzyme that breaks down thiamine (vitamin B-1). Thiamine deficiency results in low reproductive success in salmonines, particularly Atlantic salmon. High priority should be placed on continuing the research necessary to understand the magnitude of this problem in Lake Ontario, the factors which contribute to it, and ways of mitigating its effects.
- It was recognized that the public and non-government organizations could play an important role in the Atlantic salmon restoration program. An action plan needs to be developed to ensure that the public is informed and involved.
- The role of angler-harvest during restoration was discussed. We need to address concerns about the possible effects of even limited harvest on a recovering population.

These workshop findings will help to set future direction for the Atlantic salmon restoration program on Lake Ontario.

American Eel

The numbers of eel migrating upstream at the ladder, located at the R.H. Saunders Hydroelectric Dam, remain at a very low level. Commercial harvest of eel below the dam remain relatively stable; however,- harvests above the dam (upper St. Lawrence River and Lake Ontario) have declined in an unprecedented fashion. The low levels of upstream eel migration suggest that the commercial harvest of eel in the upper St. Lawrence River and Lake Ontario will remain low for at least the next decade. Actions taken by the Lake Ontario Management Unit to address the declining abundance of eel include:

1) no new commercial licences issued;

2) commercial quotas for eel reduced by approximately 50% in 2001 and an additional 50% in 2002;
3) continued operation of the eel ladder at the R.H. Saunders Hydroelectric Dam;
4) began development of a management plan for American eel in Canadian waters in cooperation with the Department of Fisheries and Oceans Canada and the Province of Quebec;
5) participated in the New York Power Authority eel working group;
6) contributed to the American Fisheries Society eel symposium held during August 2003.

8.4. Bay of Quinte Fisheries Advisory Committee

Beginning in 2001, fisheries managers expressed strong concerns over significant declines in the Bay of Quinte walleye population. These declines apparently were due to major ecosystem change and excessive harvest. The Ministry undertook significant efforts to involve local stakeholders in finding the best course of action to deal with the issues facing the walleye population and fishery.

In April 2002, former Minister Snobelen announced MNR's commitment to form the Bay of Quinte Fisheries Advisory Committee (BQFAC). Former Minister Ouellette created a 10-member committee that represented both local and provincial interests in the Bay of Quinte fisheries. Their mandate is to provide input and advice, and develop and make recommendations to MNR about the sustainable management of fish communities and fisheries in the Bay of Quinte and eastern Lake Ontario. The committee is also to play a role in promoting fishing in the area, and in supporting/enhancing communications with stakeholders.

The BQFAC and MNR co-developed a Terms of Reference in 2003; since then they have met six times. At these meetings, BQFAC was presented with information from the MNR and stakeholders relating to the Bay of Quinte. The committee is now able to provide recommendations to MNR and take a more proactive role with stakeholders.

8.5. Lake Ontario Commercial Fishing Licence Condition Review

In late 2002, the Lake Ontario Management Unit embarked upon a review of Lake Ontario commercial fishing licence conditions in an attempt to chronicle the complex and varied changes to licence conditions since 1991 or where possible, since 1985 (the institution of fishing licences and the modernization of the Lake Ontario commercial fishery). The objective was to standardize conditions within and across quota zones and to eliminate those conditions that were no longer appropriate.

Licence conditions regarding season, gear and size restrictions were discussed with a sub-group of Lake Ontario Commercial Fish Liaison Committee on two occasions, and recommendations were twice presented to, and discussed with, the Lake Ontario Commercial Fish Liaison Committee. The resulting licence condition changes were presented at the General Commercial Fish Meeting in March, 2003, and appeared in amended 2003 Lake Ontario commercial fishing licences:

1) Removal of the July 31-Labour Day carp season closure in Quota Zone 1-4.
2) For all Quota Zones where this is currently a summer closure for impoundment gear, the season will now be open the 1st day after Labour Day and close June 20. The December 31 closure will be maintained.
3) The lake whitefish season in Quota Zone 1-1 will open on October 22 rather than October 25 so that it is the same as Quota Zones 1-2 and 1-4.
4) The priority for contaminant testing will be: walleye – carp – channel catfish – northern pike – lake trout – American eel.
5) Carp Gillnet Licences will be renamed Carp Licences.
6) Round whitefish, lake herring, and white perch will be listed as UNLIMITED on 2003 licences. These species are to be reported on DCRs for assessment purposes.

The license condition review is to be continued in 2004.

8.6 Lake Whitefish Commercial Test Netting

The Ontario Living Legacies Program (OLL) funded a 10-week test netting program in 2003. This project provided information about fishing opportunities for a fishery that has been in existence since the 1800s. This partnership between the Ontario Commercial Fisheries Association, the fishermen from eastern Lake Ontario, and the Lake Ontario Management Unit (LOMU) had three primary objectives:

1) To assess the feasibility of harvesting whitefish at different times of the year than currently licensed,
2) To estimate the incidental harvest rates for all fish species with an emphasis on lake trout, and
3) To provide biological and environmental information.

The commercial fishery used just over 46 km (50,500 yards) of primarily 140 mm (4 ½ inch mesh) gillnet and harvested 9,786 kg (21,588 lbs) of whitefish from early July to mid-September. The study was designed to sample 11 different 5x5 minute grids in Quota Zones 1-1 and 1-2. Two grids were sampled twice, about four weeks apart. Technicians sampled 2,027 fish representing 17 species during the course of the program. These samples provided a wide variety of information including stomach samples for a whitefish bioenergetics study (see Section 9.4), adipose fins for a whitefish growth and genetics study, and whitefish distribution information.

The majority of whitefish were harvested in August. The incidental catch rate (by weight) of lake trout ranged from 3% in week-4 to 80% in week-10. The average catch rate of lake trout from all grids and weeks was 18% by weight. Whitefish caught during this program ranged in value from $0.50 to $0.75 per lb, round weight.

LOMU considers this successful program to be preliminary and as such may repeat the program in 2004 for a longer period of time and using a modified field design.

9. Research Activities

9.1 Use of Stable Isotope Ratios to Determine Origin of Lake Trout

The first phase of a project examining the use of stable isotope ratios to identify naturally produced (wild) lake trout has been completed. The idea behind this method is that during the first year of life, hatchery and wild lake trout experience vastly different trophic and thermal conditions, and this is reflected in carbon and oxygen isotope ratios of the material deposited in the otolith. Analysis of the otolith region corresponding to the first year of life should reveal the origin of the fish.

Otoliths from yearling and YOY lake trout from the two hatcheries that supply stocked lake trout for Lake Ontario, as well as otoliths from wild fish have been analyzed by W. P. Patterson of University of Saskatchewan. The results showed that the combination of carbon and oxygen stable isotope values was characteristic of the origin, and clearly distinguished between the three groups (Fig. 9.1.1). Further assays using adult fish of known hatchery origin caught in the lake showed that the isotope ratio values were similar to those from hatchery yearlings, which would have resulted in correct classification. Last, a test with a group of adult lake trout of unknown origin, caught in Lake Ontario showed a clear split into two groups, one similar to the wild yearling group and one similar to one of the hatchery groups. It thus appears that stable isotope method works, and will allow the origin of unknown adults to be determined.

The ability to identify wild fish in archival otolith samples will allow us to determine the past levels of natural reproduction, and describe the population parameters of the wild fish. Materials from wild fish can also be analyzed to determine genetic origin, and to evaluate the success of the various strains stocked in Lake Ontario in the past.

9.2 Larval Lake Whitefish Feeding and Growth

A larval lake whitefish feeding and growth study was re-established in 2003 to augment similar work conducted annually from 1991-1996 (excluding 1994) in the Bay of Quinte and eastern Lake Ontario. The objective of these studies was to assess larval lake whitefish diet and growth relative to zooplankton community structure.

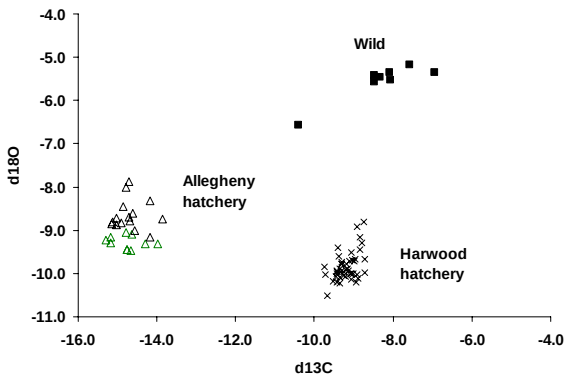

FIG. 9.1.1. Plot of $\delta^{13}C_{(CaCO3)}$ versus $\delta^{18}O_{(CaCO3)}$ values from otoliths of hatchery yearling and YOY fish, and wild yearling fish. Multiple assays from individual fish are averaged.

The 2003 larval whitefish feeding and growth study was conducted on 18 days from April 11-May 16 at four sampling areas (Table 9.2.1). Water temperature ranged from 0.1 to 13.8 ^{o}C over the duration of the study. A total of 1596 larval whitefish were caught in 58 tows and 688.6 min of sampling effort. A total of 659 lengths, 191 stomachs and 91 otolith samples were collected. Forty-one zooplankton samples were also taken.

This program also has a research component via a partnership with the University of Guelph's Dr. David Noakes and MNR Research's Dr. Chris Wilson. One graduate student will begin working on this project in January 2004. The focus of this MSc thesis will revolve around the growth, survival and availability of food for larval lake whitefish, pre and post collapse of *Diporeia hoyi*. This project was fully funded by the Canada Ontario Agreement. A second MSc candidate is scheduled to begin work on stock identification and distribution using genetics as a tool. This complimentary research should begin in September 2004 pending funding.

9.3 Lake Whitefish Bioenergetics: A comparison of populations from Lakes Erie and Ontario

In 2002, the Fish and Wildlife Restoration Act funded a multi-year study to compare and contrast lake whitefish from Lakes Erie and Ontario using a bioenergetics model. As such, LOMU has been involved in field sampling invertebrates and lake whitefish in support of the laboratory analyses required to satisfy the thesis proposal of a University

TABLE 9.2.1. Summary of sampling, effort and catch statistics obtained during the 2003 larval lake whitefish feeding and growth study in the Bay of Quinte (Trident Point, Shermans Point and Indian Point) and eastern Lake Ontario (Petticoat Point)

Area	Date	Water Temperature (^{O}C)	Number of larval tows	Total effort (min)	Number of larval whitefish caught	Number Lengthed	Mean length (mm)	Number of stomach samples	Number of otolith samples	Number of zooplankton samples
Trident Point	14-Apr	0.1	3	45.0	428	100	13.3	20	10	2
	25-Apr	8.1	3	31.0	244	100	15.2	20	10	2
	07-May	12.5	1	15.0	1	1	20.9	1	1	2
	15-May	13.8	2	12.6	0					
Shermans Point	11-Apr	1.7	3	30.0	128	101	13.9	20	10	4
	17-Apr	4.7	4	64.0	11	11	13.7	11	0	2
	24-Apr	7.2	3	31.0	488	100	14.7	20	10	2
	30-Apr	10.5	3	31.0	160	110	16.3	20	10	4
	05-May	12.6	4	55.0	23	23	17.5	23	0	3
	14-May	12.5	1	15.0	0					4
Indian Point	22-Apr	1.9	4	44.0	5	5	14.9	5	0	2
	28-Apr	3.0	4	49.0	15	15	14.0	0	10	2
	03-May	6.0	4	44.0	25	25	15.5	3	10	2
	06-May	6.2	4	30.0	28	28	15.2	20	8	2
	16-May	10.9	4	56.0	8	8	16.1	8	0	2
Petticoat Cove	16-Apr	7.4	3	34.0	0					2
	29-Apr	9.0	4	47.0	8	8	14.1	0	8	2
	08-May	8.5	4	55.0	24	24	15.1	20	4	2
Totals	18-days		58	688.6	1596	659		191	91	41

of Windsor MSc candidate. The following is a summary of the laboratory progress and also indicates the field collections undertaken by both LEMU and LOMU.

A bioenergetics model requires the collection of variables such as length, round weight, dressed weight, gonad weight and condition, sex, scale and otolith samples, and stomachs to assess the use of energy by whitefish.

In short, 327 fish were sampled from Lake Erie and 542 from Lake Ontario. The commercial fishery provided the majority of the Lake Erie sample whereas LOMU's community index gillnetting and an OLL testnetting partnership supplied most of the sample from Lake Ontario. As of January 2004, the diet analysis for Lake Erie's whitefish was completed and that for Lake Ontario was to be completed by March 2004. Twenty to 30 stomachs were examined per month. Whole fish homogenate for bomb calorimetry (energy density) requires tissue to be dried and ground. Seventy-nine Lake Erie fish and 42 from Lake Ontario were tested. The final component of laboratory analysis uses stable isotopes to assess differences in diet. For this process, 51 and 22 fish from Lakes Erie and Ontario were used, respectively. The results and interpretation of findings will be documented in a MSc thesis during 2004 and defended by March 2005.

9.4 Bay of Quinte ECOPATH Ecosystem Modeling

The Lake Ontario Management Unit (LOMU) participated in an ecosystem modeling project designed to compute energy flows among biota in the Bay of Quinte for key time-stanzas and to compare these trends to those found for Oneida Lake, New York. Other collaborators, besides Ontario Ministry on Natural Resources Assessment (i.e. LOMU), are OMNR Research, the Department of Fisheries and Oceans (DFO), the University of Waterloo, Cornell University, the University of Syracuse, University of Toledo and the Great Lakes Fisheries Commission (GLFC). The ecosystem modelling will be done using ECOPATH with ECOSIM (Christensen et al. 2000), which is a holistic model with two base components: 1) construction of balanced matrices detailing fauna biomass, production, and consumption in a static ecosystem, and 2) a simulation tool that employs the balanced ecosystem matrices to predict the effects of manipulations or changes to the ecosystem (e.g. invasion of a non-native species). Workshops II and III, and a symposium were held in 2003. Workshop II was held in April at the Canada Centre for Inland Waters (CCIW) in Burlington, Ontario. In June, LOMU staff authored

five papers presented at the Ecosystem Comparison: the Bay of Quinte, Lake Ontario and Oneida Lake symposium as part of the 46th Conference on Great Lakes Research held in Chicago, Illinois, organized by the International Association for Great Lakes Research (IAGLR). Workshop III was hosted by the Glenora Fisheries Station in October. Current results will be presented at the World Fisheries Conference to be held in Vancouver, B.C. in May, 2004. LOMU representatives will also attend an ECOPATH training course held in Vancouver in May of 2004. Quinte-Oneida Workshop IV will be held in June of 2004 at the Cornell Biological Field Station, New York when the emphasis will be on producing balanced lake models and reviewing topics of the ECOPATH-ECOSIM training course.

9.5 International Joint Commission Water Levels Study

The International Joint Commission (IJC) is composed of representatives from the United States and Canada. Three years ago, a collection of committees were formed to assess the concerns of the scientific community, government agencies, and the general public regarding the proposed change of water level and flow management of Lake Ontario and the St. Lawrence Seaway. The geographic area of study includes Lake Ontario, the St. Lawrence River from Cornwall, including Montreal Harbour, and downstream to Quebec City. The Lake Ontario Management Unit (LOMU) is involved in the IJC Water Level Study via representation in the Environmental Technical Working Group (ETWG) and the Fish Sub-group. The Fish Sub-group will provide models to the ETWG that explain fish responses to water level regime. These relationships will then be used by the ETWG to create criteria for formulating and assessing water level scenarios. The ETWG will collate models and other information, including expert opinion, to be included in an Integrated Ecological Research Model (IERM) which will in turn become a component of a Shared Vision Model (SVM). The SVM will incorporate the models and interests from a wide variety of stakeholders and commercial interests, as well as from the ETWG. This study is nearing completion and as of November 2004, all models from each Technical Working Group must be completed and submitted to the Plan Formulation and Evaluation Group (PFEG). In the near future LOMU will be involved in providing criteria used in this final process. For more information pertaining to the IJC water level study please visit http://www.losl.org/ .

10. Communications

Lake Ontario Management Unit staff use a variety of formal and informal ways to communicate with the public, stakeholders, partners, the media, and other resource management agencies. Good communications strategies are important to effectively convey results of fisheries assessment, management and enforcement programs. Seeking input from client groups through formal consultation processes helps us to understand their values, ideas and concerns. Staff also interact with clients on a day-to-day basis through phone calls, site visits and contacts made in the field or during enforcement patrols. Staff actively participate on a variety of bi-national and inter-agency committees to share information and expertise, and to develop solutions to problems of common concern in the Great Lakes Basin. A strong network of communications outside and within OMNR is critical to making sound resource management decisions (e.g. setting sport fishing regulations, commercial fishing quotas, stocking levels, fisheries management objectives).

Table 10.1 summarizes some of the major communications initiatives undertaken by the unit in 2003. In addition to the items listed in the table, LOMU staff responded to a broad range of questions and information requests from the public, stakeholders, the media and other agencies. Staff also provided support to senior managers by developing a variety of communications and briefing materials relating to the management of Lake Ontario fisheries and fish communities.

TABLE 10.1 Lake Ontario Management Unit communications initiatives, 2003.

Communications plans

- Lake Ontario Salmon & Trout Management Review (approved)
- Lake St. Francis Fisheries Management Review (drafted)

News releases

- February 20, 2003 – Illegal sale of salmon from salmon derby
- July 18, 2003 – Lake Ontario Commercial Fisher fined for selling illegal walleye
- December 24, 2003 – Angler convicted of using three lines in Lake Ontario

Fact sheets / brochures / articles

- Brochures highlighting native species restoration in Lake Ontario: Atlantic salmon and lake trout (in progress)
- Chinook salmon pen-imprinting project
- Contributed to the revision of the Lake Ontario Lakewide Management Plan (LaMP) information binder

Websites / web products developed

- Lake Ontario Management Unit annual reports (access to reports in PDF format provided through the Great Lakes Fishery Commission website)
- Lake Ontario stocking history (access to data provided through the Great Lakes Fishery Commission website)
- Salmon & Trout Management Review webpage (under development – MNR website)

Media contacts

- Restoration of Atlantic salmon to Lake Ontario - Fish'n Canada TV interview (part of MNR series "Your Licence Dollars at Work") (M. Daniels)

Papers / reports

- Lake Ontario Fish Communities and Fisheries: 2003 Annual Report of the Lake Ontario Management Unit (all staff)
- Status of In-Stream Barrier Information in the Lake Ontario Watershed (J. Borwick)

Papers presented

- "Distribution and Movement of Walleye in Eastern Lake Ontario" (presented by J. Bowlby, at PERCIS III in Madison, Wisconsin)

(TABLE 10. continued.)

- "Status of Lake Herring in Lake Ontario" (presented by J. Hoyle at Lake Herring Workshop hosted by the Great Lakes Fishery Commission in Ann Arbor, Michigan)
- "Management of American Eel, *Anguilla rostrata*, in Lake Ontario and the Upper St. Lawrence River" (presented by A. Mathers at the International Eel Symposium hosted by the American Fisheries Society in Quebec City)
- 2003 Conference on Great Lakes Research (hosted by the International Association for Great Lakes Research in Chicago, Illinois)
    - "Comparative Walleye Population Dynamics in Bay of Quinte and Oneida Lake" (presented by J. Hoyle)
    - "Incorporating Measurement Error into Abundance Estimates: One Facet of Risk in Setting Harvest Levels" (presented by B. Morrison)
- State of Lake Ontario (bi-national conference hosted by the Lake Ontario Committee in Niagara Falls) – various presentations by LOMU staff

Workshops / conferences hosted

- Restoration of Atlantic Salmon to Lake Ontario (hosted by LOMU in Peterborough; 29 attendees)
- State of Lake Ontario Conference (hosted by the Lake Ontario Committee in Niagara Falls)

Workshops / conferences attended

- American Fisheries Society Annual Meeting (Quebec City)
- Decision Analysis / Adaptive Management Workshop (hosted by the Upper Lakes Management Unit in Owen Sound)
- Ecosystem Dysfunction, Invasive Species, and Thiamine Deficiency Complex Workshop (bi-national workshop hosted by U.S. Geological Survey in Ann Arbor, Michigan)
- Lake Herring Workshop (hosted by the Great Lakes Fishery Commission in Ann Arbor Michigan)
- Offshore Monitoring Workshop
- Peterborough District Coldwater Stream Strategy Workshops
- Quinte-Oneida Workshops (April Workshop hosted by Canada Centre for Inland Waters in Burlington, October Workshop hosted by Glenora Fisheries Research Station in Picton)
- Restoration of Atlantic Salmon to Lake Ontario (hosted by LOMU in Peterborough)
- U.S. Forage Fish Assessment Workshop (hosted by New York Sea Grant in Syracuse, NY)
- Water Levels Workshops (hosted by the International Joint Commission in Kingston and Cornwall)
- Workshop on Streamlining Ontario's Sport Fishing Regulations (hosted by OMNR's Fisheries Section)
- Lower Great Lakes Lake Trout Working Group (hosted by USGS in Warren, Pennsylvania)

Committee / task group membership

- Bay of Quinte Fisheries Advisory Committee (BQFAC)
- Bi-national committees, under the Great Lakes Fishery Commission
    - Council of Lakes Committee (CLC)
    - Council of Lakes Technical Committee
    - Lake Ontario Committee (LOC)
    - Lake Ontario Technical Committee (LOTC)
    - Law Enforcement Committee
- Canada/Ontario Agreement (COA) – Lake Ontario Technical Team
- Commercial Fish Harvest Information System Development and Implementation Teams
- FISHNET III Development Team
- Fish Stocking Information System Development Team
- Great Lakes Assessment Modeling Review Team
- Inter-agency committees:

(TABLE 10. continued.)

- Hamilton Harbor Remedial Action Plan (RAP) Team
- Management Committee - Lake Ontario Lake-wide Management Plan (LaMP)
- Quinte Remedial Action (RAP) Team
- Thiamine Deficiency Complex Implementation Committee
- Thiamine Deficiency Complex Workshop Steering Committee
- St. Lawrence River Restoration Council (RAP)
- Toronto & Region Remedial Action Plan (RAP) Team
- Watershed / fisheries management planning teams – various watersheds

- Lake Ontario Commercial Fish Liaison Committee (LOCFLC)
- Sport Fishing Regulatory Tool Kit Teams – various species
- Great Lakes Hydro-acoustic Working Group (under Great Lakes Fishery Commission)
- Great Lakes Vessel Design and Construction Committee
- Small Vessel Safety Policy Committee
- Fish Habitat Advisory Compliance Working Group
- Fish Habitat Advisory Committee
- Hamilton Bay Area Implementation Team
- Canadian Eel Working Group
- Code of Professionalism Working Group

Presentations given

- Atlantic Salmon Restoration Workshop (M. Daniels – Lake Ontario fisheries management planning; B. Morrison – Lake Ontario ecological issues)
- Bay of Quinte Fisheries Advisory Committee
  - Fisheries Management Plan for the Bay of Quinte (P. Edwards)
  - Lake Ontario Management Unit Field and Lab Programs Overview (J. Hoyle)
  - Bay of Quinte Walleye (Trapnetting and Mortality Presentations by J. Bowlby)
  - Bay of Quinte Walleye Population Model (T. Schaner)
  - Walleye Review and Slot-size Discussion (B. Morrison)
- Central Lake Ontario Sport Anglers (M. Daniels – Invasive species; J. Bowlby – Status of salmon & trout in western Lake Ontario)
- Lake Ontario Commercial Fish Liaison Committee
  - Licence conditions review (P. Edwards)
  - Lake Whitefish Biology Update 2003 (J. Hoyle)
  - Test-netting (B. Morrison)
- Picton Rotary Club (P. Edwards - Invasive species in Lake Ontario)
- Port Whitby Sport Fishing Association (M. Daniels - Invasive species in Lake Ontario)
- St. Catharines Game & Fish Association (J. Bowlby - Status of salmon & trout in western Lake Ontario)
- Bay of Quinte Restoration Council Workshop (T. Schaner – Gobies in the Bay of Quinte)
- State of Lake Ontario Report at the Great Lakes Fishery Commission Annual Meeting in Thunder Bay
- Provincial Roll-out of Fisheries Habitat Compliance Protocol
- Glenora Fisheries Station Tours
  - ADM Office Staff
  - OSUM – Wellington Municipal Officials
  - Multiple Public Schools

Client contacts

Angler-interviews

- 2003 Bay of Quinte summer creel – 3,000+ anglers interviewed
- 2003 Bay of Quinte winter creel – 284 anglers interviewed
- 2003 Western basin creel – 1,646 fishing parties interviewed
- 2003 Lake St. Francis summer creel – 1,118 anglers interviewed

Appendix A:
Lake Ontario Management Unit Staff
2003

PETERBOROUGH
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Robert MacGregor – Lake Manager
Bev Ritchie – Inter-Agency Liaison, Great Lakes Coordinator
Marion Daniels – Management Biologist

Unclassified Staff:
Michelle Weller – A/Section Secretary
Jason Borwick – Management Biologist
Patricia Edwards – Management Biologist

GLENORA
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Derrick Humber – Enforcement Supervisor
Bruce Morrison – A/Assessment Supervisor
Tom Stewart – Assessment Supervisor, Special Projects
Dawn Walsh – Operations Supervisor
Linda Blake – Administrative Assistant
Kelly Sarley – Database Technician, Computer Operator
Alastair Mathers – Management Biologist
Jim Bowlby – Assessment Biologist
Jim Hoyle – Assessment Biologist
Ted Schaner – Assessment Biologist
Dale Dewey – Operations Coordinator
Wayne Miller – Senior Technician, Base Operations
Charles Wood – Senior Marine and Fisheries Technician
Dave Goodfellow – Great Lakes Technician
Tom Lawrence – Great Lakes Technician
Steve McNevin – Great Lakes Technician
Darren Bishop – Lake Unit Conservation Officer
Matthew Orok – Lake Unit Conservation Officer
Gord Rooney – Lake Unit Conservation Officer

Unclassified Staff:
Yvonne Murphy – Data Evaluation Clerk
Jason Dietrich – Special Projects Biologist
Ted Allan – Great Lakes Fisheries Technician
Terry Cronin – Great Lakes Fisheries Technician
Tim Dale – Great Lakes Fisheries Technician
Randy Gurnsey – Great Lakes Fisheries Technician
Glen Hales – Great Lakes Fisheries Technician
Tony McCambridge – Great Lakes Fisheries Technician
Zach Richmond – Great Lakes Fisheries Technician
Tyson Scholz – Great Lakes Fisheries Technician
Matt Shea – Great Lakes Fisheries Technician
Rob Slapkauskas – Great Lakes Fisheries Technician

Alan McIntosh – Boat Captain
Craig MacDonald – Marine Technician
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Gary Higgins – Lake Unit Conservation Officer
Bill Ingham – Lake Unit Conservation Officer

Unclassified Staff:
Kevin Hoare – Commercial Fish Assistant (DCO)

Aquatic Research and Development Section – GLENORA
Dr. John Casselman – Research Scientist
Les Stanfield – Research Biologist
Laurie Allin – Research Technician

Unclassified Staff:
Jason Dietrich – Research Biologist
Suzanne Gouveia – Research Biologist
Vicki Lee – Research Technician

Appendix B. Lake Ontario Management Unit Operational Staff Field and Lab Schedule, 2003.

Project	Field & Lab Schedule 2003/04	Species assessed/monitored or stocked	Length of data series (years)	Lead Biologist	Funding Source
Ganaraska Fishway - Rainbow Trout Assessment	April 1 - May 2	Adult rainbow trout	30	Bowlby	COA
Larval Whitefish Trawls	April 4 - May 16	Larval lake whitefish	6	Hoyle	COA
Lake Trout Tug Stocking	April 23 - May 9	Juvenile lake trout	n/a	Daniels	OLL/BASE
Bay of Quinte Open Water Creel	May 3 - Nov 23	Walleye, yellow perch, smallmouth bass, largemouth bass, sunfishes, northern pike and round goby	27	Hoyle	BASE
Whitefish Commercial Catch Sampling	April 22 - May 9 Oct 20 - Nov 21	Lake whitefish	17	Hoyle	COA
Western Basin Salmonid Creel	April 5 - Sept 26	Chinook salmon, rainbow trout, Coho salmon, brown trout, lake trout and Atlantic salmon	22	Bowlby	BASE
Juvenile Atlantic Salmon Stocking	May 12 - 16	Juvenile Atlantic salmon	n/a	Daniels	COA
Lake St. Francis Creel	May 10 - Sept 26	Yellow perch, smallmouth bass, northern pike and walleye	3	Mathers	COA
Moses Saunders Eel Ladder Monitoring	June 2 - Oct 24	Juvenile American eel	30	Mathers	BASE
Eastern Lake Ontario and Bay of Quinte Community Index Netting	June 23 - Sept 5	Various warm, cool and cold water species in Eastern Lake Ontario and the Bay of Quinte	45	Hoyle	BASE
Lake Whitefish Test Netting - Partnership with OCFA/MNR	July 14 - Sept 19	Lake Whitefish and non-targeted fish (e.g. lake trout, walleye and smallmouth bass)	1	Morrison	OLL
Rainbow Trout Recruitment	Aug 11 - Sept 12	Wild juvenile rainbow trout, Chinook salmon, Coho salmon, brown trout, brook trout, various minnows, darters and sculpin	11	Bowlby	COA
Lake Ontario Hydroacoustics	July 2 - July 22	Alewife, rainbow smelt and three-spine stickleback	12	Schaner	COA
Bay of Quinte Nearshore Community Index Netting	Sept 1- Oct 3	Various warm and cool water species, specifically sunfishes, brown bullhead, freshwater drum, largemouth bass, smallmouth bass, walleye and yellow perch	3	Hoyle	COA
St. Lawrence River Indexing Netting - Thousand Islands	Sept 8 - Oct 3	Warm and cool water species specifically northern pike, white sucker, brown bullhead, sunfishes, smallmouth bass, largemouth bass, yellow perch and walleye	20	Mathers	COA
Walleye Mark/Recapture	Sept 22 - Nov 14	Walleye and Lake whitefish	23	Bowlby	COA
Credit River Chinook Assessment and Egg Collection	Sept 29 - Oct 10	Adult Chinook salmon	30	Bowlby	COA
Age and Growth	Nov 17 - March 31	Walleye, lake whitefish, large/smallmouth bass, yellow perch, lake trout, rainbow trout, northern pike, sunfishes, crappie and freshwater drum	n/a	Hoyle/Bowlby/ Schaner/Mathers/ Morrison	COA/BASE
Bay of Quinte On-Ice Creel	Dec 15 - Feb 28	Walleye	22	Hoyle	BASE

Appendix C. Atlantic salmon stocked in the Province of Ontario waters of Lake Ontario, 2003.

SITE NAME	MONTH STOCKED	YEAR SPAWNED	HATCHERY	STRAIN/ EGG SOURCE	AGE (MONTHS)	MEAN WT (G)	MARKS	NUMBER STOCKED
ATLANTIC SALMON - EGGS								
SHELTER VALLEY CREEK								
Doig Property	11	2003	Partnership	LaHave/Normandale	0		None	**38,979**
ATLANTIC SALMON - DELAYED FRY								
CREDIT RIVER								
Mississauga & King Rds.	5	2002	Partnership	LaHave/Normandale	5		None	55
Norval	5	2002	Partnership	LaHave/Normandale	5		None	55
West Credit Belfountain	5	2002	Partnership	LaHave/Normandale	5		None	5,500
								5,610
ATLANTIC SALMON - ADVANCED FRY								
BARNUM HOUSE CREEK								
Lower	5	2002	Ringwood	LaHave/Normandale	6	0.8	None	32,001
Middle	5	2002	Ringwood	LaHave/Normandale	6	0.9	None	39,575
Upper	5	2002	Ringwood	LaHave/Normandale	6	1.0	None	40,425
								112,001
CREDIT RIVER								
Black Cr Stewarttown	5	2002	Partnership	LaHave/Normandale	5	2.1	None	**9,850**
ATLANTIC SALMON - YEARLINGS								
CREDIT RIVER								
Belfountain	10	2002	Ringwood	LaHave/Normandale	11	7.7	None	23,256
Black Cr Stewarttown	10	2002	Ringwood	LaHave/Normandale	11	7.9	None	22,236
Forks of the Credit	10	2002	Ringwood	LaHave/Normandale	11	7.9	None	29,592
Forks of the Credit Park	10	2002	Ringwood	LaHave/Normandale	11	7.7	None	9,044
								84,128
ATLANTIC SALMON - ADULTS								
CREDIT RIVER								
Forks of the Credit	9		Codrington	LaHave/Normandale		2246.3	Floy Tag	41
Forks of the Credit Park	9		Codrington	LaHave/Normandale		2193.9	Floy Tag	82
West Credit Belfountain	9		Codrington	LaHave/Normandale		2003.5	Floy Tag	123
								246
LAKE ONTARIO								
Plaus Park	12	1999	Normandale	LaHave/Normandale	49	1990.0	Floy Tag	**214**
TOTAL - ATLANTIC SALMON EGGS								**38,979**
TOTAL - ATLANTIC SALMON DELAYED FRY								**5,610**
TOTAL - ATLANTIC SALMON ADVANCED FRY								**121,851**
TOTAL - ATLANTIC SALMON YEARLINGS								**84,128**
TOTAL - ATLANTIC SALMON ADULTS								**460**
TOTAL - ATLANTIC SALMON								**251,028**

Appendix C. Brown trout stocked in the Province of Ontario waters of Lake Ontario , 2003.

SITE NAME	MONTH STOCKED	YEAR SPAWNED	HATCHERY	STRAIN/ EGG SOURCE	AGE (MONTHS)	MEAN WT (G)	MARKS	NUMBER STOCKED
				BROWN TROUT - SPRING YEARLINGS				
BRONTE CREEK								
Bronte Beach Park	3	2001	Normandale	Ganaraska/Normandale	16	39.8	RV	**15,314**
DUFFIN CREEK								
401 Bridge	5	2001	Harwood	Ganaraska/Normandale	18	63.3	RV	**10,514**
LAKE ONTARIO								
Ashbridge's Bay Ramp	3	2001	Harwood	Ganaraska/Normandale	16	47.6	RV	7,356
	5	2001	Harwood	Ganaraska/Normandale	18	64.0	RV	8,679
Bluffer's Park	3	2001	Harwood	Ganaraska/Normandale	16	46.0	RV	7,814
	5	2001	Harwood	Ganaraska/Normandale	18	63.1	RV	8,553
Burlington Canal	4	2001	Normandale	Ganaraska/Normandale	17	40.1	RV	22,562
Fifty Point CA	4	2001	Normandale	Ganaraska/Normandale	17	37.6	RV	15,044
Jordan Harbour	4	2001	Normandale	Ganaraska/Normandale	17	38.4	RV	10,039
Lakefront Promenade	3	2001	Normandale	Ganaraska/Normandale	16	40.7	RV	4,669
	4	2001	Normandale	Ganaraska/Normandale	17	37.7	RV	5,334
Lakeport	5	2001	Harwood	Ganaraska/Normandale	18	59.3	RV	10,626
Millhaven Wharf	3	2001	Harwood	Ganaraska/Normandale	16	47.3	RV	7,725
	5	2001	Harwood	Ganaraska/Normandale	18	62.1	RV	8,851
Oshawa Harbour	5	2001	Harwood	Ganaraska/Normandale	18	56.2	RV	10,596
Port Dalhousie East	4	2001	Normandale	Ganaraska/Normandale	17	45.3	RV	27,600
								155,448
TOTAL - BROWN TROUT								**181,276**

Appendix C. Chinook salmon stocked in the Province of Ontario waters of Lake Ontario, 2003.

SITE NAME	MONTH STOCKED	YEAR SPAWNED	HATCHERY	STRAIN/ EGG SOURCE	AGE (MONTHS)	MEAN WT (G)	MARKS	NUMBER STOCKED
				CHINOOK - SPRING FINGERLINGS				
BOWMANVILLE CREEK								
CLOCA Ramp	4	2002	Ringwood	Wild - Credit R.	5	3.7	None	23,100
	4	2002	Partnership	Wild - Cobourg Br.	7	4.8	None	3,200
								26,300
BRONTE CREEK								
2nd Side Road Bridge	4	2002	Ringwood	Wild - Credit R.	5	4.6	None	20,879
5tn Side Road Bridge	4	2002	Ringwood	Wild - Credit R.	5	4.6	None	23,440
								44,319
COBOURG BROOK								
South of King St	4	2002	Ringwood	Wild - Credit R.	5	3.7	None	**13,742**
CREDIT RIVER								
Eldorado Park	4	2002	Ringwood	Wild - Credit R.	5	3.7	None	26,546
Huttonville	4	2002	Ringwood	Wild - Credit R.	5	4.0	None	26,546
Norval	4	2002	Ringwood	Wild - Credit R.	5	4.0	None	27,509
								80,601
DON RIVER								
Pottery Road	4	2002	Ringwood	Wild - Credit R.	5	3.9	None	**13,743**
HIGHLAND CREEK								
Colonel Danforth Park	4	2002	Ringwood	Wild - Credit R.	5	3.7	None	**9,474**
HUMBER RIVER								
East Branch Islington	4	2002	Ringwood	Wild - Credit R.	5	3.9	None	**13,473**
LAKE ONTARIO								
Ashbridge's Bay Ramp	4	2002	Ringwood	Wild - Credit R.	5	3.5	None	9,211
Barcovan	5	2002	Ringwood*	Wild - Credit R.	7	5.0	Ad	10,141
Bluffer's Park	4	2002	Ringwood	Wild - Credit R.	5	3.5	None	32,423
Burlington Canal	4	2002	Ringwood	Wild - Credit R.	5	3.4	None	46,069
Consecon Robinson Pt	5	2002	Ringwood	Wild - Credit R.	6	4.5	None	14,685
Jordan Harbour	4	2002	Ringwood	Wild - Credit R.	5	3.7	None	23,709
Oshawa Harbour	4	2002	Ringwood	Wild - Credit R.	5	3.8	None	23,709
Port Dalhousie East	4	2002	Ringwood	Wild - Credit R.	5	4.1	None	93,468
Wellington Channel	5	2002	Ringwood	Wild - Credit R.	6	4.5	None	14,685
	5	2002	Ringwood*	Wild - Credit R.	7	5.8	Ad	10,149
Whitby Harbour	4	2002	Ringwood	Wild - Credit R.	5	3.8	None	23,709
								301,958
TOTAL - CHINOOK SALMON								**503,610**

* - Pen-Imprinted

Appendix C. Coho salmon stocked in the Province of Ontario waters of Lake Ontario, 2003.

SITE NAME	MONTH STOCKED	YEAR SPAWNED	HATCHERY	STRAIN/ EGG SOURCE	AGE (MONTHS)	MEAN WT (G)	MARKS	NUMBER STOCKED
				COHO - SPRING YEARLINGS				
CREDIT RIVER								
Eldorado Park	3	2001	Ringwood	Wild - Credit R.	15	21.4	Ad	18,255
Huttonville	3	2001	Ringwood	Wild - Credit R.	15	20.6	Ad	23,663
	3	2001	Ringwood	Wild - Salmon R.	15	17.7	RV	14,050
Norval	3	2001	Ringwood	Wild - Credit R.	15	18.4	Ad	38,824
TOTAL - COHO SALMON								**94,792**

Appendix C. Lake trout stocked in the Province of Ontario waters of Lake Ontario, 2003.

SITE NAME	MONTH STOCKED	YEAR SPAWNED	HATCHERY	STRAIN/ EGG SOURCE	AGE (MONTHS)	MEAN WT (G)	MARKS	NUMBER STOCKED
				LAKE TROUT - SPRING YEARLINGS				
LAKE ONTARIO								
Cobourg Harbour Pier	3	2001	Harwood	Seneca Lake/Harwood	15	32.2	AdRV	36,637
Fifty Point CA	4	2001	Harwood	Seneca Lake/Harwood	16	31.4	AdRV	51,041
	4	2001	Harwood	Slate Islands/Dorion	17	27.6	AdRV	15,244
North of Main Duck Sill	4	2001	Harwood	Mishibishu Lakes/Tarentorus	17	29.2	AdRV	18,067
	5	2001	Harwood	Slate Islands/Dorion	18	34.6	AdRV	51,458
	5	2001	Harwood	Michipicoten Island/Dorion	18	41.5	AdRV	23,884
Pigeon Island	5	2001	Harwood	Michipicoten Island/Dorion	18	44.8	AdRV	11,245
Scotch Bonnet Shoal	4	2001	Harwood	Seneca Lake/Harwood	16	37.8	AdRV	73,958
	4	2001	Harwood	Michipicoten Island/Dorion	17	36.0	AdRV	15,789
	4	2001	Harwood	Mishibishu Lakes/Tarentorus	17	33.4	AdRV	13,735
South of Long Point	4	2001	Harwood	Michipicoten Island/Dorion	17	39.0	AdRV	2,950
	4	2001	Harwood	Mishibishu Lakes/Tarentorus	17	33.2	AdRV	12,307
	5	2001	Harwood	Michipicoten Island/Dorion	18	39.4	AdRV	15,642
	5	2001	Harwood	Seneca Lake/Harwood	17	38.9	AdRV	67,601
TOTAL - LAKE TROUT								**409,558**

Appendix C. Rainbow trout stocked in the Province of Ontario waters of Lake Ontario, 2003.

SITE NAME	MONTH STOCKED	YEAR SPAWNED	HATCHERY	STRAIN/ EGG SOURCE	AGE (MONTHS)	MEAN WT (G)	MARKS	NUMBER STOCKED
RAINBOW TROUT - FRY								
CREDIT RIVER								
Black Cr Stewarttown	6	2003	Partnership	Wild - Credit R.	1	0.2	None	25,500
Papermill Dam	6	2003	Partnership	Wild - Credit R.	1	0.2	None	45,000
Silver Creek	6	2003	Partnership	Wild - Credit R.	1	0.2	None	55,000
								125,500
DON RIVER								
East Don R Elgin Mills Rc	7	2003	Partnership	Wild - Rouge R.	2	0.5	None	3,127
East Don R Regent St	7	2003	Partnership	Wild - Rouge R.	2	0.5	None	1,736
								4,863
ROUGE RIVER								
Berczy Cr	6	2003	Partnership	Wild - Rouge R.	1	0.2	None	5,954
Bruce Cr	6	2003	Partnership	Wild - Rouge R.	1	0.2	None	4,400
Little Rouge R Hwy 48	6	2003	Partnership	Wild - Rouge R.	1	0.2	None	10,887
	7	2003	Partnership	Wild - Rouge R.	2	0.7	None	2,140
Parkview Hatchery	6	2003	Partnership	Wild - Rouge R.	1	0.2	None	2,000
Robinson Cr	6	2003	Partnership	Wild - Rouge R.	1	0.2	None	19,061
	7	2003	Partnership	Wild - Rouge R.	2	0.4	None	2,008
	8	2003	Partnership	Wild - Rouge R.	2	1.0	None	2,100
Rouge A Edward Ave	7	2003	Partnership	Wild - Rouge R.	2	0.5	None	3,063
Rouge B Cedarhurst Dr	7	2003	Partnership	Wild - Rouge R.	2	0.4	None	4,405
								56,018
RAINBOW TROUT - FALL FINGERLINGS								
CREDIT RIVER								
Silver Cr	10	2003	Partnership	Wild - Rouge R.	5	2.0	None	**10,000**
ROUGE RIVER								
Berczy Cr	10	2003	Partnership	Wild - Rouge R.	5	2.3	None	5,000
Bruce Cr	10	2003	Partnership	Wild - Rouge R.	5	2.3	None	5,000
Little Rouge R Hwy 48	9	2003	Partnership	Wild - Rouge R.	4	1.8	None	2,358
	10	2003	Partnership	Wild - Rouge R.	5	2.8	None	6,500
Robinson Cr	9	2003	Partnership	Wild - Rouge R.	4	1.8	None	1,655
								20,513
RAINBOW TROUT - SPRING YEARLINGS								
BRONTE CREEK								
5th Side Road Bridge	4	2002	Normandale	Ganaraska/Normandale	13	12.0	AdRV	**20,069**
CREDIT RIVER								
Norval	4	2002	Normandale	Ganaraska/Normandale	13	14.4	AdRV	**20,054**
HUMBER RIVER								
East Branch Islington	4	2002	Normandale	Ganaraska/Normandale	13	17.6	AdRV	13,049
East Branch Mill Rd	4	2002	Normandale	Ganaraska/Normandale	13	16.3	AdRV	13,193
								26,242

(Continued on next page)

Appendix C. Rainbow trout stocked in the Province of Ontario waters of Lake Ontario, 2003.

SITE NAME	MONTH STOCKED	YEAR SPAWNED	HATCHERY	STRAIN/ EGG SOURCE	AGE (MONTHS)	MEAN WT (G)	MARKS	NUMBER STOCKED
(Continued from previous page)								
LAKE ONTARIO								
Glenora	6	2002	Harwood	Ganaraska/Normandale	15	29.1	AdRV	8,520
Jordan Harbour	4	2002	Normandale	Ganaraska/Normandale	13	13.1	AdRV	20,007
Millhaven Wharf	6	2002	Harwood	Ganaraska/Normandale	15	30.8	AdRV	6,441
North of Main Duck Sill	5	2002	Harwood	Ganaraska/Normandale	14	18.4	AdRV	5,433
Port Dalhousie East	4	2002	Normandale	Ganaraska/Normandale	13	14.4	AdRV	24,994
								65,395
ROUGE RIVER								
Bruce Cr	4	2002	Normandale	Ganaraska/Normandale	13	16.3	AdRV	7,059
Silver Spring Farms	4	2002	Normandale	Ganaraska/Normandale	13	16.3	AdRV	7,060
								14,119
TOTAL - RAINBOW TROUT FRY								**186,381**
TOTAL - RAINBOW TROUT FALL FINGLERLINGS								**30,513**
TOTAL - RAINBOW TROUT SPRING YEARLINGS								**145,879**
TOTAL - RAINBOW TROUT								**362,773**

Appendix C. Walleye stocked in the Province of Ontario waters of Lake Ontario, 2003.

SITE NAME	MONTH STOCKED	YEAR SPAWNED	HATCHERY	STRAIN/ EGG SOURCE	AGE (MONTHS)	MEAN WT (G)	MARKS	NUMBER STOCKED
				WALLEYE - FRY				
ST. LAWRENCE RIVER								
Gananoque River	5	2003	Partnership	Wild - Bay of Quinte	1		None	**20,000**
				WALLEYE - FINGERLINGS				
ST. LAWRENCE RIVER								
Gananoque River	10	2003	Partnership	Wild - Napanee R.	5	75.0	None	**950**
TOTAL - WALLEYE FRY								**20,000**
TOTAL - WALLEYE FINGERLINGS								**950**
TOTAL - WALLEYE								**20,950**