LAKE ONTARIO FISH COMMUNITIES AND FISHERIES:

2009 ANNUAL REPORT OF THE LAKE ONTARIO MANAGEMENT UNIT

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Lake Ontario Fish Communities and Fisheries: 2009 Annual Report of the Lake Ontario Management Unit

Foreword

The Lake Ontario Management Unit (LOMU) is pleased to release its Annual Report of assessment and management activities carried out during 2009.

Lake Ontario, the Bay of Quinte and the St. Lawrence River provide important subsistence, recreational and commercial fisheries presenting unique aquatic ecosystem challenges including: loss of native species, introduction of non-native species, destruction of fish habitat, and spread of fish disease.

LOMU continues to work closely with Canadian federal agencies, First Nations, provincial governments, various U.S. federal and state agencies and non-government partners to develop and implement plans to protect and restore native species and to maintain sustainable commercial and recreational fisheries.

We express our sincere appreciation to the many partners and volunteers who contribute to the successful delivery of LOMU initiatives. LOMU gratefully acknowledges the important contribution of the Lake Ontario Liaison Committee and the Fisheries Management Zone 20 Council members who provide input and advice in the management of the commercial and recreational fisheries.

Our team of skilled and committed staff (see Appendix A for a staff listing) delivered an exemplary program of field, laboratory (see Appendix B for a list of field and lab projects), and analytical work that will provide long-term benefits to the citizens of Ontario. We are pleased to share the important information about the activities and findings of the Lake Ontario Management Unit from 2009.

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1. Status of Major Species

The following is an overview of the status of major species in Ontario waters of Lake Ontario for 2009. The overview draws largely upon information presented in the chapters and sections that follow in this report. The fish communities of Lake Ontario continue to respond to changes in the ecosystem attributed to the effects of dreissenid mussels.

1.1 Chinook Salmon

Growth and condition of female Chinook salmon in the Credit River in 2009 was similar to that of 2003-2008, and continued to be lower than most years prior to 2003 (see Section 2.9). Growth and condition of male Chinook salmon has been highly variable in recent years and difficult to interpret. Although current prey fish populations still support this top predator, the long term stability of the fish community remains in question.

1.2 Rainbow Trout

Counts of wild rainbow trout at the Ganaraska River fishway have continued to be stable from 1998-2009. Condition of rainbow trout in the Ganaraska River in 2009 remained unchanged from the previous 2 years—about 5% below the long term average (see Section 2.1). Lamprey marks on rainbow trout continue to be a concern as they remain comparable with levels observed in the 1970s before lamprey control (see Section 2.1).

1.3 Lake Trout

The abundance of adult lake trout remains low after a period of decline that began in the 1990s, and is attributed to the combination of decreased survival of the stocked juveniles and reduced stocking numbers. In recent years the early survival appears to be improving (see Section 2.3).

1.4 Lake Whitefish

Abundance of lake whitefish in assessment gillnets is very low (see Section 2.3). Many strong year-classes produced in the late 1980s and early 1990s are aging and declining in both assessment gillnets (see Section 2.3) and commercial gear (see Section 4.2). Reproductive success was very low after the mid 1990s until a strong year-class was produced in 2003 (see Section 2.4). Growth of these young fish is very slow and age-at-maturity is delayed by at least two years. The condition of lake whitefish caught in summer assessment gillnets improved after the mid to late 1990s but condition of fish caught during the fall remained low. Commercial lake whitefish harvest in 2009 (68,354 lb) was nearly identical to 2008 (see Section 4.1).

1.5 Northern Pike

Northern pike, while not abundant in the open waters of Lake Ontario are common in many embayment and nearshore areas (see Section 2.6). Northern pike have declined in the Thousand Islands area of the St. Lawrence River (see Section 2.7).

1.6 American Eel

Eel are counted at the fish ladder located at the Moses-Saunders Hydroelectric Dam on the St. Lawrence River at Cornwall. The total number of eel migrating upstream during 2009 was somewhat lower than 2008, but continues the general trend of increasing numbers since 2001 (see Section 7.3). While this development is encouraging, the abundance of eel entering the upper St. Lawrence River and Lake Ontario is still less than 2% of the migrations observed in the early 1980s. Even with the closure of the commercial (2004) and sport fisheries (2005), the abundance of yellow eel in the Lake Ontario/upper St. Lawrence River ecosystem remains low. The Ontario Ministry of Natural Resources worked with Ontario Power Generation to stock eels into the upper St. Lawrence River and the Bay of Quinte (see Sections 7.1 and 7.3) to help maintain eels in this system and to improve biodiversity. In addition, Ontario is continuing to work with management agencies in other jurisdictions and other stakeholders, including Ontario Power Generation, Hydro Quebec, local commercial fish harvesters and the New

York Power Authority, to encourage the safe passage of eels around hydro dams and to mitigate barriers to migration. A pilot project was initiated during 2008 and continued during 2009 to trap large yellow eels in the Lake Ontario – upper St. Lawrence River and release them below all barriers to downstream migration in the St. Lawrence. Preliminary results of this project suggest that some of the transported eel do migrate out of the St. Lawrence River system towards the spawning grounds. It is hoped that these actions will contribute to the fecundity of the global spawning stock. Sustainable management practices throughout the range of this panmictic species in North America will be required to restore eel abundance.

1.7 Smallmouth Bass

Assessment gillnet and nearshore trapnet indices indicate that smallmouth bass remain at low to moderate abundance levels in the nearshore areas of Lake Ontario (see Section 2.3 and Section 2.6).

1.8 Largemouth Bass

Assessment trapnetting information indicate that largemouth bass abundance increased in the Bay of Quinte following increases in water transparency and aquatic vegetation in the late 1990s. Their current level of abundance exceeds that of walleye in upper Bay of Quinte nearshore areas. Largemouth bass are moderately abundant in other embayment areas of Lake Ontario (see Section 2.6).

1.9 Panfish

Panfish, particularly pumpkinseed, bluegill and black crappie, increased after re-establishment of submerged aquatic macrophytes in the Bay of Quinte (see Sections 2.3 and 2.4). These events were associated with post-dreissenid mussel invasion in the 1990s. Panfish are also common in other Lake Ontario embayments and nearshore areas (Section 2.6).

1.10 Yellow Perch

Yellow perch is one of the most common species in the nearshore areas (see Sections 2.3 and 2.4). Their current abundance levels in Lake Ontario are low to moderate compared to past levels. Yellow perch commercial harvest increased in Lake Ontario and the St. Lawrence River (see Section 4.1). Yellow perch are currently, by far, the most valuable species in the commercial fishery.

1.11 Walleye

The eastern Lake Ontario/Bay of Quinte walleye population has been stable since 2001 (Section 2.3 and 2.4). Assessment gillnet abundance indices for juvenile (age-1 to age 4) and mature walleye indicate that the walleye population has stabilized or increased slightly following their steady decline throughout the 1990s. Further, recruitment indices, based on young of year catch in bottom trawls, indicate that a strong year-class was produced in 2003, and that average (i.e. average for the last ten years) year-classes were produced in 2004, 2005, 2006 and 2009. The 2007 year-class index is the 3rd highest since 1995 and the 2008 year-class is the highest since 1994. Catches at age-1 in assessment gillnets suggest that the 2004 year-class is weaker and the 2005 year-class stronger than first indicated by the trawls. The 2003 and 2005 year-classes also figure prominently in most assessments including in other areas of Lake Ontario. Based on these recent recruitment levels, the walleye population should remain stable or increase, at least through the next few years. Current walleye status meets or exceeds BQFMP targets that call for a maintenance of walleye catches at 2002-2006 levels (see Section 7.2).

1.12 Prey Fish

The abundance of yearling-and-older alewife decreased from the previous year, and remains within the generally low levels observed since 2003 (see Section 2.5). There was a modest increase in the population of yearling-and-older rainbow smelt, but their abundance remains at the low levels observed since the early 2000s.

Three-spine stickleback abundance decreased dramatically in 2006-2007, prompting concerns for the future abundance of this species. Due to technical difficulties, their status could not be assessed in the following year, and in 2009 no threespine stickleback was caught, suggesting extremely low numbers in the offshore zone.

1.13 Round Goby

Round goby invaded Lake Ontario in the late 1990s and first appeared in routine Bay of Quinte assessment bottom trawls in 2001 and gillnets in 2002. Goby distribution expanded to include all areas of eastern Lake Ontario and the Bay of Quinte to depths of at least 36 m by 2006. Goby abundance appears to have peaked and declined in the Bay of Quinte. In Lake Ontario, 2009 catches declined in gillnets but were very high in bottom trawls (see Sections 2.3 and 2.4).

1.14 Chain Pickerel

Chain pickerel appear to be undergoing a northwest expansion of the species' native range. Three specimens were observed in 2009. All three were caught near Wolfe Island in the upper St. Lawrence River: two by a commercial fisher in April and one by Lake Ontario Management Unit assessment gillnets in September (see Section 2.7). These observations follow a single fish caught by a commercial fisher near Parrot Bay, eastern Lake Ontario, in April 2008. These four specimens possibly represent the first documented chain pickerel in the Province of Ontario. While not yet a major species, the potential future impact of this species on the nearshore ecosystem is not known.

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. Prior to 1987 counts of rainbow trout were complete, based on hand lift and visual counts. Since 1987 fish counts were made with a Pulsar Model 550 conductivity type fish counter. Estimates of missed fish were made through calibration with visual counts. During 2009, rainbow trout were counted and sampled for length, weight and age during the spring spawning run. The count of rainbow trout in the spring run has been relatively stable since 1998, and in 2009 was 4,502 fish (Table 2.1.1), about one-third peak abundances observed during the late 1980s (Fig. 2.1.1).

The body condition of rainbow trout in Lake Ontario was calculated as the estimated weight of a 635 mm (25 in) fish at the Ganaraska River. In 2009, the weights of male (2,905 g) and female (3,017 g) rainbow trout were not different than those of 2007 or 2008, and were below the long-term average for the data (Table 2.1.2).

In 2009, lamprey marks on rainbow trout in the Ganaraska River declined 34% to 0.633 marks/fish (Fig. 2.1.2), and still remained more about four times higher than the average for 1990-2003 (Table 2.1.3). The marking rates from 2004-2009 were similar to levels in the 1970s (Fig. 2.1.2). A high incidence of A1 and B1 marks[1] since 2004 indicated very recent attacks relative to rainbow trout migrating into the Ganaraska River (Table 2.1.4).

[1] King, Everett Louis, Jr. and Thomas A. Edsall. 1979. Illustrated field guide for the classification of sea lamprey attack marks on great lakes lake trout. GLFC Spcial Publication 79-1.

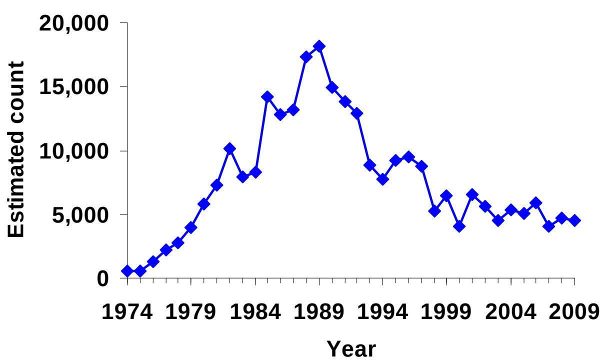


FIG. 2.1.1. Estimated upstream counts of rainbow trout at the Ganaraska River fishway, Port Hope, Ontario during April and May, 1974-2009. Estimates for 1980, 1982, 1984, 1986, 1992, and 2002 were interpolated from adjacent years.

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, 1974-2009. Observed counts are the sum of hand lifted fish and visual or electronic counts. As electronic counts are biased low, they were scaled based on simultaneous visual and electronic counts to obtain estimated counts.

Year	Observed count	Estimated count
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
2004	4,452	5,308
2005	4,417	5,055
2006	5,171	5,877
2007	3,641	4,057
2008	3,963	4,713
2009	3,290	4,502

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, 1974-2009.

	Male		Female	
Year	Weight (g)	Sample size	Weight (g)	Sample size
1974	3,069	173	3,214	231
1975	2,971	183	3,070	279
1976	3,171	411	3,326	588
1977	2,978	635	3,166	979
1978	3,183	255	3,341	512
1979	3,221	344	3,337	626
1981	3,176	252	3,360	468
1983	2,879	308	3,032	132
1984			3,178	120
1985	3,171	410	3,205	154
1987	2,643	66	3,046	74
1990	2,868	259	3,071	197
1991	2,851	126	3,087	289
1992	2,998	138	3,113	165
1993	2,952	84	3,135	166
1994	3,247	109	3,357	178
1995	2,960	146	3,077	154
1997	3,143	140	3,269	127
1998	3,035	96	3,195	222
1999	3,063	173	3,226	290
2000	3,120	121	3,241	226
2001	2,919	295	3,040	290
2003	3,034	92	3,151	144
2004	3,054	143	3,184	248
2005	2,985	142	3,109	173
2006	3,024	101	3,137	217
2007	2,922	75	3,006	132
2008	2,889	125	3,012	148
2009	2,905	74	3,017	209
Average	3,015		3,162	

TABLE 2.1.3. Lamprey marks on rainbow trout in April, 1974-2009, at the Ganaraska River fishway, in Port Hope, Ontario. Since 1990, A1 and A2 marks were called wounds and the remainder of marks was called scars to fit with historical classification.

Year	Wounds /fish	Scars/ fish	Marks/ fish	% with wounds	% with scars	% with marks	N
1974	0.083	0.676	0.759	7	33.2	36.8	527
1975	0.095	0.725	0.82	8	37.2	40.2	599
1976	0.09	0.355	0.445	6.6	23.3	28.1	1280
1977	0.076	0.178	0.254	6.4	13.5	18.2	2242
1978	0.097	0.38	0.476	8.1	28.4	33.7	2722
1979	0.122	0.312	0.434	10.3	22.8	29.8	3926
1981			0.516			36.2	5489
1983	0.113	0.456	0.569	9.7	33.4	38.8	833
1985	0.04	0.154	0.193	3.7	11.5	14.5	1256
1990	0.015	0.087	0.102	0	0.1	0.1	470
1991	0.012	0.091	0.103	1.2	7.4	8.4	419
1992	0.035	0.162	0.197	2.9	14.3	16.5	315
1993	0.034	0.165	0.199	3.1	15.3	17.2	261
1994	0.027	0.156	0.183	0	0.1	0.2	301
1995	0.017	0.046	0.063	1.7	4.3	5.9	303
1996	0.023	0.03	0.053	2.3	3	5.3	397
1997	0.017	0.158	0.175	1.7	12.7	13.7	291
1998	0.035	0.162	0.197	0	0.1	0.2	340
1999	0.015	0.199	0.214	0	0.2	0.2	477
2000	0.005	0.272	0.278	0.5	23.2	23.5	371
2001	0.028	0.229	0.257	2.5	17.8	18.8	608
2003	0.017	0.176	0.193	1.7	14.3	15.1	238
2004	0.079	0.464	0.543	6.9	33.7	37.5	392
2005	0.084	0.579	0.664	6.9	39.6	41.4	321
2006	0.088	0.577	0.665	6.9	40.1	44.5	319
2007	0.068	0.665	0.733	5.3	46.6	49	206
2008	0.113	0.843	0.956	8.8	48.5	51.5	274
2009	0.142	0.491	0.633	12.5	36.3	42.2	289

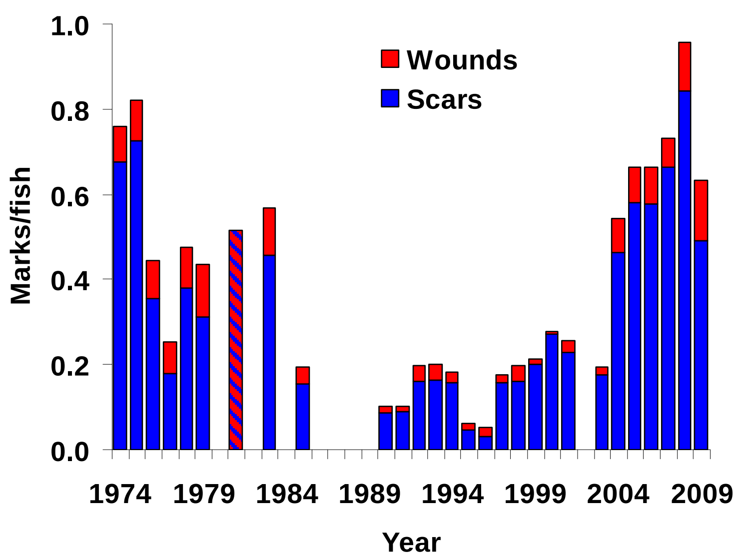


FIG. 2.1.2. Lamprey mark trends on rainbow trout in April, 1974-2009, at the Ganaraska River fishway, in Port Hope, Ontario. Since 1990, A1 and A2 marks were called wounds and the remainder of marks were called scars to fit with historical classification. Scars and wounds were combined in 1981.

TABLE 2.1.4. Classification of lamprey marks on rainbow trout in April, 1990-2009, at the Ganaraska River fishway, in Port Hope, Ontario.

	Marks/fish							
Year	A1	A2	A3	A4	B1	B2	B3	B4
1990	0	0.015	0.009	0.009	0	0.002	0.017	0.051
1991	0	0.012	0.012	0.002	0.029	0.01	0.019	0.019
1992	0.013	0.022	0.025	0.019	0.079	0.006	0.01	0.022
1993	0.011	0.023	0.019	0.023	0.061	0	0.008	0.054
1994	0.007	0.02	0.01	0.007	0.076	0.01	0.01	0.043
1995	0.007	0.01	0.017	0.003	0	0	0.02	0.007
1996	0.013	0.01	0.003	0.003	0.005	0.013	0	0.008
1997	0.003	0.014	0.021	0	0	0.021	0.017	0.1
1998	0.012	0.024	0.012	0.041	0.012	0.003	0.015	0.079
1999	0	0.013	0.023	0.021	0.01	0.023	0.019	0.105
2000	0	0.005	0.027	0.057	0	0.003	0.003	0.183
2001	0.002	0.026	0.021	0.069	0	0	0.002	0.137
2003	0	0.013	0.021	0.029	0	0.008	0.004	0.118
2004	0.02	0.059	0.084	0.064	0.186	0.005	0.031	0.094
2005	0.016	0.069	0.075	0.072	0.315	0.003	0.04	0.075
2006	0.028	0.06	0.147	0.05	0.15	0.031	0.047	0.15
2007	0.01	0.058	0.087	0.044	0.432	0	0.034	0.068
2008	0.022	0.091	0.142	0.018	0.38	0.015	0.161	0.128
2009	0.087	0.055	0.066	0.038	0.225	0.01	0.017	0.114

2.2 Large Salmonid Predation Impacts on Post-smolt Salmonids

The purpose of this program was to document the predation rates of large salmonids on smaller salmonids, particularly Atlantic salmon, shortly after smolting and/or stocking along the Lake Ontario shoreline during spring. Mortality during the early stages of life in the open-lake was hypothesized to be a critical factor involved in the decline in abundance of rainbow trout and other salmonids in Lake Ontario. Changes in distribution of adult salmon and trout and other prey species may be affecting their interaction and predation on juvenile salmonids. This was the final year (2009) of a 3-year survey.

The fish community was sampled using gillnets, set on the bottom from May 5-May 28, 2009. Gillnet catch per unit of effort (CUE) was standardized as the total catch number of fish per gillnet gang comprised of ten 15.2-m (50-ft) panels with mesh sizes from 38-152 mm (1½-6 inch) with 13 mm (½ inch) intervals. In addition, we attached a 3.7-m (12.5 ft) panel with 25 mm (1 inch) mesh to two-thirds of gillnet samples, and this catch was reported separately. Gillnets were set for one night at 54 locations (Fig. 2.2.1) in the nearshore depths of central Lake Ontario from Newcastle (78° 35′ longitude) to Collier Shoal (77° 50′

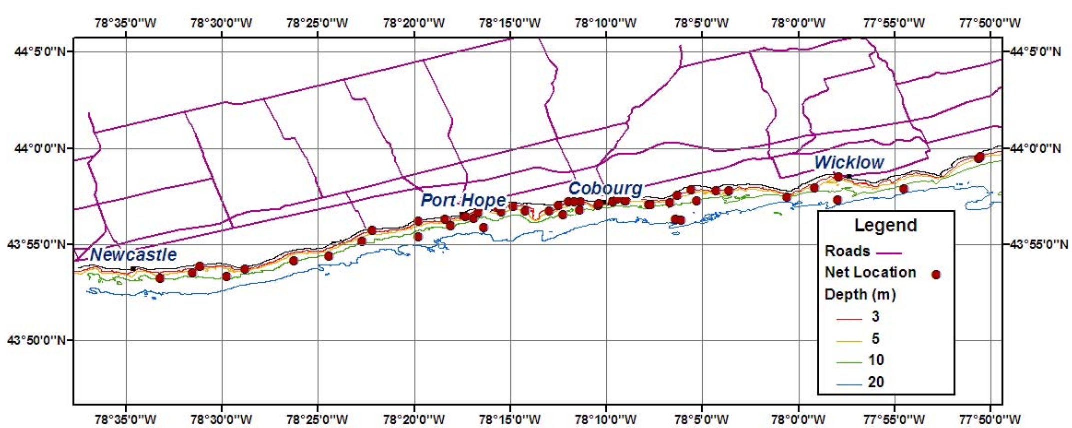


FIG. 2.2.1. Map showing gillnet sampling locations in central Lake Ontario, during May 2009.

longitude). Gillnets locations were randomly selected within three site depth strata [3-5 m (4), 5-10 m (7.5), and 10-20 m (15)], and three longitudinal strata separated at 78° 05′ and 78° 20′ longitude. Sampling effort was weighted by depth and longitudinal strata; effort was higher in the central longitudinal strata and the shallower depth strata that were closer to the Ganaraska River and Cobourg Creek where juvenile salmonid density was expected to be higher. The central strata received about 4 times the effort of the east and west strata (Table 2.2.1). Sampling in the east and west longitudinal zones was balanced among depth strata. Two-thirds of the sites were sampled with a 13 mm panel (Table 2.2.1). Biological sampling was similar to other LOMU gillnet programs, and in addition, stomachs were collected to examine diet, including predation of salmonids. That analysis is ongoing and its results will be reported at a later date.

Twelve fish species were caught in gillnet samples in 2009 (Table 2.2.2, 2.2.3). Mean gillnet CUEs were dominated by two major prey species: alewife (4.6), and round gobies (1.2), followed by two major predator species: brown trout (1.0) and lake trout (0.7). Rainbow smelt were observed only in the 13 mm gillnet panels (Table 2.2.3). Notably, one brook trout was observed in 2009 for the first time in this program, although, this species has been previously observed in Lake Ontario in another LOMU gillnet program and occasionally by anglers. No juvenile salmon and trout (fork length < 275 mm) were caught (Figure 2.2.2).

TABLE 2.2.1. The sampling distribution of gillnets in central Lake Ontario, during May 2009.

Area	Site depth zone (m)	Number of samples	
		Standard gill-net (38-152 mm)	Extra 13 mm panel
East	4.0	3	2
East	7.5	3	2
East	15.0	3	2
Middle	4.0	15	8
Middle	7.5	12	7
Middle	15.0	9	8
West	4.0	3	3
West	7.5	3	2
West	15.0	3	2

TABLE 2.2.2. The average catch per standard gillnet in central Lake Ontario, during May 2009.

Species	Site depth stratum (m)/longitudinal stratum								
	4.0 East	4.0 Middle	4.0 West	7.5 East	7.5 Middle	7.5 West	15.0 East	15.0 Middle	15.0 West
Alewife	0.0	0.6	2.7	2.3	1.3	0.0	9.7	0.2	25.0
Gizzard shad	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rainbow trout	0.0	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Brown trout	1.0	1.6	2.3	0.3	0.5	1.7	0.0	0.1	1.3
Brook trout	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lake trout	0.7	0.9	0.7	1.3	1.1	0.0	0.7	0.7	0.0
Round whitefish	0.0	0.2	0.0	0.0	0.3	1.3	0.0	0.4	0.7
White sucker	0.0	1.9	0.0	0.0	0.3	0.3	0.0	0.0	0.0
Rock bass	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Walleye	0.3	0.0	0.0	0.3	0.1	0.0	0.0	0.0	0.0
Round goby	0.0	0.9	1.3	1.3	0.8	0.7	3.3	1.7	0.3

TABLE 2.2.3. The average catch per 15.2 m of 13 mm (1 inch) gillnet in central Lake Ontario, during May.

Species	Site depth stratum (m)/longitudinal stratum								
	4.0 East	4.0 Middle	4.0 West	7.5 East	7.5 Middle	7.5 West	15.0 East	15.0 Middle	15.0 West
Rainbow smelt	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.5	0.0
Round goby	12.0	37.5	10.7	12.0	24.0	2.0	2.0	8.0	8.0

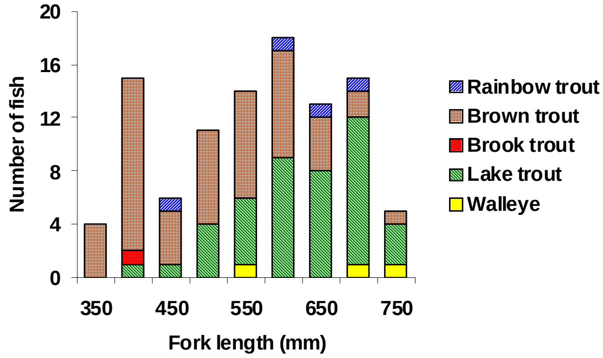


FIG. 2.2.2. Fork length of salmon, trout, and walleye observed in gillnets in central Lake Ontario, during May 2009.

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 inch (½ inch increments) stretched mesh. Monofilament mesh replaced multifilament in 1992. The gillnetting program is used to monitor the abundance of a variety of warm, cool and cold-water fish species in the eastern Lake Ontario and Bay of Quinte.

Species-specific catches in the gillnetting program are shown by geographic region in Tables 2.3.1-2.3.8 for 1992-2009. Each gillnet catch was standardized to represent the total number of fish in 100 m of each mesh size and summed across the ten mesh sizes from 1½-6 inch. Twenty-one different species and over eighteen thousand individual fish were caught in 2009. About 80% of the catch was alewife.

More detailed biological information is presented below for selected species including lake whitefish, walleye, round goby and lake trout.

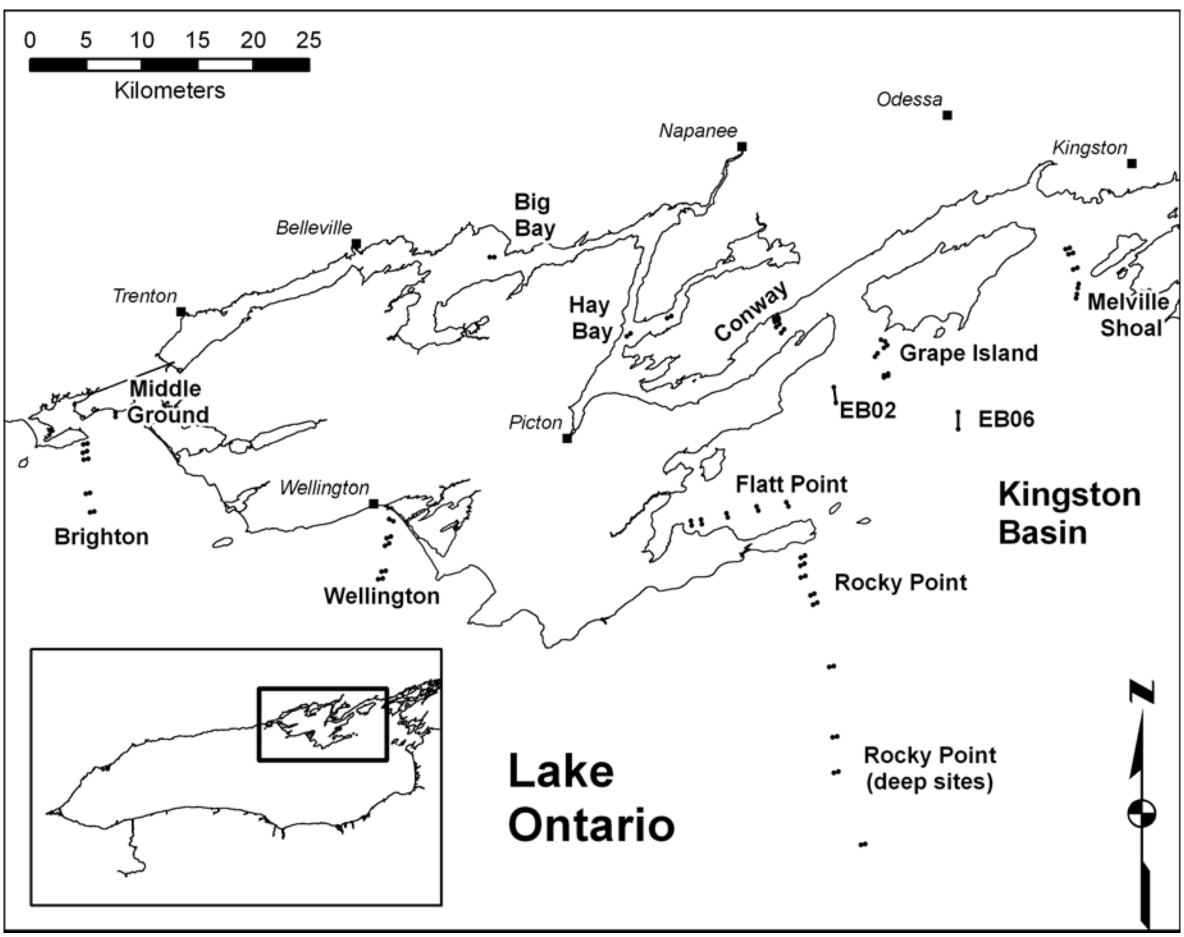


FIG. 2.3.1. Map of northeastern Lake Ontario. Shown are eastern Lake Ontario and Bay of Quinte fish community index gillnetting locations.

Lake Ontario

Middle Ground

Seven species were caught at Middle Ground in 2009. The most abundant species were yellow perch, alewife, northern pike, white sucker and walleye (Table 2.3.1). Yellow perch were less abundant in 2009 than in 2008 and also less abundant than for the 1992-2009 average. Alewife and northern pike were more abundant in 2009 than for their long-term averages. White sucker and walleye were less abundant than their long-term averages. Alewife, a species that was moderately abundant in the early to mid-1990s but not been caught from 2003-2007, reappeared in 2008 and, in 2009, returned to the early 1990 levels of abundance.

Northeast (Brighton, Wellington and Rocky Point shallow sites)

Fourteen species were caught in the Northeast Lake Ontario gillnets in 2009. The most abundant species were alewife, round goby, yellow perch, rock bass, and brown trout (Table 2.3.2). Of these species, alewife, round goby and brown trout were more abundant in 2009 than the 1992-2009 average while yellow perch and rock bass were less abundant. The cold-water benthic species, lake trout, lake whitefish and round whitefish, declined markedly over the 1992-2009 time-period. Round goby, caught for the first time in 2003 is now, along with alewife and yellow perch, one of the most abundant species in the northeast region.

Rocky Point—Deep Sites

Four species, alewife, lake trout, lake whitefish and rainbow smelt were caught at the Rocky Point deep sites in 2009 (Table 2.3.3). Alewife were more abundant in 2009 than in any other year since 1997.

Kingston Basin—Nearshore Sites (Melville Shoal, Grape Island and Flatt Point)

Twelve species were caught in Kingston Basin nearshore gillnets in 2009. The most abundant species were alewife, yellow perch, walleye, lake trout and round goby (Table 2.3.4). Alewife were more abundant in 2009 than their long term averages while yellow perch walleye and lake trout were less abundant. Round goby declined to its lowest level since being caught for the first time in 2003. Burbot, which were caught each year from 1992-2004, have not been caught in the last six years.

Kingston Basin—Deep Sites (EB02 and EB06)

Eight species were caught in Kingston Basin deep gillnets in 2009. The most abundant species were alewife, lake trout, lake whitefish, rainbow smelt and Chinook salmon (Table 2.3.5). The catches of each of these species was lower in 2009 than their long-term averages except for Chinook salmon catch which was slightly higher. Round goby, caught for the first time in 2004 at these deep sites, were not captured in the last two years.

Bay of Quinte

Big Bay

Twelve species were caught in Big Bay gillnets in 2009. The most abundant species were yellow perch, white perch, walleye, freshwater drum and bluegill (Table 2.3.6). Of these species, white perch and bluegill were more abundant in 2009 than their 1992-2009 average. Walleye and freshwater drum were less than their long-term average and yellow perch were about the same as their long-term average. Brown bullhead have shown an steady decrease in abundance since 2001. Round goby, first caught here in 2003, have not been caught since 2005.

Hay Bay

Ten species were caught in Hay Bay gillnets in 2009. The most abundant species were yellow perch, alewife, white perch, white sucker and walleye (Table 2.3.7). Of these species, only alewife were more abundant in 2009 than the 1992-2009 average; while the others were less abundant. Round goby, having been caught each year from 2002-2005, were absent from the 2006-2009 catches.

Conway

Thirteen species were caught in Conway gillnets in 2009. The most abundant species were alewife, yellow perch, walleye, freshwater drum and white sucker (Table 2.3.8). Of these species only alewife were more abundant in 2009 than the 1992-2009 average; the other species were less abundant. Round goby, which were caught for the first time in 2002 and which had increased to a high abundance level by 2004, have subsequently declined and were absent in 2009.

Species Highlights

Lake Whitefish

Thirty-nine lake whitefish were caught in the 2009 index gillnets. Ninety percent of these fish were age-7 or less. Age-5 fish were an average of 390 mm fork length and 758 g in weight (Table 2.3.9 and Fig. 2.3.2). All age-6 female fish were classified as mature. Lake whitefish condition appears to have stabilized at a level lower than that observed in the early 1990s but significantly higher than that in 1996 and 1997 (Fig. 2.3.3).

Walleye

The age distribution of walleye (Table 2.3.10) showed a broad range of age-classes from age-1 to age-21. Generally speaking, during the summer index gillnetting program young walleye were found in the Bay of Quinte (e.g., age-1 to age-5 fish comprised 88% of the Bay of Quinte walleye catch) while older walleye were present in eastern Lake Ontario (e.g., age-6 and older fish comprised 94% of the catches in the Kingston Basin). Of the young walleye, all ages were quite common indicating that year-class strength has been relatively strong and consistent in recent years. Older walleye, from many strong year-classes, were also abundant in eastern Lake Ontario. The 2003 and 2005 year-classes appear particularly strong in Lake Ontario. Female walleye begin to mature for the first time during the summer at age-4 to presumably spawn the following spring at age-5.

Round Goby

Only large round goby are susceptible to capture in assessments gillnets. Round goby first appeared in assessment gillnets in the northeast and Bay of Quinte in 2002, Kingston Basin nearshore sites in 2003 (depth range 7.5 to 27.5 m), and in Kingston Basin deep sites (depth about 30 m) in 2004 (Table 2.3.11). No round goby were captured to date at Middle Ground or the Rocky Point deep sites (40-140 m). In the Bay of Quinte, round goby abundance initially increased, peaked in 2004, and then decreased substantially. In Lake Ontario, goby abundance increased until 2007, declined in 2008 and remained stable in 2009.

Lake Trout

The abundance of adult lake trout remains low (Fig. 2.3.4). The current levels were reached around the year 2002, after a period of decline that began in the early 1990s, and which was attributed to reduced stocking levels combined with a decline in early survival of the stocked fish. Recently there appears to be improvement in their early survival. There has been an increase in abundance of immature fish in the Kingston basin (Fig. 2.3.5), and the early survival of the recent year classes has recently started to improve (Fig. 2.3.6). It seems reasonable to anticipate that the numbers of adult fish will start to increase in the near future.

TABLE 2.3.1. Species-specific catch per gillnet set at **Middle Ground**, 1992-2009. Shown are the average catches in 1-3 gillnet gangs set at a single depth (5 m) during each of 2-3 visits to a single site (Middle Ground). The total number of species caught and gillnets set each year are indicated.

	Year																		
Species	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	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	0.0	0.0	0.0	0.0	0.0	0.0	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	0.0	0.0	0.0	0.0	5.4	54.3	13.5
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	0.0	3.3	0.0	1.6	0.0	0.0	1.6
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	0.0	0.0	1.6	0.0	1.6	3.3	0.6
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	0.0	0.0	1.6	0.0	0.0	0.0	3.2
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	0.0	1.6	1.6	9.9	6.6	8.2	2.5
White sucker	3.3	2.2	0.0	13.2	19.7	9.9	3.3	23.0	8.2	9.9	20.2	0.0	13.7	4.9	8.2	26.3	14.8	6.6	10.6
Common carp	0.0	1.1	0.0	0.0	6.6	0.0	9.9	6.6	0.0	3.3	0.0	4.9	3.3	0.0	0.0	0.0	0.0	0.0	2.1
Brown bullhead	4.4	2.2	1.6	32.9	0.0	0.0	26.3	13.2	3.3	13.2	3.3	14.2	1.6	10.4	5.4	4.9	1.6	0.0	8.1
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	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Rock bass	0.0	3.3	3.3	10.9	3.3	3.3	3.3	32.6	27.2	7.1	1.6	3.3	4.9	3.3	0.0	7.1	0.0	0.0	6.7
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	0.0	0.0	0.0	0.0	0.0	0.0	0.6
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	0.0	0.0	0.0	0.0	0.0	0.0	0.2
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	1.6	0.0	0.0	1.6	0.0	0.0	0.3
Largemouth bass	0.0	0.0	0.0	0.0	0.0	0.0	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Yellow perch	539.8	267.5	455.0	332.7	129.4	281.6	506.6	419.9	423.7	285.4	400.7	170.1	448.2	193.0	695.6	192.5	291.8	149.0	354.9
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	3.3	4.9	8.2	23.0	4.9	4.9	11.8
Freshwater drum	0.0	1.1	0.0	9.9	13.2	0.0	6.6	0.0	3.3	0.0	1.6	0.0	19.7	1.6	0.0	3.3	0.0	3.3	3.5
Total catch	626	309	565	516	242	345	559	523	467	326	436	204	496	223	722	270	327	230	421
Number of species	9	10	7	9	8	9	7	10	6	7	7	7	8	8	7	9	7	7	18
Number of sets	6	6	4	2	2	2	1	2	4	4	4	4	4	4	4	4	4	4	

TABLE 2.3.2. Species-specific catch per gillnet set in **Northeastern** Lake Ontario, 1992-2009. Shown are the average catches in 1-3 gillnet gangs set at each of 5 depths (range 7.5-27.5 m) during each of 2-3 visits to each of 3 sites (Brighton, Wellington and Rocky Point). The total number of species caught and gillnets set each year are indicated.

Species	Year																		
	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Mean
Alewife	218.4	130.5	338.4	439.2	721.6	337.1	867.2	535.5	218.3	385.6	657.0	396.8	473.9	916.2	773.3	307.9	877.0	1829.3	579.1
Gizzard shad	0.0	3.5	0.5	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
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	0.0	0.0	0.0	0.0	0.0	0.0
Chinook salmon	1.2	5.4	7.7	3.3	2.4	0.9	1.3	0.5	0.0	0.4	1.4	3.8	4.6	1.3	1.3	2.3	2.0	0.1	2.2
Rainbow trout	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
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	0.0	0.0	0.0	0.0	0.0	0.0
Brown trout	0.4	0.3	2.5	0.2	0.0	0.2	0.4	0.2	0.5	0.2	2.2	1.1	1.6	0.7	1.1	0.5	2.1	1.0	0.8
Lake trout	65.8	30.6	56.9	49.9	22.8	22.4	22.2	5.7	17.5	9.6	6.6	2.7	5.0	1.1	2.8	1.1	0.5	0.5	18.0
Lake whitefish	4.6	9.1	4.6	7.5	2.6	3.4	0.7	0.0	0.5	0.4	0.1	0.7	0.2	0.1	0.2	0.1	0.5	1.0	2.0
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	0.0	0.2	0.3	0.1	0.5	0.2	0.4
Round whitefish	5.9	5.2	2.0	6.8	2.4	0.9	0.4	0.2	0.0	0.0	0.5	0.1	0.1	0.0	0.0	0.0	0.0	0.0	1.4
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	0.0	0.0	0.0	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	0.0	0.0	0.0	0.0	0.5	0.2	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	0.0	0.2	0.0	0.4	0.1	0.0	0.1
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	0.5	0.3	0.1	0.4	0.0	0.0	0.6
Greater redhorse	1.2	0.8	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.2
Lake chub	0.1	0.1	0.0	0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.1
Common carp	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0
Brown bullhead	0.0	0.1	0.0	0.0	0.0	0.2	0.4	0.2	0.9	1.2	0.7	1.9	0.8	1.1	0.0	0.5	0.5	0.1	0.5
Channel catfish	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	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	0.0	0.2	0.1	0.6	0.0	0.0	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	0.0	0.0	0.0	0.0	0.0	0.0
Burbot	0.6	1.4	1.3	2.0	2.6	0.9	0.7	0.0	0.5	0.1	0.4	0.1	0.0	0.1	0.2	0.0	0.0	0.0	0.6
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	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rock bass	1.5	2.1	2.5	3.3	2.4	1.7	9.4	4.1	2.7	1.1	1.9	4.3	2.0	1.6	1.5	2.1	4.9	1.4	2.8
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	0.0	0.0	0.0	0.0	0.0	0.0
Smallmouth bass	6.1	4.0	4.4	2.0	0.2	0.4	1.8	4.8	0.4	1.5	1.4	1.5	1.6	0.7	0.9	0.9	1.1	0.3	1.9
Yellow perch	100.4	224.4	97.6	135.7	75.6	76.4	48.3	45.8	63.9	27.8	14.7	40.5	23.3	34.7	24.2	56.9	49.8	57.8	66.5
Walleye	3.8	4.4	3.8	2.2	0.9	1.3	1.5	1.3	0.6	0.0	0.4	0.8	1.4	2.3	0.7	2.6	1.0	0.2	1.6
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	2.5	71.3	63.3	162.1	49.8	67.4	23.2
Freshwater drum	0.6	0.7	1.6	0.4	1.1	1.2	0.4	0.7	0.0	0.2	0.1	0.1	0.5	0.0	0.1	0.0	0.2	0.0	0.5
Total catch	416	426	530	658	835	448	957	600	307	430	688	456	518	1032	870	539	991	1960	703
Number of species	20	21	18	16	13	16	17	14	13	14	16	17	15	17	16	16	16	14	31
Number of sets	90	90	40	30	30	30	29	35	36	60	60	60	60	60	60	60	60	60	

TABLE 2.3.3. Species-specific catch per gillnet set at **Rocky Point** Lake Ontario deep sites (range 60-140 m), 1997-2009. 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 species caught and gillnets set each year are indicated.

	Year													
Species	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Mean
Alewife	28.4	88.0	6.2	0.8	80.6	2.5	60.6	95.1	12.1	Not completed	Not completed	157.3	267.5	53.2
Lake trout	34.3	34.5	34.5	29.6	44.8	41.1	27.4	14.3	12.1			9.6	12.3	28.2
Lake whitefish	0.0	8.6	4.1	0.4	0.8	0.0	0.5	0.0	0.5			1.6	3.3	1.7
Cisco (Lake herring)	0.0	2.1	0.4	0.8	0.0	0.8	0.5	1.4	0.0			0.0	0.0	0.6
Rainbow smelt	3.7	3.3	2.9	0.8	0.0	1.2	0.0	0.0	0.0			0.5	0.5	1.2
Burbot	1.2	0.4	0.8	0.0	0.0	0.0	0.0	0.3	0.0			0.0	0.0	0.3
Slimy sculpin	0.0	1.6	0.0	0.4	0.4	0.0	0.3	0.3	0.0			0.5	0.0	0.4
Total catch	68	139	49	33	127	46	89	111	25			170	284	85.5
Number of species	4	7	6	6	4	4	5	5	3			5	4	7
Number of sets	15	16	13	16	16	16	24	24	24	0	0	24	24	

TABLE 2.3.4. Species-specific catch per gillnet set in the **Kingston Basin** Lake Ontario (**nearshore sites**), 1992-2009. Shown are the average catches in 1-3 gillnet gangs set at each of 5 depths (range 7.5-27.5 m) during each of 2-3 visits to each of 3 sites 9 (Flatt Point, Grape Island and Melville Shoal). The total number of species caught and gillnets set each year are indicated.

	Year																		
Species	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Mean
Lake sturgeon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alewife	838.3	469.6	185.8	538.4	508.6	351.9	1327.9	552.3	392.2	530.6	130.3	151.0	497.0	1195.0	1700.4	825.8	1734.7	2295.7	790.3
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	0.0	0.0	0.0	0.0	0.0	0.0
Chinook salmon	0.2	1.8	0.0	0.9	0.0	0.0	0.7	0.0	0.3	0.0	0.0	0.0	0.8	0.4	0.0	0.4	0.0	0.0	0.3
Rainbow trout	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
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	0.0	0.1	0.4	0.0	0.4	0.1	0.1
Lake trout	54.5	67.0	80.2	63.9	47.3	20.4	13.0	2.7	2.9	5.0	2.3	3.4	2.4	1.4	0.9	3.4	1.9	4.7	21.0
Lake whitefish	20.2	42.0	33.8	27.1	15.1	8.4	15.9	1.4	4.8	10.4	6.5	2.5	5.2	1.3	0.7	3.4	1.9	0.5	11.2
Cisco (Lake herring)	6.8	3.7	7.1	2.6	0.7	0.0	0.2	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.0	0.0	0.0	0.0	1.2
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	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	0.0	0.0	0.0	0.0	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	0.0	0.0	0.1	0.0	0.5	0.1	0.4
Northern pike	0.8	0.4	0.3	0.4	0.2	0.0	0.5	0.0	0.1	0.3	0.2	0.1	0.1	0.3	0.1	0.2	0.8	0.5	0.3
White sucker	5.5	6.0	0.5	1.8	0.0	0.9	4.8	0.3	1.5	1.1	1.0	1.6	2.0	1.3	0.8	0.5	1.2	0.1	1.7
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	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	0.0	0.0	0.0	0.0	0.0	0.0
Moxostoma sp.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Common carp	0.0	0.0	0.0	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Brown bullhead	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.1	0.0	0.1	0.4	0.5	0.1	0.1	0.1	0.0	0.0	0.1
Channel catfish	0.9	0.1	0.0	0.2	0.0	0.7	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Stonecat	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.5	0.3	0.8	1.4	0.9	0.7	1.1	0.0	0.0	0.0	0.0	0.3
Burbot	0.1	0.4	0.2	0.4	0.9	1.6	1.4	0.3	0.1	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.3
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	0.0	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	0.2	0.1	0.0	0.0	0.0	0.0	0.3
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	6.1	4.4	6.3	6.4	9.7	2.8	7.3
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	0.0	0.0	0.0	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	1.8	1.6	0.2	1.1	1.3	2.3	1.1	2.1
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	298.5	127.5	250.7	164.7	71.1	47.8	141.4
Walleye	29.3	26.8	13.0	32.5	3.9	15.0	17.9	22.0	7.3	6.1	3.7	5.3	5.5	5.5	8.0	7.1	6.8	9.6	12.5
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	129.9	42.2	56.9	46.0	10.9	3.6	16.2
Freshwater drum	1.0	0.3	0.5	0.7	0.0	0.2	1.1	0.5	0.5	0.0	0.0	0.3	0.0	0.0	0.0	0.5	0.0	0.0	0.3
Total catch	1297	944	426	738	636	511	1551	720	537	611	262	280	950	1381	2026	1060	1842	2367	1008
Number of species	19	20	14	16	10	12	15	17	15	14	12	17	14	16	13	14	12	12	31
Number of sets	86	88	40	30	29	29	29	41	48	60	60	60	60	60	60	60	60	60	

TABLE 2.3.5. Species-specific catch per gillnet set in the **Kingston Basin** Lake Ontario (**deep sites**), 1992-2009. Shown are the average catches in 4-8 gillnet gangs set at a single depth (approx. 30 m) during each of 3 visits to each of 2 sites (EB02 and EB06). The total number of species caught and gillnets set each year are indicated.

	Year																		
Species	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	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	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	0.0	0.0	0.0	0.0	0.0	0.0
Alewife	298.8	183.7	50.7	122.5	74.5	20.0	491.2	629.4	157.3	110.2	2.7	3.4	37.7	11.9	22.9	31.9	46.6	28.8	129.1
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	0.1	0.3	0.0	0.1	0.1	0.4	0.2
Rainbow trout	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Atlantic salmon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
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	0.0	0.1	0.0	0.3	0.3	0.1	0.1
Lake trout	276.6	256.3	207.5	166.7	157.4	78.9	51.3	41.4	22.7	10.4	10.1	11.8	12.1	8.1	13.0	15.5	22.9	17.4	76.7
Lake whitefish	51.5	71.3	28.8	37.8	29.1	33.4	24.4	16.4	6.2	2.7	2.7	1.1	8.9	1.0	1.9	1.9	7.4	1.8	18.3
Cisco (Lake herring)	1.9	0.5	2.2	0.8	0.9	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.4
Rainbow smelt	12.9	4.4	5.5	4.9	1.4	0.3	2.7	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.4	0.1	0.0	0.7	1.9
Common carp	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
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	0.0	0.0	0.0	0.0	0.0	0.0
Burbot	0.0	0.3	0.5	0.3	0.7	1.1	0.8	0.3	1.1	0.8	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.4
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	0.0	0.0	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	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Smallmouth bass	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
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	9.6	1.6	2.3	0.5	2.1	0.4	1.1
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	0.0	0.1	0.0	0.1	0.0	0.1
Round goby	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.3	1.0	1.1	0.0	0.0	0.2
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	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	0.0	0.0	0.0	0.0	0.0	0.0
Total catch	645	517	296	334	264	136	571	688	188	125	17	17	69	23	42	52	80	50	229
Number of species	10	8	8	10	6	10	8	6	7	6	6	7	11	8	7	9	8	8	22
Number of sets	24	24	24	24	24	24	24	24	36	24	24	48	48	48	48	48	48	48	

TABLE 2.3.6. Species-specific catch per gillnet set at **Big Bay**, Bay of Quinte, 1992-2009. Shown are the average catches in 2-4 gillnet gangs set at a single depth (5 m) during each of 2-4 visits (summer). The total number of species caught and gillnets set each year are indicated.

	Year																		
Species	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Mean
Lake sturgeon	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Longnose gar	5.5	5.5	1.1	23.0	4.9	7.7	0.0	29.6	4.9	6.6	6.6	1.1	6.6	9.9	19.7	2.2	16.4	24.8	10.0
Alewife	1.1	1.1	0.0	0.0	4.9	27.4	5.5	0.0	1.6	0.0	5.8	11.0	20.8	0.0	4.9	0.0	6.6	17.5	6.3
Gizzard shad	4.4	108.6	30.7	162.8	3.3	1.1	5.5	108.6	3.3	14.0	43.6	13.2	1.1	277.4	1.6	6.6	24.1	0.0	47.4
Northern pike	8.8	7.7	7.7	0.0	3.3	1.1	2.2	4.4	4.9	0.8	0.8	0.0	1.1	1.1	3.3	1.1	0.0	0.0	2.3
Mooneye	0.0	0.0	0.0	0.0	0.0	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
White sucker	63.6	53.7	54.8	59.2	47.7	55.9	49.3	23.0	24.7	23.0	60.9	15.4	35.1	16.4	32.9	16.4	28.5	21.9	36.4
Moxostoma sp.	0.0	0.0	0.0	0.0	0.0	2.2	0.0	0.0	0.0	0.8	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Common carp	3.3	1.1	6.6	0.0	0.0	4.4	2.2	0.0	0.0	0.0	0.0	1.1	1.1	0.0	0.0	0.0	0.0	0.0	1.0
Brown bullhead	36.2	100.0	57.0	21.4	19.7	31.8	38.4	50.4	42.8	44.4	36.2	12.1	15.4	5.5	13.2	5.5	4.4	4.4	29.6
Channel catfish	3.3	3.3	5.5	1.6	1.6	2.2	3.3	1.1	0.0	0.0	0.8	0.0	1.1	0.0	1.6	0.0	0.0	1.1	1.4
Burbot	0.0	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
White perch	1235.7	758.5	1537.3	360.2	225.3	277.4	315.5	323.5	302.6	144.7	239.3	393.6	858.6	523.0	1294.4	782.9	838.8	810.3	587.4
White bass	3.3	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	1.1	1.1	0.0	0.3
Rock bass	0.0	1.1	0.0	0.0	3.3	7.7	0.0	0.0	3.3	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0	1.0
Pumpkinseed	0.0	6.6	0.0	1.6	13.2	14.3	82.2	35.1	82.2	111.8	54.3	5.5	28.5	2.2	21.4	3.3	6.6	4.4	27.8
Bluegill	0.0	0.0	0.0	0.0	1.6	4.4	11.0	5.5	11.5	46.9	24.7	3.3	2.2	16.4	42.8	35.1	20.8	36.5	15.5
Smallmouth bass	0.0	2.2	0.0	0.0	8.2	35.1	12.1	3.3	4.9	3.3	0.0	0.0	0.0	0.0	3.3	0.0	0.0	1.1	4.3
Largemouth bass	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.2
Black crappie	2.2	1.1	0.0	0.0	0.0	0.0	3.3	0.0	0.0	1.6	2.5	2.2	1.1	1.1	14.8	6.6	2.2	0.0	2.1
Yellow perch	118.4	380.0	62.5	350.3	1129.9	1641.4	2273.2	1209.4	1044.4	1254.1	1203.1	758.8	721.5	677.6	782.9	108.6	414.5	852.3	874.4
Walleye	237.9	142.1	122.8	115.1	111.8	81.1	83.3	55.9	49.3	29.6	50.2	42.8	52.6	38.4	70.7	35.1	60.3	52.6	70.2
Round goby	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	2.2	3.3	0.0	0.0	0.0	0.0	0.5
Freshwater drum	85.5	30.7	85.5	75.7	139.8	179.8	150.2	80.0	90.5	139.8	48.5	48.2	48.2	62.5	129.9	74.6	42.8	50.4	86.9
Total catch	1809	1605	1971	1173	1719	2377	3037	1931	1671	1822	1778	1311	1797	1636	2439	1079	1467	1877	1805
Number of species	14	17	11	11	15	18	16	14	14	14	15	15	16	14	16	13	13	12	24

TABLE 2.3.7. Species-specific catch per gillnet set at **Hay Bay**, Bay of Quinte, 1992-2009. Shown are the average catches in 1-3 gillnet gangs set at each of 2 depths (7.5 and 12.5 m) during each of 1-2 visits (summer). The total number of species caught and gillnets set each year are indicated.

	Year																		
Species	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Mean
Sea lamprey	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0
Lake sturgeon	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Longnose gar	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0
Alewife	119.5	46.1	52.1	117.6	31.3	35.1	29.1	34.0	28.8	126.6	53.5	0.0	8.2	1.6	49.3	24.7	0.8	64.1	44.6
Gizzard shad	2.2	21.9	0.5	0.8	0.0	3.3	0.5	4.4	8.2	0.0	1.6	0.0	0.0	0.0	3.3	0.8	0.8	0.0	2.9
Chinook salmon	0.0	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Brown trout	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lake trout	3.8	0.0	0.5	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Lake whitefish	2.2	0.0	0.0	0.0	0.0	0.5	1.1	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Cisco (Lake herring)	1.6	13.2	3.3	5.8	37.8	72.9	62.0	15.4	12.3	6.6	0.8	0.0	0.8	0.0	0.0	0.8	0.0	0.8	13.7
Coregonus sp.	0.0	0.0	0.0	0.8	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.2
Rainbow smelt	2.2	0.0	4.9	2.5	0.0	1.1	0.5	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.8	0.0	0.0	2.5	0.8
Northern pike	3.8	8.8	15.9	5.8	7.4	2.7	4.4	6.6	4.1	5.8	0.8	2.5	0.0	3.3	2.5	7.4	6.6	3.3	5.2
White sucker	46.6	26.3	40.6	55.9	45.2	49.9	36.7	42.8	18.1	37.0	18.9	14.8	40.3	9.9	11.5	9.0	16.4	28.0	30.6
River redhorse	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0
Common carp	1.6	11.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8
Spottail shiner	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.1
Brown bullhead	1.1	21.9	4.9	10.7	0.0	0.5	7.1	3.8	5.8	5.8	0.8	1.6	1.6	2.5	5.8	2.5	3.3	0.0	4.7
Channel catfish	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.8	0.8	0.0	0.0	0.0	0.0	0.0	0.1
Burbot	0.0	0.0	0.0	0.8	0.0	0.5	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
White perch	25.8	182.0	48.8	182.6	27.1	27.4	17.5	120.1	19.7	3.3	35.4	55.1	95.4	0.8	198.2	106.9	136.5	61.7	75.4
Rock bass	0.5	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.2
Pumpkinseed	0.0	0.0	0.0	0.8	0.0	1.1	12.6	34.5	1.6	7.4	6.6	4.1	14.0	2.5	4.1	4.9	4.9	4.9	5.8
Smallmouth bass	0.0	4.4	0.0	0.0	0.0	0.0	0.5	1.1	0.0	0.8	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Yellow perch	1247.3	1000.0	808.8	1246.7	596.2	944.6	1036.7	1396.4	847.0	948.2	737.7	727.0	565.8	939.1	421.1	671.1	650.5	537.0	869.7
Walleye	15.9	103.1	7.7	26.3	18.9	20.3	25.8	32.3	9.9	16.4	24.7	18.1	14.0	5.8	11.5	16.4	7.4	18.1	22.0
Round goby	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	1.6	1.6	0.8	0.0	0.0	0.0	0.0	0.3
Freshwater drum	1.6	21.9	0.5	8.2	4.1	4.4	5.5	7.7	9.9	1.6	20.6	8.2	43.6	16.4	54.3	6.6	5.8	3.3	13.0
Total catch	1476	1463	989	1666	771	1166	1241	1700	967	1160	905	836	786	983	762	853	835	724	1092
Number of species	16	13	13	15	9	15	16	13	13	12	14	11	11	10	11	14	13	10	28
Number of sets	12	2	12	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	

TABLE 2.3.8. Species-specific catch per gillnet set at **Conway**, Bay of Quinte, 1993-2009. Shown are the average catches in 1-2 gillnet gangs set at each of 5 depths (range 5-40 m) during each of 2 visits (summer). The total number of species caught and gillnets set each year are indicated.

	Year																		
Species	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Mean
Sea lamprey		0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lake sturgeon		0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Longnose gar		0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alewife		422.8	659.7	370.6	132.8	268.2	353.5	176.1	76.0	54.3	19.1	39.5	106.6	456.9	76.0	127.3	467.1	493.1	237.9
Gizzard shad		0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	1.3	0.7	0.0	0.2
Chinook salmon		1.1	0.0	0.0	0.0	0.0	0.4	0.2	0.0	0.3	0.0	0.3	0.7	0.0	0.0	0.7	0.7	0.7	0.3
Rainbow trout		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0
Atlantic salmon		0.0	0.4	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Brown trout		8.2	2.6	3.3	0.0	0.9	0.2	0.2	0.0	0.7	0.3	2.3	0.7	1.6	1.6	1.0	3.0	0.7	1.7
Lake trout		15.4	13.9	8.2	25.5	20.7	9.6	4.6	8.6	4.9	15.1	11.5	13.5	18.1	7.6	8.9	6.3	0.7	12.0
Lake whitefish		11.5	5.1	0.0	10.7	4.8	11.8	4.4	2.0	3.0	1.6	4.9	0.7	3.9	2.0	1.6	1.3	0.3	4.3
Cisco (Lake herring)		4.9	0.7	0.0	0.0	0.2	1.1	0.7	2.3	1.3	0.0	0.0	0.0	0.0	0.3	0.0	0.7	0.3	0.8
Coregonus sp.		0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Rainbow smelt		1.1	0.0	0.0	0.0	0.4	1.5	1.1	0.0	1.3	0.0	0.0	0.3	1.3	0.3	0.0	2.3	0.7	0.6
Northern pike		1.1	0.4	0.0	0.0	0.4	0.0	0.0	0.0	0.3	0.0	0.3	0.0	0.0	0.0	0.3	0.3	0.0	0.2
White sucker		19.2	16.4	14.0	11.1	8.1	9.6	22.6	23.0	21.7	17.1	14.1	6.9	3.9	3.0	9.5	3.6	2.0	12.8
Silver sedhorse		0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Moxostoma sp.		0.5	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Common carp		1.1	0.4	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.1
Brown bullhead		1.6	0.7	0.0	0.0	0.2	0.0	0.0	0.0	0.3	0.0	0.7	1.3	1.0	5.9	2.3	0.0	0.0	0.9
Channel catfish		0.0	0.4	0.0	0.0	0.4	0.0	0.0	0.3	0.3	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.1
Stonecat		0.0	0.0	0.0	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	0.0	0.0
Burbot		0.0	0.0	0.0	0.0	0.2	0.7	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Trout-perch		0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
White perch		70.3	6.9	19.7	0.4	1.1	0.0	3.9	0.3	0.0	0.3	5.6	17.4	0.0	5.6	8.2	7.6	1.0	9.2
Rock bass		43.3	8.8	16.4	5.8	8.3	12.1	13.6	7.2	3.0	5.9	1.0	1.0	3.3	6.3	25.3	13.5	1.3	10.9
Pumpkinseed		0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.3	0.3	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.2
Smallmouth bass		4.4	1.1	1.6	1.6	1.3	1.1	3.7	1.6	0.3	0.0	0.0	0.0	0.3	1.0	1.0	0.3	0.0	1.2
Yellow perch		1219.2	466.0	546.1	377.5	264.3	311.6	593.2	656.3	430.9	509.9	320.1	218.1	184.2	376.6	119.7	171.7	76.3	422.8
Walleye		133.9	62.9	94.0	67.8	19.1	15.4	14.5	25.3	6.6	9.5	17.8	6.9	8.2	12.5	16.4	10.5	8.9	32.6
Round goby		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.6	72.4	204.3	5.3	1.0	0.7	1.6	0.0	18.2
Freshwater drum		9.9	2.9	3.8	1.2	4.8	1.3	1.1	3.3	0.3	0.7	1.0	4.3	3.3	7.9	8.9	4.9	2.6	3.7
Total catch		1970	1249	1078	634	604	731	841	808	531	587	492	583	692	508	334	696	588	771
Number of species		19	17	11	10	20	17	17	13	19	14	15	16	15	15	18	17	13	32
Number of sets	0	12	18	12	16	30	30	30	20	20	20	20	20	20	20	20	20	20	

TABLE 2.3.9. Age distribution of 39 **lake whitefish** sampled from summer index gillnets, by region, 2009. Also shown are mean fork length, mean weight, mean GSI (females), and percent mature (females). GSI = gonadal somatic index (calculated for females only) as log10(gonad weight + 1)/log10(weight). A GSI greater than approximately 0.25 indicates a mature female.

	Age (years) / Year class																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997	1996	1995	1994	1993	1992	
Bay of Quinte	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Kingston Basin (deep)	0	1	0	1	0	2	4	0	0	0	0	0	0	0	1	1	2	12
Kingston Basin (nearshore)	0	0	0	0	0	2	3	0	0	0	0	0	0	0	0	0	0	5
Northeast	2	0	8	4	5	0	2	0	0	0	0	0	0	0	0	0	0	21
Total	2	1	8	5	5	5	9	0	0	0	0	0	0	0	1	1	2	39
Mean fork length (mm)	172	180	295	297	295	390	411								519	520	535	
Mean weight (g)	73	64	277	304	305	758	836								1647	1914	2105	
GSI (females)				0.09	0.02	0.65	0.31								0.48		0.55	
% Mature (females)				0%	0%	100%	67%								100%		100%	

TABLE 2.3.10. Age distribution of 259 **walleye** sampled from summer index gillnets, by region, 2009. Also shown are mean fork length, mean weight, mean GSI (females), and percent mature (females). GSI = gonadal somatic index (calculated for females only) as log10(gonad weight + 1)/log10(weight).

	Age (years) / year-class																						0
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	Total
	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990	1989	1988	
Bay of Quinte	0	26	35	19	4	1	4	0	4	0	1	1	0	0	0	1	0	1	0	0	0	0	97
Kingston Basin (nearshore)	0	0	0	0	6	3	27	1	28	7	13	8	11	3	3	15	10	8	5	3	4	1	156
Northeast	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	3
Middle Ground	0	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	3
Total	0	26	36	19	11	4	32	1	32	7	15	9	11	3	3	16	10	9	5	3	6	1	259
Mean fork length (mm)		202	343	404	472	522	541	703	568	630	591	615	632	577	638	621	636	640	648	610	640	596	
Mean weight (g)		83	468	716	1350	1983	2095	4199	2630	3319	2896	3223	3267	2423	3235	3194	3532	3513	3495	3012	3416	2652	
GSI (females)		0.04	0.19	0.19	0.27	0.37	0.38	0.50	0.42	0.44	0.38	0.46	0.46	0.45	0.48	0.45	0.47	0.45	0.46	0.32	0.50		
% mature (females)		0	15%	0%	60%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	88%	100%	100%	100%	100%	100%		

TABLE 2.3.11. **Round goby** catch-per-gillnet, by region, in eastern Lake Ontario and the Bay of Quinte, 1992-2009.

	Region									
	Middle Ground	Northeast	Rocky Point (deep sites)	Kingston Basin (nearshore sites)	Kingston Basin (deep sites)	Big Bay	Hay Bay	Conway	Lake Ontario	Bay of Quinte
1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00
1993	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1994	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1995	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1996	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1997	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1999	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2002	0.00	0.00	0.00	0.00	0.00	0.00	1.64	6.58	0.00	2.74
2003	0.00	1.09	0.00	2.90	0.00	2.19	1.64	72.37	0.80	25.40
2004	0.00	2.54	0.00	129.90	0.41	2.19	1.64	204.28	26.57	69.37
2005	0.00	71.31	0.00	42.25	0.27	3.29	0.82	5.26	22.77	3.13
2006	0.00	63.26	n/a	56.89	0.96	0.00	0.00	0.99	30.28	0.33
2007	0.00	162.09	n/a	46.02	1.14	0.00	0.00	0.66	52.31	0.22
2008	0.00	49.79	0.00	10.91	0.00	0.00	0.00	1.64	12.14	0.55
2009	0.00	67.41	0.00	3.62	0.00	0.00	0.00	0.00	14.21	0.00

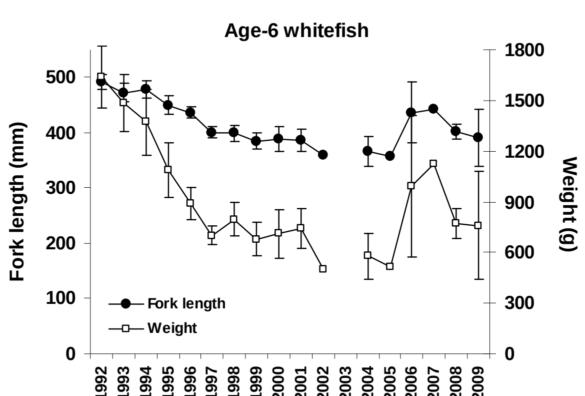


FIG. 2.3.2. Lake whitefish fork length and weight of an age-6 fish caught in summer index gillnets, 1992-2009. No age-6 fish was caught in 2003.

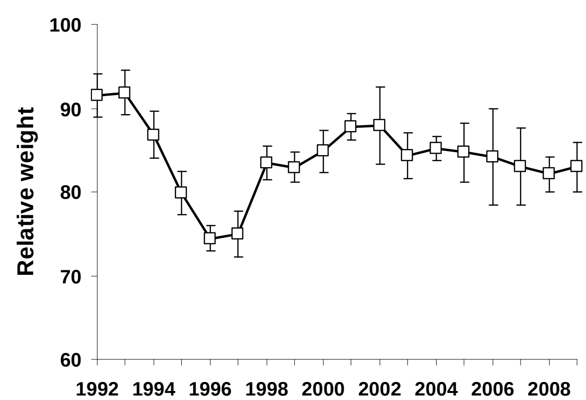


FIG. 2.3.3. Lake whitefish relative weight (see [1]Rennie et al. 2008) for fish caught in summer index gillnets, 1992-2009.

[1]*Rennie, M.D. and R. Verdon. 2008. Development and evaluation of condition indices for the lake whitefish. N. Amer. J. Fish. Manage. 28:1270-1293.*

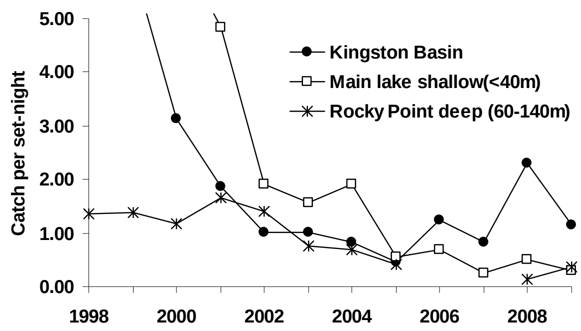


FIG. 2.3.4. Catch per unit effort of adult lake trout in bottom-set gillnets in three areas of eastern lake Ontario. Deep sets off Rocky Point were not fished in 2006 and 2007.

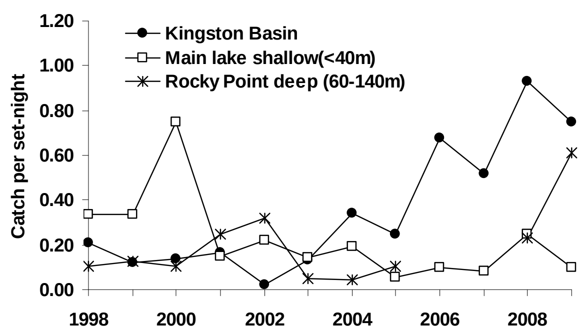


FIG. 2.3.5. Catch per unit effort of immature lake trout in bottom-set gillnets in three areas of eastern lake Ontario. Deep sets off Rocky Point were not fished in 2006 and 2007.

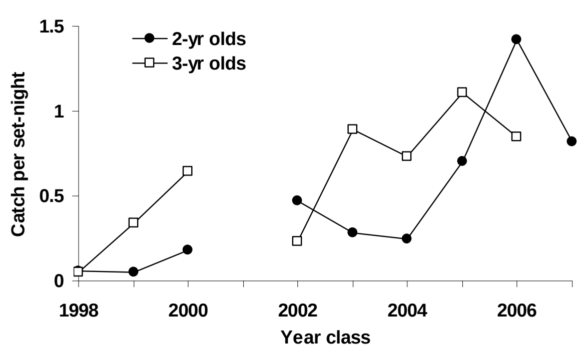


FIG. 2.3.6. Relative survival of lake trout to ages 2 and 3. The survival index is the catch per unit effort of 2 and 3 year old fish, corrected for number stocked 2 or 3 years earlier; age determination is based on of year-specific fin clip information combined with the size of the fish.

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

Bottom trawling at fixed sites (Fig. 2.4.1) in eastern Lake Ontario (ranging in depth from 21-100 m) and the Bay of Quinte (ranging in depth from 4 to 23 m) has occurred annually since 1972 (except 1989). Typically, ½ mile trawl drags using a three-quarter "Yankee Standard" No. 35 bottom trawl are made at Lake Ontario sites while ¼ mile drags using a three-quarter "Western" bottom trawl are made at Bay of Quinte sites. At the deep Rocky Point trawl site (100 m) the trawling distance is 1 mile. Bottom trawling is used primarily to monitor the abundance of small fish species and the young (e.g. age-0) of larger species. Species-specific catches in the 2009 trawling program are shown in Tables 2.4.1-2.4.10. Twenty-eight species and over 104,000 fish were caught in 92 bottom trawls in 2009. White perch (33%), round goby (33%), yellow perch (13%), alewife (8%), gizzard shad (3%) and trout perch (3%) collectively made up 93% of the catch by number.

Lake Ontario Sites

EB02

Only four species, round goby, rainbow smelt, alewife and lake whitefish, were caught at EB02 in 2009 (Table 2.4.1). Threespine stickleback, having risen to high levels of abundance in the late 1990s, declined rapidly after 2003 and has been absent in the EB02 catches for the last three years.

EB03

Six species were caught at EB03 in 2009. The most abundant species were round goby and rainbow smelt and these two species were more abundant in 2009 than the previous year. Round goby, having first appeared in the EB03 catches in 2004, now dominates the total catch (Table 2.4.2).

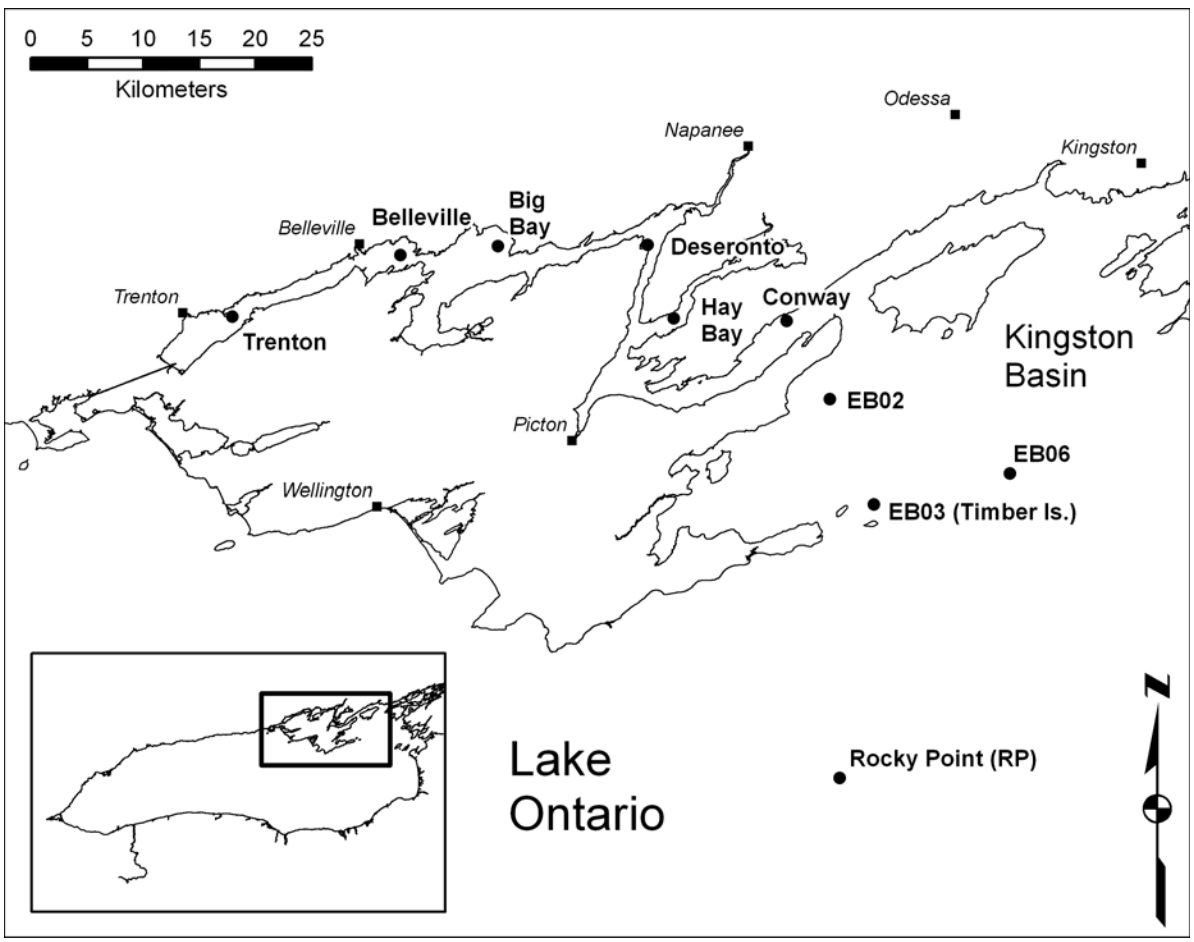


FIG. 2.4.1. Map of northeastern Lake Ontario. Shown are eastern Lake Ontario and Bay of Quinte fish community index bottom trawling site locations.

EB06

Trawl catches at EB06 were very low in 2009; five species, alewife, round goby, rainbow smelt, slimy sculpin and deepwater sculpin were caught (Table 2.4.3). Of particular significance is the capture of the single deepwater sculpin; a species of special concern (see Section 7.3).

Rocky Point

Four species were caught at the deep (100 m) Rocky Point site, rainbow smelt, slimy sculpin, alewife and deepwater sculpin (Table 2.4.4). The invasive round goby have yet to be captured at this site. A single deepwater sculpin was captured in 2009.

Bay of Quinte Sites

Trenton

Nineteen species were caught at Trenton in 2009. The most abundant species were yellow perch, white perch, spottail shiner, alewife and pumpkinseed (Table 2.4.5).

Belleville

Seventeen species were caught at Belleville in 2009. White perch, gizzard shad, alewife, yellow perch and spottail shiner were the most abundant species in the catch at Belleville, 2009 (Table 2.4.6).

Big Bay

Seventeen species were caught at Big Bay in 2009. The most abundant species were white perch, yellow perch and trout-perch (Table 2.4.7).

Deseronto

Nineteen species were caught at Deseronto in 2009. The most abundant species were white perch, trout-perch and yellow perch (Table 2.4.8).

Hay Bay

Eighteen species were caught at Hay Bay in 2009. The most abundant species were alewife, white perch, yellow perch and spottail shiner (Table 2.4.9).

Conway

Only seven species were caught at Conway in 2009. The most abundant species were round goby, yellow perch and alewife (Table 2.4.10).

Species Highlights

Catches of age-0 fish in 2009 for selected species and locations are shown in Tables 2.4.11-2.4.14 for lake whitefish, lake herring, yellow perch and walleye respectively. Age-0 lake whitefish catches were low; none was caught at Timber Island and only three fish were caught at Conway in 2009 (Table 2.4.11). Age-0 lake herring catches at Conway were low in 2009 having been generally moderate to high from 2002-2007 (Table 2.4.12). Age-0 catches of yellow perch were moderate at the upper Bay of Quinte sites but relatively low at Hay Bay and Conway (Table 2.4.13). Age-0 walleye catches were moderate (Table 2.4.14).

Age-0, age-1 and age-2 walleye were common in the 2009 trawls (Table 2.4.15).

Site-specific round goby catches are summarized in Table 2.4.16. Round goby first appeared in bottom trawl catches in the Bay of Quinte in 2001 and in the Kingston Basin of eastern Lake Ontario in 2003. The species was caught at all Bay of Quinte trawling sites by 2003, peaking in abundance, at each site, between 2003 and 2005. Catches have been quite variable since. Round goby catches in the Kingston Basin increased significantly in 2009.

Two deepwater sculpin, a species of special concern, were caught in 2009, one at EB06 (35 m depth) and one at the Rocky Point deep water site (100 m). The fish were 80 and 94 mm total length and weighed 4.81 and 7.03 g respectively (Table 2.4.17).

TABLE 2.4.1. Species-specific catch per trawl (12 min duration; 1/2 mile) by year in the fish community index bottom trawling program during summer at **EB02**, eastern Lake Ontario. Catches are the mean number of fish observed for the number of trawls indicated. Total catch and number of species caught are indicated.

	Year																		
Species	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Mean
Alewife	4405.278	150.553	288.789	226.167	45.083	77.167	576.333	60.667	5152.700	203.333	20.917	19.500	27.100	0.000	0.417	11.000	0.667	72.425	629.894
Rainbow trout	0.000	0.000	0.000	0.000	0.000	0.167	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009
Lake trout	0.278	0.765	0.278	0.417	0.000	0.000	0.000	0.000	0.083	0.000	0.083	0.083	0.000	0.583	0.167	0.583	0.500	0.000	0.212
Lake whitefish	4.056	1.353	3.167	6.083	7.083	5.167	1.500	0.250	0.167	0.167	0.000	0.583	0.400	0.250	0.000	0.167	0.000	0.250	1.702
Cisco (Lake herring)	0.778	0.176	2.056	0.167	0.000	0.083	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.181
Coregonus sp.	0.000	0.000	0.056	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003
Rainbow smelt	1244.817	593.971	397.306	1047.750	352.383	283.417	14.417	4.417	29.583	29.667	7.917	0.917	5.000	19.750	28.750	3.583	5.667	114.408	232.429
Emerald shiner	0.000	0.000	0.000	0.000	0.083	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005
Burbot	0.000	0.000	0.000	0.000	0.083	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005
Threespine stickleback	0.056	0.000	0.000	0.083	0.750	4.583	14.500	25.167	75.417	18.750	34.417	49.500	6.200	9.000	0.167	0.000	0.000	0.000	13.255
Trout-perch	0.278	0.882	5.167	1.833	6.000	1.250	25.333	0.583	0.750	0.250	0.000	0.167	0.000	0.000	0.000	0.000	0.000	0.000	2.361
Yellow perch	0.111	0.000	0.056	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.700	0.333	0.083	0.000	0.000	0.000	0.071
Walleye	0.056	0.059	0.389	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.028
Johnny darter	0.056	0.000	0.556	0.000	0.000	0.000	0.000	0.083	0.000	0.000	0.000	0.000	0.400	0.000	0.000	0.000	0.000	0.000	0.061
Round goby	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.083	250.100	24.833	40.083	119.750	26.667	169.900	35.079
Slimy sculpin	1.889	1.529	3.833	0.167	2.500	1.417	1.333	4.083	2.000	0.417	0.667	44.083	74.900	0.750	0.167	0.000	0.000	0.000	7.763
Deepwater sculpin	0.000	0.000	0.000	0.000	0.083	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005
Total	5657.650	749.288	701.650	1282.667	414.050	373.250	633.417	95.250	5260.700	252.583	64.000	114.917	364.800	55.500	69.833	135.083	33.500	356.983	923.062
Number of species	11	8	11	8	9	8	6	7	7	6	5	8	8	7	7	5	4	4	17
Number of trawls	18	17	18	12	12	12	12	12	12	12	12	12	10	12	12	12	12	12	

TABLE 2.4.2. Species-specific catch per trawl (12 min duration; 1/2 mile) by year in the fish community index bottom trawling program during summer at **EB03**, eastern Lake Ontario. Catches are the mean number of fish observed for the number of trawls indicated. Total catch and number of species caught are indicated.

	Year																		
Species	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Mean
Alewife	2366.830	420.308	924.583	875.750	446.500	313.338	284.000	0.000	721.425	57.375	21.375	8.000	168.375	14.833	15.250	33.917	156.325	0.000	262.433
Gizzard shad	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.015
Chinook salmon	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.667	0.000	0.000	0.000	0.000	0.047
Lake trout	1.083	0.083	4.583	1.375	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.083	0.404
Lake whitefish	0.917	4.750	89.417	20.250	3.750	10.625	0.000	0.000	0.000	0.000	0.000	43.938	2.333	50.000	3.000	1.417	0.000	0.083	13.504
Cisco (Lake herring)	0.000	0.333	1.667	0.625	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.154
Rainbow smelt	59.000	20.333	927.450	1646.125	170.250	1729.200	98.125	0.875	5.125	20.000	207.488	109.231	1.917	25.667	20.625	21.500	0.250	11.583	295.044
White sucker	0.833	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.083	0.000	0.000	0.005
Common carp	0.917	0.167	0.083	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.015
Spottail shiner	354.917	22.917	3.833	0.000	0.000	0.125	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	1.610
American eel	0.000	0.000	0.250	0.000	0.125	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.029
Brook stickleback	0.000	0.000	0.083	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005
Threespine stickleback	33.000	0.083	0.583	0.000	3.750	144.000	0.875	37.000	76.750	67.375	680.138	459.275	2781.625	116.083	8.500	0.000	0.000	0.000	257.414
Trout-perch	1663.200	938.017	2072.667	120.375	106.250	190.875	57.375	3.125	1049.800	175.000	592.200	56.294	255.083	3.417	3.750	0.417	0.000	0.000	330.861
White perch	0.000	0.083	0.083	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.017
Smallmouth bass	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007
Yellow perch	0.583	0.167	0.083	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.625	0.083	0.000	0.500	0.167	0.125	0.000	0.103
Walleye	1.250	0.750	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.063	0.000	0.000	0.125	0.000	0.000	0.417	0.087
Johnny darter	4.667	0.500	2.083	0.000	0.250	0.125	0.000	0.000	0.250	0.000	0.000	9.875	32.833	0.167	0.000	0.000	0.000	0.000	2.711
Round goby	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.333	732.358	850.325	910.133	1100.163	2551.917	361.484
Freshwater drum	0.250	0.083	0.083	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.083	0.000	0.125	0.000	0.125	0.000	0.029
Sculpin sp.	0.000	0.000	0.000	0.000	1.750	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.103
Mottled sculpin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.688	0.000	0.000	0.000	0.000	0.000	0.000	0.040
Slimy sculpin	0.833	0.083	1.417	0.125	0.125	0.625	0.000	0.000	0.125	0.000	0.250	6.750	10.833	0.083	0.000	0.000	0.000	0.000	1.201
Total	4488.3	1408.7	4029.0	2664.6	733.4	2389.0	440.4	41.0	1854.1	319.8	1501.5	694.7	3253.5	943.3	902.2	968.1	1257.0	2564.3	1527.3
Number of species	14	15	16	7	11	9	4	3	10	4	5	10	10	9	9	9	5	6	24
Number of trawls	12	12	12	8	8	8	8	8	8	8	8	16	12	12	8	12	8	12	160

TABLE 2.4.3. Species-specific catch per trawl (12 min duration; 1/2 mile) by year in the fish community index bottom trawling program during summer at **EB06**, eastern Lake Ontario. Catches are the mean number of fish observed for the number of trawls indicated. Total catch and number of species caught are indicated.

	Year																		
Species	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Mean
Alewife	540.442	84.308	42.250	46.417	16.333	0.000	16.000	24.833	0.000	5.583	0.250	0.083	1.250	0.417	8.000	0.917	0.667	10.833	44.366
Lake trout	2.167	0.917	1.000	0.750	0.333	0.167	0.083	0.000	0.083	0.083	0.083	0.083	0.083	0.000	0.000	0.000	0.000	0.000	0.324
Lake whitefish	0.917	24.667	3.250	8.333	3.000	0.000	0.583	0.083	0.083	0.000	0.167	0.167	0.250	0.000	0.000	0.083	0.000	0.000	2.310
Cisco (Lake herring)	0.083	0.000	0.000	0.167	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.014
Rainbow smelt	1294.233	697.400	383.167	2457.500	661.750	264.667	471.750	346.650	115.917	21.417	6.750	0.250	25.083	142.583	23.917	0.583	1.000	3.500	384.340
Threespine stickleback	0.000	0.000	0.000	0.000	0.000	0.083	0.250	59.500	9.667	2.583	47.750	11.417	7.500	13.917	1.083	0.000	0.000	0.000	8.542
Trout-perch	0.250	0.917	1.917	3.667	0.667	0.750	0.667	0.000	0.083	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.495
Yellow perch	0.083	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.083	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009
Johnny darter	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.333	0.000	0.000	0.000	0.000	0.000	0.019
Round goby	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.000	82.925	1.667	8.667	5.459
Sculpin sp.	0.083	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005
Slimy sculpin	0.000	0.000	0.083	0.000	0.000	0.583	0.000	0.083	0.000	0.083	0.000	3.583	399.158	15.750	0.250	0.000	0.000	0.500	23.338
Deepwater sculpin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.083	0.005
Total	1838.3	808.2	431.7	2516.8	682.1	266.3	489.3	431.2	125.9	29.8	55.0	15.6	433.7	172.7	38.3	84.5	3.3	23.5	469.2
Number of species	8	5	6	6	5	5	6	5	6	5	5	6	7	4	5	4	3	5	13
Number of trawls	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	

TABLE 2.4.4. Species-specific catch per trawl (12 min duration; 1/2 mile) by year in the fish community index bottom trawling program during summer at **Rocky Point**, eastern Lake Ontario. Catches are the mean number of fish observed for the number of trawls indicated. Total catch and number of species caught are indicated.

	Year													
Species	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Mean
Alewife	11.000	5.250	0.000	0.250	5.500	0.750	3.000	11.500	0.250		13.750	3.000	0.750	4.9
Lake trout	0.000	0.000	0.000	0.500	1.000	0.000	0.000	0.250	0.000		0.000	0.250	0.000	0.2
Lake whitefish	0.000	0.000	0.000	0.750	0.000	0.250	0.000	0.000	0.000		0.000	0.000	0.000	0.1
Rainbow smelt	378.000	844.250	161.250	220.500	159.500	75.250	8.250	22.750	11.000		4.500	14.500	13.500	172.7
Threespine stickleback	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.250		0.000	0.000	0.000	0.0
Slimy sculpin	16.000	16.000	7.250	5.750	0.500	0.250	4.500	191.500	28.500		49.500	17.750	10.000	30.7
Deepwater sculpin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250		1.500	0.500	0.250	0.2
Total	405.0	865.5	168.5	227.8	166.5	76.5	15.8	226.3	40.3		69.3	36.0	24.5	208.8
Number of species	3	3	2	5	4	4	3	5	5		4	5	4	7
Number of trawls	5	4	4	4	2	4	4	4	4	0	4	4	4	

TABLE 2.4.5. Species-specific catch per trawl (6 min duration; 1/4 mile) by year in the fish community index bottom trawling program at **Trenton** (4 m depth), Bay of Quinte. Catches are the mean number of fish observed at each site for the number of trawls indicated. Total catch and number of species caught are indicated.

	Year																		
Species	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Mean
Alewife	34.250	154.100	12.250	109.125	13.875	5.750	1.125	246.075	25.625	149.288	98.600	174.113	8.625	508.825	126.625	24.500	8.750	112.363	100.770
Gizzard shad	29.625	54.000	691.450	369.750	23.875	114.438	4.125	131.750	68.438	4.125	6.375	22.250	0.000	30.375	23.375	1.375	38.500	5.750	89.976
Rainbow smelt	0.000	0.000	0.125	0.000	0.000	0.000	0.375	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.028
Northern pike	0.000	0.000	0.250	0.125	0.000	0.125	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.042
Mooneye	0.375	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.028
White sucker	11.000	6.000	1.875	3.375	1.875	0.625	0.375	1.875	0.000	0.500	1.625	0.625	1.125	1.875	2.125	2.125	0.375	0.500	2.104
Minnow	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007
Common carp	1.250	1.000	0.000	0.000	0.000	0.000	0.125	0.125	0.000	0.000	0.250	0.000	0.000	0.000	0.250	0.000	0.000	0.000	0.167
Spottail shiner	19.250	54.125	206.825	188.750	55.000	163.750	3.750	104.500	0.250	217.400	60.875	60.875	1.250	24.500	41.750	0.000	76.000	148.400	79.292
Brown bullhead	15.750	22.375	20.000	20.375	24.875	60.875	9.375	61.250	3.000	10.625	3.500	4.250	1.125	8.750	3.750	4.500	1.375	0.875	15.368
Channel catfish	0.000	0.625	0.000	0.000	0.125	1.375	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.118
American eel	0.125	0.250	1.375	0.125	0.250	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125
Burbot	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007
Trout-perch	23.875	44.875	79.375	43.250	28.875	21.250	2.250	0.500	0.000	0.500	0.500	0.000	0.000	0.125	0.125	0.000	0.250	1.625	13.743
White perch	16.125	38.125	601.725	304.500	322.325	1457.775	21.375	126.250	1.500	54.250	19.875	240.000	80.775	278.988	388.213	29.875	33.750	669.275	260.261
White bass	0.125	0.250	0.750	0.750	0.375	1.250	0.000	0.125	0.000	0.000	0.125	0.000	0.000	0.000	1.250	0.125	0.000	0.875	0.333
Sunfish	0.000	3.875	0.750	93.375	0.000	0.000	0.750	25.125	0.000	33.250	0.000	22.375	0.000	0.000	11.500	0.000	0.875	0.000	10.660
Rock bass	0.000	0.000	0.625	0.500	2.500	0.125	0.125	0.000	4.125	0.625	0.625	0.125	0.000	0.500	2.250	0.000	1.250	2.875	0.903
Pumpkinseed	4.500	24.000	15.875	21.000	79.375	90.375	55.875	113.250	372.850	84.750	32.250	88.875	56.788	46.750	20.000	77.513	143.775	66.250	77.447
Bluegill	0.000	0.125	0.250	0.375	1.375	0.000	0.000	0.375	4.250	1.125	0.500	1.500	0.875	0.375	3.875	5.250	2.625	0.625	1.306
Smallmouth bass	0.000	0.375	0.000	0.000	0.625	2.000	0.250	0.250	1.500	0.375	0.250	0.500	0.500	0.125	0.000	0.000	0.125	0.250	0.396
Largemouth bass	0.000	0.000	0.000	4.375	1.000	7.750	0.625	5.375	1.000	2.375	2.875	4.625	0.125	6.625	4.250	0.125	6.375	2.750	2.792
Black crappie	0.250	1.750	9.000	2.875	1.000	0.250	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.847
Lepomis sp.	0.000	0.000	6.875	0.000	0.000	0.000	0.000	0.000	0.000	0.000	64.788	0.000	0.000	59.750	10.250	0.000	17.000	0.625	8.849
Yellow perch	63.000	293.838	526.525	960.625	122.613	523.388	33.375	101.625	234.800	200.625	239.000	544.613	186.375	340.825	130.125	584.738	769.538	1095.063	386.149
Walleye	10.000	17.875	23.750	20.250	8.500	5.375	0.500	1.625	0.000	9.625	3.625	10.500	1.500	1.875	0.750	4.750	7.375	6.125	7.444
Johnny darter	0.000	1.375	1.250	34.750	8.625	2.625	0.375	0.125	0.000	2.500	7.250	7.625	0.375	0.000	0.000	0.000	0.000	0.000	3.715
Logperch	0.250	0.625	0.375	3.875	5.500	8.125	8.375	0.125	0.625	2.000	0.000	15.250	4.250	52.750	0.625	5.625	23.375	32.375	9.118
Brook silverside	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.000	0.125	0.000	0.000	0.021
Round goby	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.875	8.500	13.125	5.250	0.750	12.375	34.125	4.278
Freshwater drum	1.625	22.750	12.125	46.625	9.375	3.875	5.125	5.375	0.500	6.750	3.625	2.000	0.375	4.125	4.875	9.500	1.500	4.875	8.056
Total	231.5	742.4	2213.4	2228.8	711.9	2471.1	148.3	925.8	718.6	780.9	546.5	1203.2	352.6	1380.4	781.2	750.9	1145.2	2185.6	1084.3
Number of species	18	22	22	21	21	20	19	20	14	20	19	19	15	19	20	15	19	19	31
Number of trawls	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	

TABLE 2.4.6. Species-specific catch per trawl (6 min duration; 1/4 mile) by year in the fish community index bottom trawling program at **Belleville** (5 m depth), Bay of Quinte. Catches are the mean number of fish observed at each site for the number of trawls indicated. Total catch and number of species caught are indicated.

	Year																		
Species	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Mean
Sea lamprey	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007
Alewife	45.125	501.913	2.250	198.750	31.625	0.125	23.750	11.250	13.375	0.250	82.375	0.125	11.500	13.875	9.750	0.125	34.875	78.775	57.708
Gizzard shad	6.125	11.625	31.250	163.250	0.250	77.238	81.125	245.875	1762.000	99.200	234.363	46.025	581.775	50.563	88.325	73.313	326.875	321.425	228.187
Rainbow smelt	0.000	0.000	0.000	0.000	0.000	0.000	0.875	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.059
Northern pike	0.250	0.250	0.125	0.125	0.125	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.059
Mooneye	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007
White sucker	3.000	1.000	11.250	1.250	3.375	2.125	0.375	0.750	0.500	0.375	0.375	0.500	0.125	0.000	0.750	0.250	0.250	0.125	1.544
Common carp	0.500	0.125	1.125	0.375	0.250	0.000	0.000	0.500	0.000	0.125	0.125	0.625	0.000	0.500	0.625	0.250	0.125	1.000	0.309
Spottail shiner	32.000	160.625	115.125	123.250	49.375	21.500	15.875	103.125	19.375	10.625	21.500	4.750	3.875	13.250	23.875	3.750	17.375	33.375	43.485
Brown bullhead	27.625	10.750	36.125	9.875	8.625	9.375	10.750	25.000	22.500	32.000	10.875	5.375	17.875	15.000	14.875	9.375	6.000	2.750	16.000
Channel catfish	0.000	0.000	0.250	0.000	0.250	0.000	0.125	0.000	0.000	0.000	0.125	0.125	0.000	0.375	0.000	0.000	0.000	0.000	0.074
American eel	0.375	0.375	0.750	0.125	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.103
Burbot	0.000	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007
Trout-perch	179.875	53.500	302.000	6.000	118.500	24.875	2.000	1.125	13.625	13.000	5.500	12.750	14.375	9.750	4.000	14.250	19.000	32.125	46.713
White perch	34.250	149.500	122.000	496.375	714.338	658.600	44.500	251.000	205.013	6.625	154.625	165.013	1929.950	475.900	880.563	338.925	845.013	1601.363	439.540
White bass	0.250	0.250	0.125	1.250	0.750	8.250	0.250	0.375	0.000	0.125	3.000	1.625	3.625	2.000	6.000	0.250	1.000	13.375	1.713
Sunfish	0.000	0.000	0.250	0.000	0.000	0.000	21.875	18.125	0.000	48.125	0.000	14.625	0.000	0.000	14.500	0.000	42.125	0.000	9.390
Rock bass	1.000	0.125	0.375	0.000	0.000	0.000	0.000	0.000	0.625	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125
Pumpkinseed	0.375	10.750	2.375	0.125	10.375	37.750	4.875	13.750	145.663	21.750	5.125	1.875	4.125	1.750	1.125	0.875	0.500	0.250	15.480
Bluegill	0.000	0.000	0.000	0.875	0.125	0.000	0.000	0.000	119.863	0.250	0.500	0.125	0.000	0.375	1.250	1.875	0.000	0.000	7.367
Smallmouth bass	0.000	0.250	0.000	0.000	0.875	0.500	0.000	0.000	0.875	0.125	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.162
Largemouth bass	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.000	1.250	0.125	0.375	0.250	0.625	0.375	0.000	0.125	0.625	0.000	0.228
Black crappie	2.125	1.750	0.375	22.125	0.250	0.375	0.250	0.500	2.625	0.375	0.000	0.000	0.250	0.125	2.000	0.375	0.250	0.125	1.985
Lepomis sp.	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	88.375	0.000	2.375	409.700	0.250	5.125	8.000	17.875	30.232
Yellow perch	8.500	46.375	50.625	176.375	190.875	63.875	38.125	29.000	429.625	37.875	53.250	14.250	66.250	47.375	14.625	78.750	214.725	44.375	91.793
Walleye	18.875	22.625	33.250	11.250	10.625	11.750	3.625	0.750	5.500	5.375	0.750	8.500	2.625	2.000	2.750	8.625	18.125	3.500	9.824
Johnny darter	0.125	0.125	0.000	0.250	5.750	1.750	4.500	0.000	0.250	12.500	2.125	0.125	0.000	0.000	0.000	0.000	0.000	0.000	1.618
Logperch	0.125	0.000	0.000	0.000	2.125	0.000	0.250	0.000	0.625	0.250	0.500	0.125	0.125	0.125	0.000	0.750	1.000	1.000	0.353
Brook silverside	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.250	0.000	0.000	0.500	0.000	0.000	0.000	1.250	0.000	0.000	0.000	0.176
Round goby	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.625	67.000	47.250	60.250	7.125	53.875	8.625	30.500	14.456
Freshwater drum	6.125	12.125	36.375	6.500	27.875	17.750	70.000	25.000	5.750	163.750	58.250	20.875	4.375	214.763	87.000	830.063	25.000	31.000	94.799
Sculpin sp.	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007
Total	366.6	984.2	746.3	1218.1	1176.3	936.1	323.5	727.5	2749.0	452.8	724.4	364.7	2691.1	1318.1	1160.6	1420.9	1569.5	2212.9	1113.5
Number of species	19	20	21	18	20	17	21	17	18	20	22	20	17	19	19	19	19	17	32
Number of trawls	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	

TABLE 2.4.7. Species-specific catch per trawl (6 min duration; 1/4 mile) by year in the fish community index bottom trawling program at **Big Bay** (5 m depth), Bay of Quinte. Catches are the mean number of fish observed at each site for the number of trawls indicated. Total catch and number of species caught are indicated.

	Year																		
Species	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Mean
Longnose gar	0.375	0.250	0.125	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.069
Alewife	10.375	93.500	2.250	173.000	1.875	0.625	0.000	19.625	0.500	0.000	224.938	0.000	407.363	35.750	13.000	0.375	190.263	37.875	67.295
Gizzard shad	92.375	73.000	11.500	1482.250	39.075	4.375	0.125	337.500	12.750	0.000	52.250	23.250	58.375	25.875	2.250	2.250	68.738	0.000	126.997
Rainbow smelt	0.000	0.000	0.000	0.000	0.000	0.500	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.035
Northern pike	0.000	0.250	0.125	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.035
White sucker	2.250	2.125	6.750	8.250	5.125	1.875	9.625	3.250	0.375	0.750	2.875	1.125	1.375	0.875	0.125	0.375	0.375	0.625	2.674
Moxostoma sp.	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007
Common carp	2.000	0.875	1.000	0.125	0.125	0.250	0.000	0.125	0.375	0.250	0.000	0.500	0.375	0.250	0.875	0.125	0.375	0.000	0.424
Emerald shiner	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.375	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.021
Spottail shiner	7.875	4.750	38.250	45.375	4.250	11.375	8.000	26.625	4.000	12.125	63.625	8.875	20.250	56.250	18.625	15.375	10.625	19.500	20.875
Brown bullhead	18.875	35.750	64.125	11.000	21.625	16.750	29.375	61.500	19.875	16.375	32.625	38.000	23.750	12.125	54.625	9.750	8.750	3.000	26.549
Channel catfish	0.000	0.000	0.625	0.375	0.125	0.000	0.250	0.000	0.000	0.000	0.125	0.000	0.000	0.125	0.375	0.000	0.000	0.000	0.111
Ictalurus sp.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.375	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.021
American eel	0.250	0.375	0.875	0.375	0.625	0.375	0.375	0.000	0.000	0.125	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.194
Trout-perch	41.500	10.875	72.375	4.625	27.375	7.125	23.000	30.750	1.750	1.375	9.125	5.000	3.125	21.625	21.000	14.000	65.875	67.750	23.792
White perch	113.250	134.000	178.250	789.000	1310.425	851.063	399.500	329.500	368.075	18.250	793.025	145.125	1498.975	554.588	1252.238	363.425	456.700	1116.888	592.904
White bass	0.125	0.125	0.750	2.000	3.250	7.375	0.250	0.375	0.000	0.000	2.125	0.000	0.250	2.625	3.875	0.250	0.750	8.250	1.799
Sunfish	0.000	0.000	0.000	0.000	0.000	0.000	0.000	15.375	0.000	50.000	0.000	0.000	0.000	0.000	25.250	0.000	9.750	0.000	5.576
Rock bass	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007
Pumpkinseed	0.125	13.125	1.125	0.375	15.250	19.750	39.625	2.000	87.625	83.875	64.125	67.625	36.625	3.750	6.875	1.875	5.750	12.125	25.646
Bluegill	0.000	0.000	0.000	0.250	0.250	4.750	3.875	0.125	11.625	124.875	13.625	14.625	0.750	9.625	6.750	16.000	3.875	10.375	12.299
Smallmouth bass	0.000	0.000	0.000	0.000	0.125	0.000	0.250	0.000	0.000	0.125	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.042
Largemouth bass	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.250	0.000	0.000	0.000	0.125	1.500	0.118
Black crappie	0.000	0.000	0.000	0.375	1.000	1.250	0.250	0.250	0.750	0.625	0.500	0.375	0.375	1.000	2.625	0.250	0.125	0.250	0.556
Lepomis sp.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	66.625	0.000	0.000	1060.175	0.000	4.125	56.475	41.500	68.272
Yellow perch	2.625	11.250	10.250	17.375	62.875	80.250	222.500	16.500	45.889	381.125	153.463	107.650	200.250	90.613	99.388	33.750	660.600	197.775	133.007
Walleye	18.875	8.625	18.625	8.625	14.750	10.250	10.125	3.125	2.875	7.500	6.125	19.250	16.875	6.500	8.125	8.750	28.125	10.750	11.549
Johnny darter	0.000	0.000	0.000	0.000	0.000	0.000	0.500	0.000	0.000	1.250	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.111
Logperch	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125	0.125	0.000	0.250	0.000	0.000	0.125	0.250	3.250	2.250	0.354
Brook silverside	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.625	0.000	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.042
Round goby	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125	1.375	15.750	9.500	4.750	50.413	1.125	0.625	4.648
Freshwater drum	2.500	15.000	20.375	4.250	7.125	12.375	24.375	9.500	10.250	21.750	24.375	9.000	15.625	125.500	178.450	139.350	14.625	11.625	35.892
Total	313.4	403.9	427.4	2547.9	1515.3	1030.4	772.1	857.1	567.0	720.9	1510.8	442.0	2300.3	2016.8	1699.5	660.9	1586.3	1542.7	1161.9
Number of species	15	16	17	18	18	18	18	18	16	18	23	15	17	18	20	19	20	17	30
Number of trawls	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	

TABLE 2.4.8. Species-specific catch per trawl (6 min duration; 1/4 mile) by year in the fish community index bottom trawling program at **Deseronto** (5 m depth), Bay of Quinte. Catches are the mean number of fish observed at each site for the number of trawls indicated. Total catch and number of species caught are indicated.

	Year																		
Species	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Mean
Longnose gar	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007
Alewife	226.500	496.288	128.388	156.000	38.625	6.250	0.000	23.500	9.625	180.063	47.625	277.350	55.375	54.213	106.263	1037.375	217.088	16.250	170.932
Gizzard shad	121.538	35.250	94.175	27.375	150.563	1.375	22.500	36.125	0.000	32.000	20.875	11.875	1.375	22.000	62.100	29.250	109.375	47.538	45.849
Rainbow smelt	0.125	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.014
Northern pike	0.000	0.125	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.021
White sucker	3.875	2.000	0.875	0.000	1.500	0.125	0.250	0.250	0.375	0.625	0.375	1.250	1.250	0.125	0.375	0.375	0.625	2.625	0.938
Common carp	0.250	0.125	0.500	1.250	0.375	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.146
Spottail shiner	28.125	23.000	38.250	115.625	7.125	14.125	6.875	29.625	0.000	25.250	25.000	35.625	1.500	18.875	54.750	28.750	104.125	38.625	33.069
Brown bullhead	21.875	47.500	41.125	9.625	43.875	13.250	15.375	21.875	3.750	69.250	10.625	21.500	37.000	12.500	11.625	18.125	2.500	4.000	22.521
Channel catfish	0.000	0.125	0.500	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125	0.250	0.125	0.000	0.000	0.000	0.069
Ictalurus sp.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007
American eel	1.125	2.000	2.875	0.000	0.750	0.250	0.250	0.000	0.500	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.438
Trout-perch	92.500	54.125	89.500	39.125	10.250	0.125	15.125	0.875	14.500	4.750	7.500	0.125	4.500	6.000	12.375	18.375	550.213	226.813	63.710
White perch	147.000	29.375	141.125	481.625	87.875	249.300	73.750	544.413	703.788	10.250	194.863	306.238	3075.588	237.588	793.925	226.200	298.113	811.600	467.367
White bass	0.125	0.125	1.875	0.625	0.375	0.500	0.000	0.000	0.000	0.000	0.000	0.500	1.625	1.250	4.250	0.375	0.000	1.250	0.715
Sunfish	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.875	0.000	0.375	0.000	0.000	0.000	0.000	1.375	0.000	0.125	0.000	0.167
Rock bass	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125	1.750	0.250	0.000	0.000	0.000	0.000	0.000	0.500	0.153
Pumpkinseed	0.125	2.750	0.875	0.375	33.250	18.625	12.625	17.125	49.625	118.088	17.500	67.500	19.500	14.750	15.500	19.125	11.500	30.500	24.963
Bluegill	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.500	0.125	4.500	0.000	0.125	0.875	0.375	0.000	0.250	0.382
Smallmouth bass	0.000	0.000	0.000	0.375	0.750	0.375	0.000	1.625	1.375	0.500	0.125	1.000	1.250	0.625	0.250	0.000	0.000	0.250	0.472
Largemouth bass	0.000	0.000	0.000	0.375	0.000	0.250	0.000	0.125	0.000	0.000	1.125	0.000	0.250	1.125	2.125	0.000	0.125	0.375	0.326
Black crappie	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.125	0.625	0.125	0.000	1.750	1.375	4.875	0.000	3.375	0.694
Lepomis sp.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	483.675	0.000	1.000	0.250	0.000	26.940
Yellow perch	20.625	100.738	101.500	916.000	224.000	171.788	373.413	803.563	176.663	412.700	555.388	683.425	152.138	1030.913	638.313	1087.100	531.750	219.300	455.517
Walleye	51.375	20.625	39.625	22.250	12.125	3.375	2.625	3.250	2.125	12.500	2.875	7.500	15.125	5.000	5.250	9.875	19.875	15.875	13.958
Johnny darter	0.125	0.000	0.000	0.000	0.375	0.125	2.000	0.000	1.000	0.625	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.236
Logperch	0.000	0.000	0.000	0.000	1.625	0.375	0.000	0.000	0.500	1.000	0.125	0.375	0.000	3.625	0.125	0.750	2.875	23.625	1.944
Brook silverside	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.750	0.000	0.000	0.000	0.000	0.000	0.750	0.000	0.000	0.000	0.000	0.194
Round goby	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.250	11.500	16.125	20.625	117.300	4.625	4.250	4.500	2.750	10.163
Freshwater drum	7.250	7.625	23.625	3.250	21.000	6.750	6.125	1.250	5.125	16.500	1.875	15.375	15.625	8.250	22.000	24.000	10.125	11.500	11.514
Total	722.7	821.8	704.9	1773.9	634.6	487.2	531.2	1487.6	969.0	886.6	900.0	1450.8	3402.9	2020.8	1737.6	2510.2	1863.2	1457.0	1353.4
Total of species	17	16	16	14	18	19	13	17	13	20	19	19	16	22	20	17	16	19	30
Number of trawls	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	

TABLE 2.4.9. Species-specific catch per trawl (6 min duration; 1/4 mile) by year in the fish community index bottom trawling program at **Hay Bay** (7 m depth), Bay of Quinte. Catches are the mean number of fish observed at each site for the number of trawls indicated. Total catch and number of species caught are indicated.

	Year																		
Species	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Mean
Alewife	8.375	21.125	198.625	256.500	19.250	21.250	122.225	1051.200	466.556	565.963	21.125	1.750	67.063	72.088	394.425	695.188	631.613	713.000	295.962
Gizzard shad	0.000	0.250	2.500	39.875	2.250	0.000	0.000	0.750	46.000	2.625	0.125	0.000	0.125	0.000	0.375	0.125	7.000	0.750	5.708
Cisco (Lake herring)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.056
Rainbow smelt	2.000	1.000	0.000	0.250	0.000	0.125	0.000	0.125	0.125	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.375	0.000	0.229
Northern pike	0.125	0.000	0.000	0.000	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.125	0.000	0.125	0.056
White sucker	7.625	6.875	2.375	0.500	0.750	3.250	1.875	4.750	1.500	3.500	0.125	5.875	8.250	0.000	0.625	4.875	3.000	0.000	3.097
Common carp	0.125	2.000	0.625	0.250	0.000	0.000	0.000	0.125	0.000	0.250	0.000	0.000	0.000	0.875	0.000	0.000	0.750	0.125	0.285
Golden shiner	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125	0.007
Common shiner	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.007
Spottail shiner	5.875	21.500	8.000	22.625	77.625	13.125	57.625	134.625	4.875	63.513	54.000	53.250	64.375	79.113	133.950	188.575	47.750	46.500	59.828
Brown bullhead	4.625	9.125	14.125	30.500	0.500	1.750	59.375	22.250	20.375	32.750	15.750	8.000	10.375	10.500	15.000	8.875	0.750	3.500	14.896
Channel catfish	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.014
American eel	4.375	0.875	6.375	0.125	1.875	0.250	0.250	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.792
Burbot	0.000	0.000	0.000	0.125	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.014
Trout-perch	119.000	34.625	82.875	10.750	249.500	19.500	2.250	18.500	1.625	5.750	2.750	3.750	77.500	1.750	3.000	59.500	6.625	3.750	39.056
White perch	26.000	85.875	34.875	59.125	6.125	297.563	6.625	565.213	59.250	9.250	132.563	14.750	495.163	24.625	504.113	27.500	163.738	167.700	148.892
White bass	0.000	0.000	1.375	0.000	0.000	0.250	0.000	0.000	0.125	0.000	0.000	1.750	0.125	0.125	1.375	1.375	0.875	0.500	0.438
Sunfish	0.000	0.375	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.028
Rock bass	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.014
Pumpkinseed	0.000	1.000	2.250	7.875	0.125	2.750	4.875	76.875	24.500	19.625	11.875	0.750	4.625	1.125	44.500	11.375	8.625	0.250	12.389
Bluegill	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125	3.625	0.125	0.215
Smallmouth bass	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.069
Largemouth bass	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	1.750	0.000	0.000	0.000	0.000	0.000	0.375	1.375	0.208
Black crappie	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.375	0.875	0.000	0.000	0.000	0.125
Lepomis sp.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.375	0.000	0.000	0.000	0.000	0.743
Yellow perch	21.250	23.375	29.250	417.500	145.113	560.963	539.125	1488.375	658.125	726.475	856.588	119.200	551.850	278.638	580.700	906.500	138.063	146.038	454.840
Walleye	9.875	13.125	14.750	12.250	2.000	2.625	2.375	12.125	2.250	7.125	3.250	1.750	3.125	4.125	7.125	8.500	13.375	5.000	6.931
Johnny darter	0.000	0.000	0.000	0.000	0.625	0.125	0.000	0.000	0.000	0.000	1.750	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.146
Logperch	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.250	0.000	0.250	0.000	0.000	0.125	0.375	0.250	1.250	0.250	0.250	0.181
Round goby	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125	1.250	14.250	3.500	40.125	6.000	17.125	11.375	1.625	5.299
Freshwater drum	0.375	16.250	0.375	1.000	2.375	1.750	0.750	1.375	1.750	4.375	4.875	6.875	10.500	16.375	39.125	6.000	5.000	5.125	6.903
Slimy sculpin	0.000	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007
Total	209.6	237.6	398.4	859.3	509.0	925.4	797.5	3376.8	1287.1	1442.8	1109.0	232.1	1296.8	544.6	1731.7	1937.1	1043.2	1095.9	1057.4
Number of species	13	16	14	15	16	15	12	16	13	16	15	13	15	15	17	17	18	18	32
Number of trawls	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	

TABLE 2.4.10. Species-specific catch per trawl (6 min duration; 1/4 mile) by year in the fish community index bottom trawling program at **Conway** (24m depth), Bay of Quinte. Catches are the mean number of fish observed at each site for the number of trawls indicated. Total catch and number of species caught are indicated.

	Year																		
Species	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Mean
Silver lamprey	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.083	0.000	0.000	0.000	0.000	0.000	0.005
Alewife	345.338	66.250	35.425	1.625	83.125	245.325	0.000	0.000	248.625	0.000	0.000	2.250	1.917	0.417	9.667	0.083	214.558	1.583	69.788
Gizzard shad	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.167	0.000	0.000	0.000	0.072
Chinook salmon	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.167	0.083	0.000	0.000	0.000	0.028
Brown trout	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125	0.167	0.000	0.000	0.000	0.000	0.000	0.000	0.016
Lake trout	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.250	0.000	0.417	0.000	0.000	0.000	0.000	0.000	0.044
Lake whitefish	28.500	4.250	40.875	28.000	7.000	6.375	0.375	0.000	2.250	1.000	1.000	8.083	0.750	3.083	3.833	4.750	0.250	0.333	7.817
Cisco (Lake herring)	0.125	2.750	15.375	1.375	0.000	0.000	0.125	0.000	0.000	0.000	0.250	3.000	0.083	7.667	4.500	2.000	0.167	0.000	2.079
Coregonus sp.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.083	0.000	0.000	0.000	0.000	0.000	0.000	0.005
Rainbow smelt	24.125	2.500	11.125	629.375	104.625	46.625	59.750	0.000	0.000	0.000	39.625	10.167	3.583	6.750	0.083	25.167	1.083	0.083	53.593
White sucker	19.250	2.250	1.250	0.125	1.500	1.375	1.000	0.750	15.250	134.825	28.750	6.667	7.417	4.750	3.167	11.250	0.500	0.000	13.338
Moxostoma sp.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007
Spottail shiner	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.625	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.035
Channel catfish	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.014
American eel	0.500	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.035
Burbot	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.083	0.000	0.000	0.000	0.000	0.000	0.005
Threespine stickleback	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.083	0.000	0.000	0.000	0.000	0.000	0.000	0.005
Trout-perch	160.513	272.625	395.275	116.750	146.750	253.538	26.750	1.750	82.125	139.438	58.225	53.667	43.333	12.250	0.500	1.000	13.000	0.083	98.754
White perch	0.500	48.000	0.125	0.000	0.000	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.000	0.000	0.000	0.250	2.910
White bass	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.833	0.000	0.000	0.000	0.060
Rock bass	0.125	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.014
Smallmouth bass	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007
Yellow perch	21.375	10.750	6.875	1.750	2.875	13.625	3.250	41.375	41.000	134.700	181.238	178.133	58.667	53.750	146.567	20.000	108.975	8.250	57.397
Walleye	4.875	23.250	13.625	3.500	1.625	0.125	1.250	0.125	0.000	1.250	0.000	0.250	1.000	0.083	0.417	0.417	0.083	0.000	2.882
Johnny darter	0.000	0.000	0.250	0.375	1.375	0.750	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.153
Round goby	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.500	282.225	79.167	127.208	40.833	173.192	89.717	80.767	48.534
Freshwater drum	0.000	0.375	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.250	0.000	0.083	0.500	0.000	0.083	0.000	0.079
Mottled sculpin	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007
Slimy sculpin	0.000	0.000	0.250	0.125	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.035
Total	605.2	433.9	520.8	783.0	348.9	568.6	92.5	44.0	389.4	412.1	310.0	545.0	196.5	216.2	215.2	237.9	428.4	91.4	357.7
Number of species	11	15	13	10	8	11	7	4	6	8	9	13	12	11	14	9	10	7	29
Number of trawls	8	8	8	8	8	8	8	8	8	8	8	12	12	12	12	12	12	12	

TABLE 2.4.11. 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, 1992-2009. 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
2004	0.0	12	2.1	12
2005	2.8	12	49.8	12
2006	2.4	12	3.6	8
2007	0.8	12	0.3	12
2008	0.1	12	0.0	8
2009	0.3	12	0.1	12

TABLE 2.5.12. Mean catch-per-trawl of age-0 **lake herring** at Conway in the lower Bay of Quinte, 1992-2009. Four replicate trawls on each of two to four visits during August and early September were made at the Conway site. Distances of each trawl drag was 1/4 mile.

	Conway	N
1992	0.0	8
1993	1.5	8
1994	7.7	8
1995	1.3	8
1996	0.0	8
1997	0.0	8
1998	0.1	8
1999	0.0	8
2000	0.0	8
2001	0.0	8
2002	0.1	8
2003	2.8	12
2004	0.1	12
2005	7.2	12
2006	4.5	12
2007	2.0	12
2008	0.2	12
2009	0.0	12

TABLE 2.4.13. Mean catch-per-trawl of age-0 **yellow perch** at six Bay of Quinte sites, 1992-2009. Four replicate trawls on each of two to three visits during August and early September were made at each site. Distance of each trawl drag was 1/4 mile.

	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
2004	0.0	0.9	4.5	8.4	18.0	0.0	5.3	52
2005	202.8	37.5	24.8	444.7	61.9	0.0	128.6	52
2006	3.8	3.5	51.7	532.8	306.0	0.2	149.7	52
2007	284.3	70.9	29.6	883.5	776.0	0.1	340.7	52
2008	123.8	153.4	114.5	263.6	12.4	0.0	111.3	52
2009	101.3	29.8	130.2	81.1	14.3	0.0	59.4	52

TABLE 2.4.14. Mean catch-per-trawl of age-0 **walleye** at six Bay of Quinte sites, 1992-2009. Four replicate trawls on each of two to three visits during August and early September were made at each site. Distance of each trawl drag was 1/4 mile.

	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
2004	0.0	0.6	11.4	1.4	0.9	0.0	2.4	52
2005	0.8	1.4	3.8	1.8	1.1	0.0	1.5	52
2006	0.0	1.0	3.0	2.8	5.9	0.3	2.1	52
2007	4.1	6.1	5.4	5.6	5.6	0.2	4.5	52
2008	5.5	17.6	20.5	14.6	12.4	0.0	11.8	52
2009	2.5	2.3	7.6	1.0	2.9	0.0	2.7	52

TABLE 2.4.15. Age distribution of 249 walleye sampled from summer bottom trawls, Bay of Quinte, 2009. Also shown are mean fork length and mean weight. Fish of less than 146 mm fork length (n = 97) were assigned an age of 0, fish between 145 and 190 mm were aged using scales (n = 29); and those over 190 mm fork length (n =123) were aged using otoliths or an age length key.

	Age (years) / Year class										
	0	1	2	3	4	5	6	7	8	9	
	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000	Total
Bay of Quinte	106	86	47	4	2	0	1	0	2	1	249
Mean fork length (mm)	120	209	330	406	462		568		561	562	
Mean weight (g)	18	92	381	717	1081		2336		2438	2476	

TABLE 2.4.16. Mean catch-per-trawl of **round goby** at three Ontario and six Bay of Quinte sites, 1992-2009.

	EB02	EB03	EB06	Trenton	Belleville	Big Bay	Deseronto	Hay Bay	Conway	Lake Ontario	Bay of Quinte	Number of trawls
1992	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	90
1993	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	85
1994	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	90
1995	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	80
1996	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	80
1997	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	93
1998	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	92
1999	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	88
2000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	80
2001	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.1	0.0	0.0	0.2	80
2002	0.0	0.0	0.0	0.0	1.6	0.1	11.5	1.3	0.5	0.0	2.5	80
2003	0.1	0.0	0.0	2.9	67.0	1.4	16.1	14.3	282.2	0.0	64.0	92
2004	250.1	0.3	0.0	8.5	47.3	15.8	20.6	3.5	79.2	83.5	29.1	86
2005	24.8	732.4	0.0	13.1	60.3	9.5	117.3	40.1	127.2	252.4	61.3	88
2006	40.1	850.3	5.0	5.3	7.1	4.8	4.6	6.0	40.8	298.5	11.4	84
2007	175.1	910.1	82.9	0.8	53.9	50.4	4.3	17.1	173.2	389.4	49.9	84
2008	26.7	1100.2	1.7	12.4	8.6	1.1	4.5	11.4	89.7	376.2	21.3	84
2009	169.9	2551.9	8.7	34.1	30.5	0.6	2.8	1.6	80.8	910.2	25.1	84

TABLE 2.4.17. Biological attribute information for two deepwater scuplin caught in 2009: one at Rocky Point (100 m water depth) on July 15 and one at EB06 on Aug 31.

	Fish	Total length (mm)	Weight (g)	Sex
Rocky Point	1	94	7.03	Female
EB06	1	80	4.81	Female

2.5 Lake-wide Hydroacoustic Assessment of Prey Fish

The status of prey fish in Lake Ontario is assessed in hydroacoustic surveys conducted jointly since 1991 by Ontario Ministry of Natural Resources (OMNR) and New York State of Department of Environmental Conservation (NYSDEC). The surveys are conducted in mid-summer and cover the entire lake. The 2009 survey was conducted on July 22-30, and consisted of five north-south shore-to-shore transects in the main lake, and one transect in the Kingston Basin. Acoustic data used to estimate population densities were collected using a Biosonics 120 kHz split-beam echosounder. Nine midwater trawls were also conducted to provide data on species composition and biological attributes of the fish.

The alewife population estimate for 2009 is 134 million yearling-and-older fish. This is a decrease from the previous year, but in line with the general population levels seen since 2003 (Fig. 2.5.1). The 2009 population estimate translates into a biomass estimate of 5298 MT.

The rainbow smelt population estimate for 2009 was 311 million yearling-and-older fish, which translates into a biomass estimate of 1714 MT (Fig. 2.5.2). This is a moderate increase from the previous year, but also in line with the low levels observed in recent years.

Three-spine sticklebacks are another species assessed in the hydroacoustic surveys, albeit only from the catches in the midwater trawls that accompany the acoustic data collection. A sharp decrease in abundance of the sticklebacks was observed in 2006-2007, leading to concerns about the future levels of this species. No sticklebacks were caught in the 2009 trawls (trawling was not conducted in 2008).

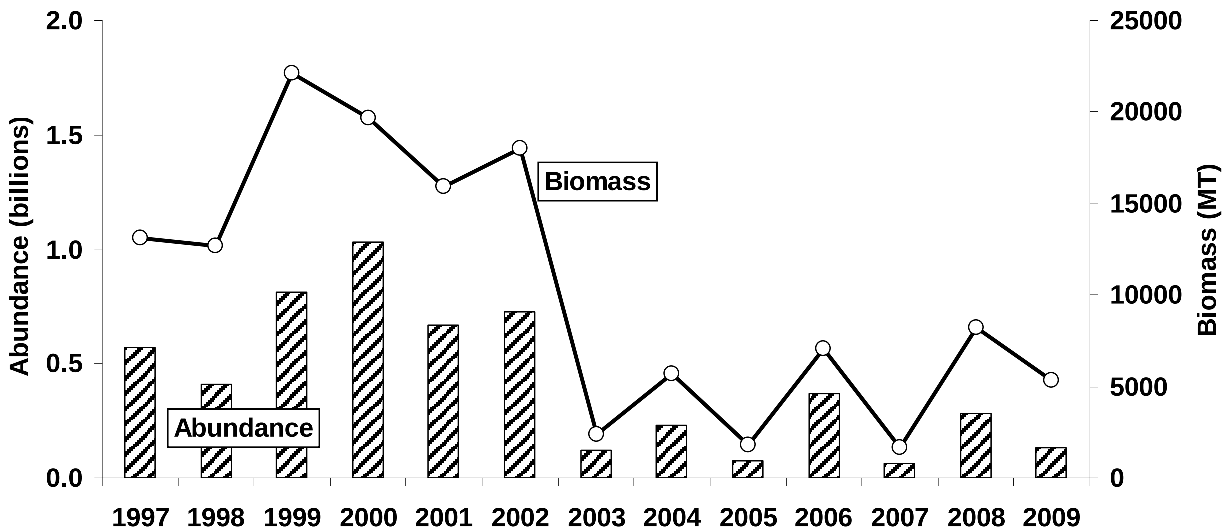


FIG. 2.5.1. Abundance and biomass of yearling-and-older **alewife**. Abundance estimates were obtained directly from hydroacoustic surveys, biomass estimates were obtained by applying average weights to abundance estimates. The weight information normally comes from midwater trawls done during the surveys, however information from other sources was used for years 2002, 2004, 2005, 2008 and 2009.

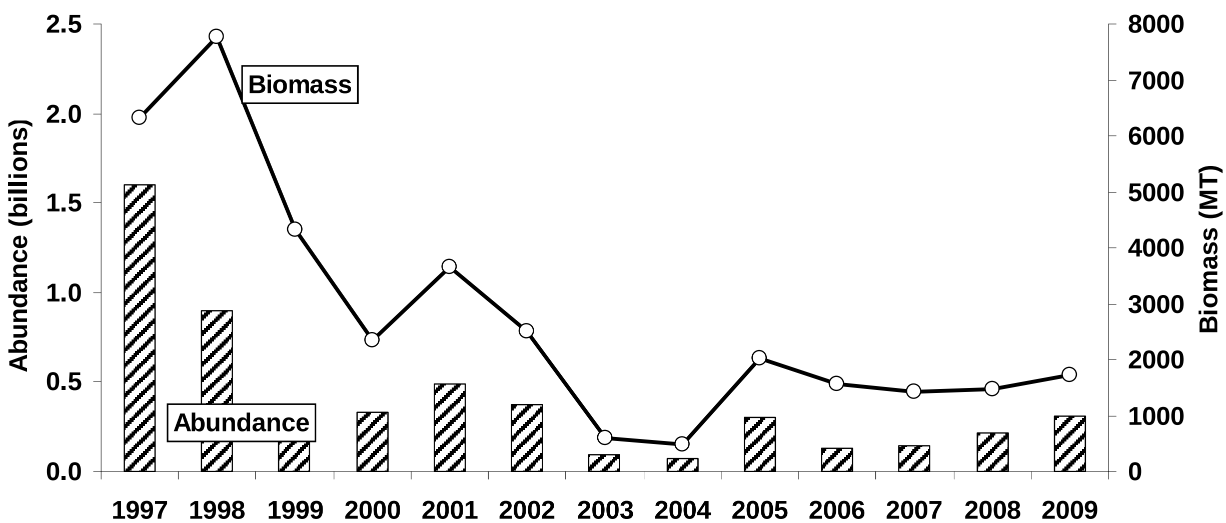


FIG. 2.5.2. Abundance and biomass of yearling-and-older **rainbow smelt**. Abundance estimates were obtained directly from hydroacoustic surveys, biomass estimates were obtained by applying average weights to abundance estimates. The weight information normally comes from midwater trawls done during the surveys, however information from other sources was used for years 2002, 2004, 2005, 2008 and 2009.

2.6 Nearshore Community Index Netting

The provincial standard nearshore community index netting program (NSCIN) was initiated on the upper Bay of Quinte (Trenton to Deseronto) in 2001, and was expanded to include the lower Bay of Quinte (Deseronto to Lake Ontario) in 2002. Both upper and lower Bay of Quinte were sampled from 2002-2005. In 2006, the NSCIN program was conducted on Hamilton Harbour and the Toronto waterfront area thanks to partnerships developed with the Department of Fisheries and Oceans Canada and the Toronto Region Conservation Authority. In 2007, NSCIN was conducted in five areas: Lake St. Francis (St. Lawrence River), the upper Bay of Quinte, East and West Lakes (two Lake Ontario embayments on the southwest side of Prince Edward County, and the Toronto waterfront area. In 2008, NSCIN was conducted in five areas: Lake St. Francis (St. Lawrence River), the upper Bay of Quinte, Weller's Bay, Presqu'ile Bay, and Hamilton Harbour. In 2009, five areas were completed: upper Bay of Quinte, lower Bay of Quinte, Prince Edward Bay, North Channel/Kingston, and the Thousand Islands (Fig. 2.6.1).

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 that contained shoreline in the area netted.

Upper Bay of Quinte

Thirty-seven trapnet sites were sampled on the upper Bay of Quinte from Aug 31-Sep 18 with water temperatures ranging from 18.0-22.0 ^{o}C (Table 2.6.1). More than 4,800 fish comprising 23 species were captured (Table 2.6.2). The most abundant species by number were bluegill (2,655), pumpkinseed (866), black crappie (371), largemouth bass (160), rock bass (144) and white perch (143). Of note was that a total of only 95 brown bullhead were caught. Four species of redhorse were caught silver (53), shorthead (13), greater (2), and river redhorse (1) a species of special concern (see Section 7.3).

TABLE 2.6.1. Survey information for the 2009 NSCIN trapnet program on the upper Bay of Quinte, lower Bay of Quinte, Prince Edward Bay, North Channel / Kingston and the Thousand Islands.

	Upper Bay of Quinte	Lower Bay of Quinte	Prince Edward Bay	North Channel / Kingston	Thousand Islands
Survey dates	Aug 31-Sep 18	Aug 31-Sep 18	Aug 4-Aug 21	Aug 4-Aug 21	Aug 4-Aug 25
Water temperature (^{o}C)	18.0-22.0 ^{o}C	19.2-22.8^{o}C	17.8-22.9 ^{o}C	20.5-26.8 ^{o}C	21.5-26.3 ^{o}C
No. of trapnet lifts	37	36	27	36	36
No. sites by depth (m):					
Target (2-2.5 m)	17	10	13	6	22
> Target	16	21	10	22	14
< Target	3	6	4	8	0
No. sites by substrate:					
Hard	13	29	17	21	14
Soft	23	8	10	15	22
No. sites by cover:					
None	0	1	3	5	2
1-25%	6	14	12	23	13
25-75%	14	18	9	6	15
>75%	16	4	3	2	6

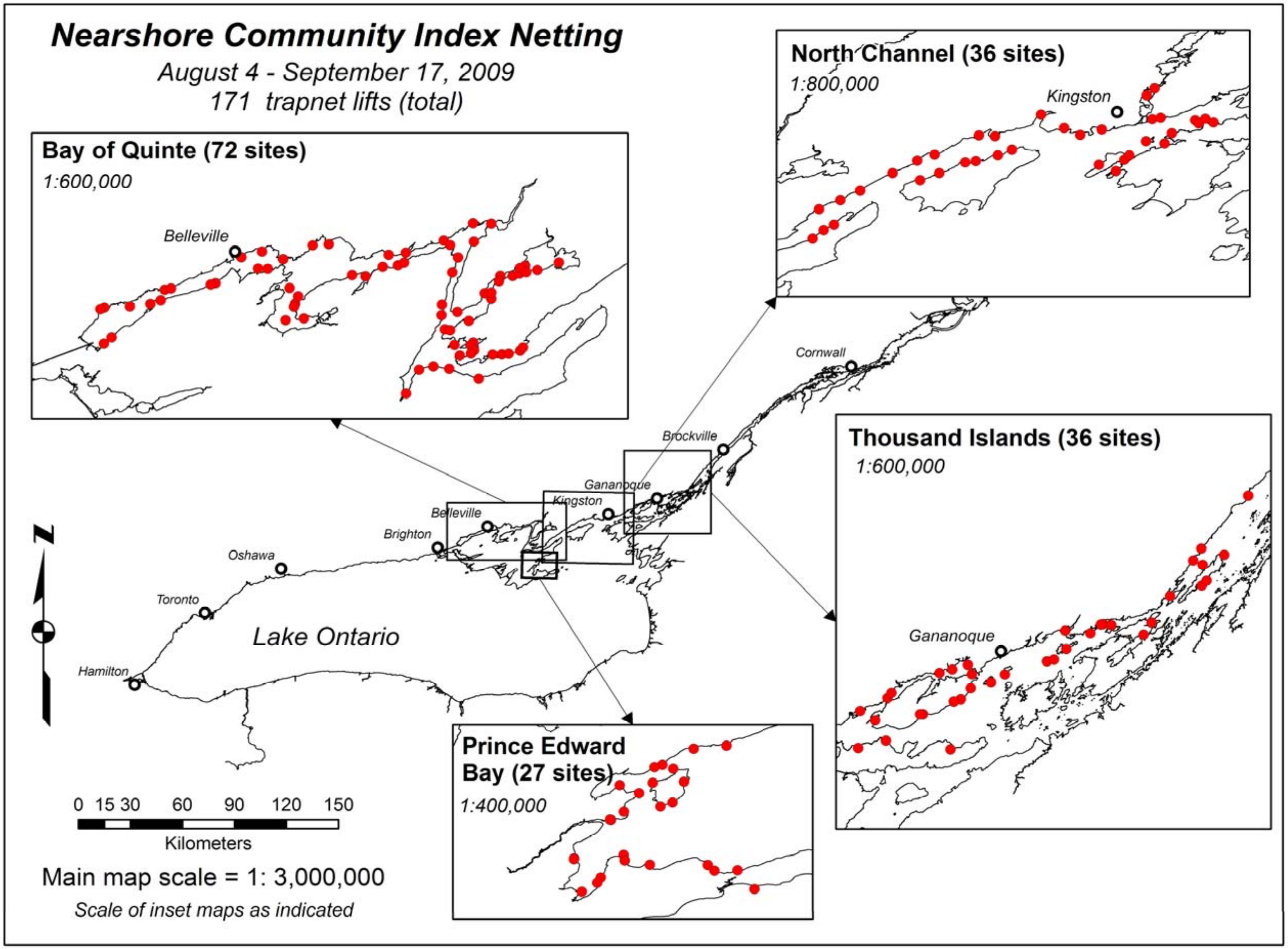


FIG. 2.6.1. Map of Lake Ontario and the St. Lawrence River indicating NSCIN trapnet locations for 2009.

TABLE 2.6.2. Species-specific catch in the 2009 NSCIN trapnet program on the upper Bay of Quinte, lower Bay of Quinte, Prince Edward Bay, North Channel / Kinston, and the Thousand Islands. Statistics shown arithmetic and geometric mean catch-per-trapnet (CUE), percent relative standard error of mean log10(catch+1), %RSE = 100*SE/mean, and mean fork or total length (mm). A total of 27 species was caught.

	Upper Bay of Quinte				Lower Bay of Quinte				Prince Edward Bay				North Channel / Kingston				Thousand Islands			
	Arithmetic mean CUE	Geometric mean CUE	RSE (%)	Mean length (mm)	Arithmetic mean CUE	Geometric mean CUE	RSE (%)	Mean length (mm)	Arithmetic mean CUE	Geometric mean CUE	RSE (%)	Mean length (mm)	Arithmetic mean CUE	Geometric mean CUE	RSE (%)	Mean length (mm)	Arithmetic mean CUE	Geometric mean CUE	RSE (%)	Mean length (mm)
Longnose gar	0.444	0.027	13	849	0.389	0.031	14	655	0.074	0.036	69	725	0.306	0.071	67	779	1.944	0.139	62	720
Bowfin	0.500	0.027	10	584	0.722	0.038	9	589	0.889	0.107	21	602	0.250	0.055	32	647	1.417	0.108	15	614
Alewife									8.074	0.221	12	151					0.722	0.101	51	153
Gizzard shad	0.056	0.011	35	115	0.278	0.029	20	195												
Northern pike	0.278	0.020	11	600	1.306	0.052	9	572	1.704	0.160	22	632	0.500	0.072	22	708	1.250	0.088	12	575
Quillback	0.028	0.007	35	440																
White sucker	0.639	0.029	8	413	1.833	0.059	8	406	0.630	0.092	23	449	1.611	0.112	14	427	1.083	0.103	18	417
Silver redhorse	1.444	0.046	13	439	0.056	0.012	31	570	0.037	0.026	100	590	0.333	0.072	41	577	0.139	0.041	42	562
Shorthead redhorse	0.361	0.026	17	389																
Greater redhorse	0.056	0.009	24	535																
River redhorse	0.028	0.007	35	570																
Common carp	0.194	0.019	18	654	0.278	0.025	13	716	0.370	0.072	28	673	0.500	0.085	32	691	2.250	0.161	22	665
Golden shiner					0.278	0.030	22	143	0.037	0.026	100	160					0.056	0.031	100	145
Spottail shiner					0.056	0.012	31	135												
Brown bullhead	2.556	0.050	5	276	21.889	0.099	4	277	55.407	0.421	12	250	12.250	0.275	16	250	66.556	0.208	5	244
Channel catfish	0.278	0.021	12	556	0.806	0.045	12	517					1.056	0.122	33	578	0.944	0.113	28	555
White perch	3.861	0.059	7	205	18.583	0.134	9	211	0.111	0.044	55	183	0.028	0.019	100	230	0.056	0.027	70	270
White bass					0.333	0.031	19	320												
Rock bass	3.889	0.063	9	170	2.444	0.065	7	175	24.111	0.293	11	176	7.639	0.253	19	157	11.139	0.196	9	147
Pumpkinseed	23.417	0.084	4	155	25.861	0.103	4	144	18.148	0.336	16	126	3.306	0.202	25	127	27.667	0.245	8	131
Bluegill	71.750	0.091	2	154	57.444	0.109	3	156	0.148	0.054	57	135	1.722	0.156	36	149	9.639	0.263	17	144
Smallmouth bass	0.556	0.031	12	387	0.139	0.021	25	402	1.111	0.145	31	317	1.917	0.150	24	359	0.556	0.096	42	308
Largemouth bass	4.333	0.053	4	254	1.917	0.057	7	237	1.741	0.162	24	332	0.250	0.060	40	321	1.306	0.125	22	275
Black crappie	10.028	0.048	2	222	6.250	0.075	5	219	0.741	0.126	47	278	0.278	0.068	51	226	5.833	0.217	18	200
Yellow perch	2.639	0.055	7	200	3.361	0.075	8	192	4.704	0.265	26	218	2.528	0.170	21	212	5.556	0.217	19	204
Walleye	1.750	0.044	6	457	3.611	0.070	6	470	0.704	0.105	26	394	0.944	0.111	28	507	0.139	0.047	57	632
Freshwater drum	1.889	0.045	6	432	6.806	0.098	7	414	0.407	0.078	29	635	2.278	0.157	23	432	0.472	0.085	39	511
Total CUE	131				155				119				38				139			
Number of species	23				22				19				18				20			
Number of nets	37				36				27				36				36			
Total catch	4,846				5,567				3,217				1,357				4,994			

Lower Bay of Quinte

Thirty-six trapnet sites were sampled on the lower Bay of Quinte from Aug 31-Sep 18 with water temperatures ranging from 19.2-22.8 ^{o}C (Table 2.6.1). Over 5,500 fish comprising 22 species were captured (Table 2.6.2). The most abundant species by number were bluegill (2,068), pumpkinseed (931), brown bullhead (788), white perch (669), freshwater drum (245), black crappie (225) and walleye (130).

Prince Edward Bay

Twenty-seven trapnet sites were sampled from Aug 4-21 with water temperatures ranging from 17.8-22.9 ^{o}C (Table 2.6.1). Over 3,200 fish comprising 19 species were captured (Table 2.6.2). The most abundant species by number were brown bullhead (1496), rock bass (651), pumpkinseed (490), alewife (218), yellow perch (127) and largemouth bass (47).

North Channel / Kingston

Thirty-six trapnet sites were sampled from Aug 4-21 with water temperatures ranging from 20.5-26.8 ^{o}C (Table 2.6.1). Over 1,300 fish comprising 18 species were captured (Table 2.6.2). The most abundant species by number were brown bullhead (441), rock bass (275), pumpkinseed (119), yellow perch (91) and freshwater drum (82).

Thousand Islands

Thirty-six trapnet sites were sampled from Aug 4-25 with water temperatures ranging from 21.5-26.3 ^{o}C (Table 2.6.1). Nearly 5,000 fish comprising 20 species were captured (Table 2.6.2). The most abundant species by number were brown bullhead (2,396), pumpkinseed (996), rock bass (401), bluegill (347), black crappie (210) and yellow perch (200).

Status of Selected Species

Northern pike

Northern pike were most abundant in Prince Edward Bay and least abundant in the upper Bay of Quinte (Table 2.6.2). The largest and fastest growing pike were found in the North Channel / Kingston area (Table 2.6.3).

Pumpkinseed

Pumpkinseed were abundant in all areas except for North Channel / Kingston area (Table 2.6.2).

Bluegill

Bluegill were most abundant in the upper Bay of Quinte and least abundant in Prince Edward Bay (Table 2.6.2).

TABLE 2.6.3. Age distribution and mean length and weight of 110 **northern pike** sampled from NSCIN trapnets in five geographic areas. Ages were interpreted using cleithra.

	Age										
Age (years)	0	1	2	3	4	5	6	7	8	9	10
Year-class	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999
Upper Bay of Quinte											
Number	1	1	2	1	2		2	1			
Mean fork length (mm)	260	351	550	555	672		689	830			
Mean weight (g)	125	311	1293	1488	2214		2341	3926			
Lower Bay of Quinte											
Number		4	5	8	8	1	2				
Mean fork length (mm)		398	485	566	613	664	631				
Mean weight (g)		452	833	1338	1737	2270	1724				
Prince Edward Bay											
Number		3	2	6	5	6	3	1			1
Mean fork length (mm)		385	505	590	566	652	724	786			920
Mean weight (g)		463	1037	1577	1825	2283	3009	3509			5854
North Channel / Kingston											
Number		1	1	2	2	3	1	4	2	1	
Mean fork length (mm)		467	565	628	709	702	734	812	758	774	
Mean weight (g)		812	1471	1670	2549	2631	2984	4095	3266	4556	
Thousand Islands											
Number		5	5	9	2		2	3	2		1
Mean fork length (mm)		401	431	568	636		693	686	694		718
Mean weight (g)		525	670	1376	1889		2128	2159	2292		2566

Smallmouth bass

Smallmouth bass were most abundant in the North Channel / Kingston area and least abundant in the lower Bay of Quinte (Table 2.6.2).

Largemouth bass

Largemouth bass were most abundant in the upper Bay of Quinte, moderately abundant in the lower Bay of Quinte, Prince Edward Bay and the Thousand Islands and of low abundance in the North Channel / Kingston area (Table 2.6.2).

Black crappie

Black crappie were most abundant in the upper and lower Bay of Quinte and the Thousand Islands and uncommon in the other areas (Table 2.6.2).

Yellow perch

Yellow perch were most abundant in the Thousand Islands and Prince Edward Bay and moderately abundant in the other areas (Table 2.6.2).

Walleye

Walleye were most abundant in the lower and upper Bay of Quinte. Walleye were least common in the Thousand Islands area (Table 2.6.2). Walleye age ranged from 1-23 years-old. The majority of walleye were young—from age-1 to age-6. The most common age was age-4 (2005 year-class) followed closely by age-3 (2006 year-class) and age-6 (2003 year-class) (Table 2.6.4). Length-at-age was similar in all areas.

TABLE 2.6.4. Age distribution and mean length and weight of 92 **walleye** sampled from NSCIN trapnets in five geographic areas. Ages were interpreted using otoliths.

	Age																						
Age (years)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Year-class	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990	1989	1988	1987
Upper Bay of Quinte																							
Number		3	3	1	13		6		1						1			1					
Mean fork length (mm)		259	386	445	477		532		545						572			652					
Mean weight (g)		177	673	1177	1239		1657		1947						2162			3022					
Lower Bay of Quinte																							
Number		1	3	11	5		3		2		1	1		1		1						1	
Mean fork length (mm)		212	361	423	484		527		592		610	554		563		656						679	
Mean weight (g)		98	482	851	1324		1693		2583		2940	1958		2093		3525						3339	
Prince Edward Bay																							
Number		3	2	1		1	2				1												
Mean fork length (mm)		277	325	463		420	576				598												
Mean weight (g)		222	337	1034		836	2844				3405												
North Channel / Kingston																							
Number			3	1	6	1	4		1								1				1		
Mean fork length (mm)			368	464	495	539	574		515								694				731		
Mean weight (g)			583	1229	1571	2025	2429		1518								3268				3695		
Thousand Islands																							
Number				1							1							1			1		1
Mean fork length (mm)				409							668							684			745		651
Mean weight (g)				799							3207							3259			4270		2735

2.7 St. Lawrence River Fish Community Index Netting—Thousand Islands

Every other year in early fall, the Lake Ontario Management Unit conducts an index gillnet survey in the Thousand Islands. The catches are used to estimate abundance, measure biological attributes, as well as to collect materials for age determination, stomach contents and tissues for contaminant analysis and pathological examination. The survey is part of a larger effort to monitor changes in the fish communities in four distinct sections of the St. Lawrence River (Thousand Islands, Middle Corridor, Lake St. Lawrence, and Lake St. Francis), and it is coordinated with the New York State Department of Environmental Conservation (NYSDEC) to provide comprehensive assessment of the river's fisheries resources.

In 2009 the survey was conducted between September 14 and October 2. Forty eight sets were made, using standard gillnets consisting of 25-foot panels of monofilament meshes ranging from 1.5 to 6 inches in half-inch increments. The nets were fished for approximately 24 hours. The overall catch was 1,886 fish comprising 21 species (summary in Table 2.7.1). The average number of fish per set was 39.3 which is near the average observed over the last two decades (Fig. 2.7.1). The dominant species in the catch were yellow perch, rock bass, smallmouth bass, and brown bullhead (Fig. 2.7.2). Less common species included northern pike, walleye, channel catfish, and pumpkinseed, while the remaining species each comprised less than 1% of the catch.

Species Highlights

Yellow perch recently showed a river-wide increase in abundance, seen in the Thousand Islands surveys as a dramatic increase in catches between the 2005 and 2007 surveys (Fig. 2.7.3). The catches in the 2009 survey returned near the average value seen over the last decade.

The centrarchids are represented by six species in the upper St. Lawrence: rock bass, pumpkinseed, bluegill, smallmouth bass, largemouth bass and black crappie (Figs. 2.7.4 and 2.7.5). In the 2009 survey all but one of the six species (bluegill) showed a decline from the

TABLE 2.7.1. Catches per standard gillnet set in the Thousand Islands area of the St. Lawrence River, 1987-2009. Catches from multifilament nets (all catches prior to 2001, and a portion of catches in 2001-2005) were adjusted by a factor of 1.58 to monofilament netting standards initiated in 2001.

	1987	1989	1991	1993	1995	1997	1999	2001	2003	2005	2007	2009
Lake Sturgeon	-	-	-	-	-	-	0.03	-	0.02	0.02	0.02	0.04
Longnose gar	-	-	0.03	-	-	0.03	-	-	0.07	0.04	-	0.04
Bowfin	0.08	0.13	-	0.06	0.03	0.07	-	0.02	0.07	0.05	0.08	0.06
Alewife	0.49	-	0.09	0.03	0.03	-	-	-	-	0.02	0.13	0.06
Gizzard shad	-	0.41	0.46	-	-	-	0.03	0.06	-	0.04	0.02	-
Chinook salmon	-	-	0.03	-	-	-	0.03	0.02	-	-	-	-
Brown trout	-	0.05	-	-	-	-	-	-	-	-	-	-
Rainbow trout	-	-	-	-	-	0.03	-	-	-	-	-	-
Lake trout	-	0.13	-	0.16	0.13	0.13	-	-	-	-	-	-
Lake herring	-	-	-	-	0.06	-	-	-	-	-	-	-
Northern pike	4.46	6.73	4.35	3.62	2.61	2.40	2.14	1.33	2.05	1.78	1.25	0.88
Muskellunge	-	-	0.03	-	-	-	-	0.02	0.04	-	-	-
Esocidae hybrids	-	-	-	-	0.03	-	-	-	-	-	-	-
Chain pickerel	-	-	-	-	-	-	-	-	-	-	-	0.02
Mooneye	0.05	-	-	-	-	-	-	-	-	-	-	-
White sucker	1.09	2.10	1.39	1.49	1.37	1.25	1.78	0.75	0.93	0.64	0.38	0.23
Moxostoma sp.	-	0.08	0.06	0.13	0.33	-	0.23	0.08	0.11	0.10	0.06	0.02
Common carp	0.05	0.13	0.09	0.03	0.09	0.36	0.13	0.08	0.12	0.04	0.02	-
Chub	-	0.05	-	-	-	-	-	-	-	0.02	-	-
Golden shiner	0.05	0.05	-	0.06	0.03	-	0.03	-	-	0.04	0.06	0.31
Brown bullhead	2.56	1.79	2.46	1.06	0.95	1.91	3.85	3.00	2.66	4.69	1.13	3.58
Channel catfish	0.81	0.08	0.55	0.16	0.30	0.30	0.56	0.25	0.35	0.20	0.67	0.54
White perch	0.08	-	0.36	0.03	0.06	-	0.07	0.10	0.02	0.15	-	-
White bass	0.05	0.60	0.43	0.24	-	0.07	-	-	-	-	-	-
Rock bass	4.14	4.46	5.44	4.77	5.56	4.87	7.54	9.48	7.23	7.28	10.77	7.00
Pumpkinseed	4.61	6.19	5.81	3.89	2.80	2.40	3.23	1.40	1.21	0.67	0.63	0.44
Smallmouth bass	3.16	5.67	4.31	2.34	1.55	1.48	3.19	1.67	3.97	7.59	5.06	3.79
Bluegill	0.65	0.88	0.43	0.06	-	0.16	0.07	0.02	0.14	0.10	0.02	0.08
Largemouth bass	0.13	0.36	0.13	0.16	0.16	0.03	0.23	0.08	0.22	0.33	0.63	0.27
Black crappie	0.13	0.16	0.09	0.06	0.03	0.03	0.10	0.06	0.07	0.16	0.06	0.04
Yellow perch	27.79	17.62	15.41	16.23	22.67	21.33	22.22	18.06	20.32	14.26	28.65	20.88
Walleye	0.21	0.60	0.33	0.33	0.27	0.59	0.07	0.19	0.23	0.23	0.60	0.60
Round goby	-	-	-	-	-	-	-	-	-	0.77	0.19	0.19
Freshwater drum	-	-	0.09	-	0.03	0.10	-	0.06	0.04	0.30	0.04	0.21
Total Catch	50.56	48.25	42.39	34.90	39.11	37.56	45.49	36.75	39.87	39.54	50.46	39.29

previous survey in 2007. The decline was quite dramatic in rock bass and largemouth bass, but in both cases it was a return from peak values in 2007 to levels typically observed in recent years. The smallmouth bass declined for the second survey in a row, but again it was from a peak level, and in 2009 the smallmouth bass still remained above long-term average. The steady decline in pumpkinseeds, observed over the history of the survey, appears to continue.

The northern pike also continue to decline in what appears to be a slow, steady trend over the last two decades. The catches in 2009 were the lowest seen in the history of the Thousand Islands survey (Fig. 2.7.6).

Other noteworthy observations from the 2009 survey include the capture of a chain pickerel (see Section 1.14), the absence of common carp for first time in the history of the survey, and the continued decline in catches of common white sucker.

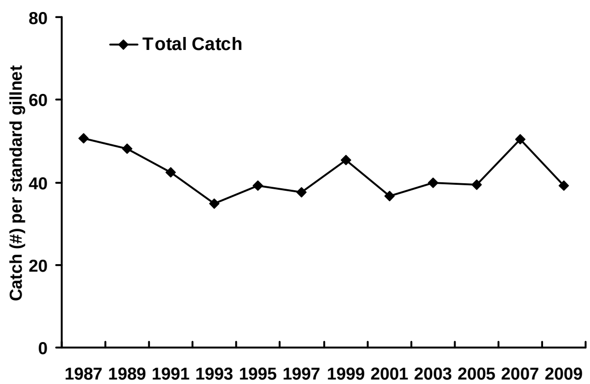


FIG. 2.7.1. Total number of fish (all species) per standard gillnet set in the Thousand Islands area of the St. Lawrence River, 1987-2009.

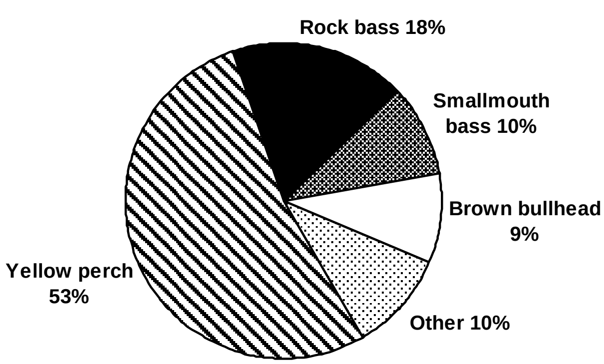


FIG. 2.7.2. Species composition in the 2009 gillnet survey in the Thousand Island area of the St. Lawrence River.

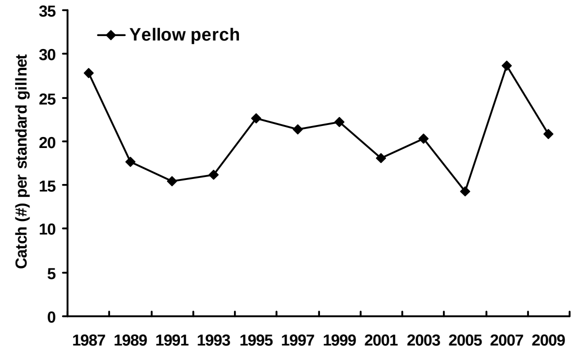


FIG. 2.7.3. Yellow perch catch per standard gillnet set in the Thousand Islands area of the St. Lawrence River, 1987-2009.

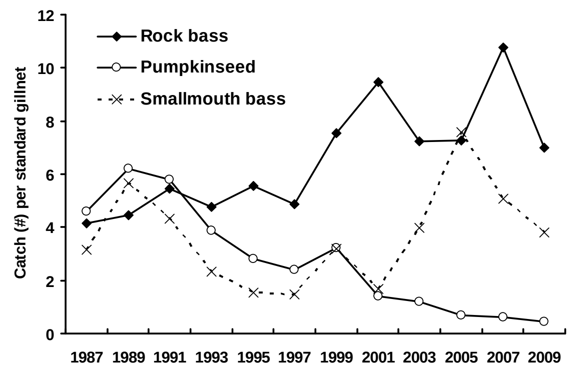


FIG. 2.7.4. Centrarchid catches per standard gillnet set in the Thousand Islands area of the St. Lawrence River, 1987-2009.

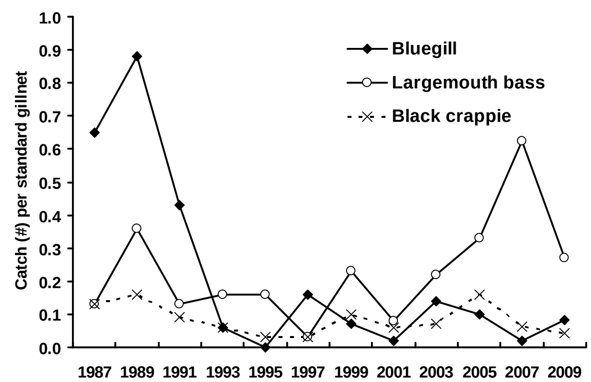


FIG. 2.7.5. Centrarchid catches per standard gillnet set in the Thousand Islands area of the St. Lawrence River, 1987-2009.

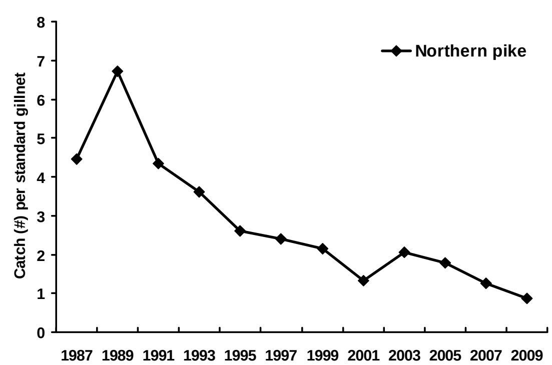


FIG. 2.7.6. Northern pike catch per standard gillnet set in the Thousand Islands area of the St. Lawrence River, 1987-2009.

2.8 Juvenile Atlantic Salmon Electrofishing

In 2009 Atlantic salmon spring fingerlings (~1 g) were stocked in Cobourg Brook, Duffins Creek and the Credit River to restore self-sustaining populations. Our purpose was to evaluate growth and survival of spring fingerling-stocked Atlantic salmon at the end of their first summer. Additionally, on the Credit River, we are assisting with future smolt assessments. Live-capture of juvenile Atlantic salmon was conducted by electrofishing in October 2009, after most of the year's growth was complete, and when fish size indicates potential smolting. On Baltimore Creek (Cobourg Brook) six sites were randomly selected from the pool of previously randomly selected sites sampled in 2007 and/or 2008. Four sites were located in Baltimore Creek between Danforth Street and Ball's Mill, and two sites were located in the Crossen tributary above Dale Road. On Duffins Creek five randomly selected, previously un-sampled sites were sampled. Three sites were located on the Mitchell tributary, above Greenwood and two sites were located on West Duffins Creek at the 32nd Sideline. Abundance of all salmonids was determined using single pass electrofishing on Baltimore Creek and Duffins Creek. Electrofishing was conducted moving upstream to a block net at the upper end of the site to reduce escapement of fish. The abundance (N) of young-of-the-year (YOY) salmonids was estimated for each species at each site using: N = catch + catch / (1/(1-0.2617 x (mean weight)$^{0.27116}$)-1). The abundance of yearlings and older salmonids was estimated according to Jones and Stockwel[1].

Mark-recapture methods were used at five reaches in the Credit River to estimate abundance or support smolt assessment. These reaches ranged in length from 411-1,357 m. Three upstream reaches had been stocked with Atlantic salmon spring fingerlings in 2009, and recaptures were made at two of them about one week after marking sessions to estimate abundance and survival. Two reaches downstream of the stocking sites were sampled for marking and to determine presence of age-1 and older Atlantic salmon from past stocking of spring and fall fingerlings, and yearlings. Only Atlantic salmon were targeted and collected. Other species were released upon capture and were not recorded. Atlantic salmon were marked using two colours of Visible Implant Elastomer (VIE) marks. Yellow and red VIE were used to mark young-of-the-year (YOY) and older fish, respectively. During the recapture session most unmarked Atlantic salmon were marked for smolt assessment. Mark-recapture population estimates of Atlantic salmon were based on the modified Petersen method.

Atlantic salmon dominated the catch by number at Duffins Creek, and was co-dominant with rainbow trout at Cobourg Brook (Table 2.8.1). However, in Cobourg Brook the salmonid biomass was evenly distributed between brown trout, Atlantic salmon, and rainbow trout (Table 2.8.2). In Duffins Creek Atlantic salmon dominated the salmonid biomass and brook trout were the only other salmonid present, although no YOY brook trout were caught in Duffins Creek. In the Credit River 1,288 Atlantic salmon were VIE marked (Table 2.8.3). The density and biomass of Atlantic salmon in the Credit River (Table 2.8.3) exceeded Duffins Creek and Cobourg Brook (Table 2.8.2). The target density[2] of 0.05 YOY Atlantic salmon m^{-2} was far exceeded at all reaches, and greatly so except for the Crossen tributary of Cobourg Brook (Fig. 2.8.1). As a function of density, over-summer survival was excellent (10.3–27.1%) at all reaches except the Crossen tributary (2.0%) (Fig. 2.8.1). Accordingly, the Crossen branch of Cobourg Brook may be less preferable for Atlantic salmon restoration.

Fork length-at-age of Atlantic salmon varied greatly within and between the streams (Figs. 2.8.2, 2.8.3, 2.8.4). Overlap between age groups in length-at-age is minimal in these streams, and so YOY are easily distinguished in the region of the first major mode in the length distributions from older Atlantic salmon. No older Atlantic salmon were observed in West Duffins Creek or Crossen tributary of Cobourg Brook as they were not stocked in 2008. Growth of YOY Atlantic salmon was greatest in the Credit River, followed by Cobourg Brook, and then Duffins Creek (Figs. 2.8.2, 2.8.3, 2.8.4). As smolting of Atlantic salmon to Lake Ontario is size dependent, we have used >100 mm fork length to show the expected proportion of smolts in 2010. Elevated growth in the Credit River suggests it has higher proportions of age-1 smolts than Cobourg Brook or Duffins Creek. Each year of stream residence compounds the mortality prior to smolting, and so age-1 smolts may be preferable to older smolts. Some age-1 smolts are expected from Cobourg Brook, with the remaining smolts as age-2 (Fig. 2.8.2). No age-1 smolts are expected from West Duffins Creek or Mitchell tributary reaches of Duffins Creek, with a majority of fish smolting at age-2 and age-3 (Fig. 2.8.3). Past Atlantic salmon surveys in downstream reaches of Duffins Creek have observed YOY Atlantic salmon with mean length >100 mm suggesting significant potential for age-1 smolts, and greater smolt production. Atlantic salmon restoration may benefit from stocking downstream reaches of Duffins Creek.

[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]Miller-Dodd, L. and S. Orsatti. 1995. An Atlantic salmon restoration plan for Lake Ontario. Ontario Ministry of Natural Resources. Lake Ontario Assessment Internal Report LOA 95.08. Napanee.

TABLE 2.8.1. Catch of fish by site and means for reaches in single pass electrofishing surveys in Cobourg Brook and Duffins Creek in 2009.

		Cobourg Brook								Duffins Creek						
		Baltimore Creek					Crossen tributary			West Duffins			Mitchell tributary			
Species	Age-group	CB11	CB15	CB16	CB18	Mean	CB21	CB22	Mean	DU26	DU27	Mean	DU29	DU30	DU31	Mean
Sea lamprey	YOY	2	0	0	0	0.5	2	0	1	0	0	0	0	0	0	0
Rainbow trout	YOY	56	57	124	16	63.25	28	8	18	0	0	0	0	0	0	0
	Older	7	12	8	5	8	14	2	8	0	0	0	0	0	0	0
Atlantic salmon	YOY	75	69	54	38	59	14	7	10.5	61	42	51.5	55	46	46	49
	Older	3	6	13	15	9.25	0	0	0	0	0	0	14	12	18	14.67
Brown trout	YOY	0	9	4	0	3.25	0	2	1	0	0	0	0	0	0	0
	Older	2	6	2	4	3.5	3	10	6.5	0	0	0	0	0	0	0
Brook trout	YOY	0	0	1	0	0.25	1	1	1	0	0	0	0	0	0	0
	Older	0	0	0	0	0	0	1	0.5	2	1	1.5	3	1	0	1.33
Common shiner	YOY	0	0	0	0	0	0	0	0	1	0	0.5	0	0	0	0
Blacknose dace	YOY	0	1	0	0	0.25	0	1	0.5	10	8	9	10	8	15	11
Longnose dace	YOY	5	0	2	0	1.75	0	0	0	21	44	32.5	9	9	2	6.67
Creek chub	YOY	0	0	0	0	0	0	0	0	8	5	6.5	0	0	0	0
Rainbow darter	YOY	0	0	0	0	0	0	0	0	15	14	14.5	1	0	4	1.67
Johnny darter	YOY	0	0	0	0	0	0	0	0	1	0	0.5	0	0	0	0
Mottled sculpin	YOY	18	16	23	15	18	24	7	15.5	4	3	3.5	0	0	0	0

TABLE 2.8.2. Density (m^{-2}) and biomass ($g\ m^{-2}$) of salmon and trout in Baltimore Creek (Cobourg Brook tributary) and Duffins Creek during electrofishing surveys in 2009. Latitude and longitude are recorded at the downstream end of site.

								Atlantic salmon		Brook trout		Brown trout		Rainbow trout		
Stream	Site	Lat	Long	Date	Site width (m)	Site length (m)	Factor	YOY	Older	YOY	Older	YOY	Older	YOY	Older	Total
							Density	0.471	0.01	0	0	0	0.007	0.41	0.027	0.925
Baltimore Cr.	CB11	44° 00.20'	78° 09.98'	20-Oct	5.7	60	Biomass	3.852	0.314	0	0	0	1.064	1.91	1.53	8.67
							Density	0.539	0.028	0	0	0.063	0.028	0.502	0.061	1.22
Baltimore Cr.	CB15	44° 01.20'	78° 09.55'	19-Oct	5.7	49.6	Biomass	4.168	1.063	0	0	0.718	7.268	2.492	3.471	19.179
							Density	0.259	0.045	0.005	0	0.02	0.005	0.696	0.026	1.056
Baltimore Cr.	CB16	44° 01.41'	78° 08.97'	20-Oct	6	69.4	Biomass	2.767	1.314	0.045	0	0.174	0.277	4.181	1.002	9.76
							Density	0.378	0.096	0	0	0	0.022	0.156	0.028	0.679
Baltimore Cr.	CB18	44° 01.93'	78° 08.75'	20-Oct	5.4	42.7	Biomass	2.555	2.443	0	0	0	4.018	1.132	1.397	11.545
							Density	0.08	0	0.006	0	0	0.009	0.186	0.052	0.333
Baltimore Cr. (Cr.ossen trib.)	CB21	44° 02.21'	78° 09.55'	19-Oct	6.6	59.6	Biomass	0.585	0	0.032	0	0	1.283	0.765	1.672	4.338
							Density	0.081	0	0.012	0.005	0.022	0.065	0.099	0.01	0.294
Baltimore Cr. (Cr.ossen trib.)	CB22	44° 02.99'	78° 09.59'	19-Oct	5.4	39.5	Biomass	0.394	0	0.049	0.46	0.131	5.874	0.382	0.362	7.652
							Density	0.514	0	0	0.007	0	0	0	0	0.521
West Duffins Cr.	DU26	43° 54.92'	79° 10.83'	22-Oct	6.3	50	Biomass	2.007	0	0	0.424	0	0	0	0	2.431
							Density	0.222	0	0	0.002	0	0	0	0	0.224
West Duffins Cr.	DU27	43° 54.98'	79° 10.71'	22-Oct	10.2	48.6	Biomass	0.902	0	0	0.162	0	0	0	0	1.064
							Density	0.606	0.079	0	0.014	0	0	0	0	0.699
Duffins Cr. (Mitchell trib.)	DU29	43° 57.68'	79° 06.44'	21-Oct	4.4	58.6	Density	1.83	1.954	0	0.906	0	0	0	0	4.691
							Biomass	0.439	0.054	0	0.003	0	0	0	0	0.496
Duffins Cr. (Mitchell trib.)	DU30	43° 57.60'	79° 06.27'	21-Oct	5.7	55.6	Density	1.03	1.132	0	0.136	0	0	0	0	2.298
							Biomass	0.473	0.091	0	0	0	0	0	0	0.564
Duffins Cr. (Mitchell trib.)	DU31	43° 57.53'	79° 06.15'	21-Oct	6.1	48.7	Density	1.08	1.438	0	0	0	0	0	0	2.518

TABLE 2.8.3. Catch, density and biomass of Atlantic salmon in the Credit River during electrofishing surveys in 2009. Latitude and longitude are recorded at the downstream end of site.

Location	Site	Latitude	Longitude	Site width (m)	Site length (m)	Date	Catch: Mark Applied	Catch: Recap	Catch: Not marked	N	Lower 95% CI	Upper 95% CI	Density (No. m^{-2})	Biomass (g m^{-2})	YOY Density (No. m^{-2})
Forks Prov. Park	CFR3	43° 48.65′	80° 0.39′	11.4	543	07-Oct	222	0	0	3,314	2,028	5,330	0.54	9.5	0.52
						15-Oct	164	14	44						
West Branch	CFR4	43° 47.77′	80° 0.24′	9.9	667	06-Oct	285	0	4	8,179	4,514	14,294	1.24	16.36	1.08
						13-Oct	231	9	45						
Dominion Street	CFR1-low	43° 48.47′	79° 59.43′	15.2	419	05-Oct	131	0	3						
	CFR1-mid	43° 48.27′	79° 59.52′	18.5	104	08-Oct	236	0	4						
Trout Unlimited	CFR7	43° 48.85′	79° 57.01′	12.3	411	14-Oct	6	0	0						
Ken Whillans CA	CFR8	43° 48.38′	79° 55.99′	12.2	1,357	14-Oct	13	0	0						

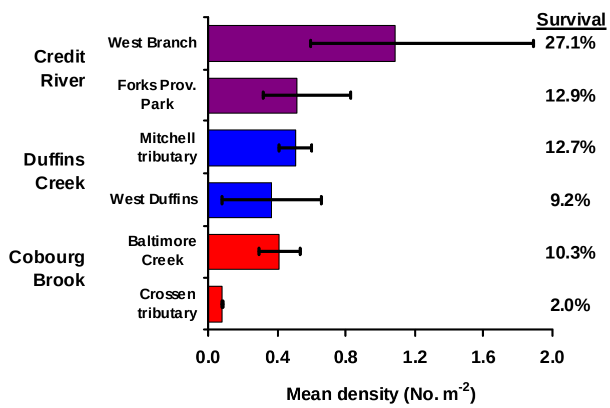


FIG. 2.8.1. Mean density and survival of young-of-the-year Atlantic salmon in the Credit River, Duffins Creek, and Cobourg Brook at sites stocked with a density 4 spring fingerlings m^{-2} in 2009. Error bars indicate the 95% confidence interval of mean density.

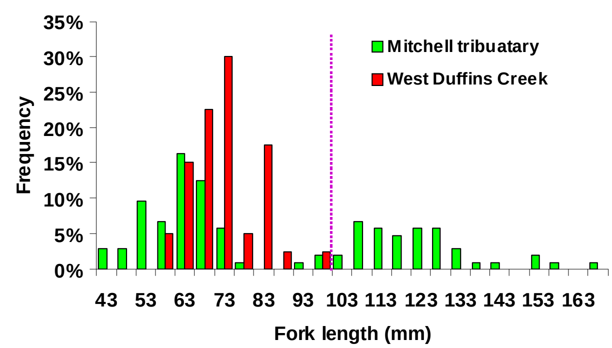


FIG. 2.8.3. Fork length distribution of Atlantic salmon in Duffins Creek in 2009. The dotted line indicates the 100 mm division, above which Atlantic salmon are expected to smolt in 2010.

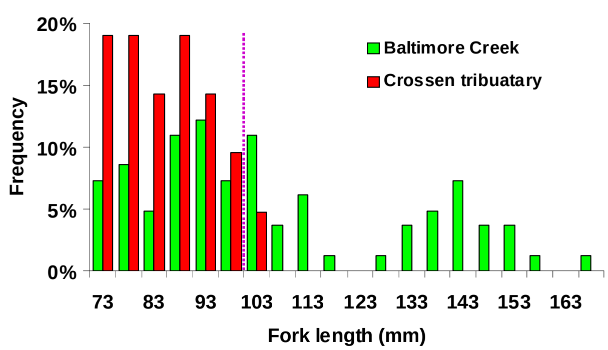


FIG. 2.8.2. Fork length distribution of Atlantic salmon in Cobourg Brook in 2009. The dotted line indicates the 100 mm division, above which Atlantic salmon are expected to smolt in 2010.

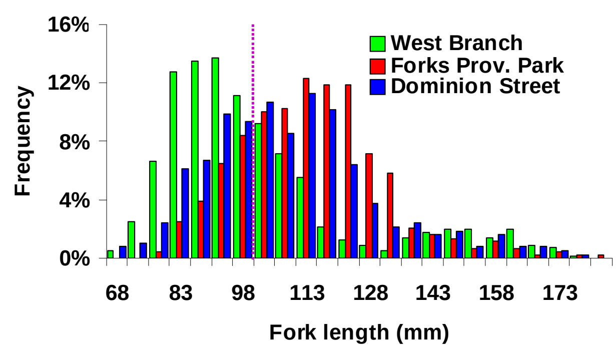


FIG. 2.8.4. Fork length distribution of Atlantic salmon in the Credit River in 2009. The dotted line indicates the 100 mm division, above which Atlantic salmon are expected to smolt in 2010.

2.9 Credit River Chinook Assessment

Growth, condition, and lamprey marking of Chinook salmon were monitored during the fall spawning run in the Credit River at the Kraft dam in Streetsville. Chinook salmon were electrofished in the Credit River for spawn collection by the Ringwood Fish Culture Station. LOMU crews measured the fork length, weighed, and collected otoliths from Chinook salmon for ageing. The body condition was estimated for each sex as the weight of a 900 mm fish based on a general linear model.

Condition of female Chinook salmon in the Credit River in 2009 was not significantly different ($P > 0.05$) from the previous six years, and remained significantly lower ($P < 0.05$) than years from 1989-2002 (Fig. 2.9.1). In conflict with the females, the condition of the males increased significantly in 2009 compared with the past five years, and was not significantly different from most years from 1989-2003. The reason for the disparity is unclear.

Length-at-age of mature Chinook salmon in the Credit River in 2008 are presented here for the first time as last year we did not understand the reasons for unusually low mean fork length of age-3 males (841 mm) that year. The 2008 value was the lowest value in the data series (Fig. 2.9.2). This had followed a higher value for the same year-class at age-2. Although this may appear to be incongruous, it can be explained by size-dependent maturity and a shifting maturity schedule. Estimates of growth of male Chinook salmon must account for size-dependent maturity and would be better obtained from complete population samples from Lake Ontario that are less biased. The maturity schedule of female Chinook salmon is more consistent than males, and most females mature at age-3 in Lake Ontario. A smaller number of fish were aged in 2009 (60 compared with ~100 in most years) and the one observed age-2 female was not presented here. Length of age-2 males and females and age-3 females in 2008 and 2009 were similar within each group and to the 2 previous years (Fig. 2.9.2). These values continue to remain lower than 1996-2000. The length of age-3 males in 2009 was lower than all other years except 2008.

No lamprey marks were observed on 92 Chinook salmon in the Credit River in 2009.

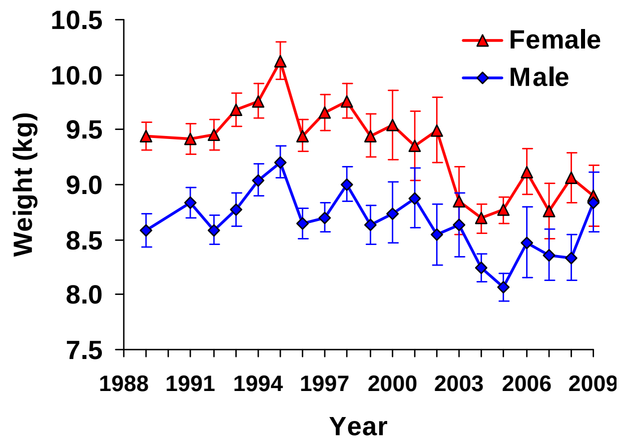


FIG. 2.9.1. Mean weight (+ 95%) of a 900 mm Chinook salmon in the Credit River, 1989-2009, during the spawning run (approximately Oct 1 each year).

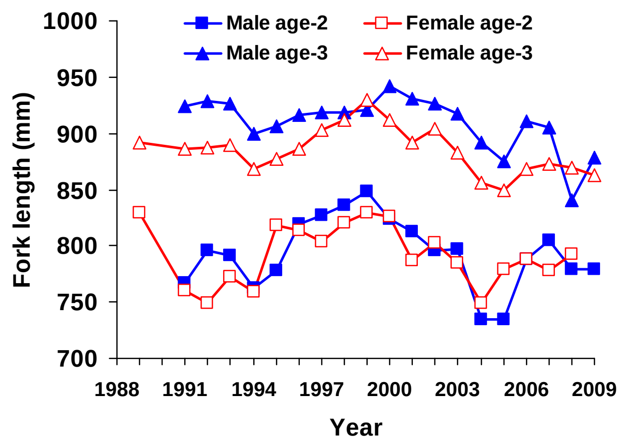


FIG. 2.9.2. Fork length by sex of age-2 and age-3 mature Chinook salmon in the Credit River, 1989-2009, during the spawning run (approximately Oct 1 each year).

3. Recreational Fishing Surveys

3.1 Bay of Quinte Recreational Fishery—Ice Angling

Only the ice-fishing component of the Bay of Quinte recreational angling fishery was monitored in 2009; the open-water fishery was not surveyed. The ice-fishing survey was conducted from Trenton to just east of Glenora. Angling effort was measured using aerial counts while on-ice angler interviews provided information on catch/harvest rates and biological characteristics of the harvest.

Ice angling

Ice conditions were generally quite good. The 2009 ice-fishing monitoring was conducted using fourteen aerial flights to count angler and ice-hut activity as well as twenty-two on-ice patrols to interview a total of 688 anglers. The maximum number of ice-huts counted during aerial flights was 351 huts (January 21); while the maximum number of on-ice anglers observed was 395 (February 16). Forty-two percent of anglers interviewed were local, 50% were from Ontario (outside the local area), 7% were from the US and 1% was from elsewhere in Canada. Table 3.1.1 and Fig. 3.1.1 summarize ice-fishing survey results for 1993-2009.

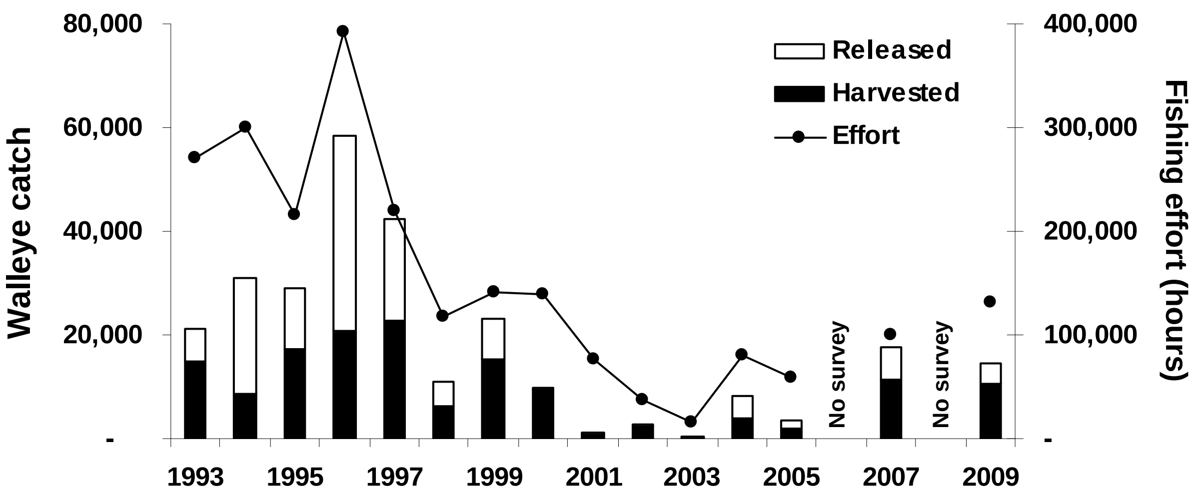
The survey estimated a total of 131,312 hours of ice-fishing effort, the highest since 2000. Anglers caught 14,666 walleye of which 10,695 were harvested. Walleye fishing success rate this winter was high.

Anglers also caught an estimated 96,037 yellow perch of which 29,771 were harvested during the winter ice-fishery.

TABLE 3.1.1. Summary of fishing effort (most fishing effort is targeted at walleye), numbers of fish harvested and caught, and walleye fishing 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 March 1), 1993-2009 (no data for 2006 or 2008).

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
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	79,767	59,227	No survey	99,368	No survey	131,312
Number of Walleye:																	
Caught	21,326	31,060	28,939	58,468	42,315	11,167	23,293	9,949	982	2,601	321	8,413	3,450		17,480		14,666
Harvested	14,816	8,557	17,445	20,972	22,631	6,089	15,285	9,240	938	2,468	70	4,075	1,947		11,313		10,695
Walleye Fishing Success:																	
CUE	0.079	0.104	0.134	0.149	0.192	0.095	0.166	0.072	0.013	0.070	0.020	0.105	0.059		0.179		0.114
HUE	0.055	0.029	0.081	0.053	0.103	0.052	0.109	0.066	0.012	0.066	0.004	0.051	0.034		0.116		0.083

FIG. 3.1.1. Fishing effort and walleye catch (released and harvested) during the winter ice-fishery, 1993-2009. No data for 2006 or 2008.



3.2 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. Renowned for its abundance of "jumbo" yellow perch, it was the only area in Ontario where anglers were legally allowed to sell their catch. In the mid-1990s, concerns were raised about declines in large yellow perch abundance. With the goal of increasing yellow perch abundance, harvest and possession limits were reduced and the sale of angler caught yellow perch was prohibited in 2005. To examine the effect of these restrictions, the Lake St. Francis fisheries management planning team recommended that an open water angler survey be implemented. This report serves to satisfy that recommendation.

This angler survey replicates the design of a 2003 survey. As in the 2003 angler survey, Lake St. Francis was divided in 2 sectors, with each sector further divided into seven areas. The survey used both on-water boat counts and on-water angler interviews to determine angler activity and catch. The open-water survey consisted of three seasons: spring (May 2-Jun 26), summer (Jun 27-Sep 1), and fall (Sep 2-Oct 3).

Fisheries Update

Over 1,500 anglers were interviewed (824 boats) by field crews. Eighty percent of anglers interviewed were local, 12 % were from Quebec, 6 % were from Ontario (not local), and 2% were U.S. residents. These results are consistent with those obtained in the 2003 survey.

As in previous surveys, angling effort was targeted mainly at yellow perch receiving about 68% of the total fishing effort (Table 3.2.1). Total angling effort in 2009 was similar to that seen in 2003, which represents about half of the average historic effort seen in previous angler surveys. Despite the lower fishing effort in 2009, high catches and catch rates of yellow perch were recorded.

Anglers caught approximately 820,000 yellow perch,

TABLE. 3.2.1. 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 the creel methodologies are not exactly the same for all years, so comparisons should be considered general in nature.

	1982	1986	1988	1993	2003	2009
Fishing Effort (angler hours):						
Total All Anglers	376,639	132,184	66,549	155,363	78,245	82,619
Anglers Targeting Perch	296,404	80,072	52,376	105,172	51,467	56,585
Percent of Effort for Perch	79	61	79	68	66	68
Number of Fish Harvested:						
Yellow Perch	555,383	148,000	173,179	465,764	312,698	308,620
Northern Pike	12,383	3,722	986	4,142	942	457
Smallmouth Bass	3,758	2,141	431	3,511	1,618	2,766
Walleye	6,635	4,046	1,867	na	3,393	6,147
Number of Fish Caught:						
Yellow Perch	678,933	168,039	224,612	764,482	687,252	819,273
Northern Pike	16,668	9,957	2,784	18,481	3,231	2,030
Smallmouth Bass	3,789	2,427	741	7,345	3,642	8,826
Walleye	6,635	4,394	2,202	2,268	4,088	7,432
Yellow Perch Angling Success:						
CUE	2.3	2.1	4.3	7.3	13.4	14.5
HUE	1.9	1.9	3.3	4.4	6.1	5.5
Yellow Perch Release Rate:	18%	12%	23%	39%	55%	62%

harvesting approximately 310,000 fish equalling about 49,000 kilograms. When compared to earlier surveys, yellow perch catch rates were the highest recorded with 14.5 yellow perch captured per rod-hour (Table 3.2.1). Catches and catch rates of smallmouth bass and walleye were also high. 2009 saw the highest recorded catches and catch rates for both smallmouth bass and walleye (Table 3.2.1 and Fig. 3.2.1). Catch-per-unit effort values however, were lower in 2009 for northern pike. 2009 catch rates for northern pike were the second lowest recorded since 1982 (Fig. 3.2.1). These trends in smallmouth bass, walleye, northern pike and yellow perch abundance are consistent with data collected during an index gillnet survey collected on Lake St. Francis in 2008 (2008 LOMU Annual Report).

Not only were yellow perch catch rates higher in 2009, but the size of the perch caught also increased. The average size of yellow perch increased in 2009 to 219 mm from 184 mm in 2003 (Fig.3.2.2). Overall, anglers considered the yellow perch fishery to have improved. Anglers were asked whether the new regulation changes (reduced limits and the prohibition of the sale of angler-caught perch) improved the perch fishery. Forty four percent thought that the fishery had improved, 4% thought there was no change, 4% thought that the fishery was worse, and 48 % offered no opinion when asked.

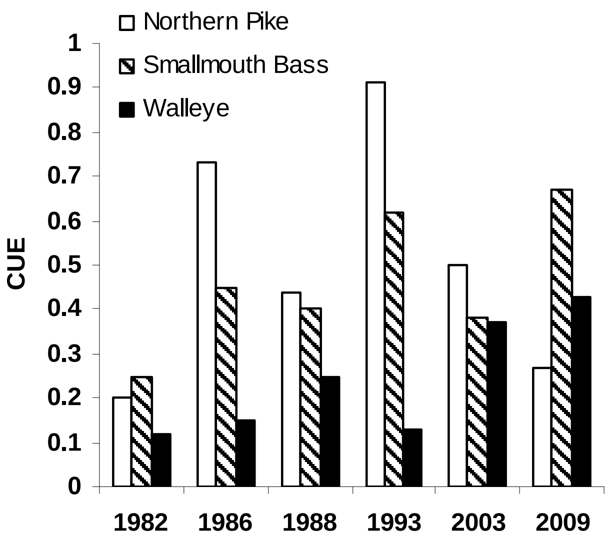


FIG. 3.2.1. Catch per-unit effort values compared for popular species on Lake St. Francis (except yellow perch) for the years 1982, 1986, 1988, 1993, 2003, and 2009.

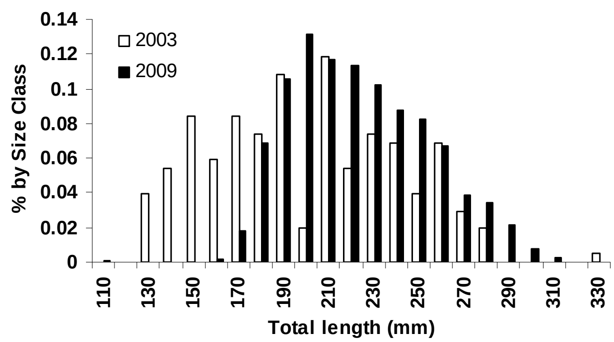


FIG. 3.2.2. Size distribution of angler caught yellow perch sampled in the 2003 and 2009 recreational angler surveys.

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 2009 were obtained from the commercial fish harvest information system (CFHIS) which is managed, in partnership, by the the Ontario Commercial Fisheries Association (OCFA) and the Ontario Ministry of Natural Resources. Commercial quota, harvest and landed value statistics for Lake Ontario and the St. Lawrence River for 2009 are shown in Tables 4.1.1 (base quota), 4.1.2 (issued quota), 4.1.3 (harvest) and 4.1.4 (landed value).

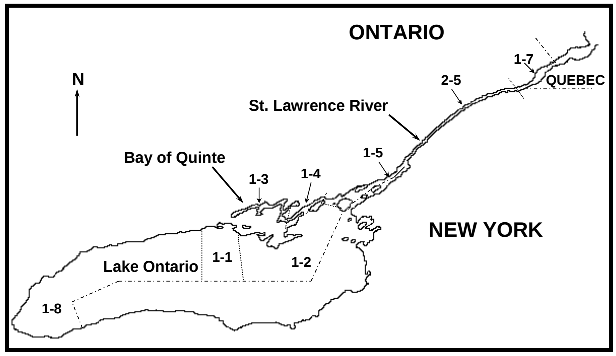


FIG. 4.1.1. Map of Lake Ontario and the St. Lawrence River showing commercial fishing quota zones in Canadian waters.

Lake Ontario

The total harvest of all species was 385,719 lb ($413,580) in 2009, up 11,802 lb (3%) from 2008 (Fig. 4.1.2, Table 4.1.5).

Lake whitefish
Lake whitefish harvest was 68,372 lb, 57% of base quota, and up 300 lb from last year's harvest. Seasonal whitefish harvest and biological attributes (e.g., size and age structure) information are reported in Section 4.2.

Yellow perch
Yellow perch harvest was 131,180 lb, 29% of the base quota, and an increase of 18,589 lb (17%) from the previous year.

Walleye
Walleye harvest was 22,095 lb, 42% of the base quota, and an increase of 2,807 lb (15%) from the previous year.

TABLE 4.1.1. Commercial fish **base quota** (lb) in the Canadian waters of Lake Ontario, 2009. See Fig. 4.1.1 for a map of the quota zones. Although there is also American eel base quota, commercial fishing for this species is currently closed, due to conservation considerations, and base quotas are not shown here.

	Lake Ontario					St. Lawrence River			East Lake	West Lake	Base quota by waterbody (lb)		
	1-1	1-2	1-3	1-4	1-8	1-5	2-5	1-7	1	1	Lake Ontario	St. Lawrence River	Total
Alewife							600					600	600
Black crappie	4,540	2,500	14,810	800	2,800	14,170	18,365	4,840	3,100	9,850	25,450	37,375	75,775
Bowfin					500						500	-	500
Brown bullhead	36,200								14,350	27,220	36,200	-	77,770
Common carp			1,000								1,000	-	1,000
Lake whitefish	7,273	76,016	15,860	20,308	208						119,664	-	119,664
Sunfish	28,130								14,600	18,080	28,130	-	60,810
Walleye	4,510	37,120		10,717	800						53,147	-	53,147
Yellow perch	35,589	182,508	96,128	126,170	13,000	68,976	83,174	5,760	1,400	4,420	453,395	157,910	617,125
Total	116,242	298,144	127,798	157,995	17,308	83,146	102,139	10,600	33,450	59,570	717,486	195,885	1,006,391

TABLE 4.1.2. Commercial fish **issued quota** (lb) in the Canadian waters of Lake Ontario, 2009. See Fig. 4.4.1 for a map of the quota zones.

	Lake Ontario					St. Lawrence River			East Lake	West Lake	Base quota by waterbody (lb)		
	1-1	1-2	1-3	1-4	1-8	1-5	2-5	1-7	1	1	Lake Ontario	St. Lawrence River	Total
Alewife							600					600	600
Black crappie	4,540	2,500	14,810	800	2,800	14,170	18,365	4,840	3,100	9,850	25,450	37,375	75,775
Bowfin					500						500	-	500
Brown bullhead	36,200								14,350	27,220	36,200	-	77,770
Common carp			1,000								1,000	-	1,000
Lake whitefish	7,273	76,016	15,860	20,308	208						119,664	-	119,664
Sunfish	28,130								14,600	18,080	28,130	-	60,810
Walleye	4,510	37,120		10,717	800						53,147	-	53,147
Yellow perch	35,589	182,508	96,128	126,170	13,000	68,976	83,174	5,760	1,400	4,420	453,395	157,910	617,125
Total	116,242	298,144	127,798	157,995	17,308	83,146	102,139	10,600	33,450	59,570	717,486	195,885	1,006,391

TABLE 4.1.3. 2009 commercial **harvest** (lb) for fish species harvested from the Canadian waters of Lake Ontario and the St. Lawrence River, East lake and West Lakes (two Lake Ontario embayments).

	Lake Ontario					St. Lawrence River			East Lake	West Lake	Total harvest (lb)		
Species	1-1	1-2	1-3	1-4	1-8	1-5	2-5	1-7	1	1	Lake Ontario	St. Lawrence River	All waterbodies
Black crappie	30	10	8,583	25	0	6,604	515	528	4	1,882	8,648	7,647	18,181
Bowfin	1,321	105	1,900	0	0	1,875	1,188	60	192	89	3,326	3,123	6,730
Brown bullhead	1,632	141	11,236	1,031	0	6,259	5,630	52,292	342	19	14,040	64,181	78,583
Burbot	5	4	0	3	0	0	0	0			12	0	12
Channel catfish	0	0	4	0	0	0	0	0			4	0	4
Common carp	553	289	1,585	120	0	529	0	0	62		2,547	529	3,138
Freshwater drum	30	1,422	13,152	11,846	0	23	0	0	8		26,450	23	26,480
Lake herring	2	358	1,838	752	0	0	0	0		14	2,950	0	2,964
Lake whitefish	0	61,952	4,628	1,792	0	0	0	0			68,372	0	68,372
Northern pike	1,822	994	19,237	2,330	0	7,472	0	0	2,615	4,960	24,383	7,472	39,429
Rock bass	387	1,542	6,089	1,171	0	1,100	241	0	1,485	2,096	9,189	1,341	14,111
Suckers	202	450	6,311	961	0	2,595	0	1,826	80	135	7,923	4,420	12,559
Sunfish	475	23	44,516	469	0	4,788	4,973	14,123	10,369	16,841	45,483	23,884	96,576
Walleye	28	6,147	0	15,920	0	0	0	0			22,095	0	22,095
White bass	0	16	0	577	0	0	0	0			593	0	593
White perch	2	93	9,626	8,805	0	269	0	0	31	3,435	18,526	269	22,261
Yellow perch	684	30,842	51,285	48,370	0	55,503	14,487	7,593	196	595	131,180	77,584	209,555
Total	7,172	104,387	179,989	94,171	0	87,016	27,035	76,422	15,385	30,066	385,719	190,472	621,642

TABLE 4.1.4. 2009 commercial **harvest** (lb), price per lb, and **landed value** for fish species harvested from the Canadian waters of Lake Ontario and the St. Lawrence River, and the total for all waterbodies including East lake and West Lakes.

	Lake Ontario			St. Lawrence River			All waterbodies		
Species	Harvest	Price per lb	Landed value	Harvest	Price per lb	Landed value	Harvest	Price per lb	Landed value
Black crappie	8,648	$3.20	$27,696	7,647	$ 2.42	$18,511	18,181	$ 2.91	$52,884
Bowfin	3,326	$0.39	$1,289	3,123	$ 0.48	$1,491	6,730	$ 0.42	$2,854
Brown bullhead	14,040	$0.30	$4,271	64,181	$ 0.31	$20,013	78,583	$ 0.31	$24,192
Common carp	2,547	$0.14	$349	529	$ 0.23	$121	3,138	$ 0.15	$476
Freshwater drum	26,450	$0.09	$2,427	23	$ 0.05	$1	26,480	$ 0.09	$2,429
Lake herring	2,950	$0.27	$790	0		$0	2,964	$ 0.27	$795
Lake whitefish	68,372	$1.02	$69,429	0		$0	68,372	$ 1.02	$69,429
Northern pike	24,383	$0.27	$6,463	7,472	$ 0.29	$2,193	39,429	$ 0.27	$10,657
Rock bass	9,189	$0.48	$4,385	1,341	$ 0.38	$508	14,111	$ 0.47	$6,583
Suckers	7,923	$0.10	$824	4,420	$ 0.14	$632	12,559	$ 0.12	$1,478
Sunfish	45,483	$1.17	$53,006	23,884	$ 0.89	$21,365	96,576	$ 1.12	$108,138
Walleye	22,095	$2.14	$47,212	0		$0	22,095	$ 2.14	$47,212
White bass	593	$0.70	$413	0		$0	593	$ 0.70	$413
White perch	18,526	$0.38	$7,022	269	$ 0.26	$69	22,261	$ 0.41	$9,147
Yellow perch	131,180	$1.43	$188,003	77,584	$ 1.11	$85,811	209,555	$ 1.31	$274,938
Total	385,703		$413,580	190,472		$150,716	621,627	12	$611,624

TABLE 4.1.5. Commercial harvest (lb; 1960-2009) and landed value ($; 1985-2009) trends for the Canadian waters of Lake Ontario, including the Bay of Quinte.

	Harvest (lb)		Harvest (lb)	Value ($)
1960	1,834,000	1985	1,497,000	$ 906,879
1961	2,026,000	1986	1,759,000	$ 1,577,086
1962	1,620,000	1987	756,000	$ 993,609
1963	1,847,000	1988	1,190,000	$ 896,481
1964	1,814,000	1989	1,211,000	$ 989,563
1965	2,226,000	1990	1,165,000	$ 907,409
1966	1,347,000	1991	1,210,000	$ 1,003,909
1967	1,617,000	1992	1,191,000	$ 1,039,892
1968	1,829,000	1993	1,103,000	$ 746,892
1969	2,130,000	1994	1,243,097	$ 1,277,262
1970	2,798,000	1995	1,218,508	$ 1,322,557
1971	2,804,000	1996	1,284,022	$ 1,456,736
1972	2,455,000	1997	1,078,250	$ 996,383
1973	2,279,000	1998	973,006	$ 1,059,212
1974	2,299,000	1999	964,743	$ 1,067,904
1975	2,664,000	2000	914,014	$ 990,544
1976	2,935,000	2001	840,557	$ 861,978
1977	2,456,000	2002	602,338	$ 475,262
1978	2,469,000	2003	447,633	$ 324,320
1979	2,042,000	2004	404,236	$ 249,444
1980	1,982,000	2005	395,365	$ 310,084
1981	2,387,000	2006	579,738	$ 521,910
1982	1,999,000	2007	443,691	$ 429,171
1983	2,263,000	2008	373,917	$ 294,331
1984	2,050,000	2009	385,719	$ 413,580

TABLE 4.1.6. Commercial harvest (lb; 1988-2009) and landed value ($; 1989-1994 and 1996-2009) trends for the Canadian waters of the St. Lawrence River.

	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
2004	143,845	$ 102,646
2005	221,294	$ 206,479
2006	230,201	$ 190,819
2007	175,951	$ 161,484
2008	148,963	$ 89,954
2009	190,472	$ 150,716

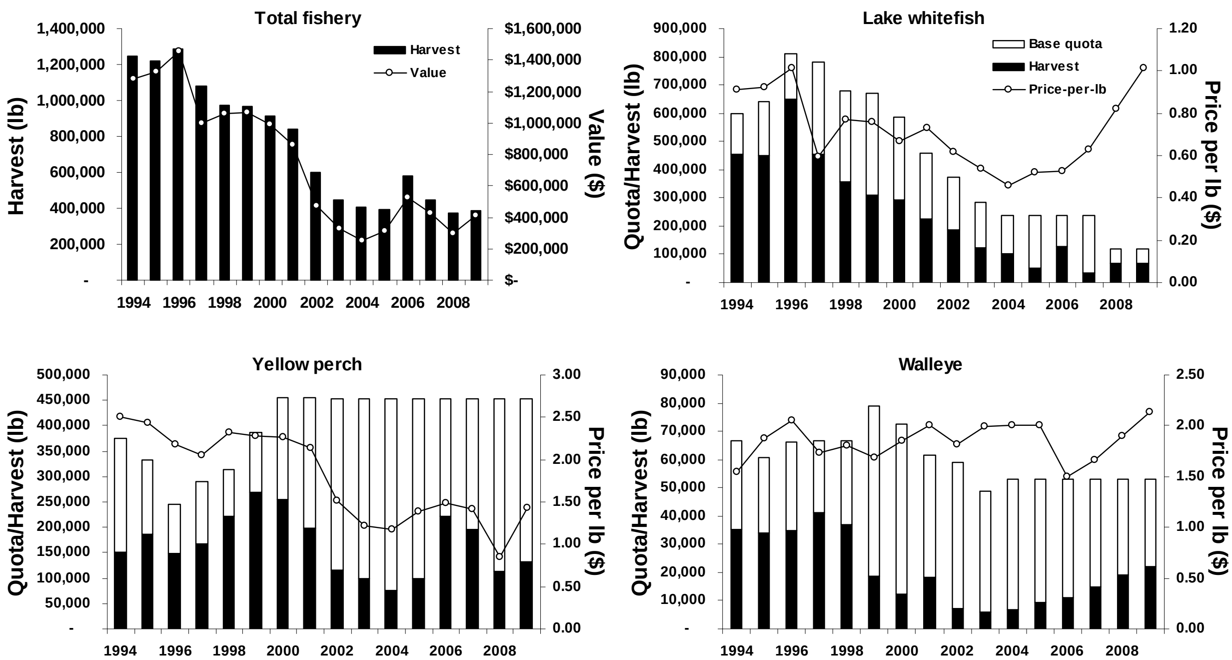


FIG. 4.1.2. Total harvest and value for the Lake Ontario commercial fishery and quota, harvest and price-per-lb for lake whitefish, yellow perch and walleye, 1994-2009.

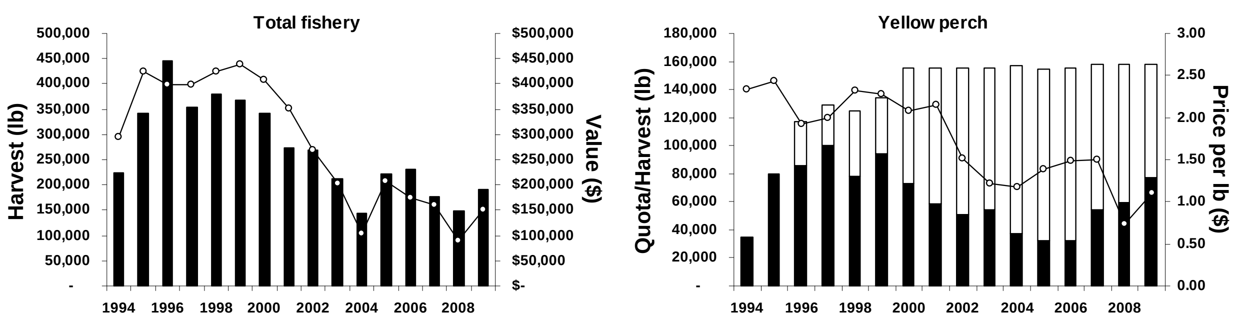


FIG. 4.1.3. Total harvest and value for the St. Lawrence River commercial fishery and quota, harvest and price-per-lb for yellow perch, 1994-2009.

St. Lawrence River

The total harvest of all species was 190,472 lb ($150,716) in 2009 (Fig. 4.1.3, Table 4.1.6).

Yellow perch

Yellow perch harvest was 77,548 lb, 49% of base quota, an increase of 18,485 lb (31%) from the previous year.

4.2 Lake Whitefish Commercial Catch Sampling

Sampling of commercially harvested lake whitefish for biological attribute information occurs annually. While total lake whitefish harvest can be determined from commercial fish Daily Catch Reports (DCRs; see section 4.1), biological sampling of the catch is necessary to breakdown total harvest into size and age-specific harvest. Age-specific harvest data can then be used in catch-age modeling to estimate population size and mortality schedule.

The spring gillnet fishery was monitored by an OCFA observer to evaluate lake whitefish size distribution and lake trout by-catch.

Commercial lake whitefish harvest and fishing effort by gear type, month and quota zone (QZ) for 2009 is reported in Table 4.2.1. Most of the harvest was taken in gillnets (93% by weight); 7% of the harvest was taken in impoundment gear. Gillnet fishing during November in QZ 1-2 accounted for 58% of the total harvest, for this gear type, and 30% of the effort). Significant harvest and effort also occurred in this QZ during the spring and again in September. Most impoundment gear harvest and effort occurred in October and November in QZ 1-3 (Table 4.2.1).

Biological sampling focused on the spring gillnet fishery, the November spawning-time gillnet fishery on the south shore of Prince Edward County (QZ 1-2), and the October/November spawning-time impoundment gear fishery in the Bay of Quinte (QZ 1-3). 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. Whitefish length and age distribution information is presented in (Fig. 4.2.1 and Fig. 4.2.2). In total, fork length was measured for 2,531 fish and age was interpreted using otoliths for 343 fish (Table 4.2.2, Fig. 4.2.1 and 4.2.2).

Lake Ontario Gillnet Fishery (QZ 1-2)

The mean fork length and age of lake whitefish harvested during the gillnet fishery in Quota Zone 1-2 were 480 and 11.3 years respectively (Fig. 4.2.1). Fish ranged from ages 5-24 years. The most abundant age-classes in the fishery were age-6, 7 and 8. The 1992 and 1991 year-classes, at ages-17 and 18 years, represented 14% and 9%, by number respectively, of the total harvest.

Bay of Quinte November Impoundment Gear Fishery (QZ 1-3)

Mean fork length and age were 455 mm and 11.6 years, respectively (Fig. 4.2.2). Fish ranged from ages 5 to 23 years. The most abundant age-classes in

TABLE 4.2.1. Lake whitefish harvest (lb) and fishing effort (yards of gillnet or number of impoundment nets) by gear type, month and quota zone. Harvest and effort value in ***bold italic*** represent months and quota zones where whitefish biological samples were collected.

		Harvest (lb)					Effort (yards or number of nets)			
Gear type	Month	1-1	1-2	1-3	1-4	Month	1-1	1-2	1-3	1-4
Gillnet	Feb	-	-	-	108	Feb	-	-	-	640
	Mar	-	112	-	157	Mar	-	3,000	-	880
	Apr	-	***4,245***	-	15	Apr	-	***31,100***	-	4,400
	May	-	3,286	-	-	May	-	19,050	-	-
	Jun	-	***2,003***	-	-	Jun	-	***17,460***	-	-
	Jul	-	2,168	-	-	Jul	-	22,560	-	-
	Aug	-	1,029	-	-	Aug	-	6,200	-	-
	Sep	-	10,436	-	1,118	Sep	-	23,400	-	9,000
	Oct	-	1,166	-	12	Oct	-	12,680	-	160
	Nov	-	***36,993***	-	185	Nov	-	***67,580***	-	1,752
	Dec	-	135	-	189	Dec	-	2,800	-	1,480
Impoundment	Mar	-	-	24	-	Mar	-	-	60	-
	Apr	-	-	23	-	Apr	-	-	61	-
	May	-	239	15	15	May	-	11	31	3
	Jun	-	133	-	-	Jun	-	5	-	-
	Jul	-	7	-	1	Jul	-	2	-	1
	Sep	-	-	2	-	Sep	-	-	16	-
	Oct	-	-	***2,301***	-	Oct	-	-	***321***	-
	Nov	-	-	***2,238***	-	Nov	-	-	***365***	-
	Dec	-	-	25	-	Dec	-	-	17	-

TABLE 4.2.2. Age-specific vital statistics of lake whitefish sampled and harvested including number aged, number lengthed (determined by age-length key), and proportion by number of fish sampled, harvest by weight (kg) and number, and mean weight (kg) and fork length (mm) of the harvest for Quota Zones 1-2 and 1-3.

Quota zone 1-2

	Sampled			Havested			
Age (years)	Number aged	Number lengthed	Prop.	Number	Weight (kg)	Mean weight (kg)	Mean length (mm)
1	-	-	0.000	-	-		
2	-	-	0.000	-	-		
3	-	-	0.000	-	-		
4	-	-	0.000	-	-		
5	11	39	0.020	430	276	0.643	392
6	28	308	0.160	3,424	3,112	0.909	435
7	26	407	0.211	4,518	4,450	0.985	447
8	17	244	0.127	2,708	2,923	1.080	453
9	2	30	0.016	335	472	1.408	483
10	5	80	0.042	890	1,215	1.365	486
11	3	69	0.036	770	1,040	1.350	481
12	1	14	0.008	161	214	1.334	482
13	-	-	0.000	-	-		
14	3	26	0.013	286	557	1.948	534
15	5	74	0.038	822	1,146	1.394	507
16	1	1	0.001	15	31	2.081	572
17	28	261	0.136	2,904	5,099	1.756	536
18	14	172	0.089	1,913	3,179	1.662	530
19	8	65	0.034	726	1,305	1.796	545
20	11	96	0.050	1,068	2,078	1.946	551
21	4	31	0.016	346	709	2.052	546
22	-	-	0.000	-	-		
23	-	-	0.000	-	-		
24	1	6	0.003	63	123	1.950	547
Total	168	1,925	1.000	21,379	27,930		
Weighted mean						**1.306**	

Quota zone 1-3

	Sampled			Havested			
Age (years)	Number aged	Number lengthed[1]	Prop.	Number	Weight (kg)	Mean weight (kg)	Mean length (mm)
1	-	-	0.000	-	-		
2	-	-	0.000	-	-		
3	-	-	0.000	-	-		
4	-	-	0.000	-	-		
5	2	7	0.011	19	13	0.681	402
6	25	87	0.143	235	190	0.809	412
7	43	149	0.246	403	366	0.908	436
8	8	28	0.046	75	74	0.985	443
9	7	24	0.040	66	68	1.033	453
10	6	21	0.034	56	60	1.059	459
11	9	31	0.051	84	125	1.482	498
12	3	10	0.017	28	40	1.406	497
13	4	14	0.023	38	62	1.658	524
14	7	24	0.040	66	87	1.326	486
15	7	24	0.040	66	104	1.586	506
16	5	17	0.029	47	92	1.954	556
17	7	24	0.040	66	111	1.691	521
18	27	93	0.154	253	451	1.781	546
19	6	21	0.034	56	107	1.898	565
20	3	10	0.017	28	41	1.452	513
21	1	3	0.006	9	18	1.900	594
22	2	7	0.011	19	34	1.816	568
23	3	10	0.017	28	57	2.024	560
24	-	-	0.000	-	-		
Total	175	606	1.000	1,642	2,099		
Weighted mean						**1.278**	

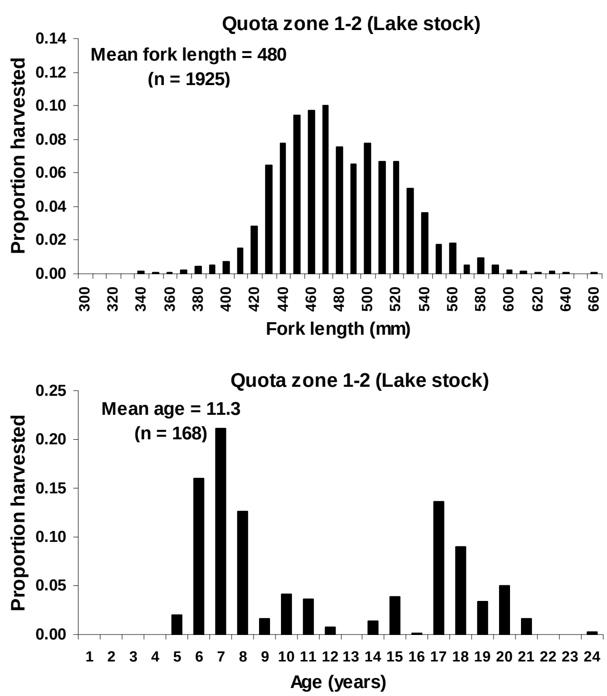


FIG. 4.2.1. Size and age distribution (by number) of lake whitefish sampled in QZ 1-2 during the 2009 commercial catch sampling program.

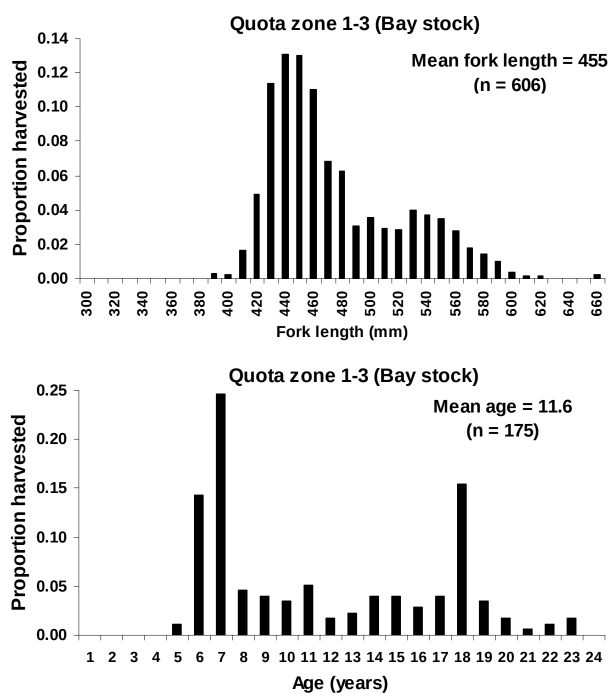


FIG. 4.2.2. Size and age distribution (by number) of lake whitefish sampled in QZ 1-3 during the 2009 commercial catch sampling program.

the fishery were age-6 and 7. The 1991 year-class, at age-18, represented 15% by number of the total harvest.

Condition

Lake whitefish (Lake Ontario and Bay of Quinte spawning stocks and sexes combined) relative weight (see Rennie et al. 2008) is shown in Figure 4.2.3. Condition declined markedly in 1994 and has remained low.

Spring Gillnet Fishery—Lake Trout Incidental Catch

The OCFA observer accompanied fishers on 13 days of experimental spring gillnet in QZ 1-2 for lake whitefish. Estimated lake trout bycatch statistics are summarized in Table 4.2.3. Estimates for Apr and Jun (**bold**) are based on observations while those from the other months were based on DCR reports. Overall an estimated 14,539 lake trout were caught of which about 40% were caught during the spring.

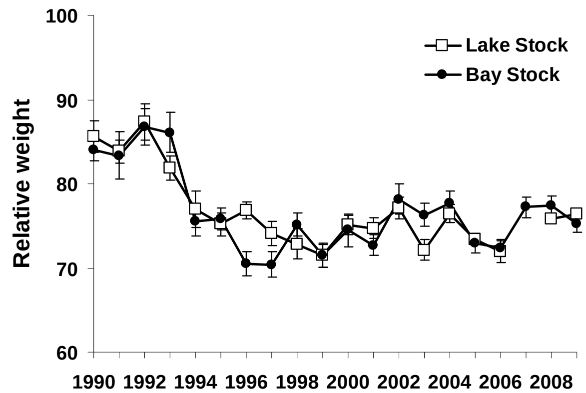


FIG. 4.2.3. Lake whitefish (Lake Ontario and Bay of Quinte spawning stocks and sexes combined) relative weight (see Rennie et al. 2008), 1990-2009.

[1] *Rennie, M.D. and R. Verdon. 2008. Development and evaluation of condition indices for the lake whitefish. N. Amer. J. Fish. Manage. 28:1270-1293.*

4.3 Northern Pike Commercial Catch Sampling

Commercial catch sampling of northern pike was conducted during the spring of 2009. An OCFA observer conducted the sampling with the primary objective of determining basic biological characteristics of the harvest. Pike have been commercially harvested, on an experimental basis since part way through the 2006 fishing season. In 2009, the OCFA observer focused on sampling pike from the April hoop net fishery in several quota zones; harvest in this component of the pike fishery had been the largest previous years (2007-2008). The 2009 harvest is summarized in Table 4.3.1.

The observer conducted sampling on 16 days in three quota zones from Apr 14-May 13, 2009. A total of 230 pike were measured for length and 132 sampled for more detailed biological characteristics (Table 4.3.2). Over 80% percent of the pike sampled were female, and the mean weight of all pike sampled was 3.1 lb. Pike ranged in age from age-2 to age-11 years (Fig. 4.3.1). The oldest pike were females.

TABLE. 4.2.3. Lake whitefish harvest and lake trout catch statistics for the QZ 1-2 lake whitefish gillnet fishery in 2009. Values in bold are based on Observer data while other values are based on DCR data.

	Estimated harvest statisitcs												
	Jan	Feb	Mar	**Apr**	May	**Jun**	Jul	Aug	Sep	Oct	Nov	Dec	Total
Number of observer days	0	0	0	**12**	**1**	**4**	0	0	0	0	0	0	17
Whitefish harvest (#)	-	-	41	**1,548**	1,195	**731**	791	375	3,808	422	13,498	49	22,458
Whitefish harvest (lb)	-	-	112	**4,243**	3,276	**2,003**	2,168	1,029	10,436	1,156	36,993	135	61,550
Gillnet effort (yd)	-	-	3,000	**29,100**	17,850	**16,660**	22,560	6,200	23,400	11,480	67,580	2,800	200,630
Whitefish HUE (#/yd)			0.0136	**0.0532**	0.0670	**0.0439**	0.0351	0.0605	0.1627	0.0367	0.1997	0.0176	
Whitefish HUE (lb/yd)			0.0374	**0.1458**	0.1835	**0.1202**	0.0961	0.1659	0.4460	0.1007	0.5474	0.0484	
Lake trout released (#)	-	-	52	**2,408**	1,071	**850**	1,302	823	1,522	1,122	1,327	21	10,497
Lake trout released (lb)	-	-	324	**15,107**	6,718	**5,330**	8,167	5,163	9,545	7,035	8,327	130	65,846
Lake trout discarded (#)	-	-	-	**832**	339	**354**	440	107	1,264	345	453	-	4,134
Lake trout discarded (lb)	-	-	-	**5,220**	2,128	**2,221**	2,758	669	7,929	2,167	2,840	-	25,931
Lake trout total (#)	-	-	52	**3,240**	1,410	**1,204**	1,743	961	2,653	1,474	1,781	22	14,539
Lake trout total (lb)	-	-	324	**20,327**	8,846	**7,550**	10,932	6,029	16,639	9,246	11,170	138	91,203
Lake trout CUE (#/yd)			0.0172	**0.1114**	0.0790	**0.0723**	0.0773	0.1550	0.1134	0.1284	0.0263	0.0079	
Lake trout as % of whitefish harvest (#)			126%	**209%**	118%	**165%**	220%	256%	70%	350%	13%	45%	65%
Lake trout as % of whitefish harvest (lb)			289%	**479%**	270%	**377%**	504%	586%	159%	800%	30%	102%	148%

TABLE 4.3.1. Northern pike harvest by gear-type (gillnet and impoundment), month, and quota zone in 2009. No pike harvest was permitted in QZ 2-5 or QZ 1-7.

		Lake Ontario					St. Lawrence R.	East L.	West L.	Total
Gear-type	Month	1-1	1-2	1-3	1-4	1-8	1-5	1	1	
Gillnet	Jan	-	-	-	9	-	-	-	-	9
	Feb	-	-	-	139	-	-	-	-	139
	Mar	-	95	-	277	-	-	-	-	372
	Apr	-	82	-	596	-	-	-	-	678
	May	-	178	-	22	-	-	-	-	200
	Jun	7	12	-	-	-	-	-	-	18
	Jul	-	10	-	-	-	-	-	-	10
	Aug	-	30	-	-	-	-	-	-	30
	Sep	-	28	-	22	-	-	-	-	50
	Oct	-	-	-	223	-	-	-	-	223
	Nov	-	105	-	291	-	-	-	-	396
	Dec	-	-	-	114	-	-	-	-	114
Impoundment	Jan	73	-	-	-	-	-	-	-	73
	Feb	285	-	-	-	-	269	-	-	554
	Mar	426	-	4,266	5	-	1,942	256	1,091	7,986
	Apr	357	378	9,386	521	-	4,346	2,023	3,251	20,262
	May	51	27	1,117	34	-	895	336	196	2,656
	Jun	28	38	13	6	-	19	-	-	103
	Jul	-	12	-	-	-	-	-	-	12
	Aug	-	-	-	72	-	-	-	-	72
	Sep	105	-	1,234	-	-	-	-	168	1,508
	Oct	240	-	1,527	-	-	-	-	253	2,020
	Nov	250	-	1,688	-	-	-	-	-	1,938
	Dec	-	-	7	-	-	-	-	-	7

TABLE 4.3.2. Results of the 2009 OCFA Observer sampling for northern pike commercial harvest: number of Observer days, pike biologically sampled, and the mean length, weight and sex ratio of pike sampled by quota zone.

Quota Zone	Number days	Number fish lengthed	Number fish bio sampled	Mean length (in)	Mean weight (lb)	% female
1 (East Lake)	1	57	0	20		
1-3	10	105	70	22	2.9	76%
1-5	5	68	62	24	3.3	89%
Total	16	230	132	22	3.1	82%

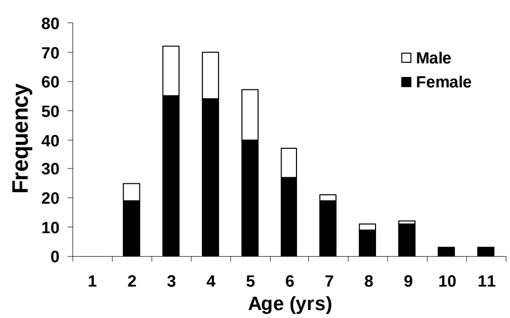


FIG. 4.3.1. Age distribution, by sex, of commercially harvested northern pike sampled during the 2009 Observer program.

5. Age and Growth Summary

Biological sampling of fish from Lake Ontario Management Unit field projects routinely involves collecting and archiving structures used for such purposes as age interpretation and validation, origin determination (e.g. stocked versus wild), life history characteristics and other features of fish growth. In 2009, a total of 9,873 structures were collected and 3,276 were processed for age interpretation from 30 different fish species and 14 different field projects (Table 5.1) .

TABLE 5.1. Species-specific summary of age and growth structures collected/archived (n = 9,561) and interpreted for age (2,915) in support of 14 different Lake Ontario Management Unit field projects, 2009.

	Scales		Otoliths		Cleithra		Opercula		Spines	
Species	Collected / archived	Interpreted for age	Collected / archived	Interpreted for age	Collected / archived	Interpreted for age	Collected / archived	Interpreted for age	Collected / archived	Interpreted for age
Longnose gar	1	-	-	-	-	-	-	-	-	-
Alewife	-	-	181	-	-	-	-	-	-	-
Gizzard shad	1	-	-	-	-	-	-	-	-	-
Chinook salmon	5	-	71	65	-	-	-	-	-	-
Rainbow trout	295	100	34	-	-	-	-	-	-	-
Brown trout	70	-	69	-	-	-	-	-	-	-
Brook trout	1	-	-	-	-	-	-	-	-	-
Lake trout	279	-	276	-	-	-	-	-	-	-
Lake whitefish	404	19	407	402	-	-	-	-	-	-
Lake herring	4	-	3	-	-	-	-	-	-	-
Round whitefish	16	-	16	-	-	-	-	-	-	-
Rainbow smelt	1	-	191	-	-	-	-	-	-	-
Northern pike	306	-	-	-	301	300	-	-	-	-
Chain pickerel	1	-	-	-	1	1	-	-	-	-
White sucker	2	-	-	-	-	-	110	-	-	-
Brown bullhead	-	-	-	-	-	-	-	-	292	-
Channel catfish	-	-	-	-	-	-	-	-	27	-
American eel	-	-	83	-	-	-	-	-	-	-
White perch	412	-	-	-	-	-	-	-	-	-
White bass	46	-	2	-	-	-	-	-	-	-
Rock bass	155	-	3	-	-	-	-	-	-	-
Pumpkinseed	215	184	-	-	-	-	-	-	-	-
Bluegill	226	191	-	-	-	-	-	-	-	-
Smallmouth bass	271	226	-	-	-	-	-	-	-	-
Largemouth bass	184	136	-	-	-	-	-	-	-	-
Black crappie	148	117	-	-	-	-	-	-	-	-
Yellow perch	1,896	526	349	147	-	-	-	-	-	-
Walleye	742	59	627	442	-	-	-	-	-	-
Freshwater drum	378	-	415	-	-	-	-	-	-	-
Slimy sculpin	-	-	44	-	-	-	-	-	-	-
Total	6,059	1,558	2,771	1,056	302	301	110	-	319	-

6. Contaminant Monitoring

Lake Ontario Management Unit cooperates annually with several agencies to collect fish samples for contaminant testing. In 2009, 677 contaminant samples were collected for Ontario's Ministry of the Environment Sport Fish Monitoring program (Table 6.1). Samples were primarily collected using existing fisheries assessment programs on Lake Ontario, Bay of Quinte and the St. Lawrence River.

A summary of the number of fish samples collected, by species, for contaminant analysis by the Ministry of Environment, 2001-2009 is shown in Table 6.2.

TABLE 6.1. Number of fish samples collected, by region and species, for contaminant analysis by the Ministry of Environment, 2009.

Region	Block	Species	Total
Northwestern Lake Ontario	6	Brown trout	34
		Lake trout	20
Ganaraska River	7	Rainbow trout	20
Upper Bay of Quinte	9	Black crappie	20
		Bluegill	88
		Brown bullhead	43
		Channel catfish	8
		Freshwater drum	20
		Largemouth bass	20
		Northern pike	8
		Pumpkinseed	85
		Rock bass	20
		Smallmouth bass	20
		Walleye	20
		White perch	20
		Yellow perch	71
Thousand Islands	12	Brown bullhead	20
		Largemouth bass	20
		Northern pike	20
		Pumpkinseed	20
		Rock bass	20
		Smallmouth bass	20
		Walleye	20
		Yellow perch	20
Total			677

TABLE 6.2. Summary of the number of fish samples collected, by species, for contaminant analysis by the Ministry of Environment, 2001-2009.

	Year									
Species	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Black crappie			20	20	3	20		20		20
Bluegill		26		20	10	23			102	88
Brown bullhead		40	44	40	25	30	33	40	68	63
Brown trout	40	3	20		31		22	6	29	34
Channel catfish	20	20	7	23		17				8
Chinook salmon	40	3	16		48		29	1	36	
Coho salmon		1	3							
Common carp				7						
Freshwater drum			43		16		13	2	32	20
Lake trout			42		54		38	17	46	20
Lake whitefish	20									
Largemouth bass		4	25	28	20	9	8	89	26	40
Northern pike		53	39	60	22	40	22	94	35	28
Pumpkinseed		60	25	57	8	11	23	78	92	105
Rainbow trout	40	37	28	20	37	20	29	20	21	20
Rock bass		36	30	38	11	21	27	30	20	40
Silver redhorse							1			
Smallmouth bass		20	87	22	21	28	35	23	39	40
Walleye		42	51	40	61	30	62	98	61	40
White perch		40		40	40	14	21	20	35	20
White sucker							1			
Yellow perch	20	60	66	58	75	40	86	90	60	91
Total	180	445	546	473	482	303	450	628	702	677

7. Management Activities

7.1 Stocking

In 2009, OMNR stocked about 2.2 million salmon and trout into Lake Ontario (Table 7.1.1; Appendix C). Fig. 7.1.1 shows stocking trends in Ontario waters from 1968-2009. The New York State Department of Environmental Conservation (NYSDEC) also stocked 3.8 million salmon and trout into the lake in 2009.

Almost 550,000 Chinook salmon spring fingerlings were stocked at various locations to provide put-grow-and-take fishing opportunities. All Chinook for the Lake Ontario program are produced at Ringwood Fish Culture Station, operated by the Ontario Federation of Anglers and Hunters, under agreement with OMNR. Volunteers from host club, Metro East Anglers, provide thousands of hours of technical support at this hatchery. About 50,000 Chinook were held in pens at five sites in Lake Ontario for a short period of time prior to stocking. This ongoing project is being done in partnership with local community groups. It is hoped that pen-imprinting will help improve returns of mature adults to these areas in the fall, thereby enhancing local nearshore and shore fishing opportunities. All Chinook salmon stocked in 2008 and 2009 were marked with a coded wire tag and/or an adipose fin clip. This was done using Northwest Marine Technology's AutoFish, a unique, highly automated clipping and tagging system. Marking will help us determine levels of natural reproduction of Chinook salmon in Lake Ontario and evaluate the effectiveness of our stocking program. The study is being done cooperatively between New York and Ontario. Anglers will continue to see adipose-clipped Chinook in the fishery in 2010. OMNR and NYSDEC will continue to sample marked fish, collect snouts and recover tags from the recreational fisheries and other sources.

TABLE 7.1.1. American eel, salmon and trout stocked into Province of Ontario waters of Lake Ontario, 2009, and target for 2010.

		Number Stocked	
Species		**2009**	**2010**
American eel		**1,303,042**	**3,000,000**
Atlantic salmon	Eggs	78,895	15,000
	Fry	453,665	603,000
	Fall fingerlings	242,095	199,000
	Spring yearlings	61,545	254,750
	Adults	698	0
		836,898	**1,071,750**
Brown trout	Spring yearlings	**178,510**	**165,000**
Chinook salmon	Spring fingerlings	**549,187**	**540,000**
Coho salmon	Fall fingerlings	**12,862**	**50,000**
Lake trout	Spring yearlings	**445,306**	**440,000**
Rainbow trout	Spring yearlings	**194,756**	155,000
		194,756	**155,000**
Stocking totals		**3,520,561**	**5,421,750**

Atlantic salmon were stocked in support of an ongoing program to restore self-sustaining populations of this native species to the Lake Ontario basin (see Section 7.3). Over 750,000 Atlantic salmon of various life stages were released into current restoration streams: Credit River, Duffins Creek and Cobourg Brook. OMNR is working cooperatively with a network of partners to plan and deliver this phase of Atlantic salmon restoration, including setting stocking targets to help meet program objectives. Atlantic salmon are produced at both OMNR and partner facilities. Three Atlantic salmon broodstocks, from different source populations in Nova Scotia, Quebec and Maine, are currently housed at OMNRs Harwood Fish Culture Station.

About 445,000 lake trout yearlings were also stocked as part of an established, long-term rehabilitation program. Lake trout stocking is focused in eastern Lake Ontario where most of the historic spawning shoals are found.

Rainbow trout and brown trout were stocked at various locations to provide shore and boat fishing opportunities. A portion of the rainbow trout target is stocked into streams with a potential to establish wild populations. Almost 13,000 coho fall fingerlings were produced at Ringwood Fish Culture Station by the Ontario Federation of Anglers and Hunters and host club, Metro East Anglers Association.

Over 1.3 million young American eel (elvers) were stocked into the upper St. Lawrence River, as a short-term measure to offset mortalities experienced in hydro electric generation turbines during downstream migration. This is part of a broad, bi-national, multi-agency effort to reverse the serious decline in abundance of this globally significant species. Federal research scientists from Quebec recently recovered a small number of stocked eel in the St. Lawrence Estuary. These fish were part of a larger group of wild silver eels migrating downstream, enroute to the Sargasso Sea to spawn.

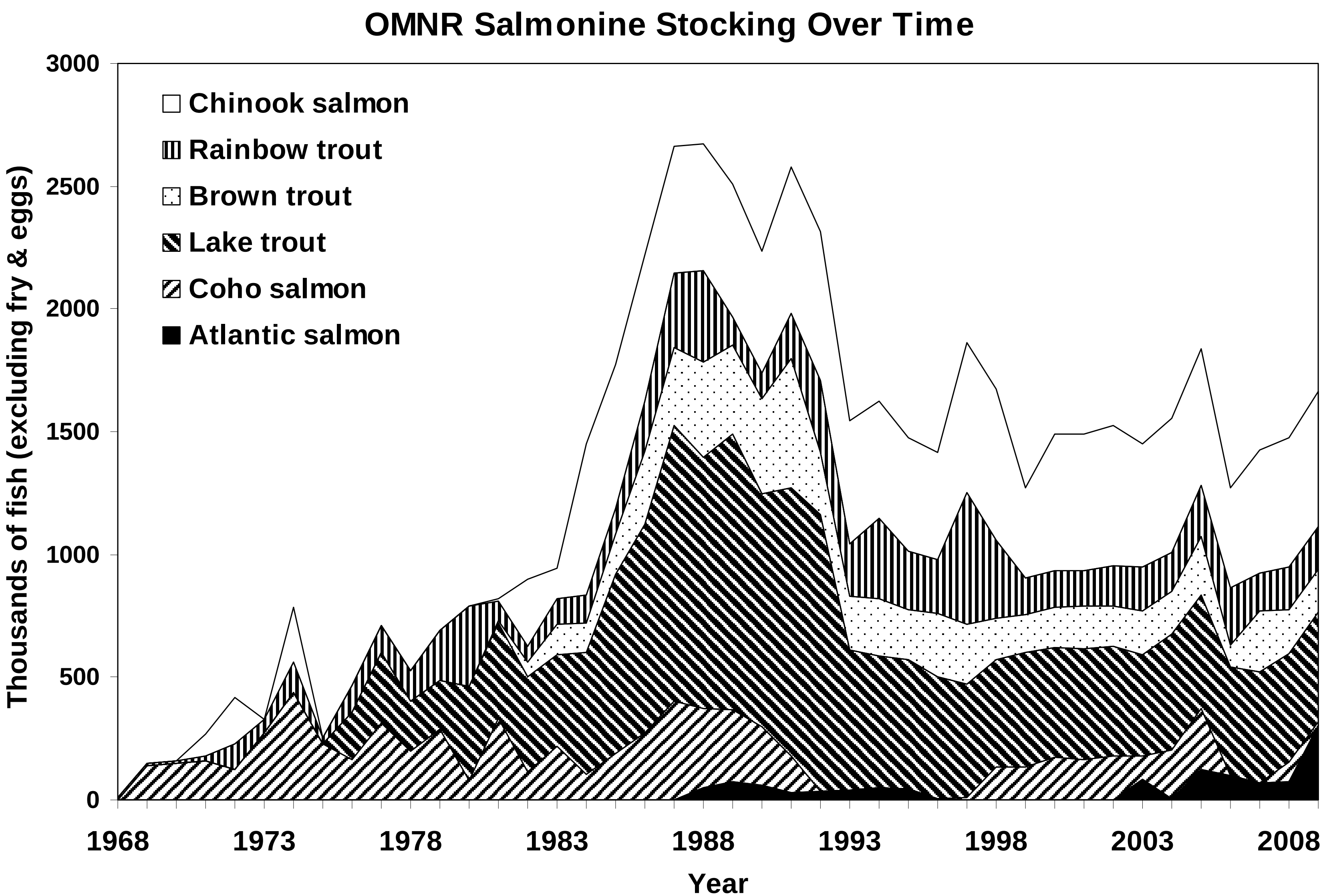


FIG. 7.1.1. Trends in salmon and trout stocking in Ontario waters of Lake Ontario, 1968-2009.

OMNR remains committed to providing diverse fisheries (and the associated benefits) in Lake Ontario and its tributaries, based on wild and stocked fish, as appropriate. OMNR is committed also to restoration of native species and supports efforts to maintain / restore healthy, stable Lake Ontario fish communities.

7.2 Fisheries Management Plans (FMP)

Hamilton Harbour and Watershed Fisheries Management Plan

Lake Ontario Management Unit, Aurora District, Guelph District, and the Royal Botanical Gardens (RBG) have prepared a FMP to complement the Hamilton Harbour Remedial Action Plan to restore, fisheries, water quality and habitat in Hamilton Harbour. The Six Nations of the Grand River, the public and stakeholders were all invited to provide input on issues and comment on the recommended direction and strategies. The FMP is a resource document to guide management and provide direction for restoration of fisheries and aquatic resources in Hamilton Harbour and its watershed for the 2009-2014 time period.

The planning area focuses on Hamilton Harbour and its main tributary watersheds: North Shore, Grindstone Creek, Spencer Creek, and Red Hill Creek and recognizes the connectivity of these tributaries (local rivers and streams) and the western portion of Lake Ontario. This recognition ensures that fisheries management occurs at an ecosystem level. For the Hamilton Harbour watershed this FMP supersedes part of the 1989 fisheries management plan for Cambridge District (now Guelph and Aurora Districts).

Water quality in Hamilton Harbour and Cootes Paradise is the most important factor that currently limits the successful restoration of sustainable, self–reproducing native fish community. Hamilton Harbour was officially designated as an Area of Concern in 1987 by the International Joint Commission, pursuant to the Great Lakes Water Quality Agreement. A Remedial Action Plan was initiated in 1989 and implementation of rehabilitation activities to improve the quality of the Hamilton Harbour began in 1992.

The goal of this FMP is *to support diverse, well-balanced, and healthy aquatic ecosystems that provide sustainable benefits to meet society's present and future needs.* The draft FMP has three broad objectives:

1. protect healthy aquatic ecosystems,
2. rehabilitate degraded aquatic ecosystems, and
3. improve cultural, social and economic benefits from the aquatic resources of Hamilton Harbour and its watershed.

Major issues addressed by the draft FMP include:

- loss or degradation of aquatic habitat
- dams and barriers to fish passage
- contaminants in fish
- declines in native species abundance
- invasive species
- water quality

The FMP provides information on the status of the aquatic community designates target species for management and provides management direction including: species management (including species at risk, introduced species, and stocking), consumptive uses (including angling, enforcement and regulations, baitfish harvest), public access, education and other issues.

Public consultation included two rounds of open houses, survey questionnaire, and inclusive feedback with an Angler's Working Group (non affiliated anglers and eight angling organizations), and Steering Committee (17 non-MNR organizations including Six Nations of the Grand River).

The Hamilton Harbour and Watershed Fisheries Management Plan was posted on the Environmental Registry for public comment for a 45 day period, from July 20-September 03, 2009. During this period, 7 comment submissions were received. Currently this FMP is in the final stage of approvals.

7.3 Native Species Restoration

OMNR works with many partners – government agencies, non-government organizations and interested individuals – at local, provincial and national levels, to monitor, protect and restore the biological diversity of fish species in the Lake Ontario basin (including the lower Niagara River and the St. Lawrence River downstream to the Quebec-Ontario boarder). Native species restoration is the center piece of LOMU's efforts to restore the biodiversity.

A number of fish species have been lost or persist in low numbers in the Lake Ontario basin. Table 7.3.1 lists twenty-two fish species that formerly occurred or are currently 'rare' in the Lake Ontario basin. Three of these species, two deepwater ciscoes, the blackfin cisco (note that there is debate about historic existence of blackfin cisco in Lake Ontario), and the Lake Ontario Kiyi, and blue pike (a subspecies of walleye) are thought to be extinct. Four species, Atlantic salmon, lake trout, bloater, and shortnose cisco have been extirpated (i.e. local extinction) from the Lake Ontario basin. Four species, American eel, burbot, deepwater sculpin and lake sturgeon that were once very common in the basin are now considered to be rare. The remaining species on this list were either uncommon historically or their historic status is uncertain. In addition, we acknowledge that there may be other species (small cyprinids for example) that may have been present historically but were lost prior to their documentation of their presence in the basin.

The sections below describe the planning and efforts to restore lake trout, Atlantic salmon, American eel, and deep-water cisco. Success restoring these native species would be a significant milestone in improving Ontario's biodiversity. Observations of rare fish species, other than those covered in detail below, in the Lake Ontario and its tributaries during 2009 included:

Burbot: 1 specimen observed during commercial fish harvest monitoring in the Kingston Basin, see Section 4.2;

Deepwater sculpin: 2 specimens captured in Lake Ontario off Rocky Point, see Section 2.4;

Grass pickerel: 5 specimens were captured at 4 sites in upper St. Lawrence River, see Section 9.1;

Lake Sturgeon: 2 specimens were captured at 1 site in the upper St. Lawrence River; see Section 2.7;

Pugnose shiner: 12 specimens were captured at 7 sites in upper St. Lawrence River, see Section 9.1;

River redhorse: 1 specimen captured in the upper Bay of Quinte, see Section 2.6 and 2 specimens observed during commercial fish harvest monitoring in the upper Bay of Quinte, see Section 4.3.

Atlantic salmon—The Lake Ontario Atlantic Salmon Restoration Program (LOASRP)

The Lake Ontario population of Atlantic salmon is listed as extirpated under the provincial Endangered Species Act (ESA). Atlantic salmon disappeared from Lake Ontario by the late 1800s, primarily as a result of the loss of spawning and nursery habitat in streams. As a top predator, they played a key ecological role in the offshore fish community. They were a valued resource for aboriginal communities and early Ontario settlers. As such, Atlantic salmon are recognized as an important part Ontario's natural and cultural heritage.

A unique partnership has been established to help bring back wild, self-sustaining populations of Atlantic salmon to Lake Ontario. This partnership, initiated in 2006, brings together the Ministry of Natural Resources and the Ontario Federation of Anglers and Hunters (OFAH) and a strong network of partners and sponsors.

Australia's Banrock Station is lead sponsor for this initiative and has committed $1.25 million to LOASRP over 5 years. Banrock Station is a world leader in their corporate commitment to the environment, supporting conservation projects world-wide. LOASRP is the largest project they have supported outside of Australia.

The LCBO adopted Atlantic salmon as the "flagship" species for its Natural Heritage Fund and has committed $250,000 to LOASRP over 5 years.

Many other conservation organizations, corporations, community groups and individuals are contributing to this program.

Funding and in-kind support from all partners will contribute to enhanced fish production, habitat rehabilitation and stewardship initiatives, a research and assessment program and public education and outreach activities.

Restoration is currently focused on three "best-bet" streams – the Credit River, Duffins Creek and Cobourg Brook. These systems offer good quality spawning and nursery habitat for Atlantic salmon and community support is strong. Demonstrated success in these

TABLE 7.3.1. Status of 'rare' fishes in the Lake Ontario basin and their designation (as of December 31, 2008) under the Ontario Endangered Species Act (ESA) and the Canadian Species at Risk Act (SARA).

Name	Status in Lake Ontario Basin	Designation	SARA Designation
American Eel, *Anguilla rostrata*	Historically very abundant throughout the nearshore zone of the basin; now rare.	Endangered	No Status - proposed as Special Concern Pending public
Atlantic Salmon (Lake Ontario population), *Salmo salar*	Historically abundant throughout Lake Ontario and major tributaries; Extirpated prior to 1900's; restoration efforts	Extirpated	No Status - proposed as Extirpated, pending public
Bigmouth Buffalo, *Ictiobus cyprinellus*	Rare historic observations; one recent observation in Lake Ontario.	Special Concern	Not at Risk
Black Redhorse, *Moxostoma duquesnei*	Historic abundance unclear; currently found at low abundance in Spencer Creek.	Threatened	No Status
Blackfin cisco, *Coregonus nigripinnis*	Historically abundance in offshore pelagic zone is unclear; thought to have become extinct by 1900.		Threatened
Bloater, *Coregonus hoyi*	Historically abundant in offshore pelagic zone; extirpated; last recorded in 1983.		Not at Risk
Blue Pike, *Sander vitreus glaucus*	Historically abundant in western Lake Ontario and Niagara River; extinct prior to 1970's.	Extinct	Extinct
Bridle Shiner, *Notropis bifrenatus*	Historic abundance unclear; Currently at low abundance in upper St. Lawrence River and tributaries, as well as Napanee River and Bay of Quinte	Special Concern	Special Concern
Burbot, *Lota lota*	Abundant in the offshore zone up to the 1920; declined steadily to virtual extirpation by about 1950; now rare.		
Channel Darter, *Percina copelandi*	Historic abundance unclear but occurred in the upper St. Lawrence River; currently found at low abundance in Moira River (including the Skootamatta River) and Salmon River.	Threatened	Threatened
Cutlip Minnow, *Exoglossum maxillingua*	Historic abundance unclear; Currently at low abundance in St. Lawrence River and tributaries.	Threatened	Not at Risk
Deepwater Sculpin (Great Lakes population), *Myoxocephalus*	Historically very abundant in offshore pelagic zone; currently rare but increasing.	Not at Risk	Special Concern
Grass Pickerel, *Esox americanus vermiculatus*	Historic abundance unclear; currently in low abundance in St. Lawrence River, Bay of Quinte, West Lake, Lake Consecon, Wellers Bay, Twenty-mile Creek.	Special Concern	Special Concern
Lake Ontario Kiyi, *Coregonus kiyi orientalis*	Historically abundant in offshore pelagic zone; extinct; last recorded in 1964.		Extinct
Lake Sturgeon (Great Lakes and Western St. Lawrence populations), *Acipenser fulvescens*	Common in the nearshore zone and large tributaries throughout the basin prior to 1900; now rare.	Threatened	No Status - proposed as Threatened pending public consultation
Lake trout, *Salvelinus namaycush*	The most abundant piscivore in the offshore zone up to the 1920s; declined steadily to virtual extirpation by about 1950; Restoration efforts underway.		
Pugnose Shiner, *Notropis anogenus*	Historic abundance is unclear; currently at low abundance in Thousand Islands area of St. Lawrence River.	Endangered	Endangered
Redside Dace, *Clinostomus elongatus*	Historic abundance unclear, but occurred in tributaries from Oshawa to Hamilton; currently rare.	Endangered	Special Concern
River Redhorse, *Moxostoma carinatum*	Historic abundance unclear; currently at low abundance in upper Bay of Quinte and Trent River.	Special Concern	Special Concern
Shortnose Cisco, *Coregonus reighardi*	Historically abundant in offshore pelagic zone; extirpated; last recorded in 1964.	Endangered	Endangered
Silver Shiner, *Notropis photogenis*	Historic abundance unclear; currently at low abundance in Bronte Creek.	Special Concern	Special Concern
Spotted Gar, *Lepisosteus oculatus*	Limited historic abundance in sheltered nearshore zone; two recent observations in Bay of Quinte and East Lake.	Threatened	Threatened

systems will pave the way for restoration of Atlantic salmon to other suitable streams in the future.

Three broodstocks from different source populations in Nova Scotia, Quebec and Maine have been established and are currently housed at OMNR's Harwood Fish Culture Station. The performance of all three stocks will be evaluated in the Lake Ontario environment.

Stocking levels have been increased to help us meet restoration targets in the selected streams and more effectively assess the rate of adult returns and production of wild juveniles. Over-summer survival of stocked spring fingerlings was excellent in 2009, in all three streams (see Section 2.8).

We have designed a long-term study to compare the effectiveness of stocking spring fingerlings, fall fingerlings and spring yearlings for the purpose of restoration. Genetic profiles have been developed for each individual brood fish in the hatchery to help us track their progeny in the streams and in the lake.

Evaluating the success of Atlantic salmon in the lake phase of their life cycle will continue to be an important component of our assessment program, particularly in light of the dramatic changes to the Lake Ontario ecosystem in recent years.

More than 1.7 million Atlantic salmon have been stocked since the launch of LOASRP in 2006. Significant returns of adults to the Credit River were documented in 2008 and 2009. Measures continue to be taken to improve access to upstream spawning habitat through the removal or modification of barriers and installation of fishways.

Thousands of students from schools and outdoor education centres have participated in a classroom hatchery program designed to actively involve youth in local restoration efforts. Thousands of staff, partner and volunteer hours have been logged on stream habitat protection and enhancement projects.

To find out more about the program, meet our partners and discover volunteer opportunities, please visit ***bringbackthesalmon.ca***.

American Eel

American eel are identified as an *Endangered* species under Ontario's Endangered Species Act (ESA). In addition, the Committee on the Status of Endangered Wildlife in Canada recommended that American eel be identified as a species of *Special Concern* under the Canadian Species at Risk Act (Table 7.3.1). These designations have lead to additional efforts to protect American eel in Ontario. Several actions were taken by MNR's partners and the Lake Ontario Management Unit during 2009 to address the low abundance of eel.

MNR and Ontario Power Generation (OPG) have collaborated on the operation of the eel ladder at the R.H. Saunders Hydroelectric Dam since 1974. Prior to the start of operation during 2009, OPG made major modifications to the Saunders eel ladder. An extension pipe was built between the original exit of the eel ladder, on the fore bay deck of the generating station, and extended to a site located 300 m upstream from the station where the new exit of the eel passage facility is located. In addition, the climbing substrate of the eel ladder was replaced by a moulded plastic substrate with studs similar to the ones installed at the other eel ladders in the St. Lawrence River. The new substrate and ladder was also covered with aluminium covers to shade the eels during passage and prevent access by potential predators.

The Saunders eel ladder was opened on Jun 22 and closed on Oct 19, 2009 (119 days). Continuous counts of eel migration activity were obtained by a photoelectric counter at the top of the ladder (Fig. 7.3.1). The electronic counts were compared to manual counts at least once a week throughout the migration season. The overall error of the electronic counter compared to manual counts is 0.4% for the entire 2009 season. The average error per sampling day of counting is 0.8%. All the eels exited the facility between 20:00 h and 9:00 h and 98.3% made it between 00:00 h and 7:00 h—a dramatic change from previous years when eels were observed at all hours of the day. The average travel time of 41 tagged eels traveling the entire facility during 2009 was 3 hr and 37 min. The average time to travel the eel ladder (without extension and new climbing substrate) reported in previous studies conducted from 1997-2001 varied between 15.1 and 24.2 hrs.

A total of 1,799 eels successfully exited the eel passage facility (Fig. 7.3.2). The first record during 2009 occurred on Jun 30 and the last one on Oct 5. The peak period of eel activity was Jul 21-Aug 21 (1,456 eels, 81% of total) with the highest daily count (172 eels) occurring on Jul 30. The total number in 2009 is 3.5 times lower than observed during 2008

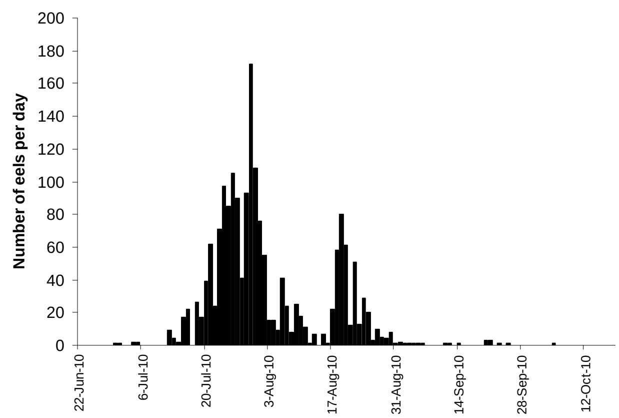


FIG. 7.3.1. The numbers of eel counted at the top of the eel ladder located at the R.H. Saunders Hydroelectric Dam during 2009.

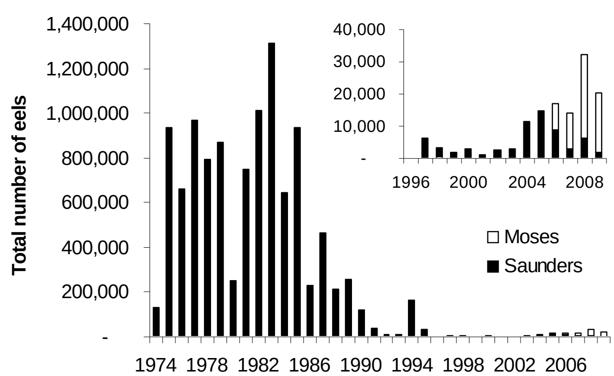


FIG. 7.3.2. Total number of eels ascending the eel ladder(s) at the Moses-Saunders Dam, Cornwall, Ontario for 1974-2009. No counts are available for 1996.

(6,398) and also lower than in 2007 (2,689) and in 2006 (8,795). Adjustments required to optimize the operation of the new ladder contributed to the low number of eels during 2009, however the passage of eels at ladders on the Moses portion of the dam and the Beauharnois dam were lower in 2009 than 2008 as well.

A sub-sample of 84 eels were collected and sampled for biological characteristics during 2009. The average length (325 mm, range 225-433 mm, Fig. 7.3.3) was the second smallest average observed since the ladder opened in 1974 and continued the trend of declining size that started in 2004. In addition, the maximum size of eels observed in the ladder was the smallest on record. One possible explanation for the low total number of eels at Saunders during 2009 may be that larger eels did not or could not ascend the Saunders eel ladder as frequently as smaller eels. Some modifications at the entrance of the ladder might also have limited the number of eels entering the ladder.

The numbers of eels moving up the ladders located at the Moses (18,415 eels) and Beauharnois (61,321eels) generating stations during 2009 were also lower compared to 2008 but were higher than 2007 and 2006. Combined, 20,214 eels passed the two ladders located at the Moses-Saunders Dam during 2009. This number was somewhat lower than that observed in 2008 (32,330) but continues the general trend of increasing numbers since 2001. However, the numbers migrating upstream are still less than 2% of the numbers of eel observed during the early 1980s (Fig. 7.3.2, over 1-million eels per year during 1982 and 1983).

The abundance of larger ‘yellow’ eels in the upper St. Lawrence River (USLR) and eastern Lake Ontario (ELO) was measured with three assessment programs during 2009. Bottom trawling in the Bay of Quinte has been conducted since 1974 as part of the fish community index program (Section 2.4). The average catch of American eel for 1974-1994 was 0.94 eels per trawl; however, no eels were captured in the 364 trawls conducted between 2003 and 2009. This suggests that eels are at a very low abundance in this area.

Quantitative electrofishing was conducted during 2009 in the Mallorytown area (USLR) and Main Duck Island - Yorkshire Bar area (ELO) by Dr. J. Casselman and L. Marcogliese of Queens University with the financial support provided by the Ontario Ministry of Natural Resources. Night-time electrofishing indices measuring wild American eel abundance in the USLR (0.184 ± 0.397 eels/hr) and ELO (0.192 ± 0.406 eels/hr) showed a slight increase relative to 2008. However, both the ELO and USLR values were the second lowest in the 26 and 16 years of the indices, respectively. For the first time since eel stocking commenced (in 2006), eels that, by size (≤ 350 mm TL), appeared to have been stocked were detected in the USLR quantitative electrofishing index. As the stocked eels grow they will likely be observed in increasing numbers in future electrofishing projects. In 2009, the ELO daytime electrofishing index recorded no catch for the fifth consecutive year, while the USLR daytime index recorded no catch for the first time. At both locations and times of day, catches were not statistically different than the previous four years ($P > 0.05$) and have not been statistically greater than 0 since night-time catches in 2005, even with the inclusion of stocked eels. These low catch rates continue the trend of very low abundance of American eel in these locations (Fig. 7.3.4).

Nearshore trapnetting was conducted in the upper Bay of Quinte, lower Bay of Quinte, North Channel, Prince Edward Bay (all areas of ELO) and the Thousand Islands area of the USLR using the NSCIN fish community index protocol during 2009 (see Section 2.6). All of these areas are within the historical range of the eel and this gear has been shown to be effective for larger eels; however no eel were captured in the total of 171 net sets.

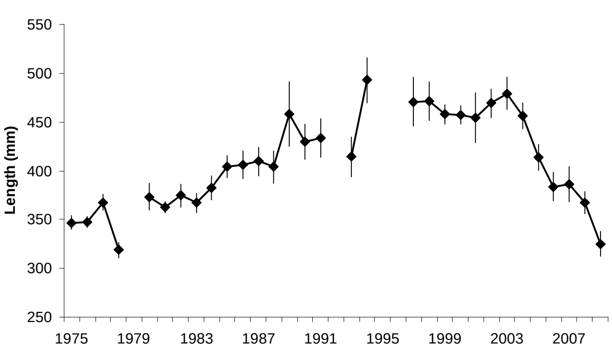


FIG. 7.3.3. Length (error bars are 95% confidence limits) of eel migrating upstream through the eel ladder located at the R.H. Saunders Hydroelectric Dam, 1975-2009.

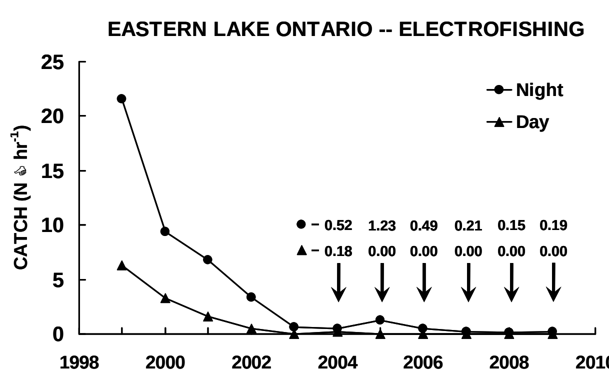


FIG. 7.3.4. Electrofishing catch of American eel (numbers caught per hr) in eastern Lake Ontario, separated by day and night for a recent period of 1999-2009.

Lake Ontario Management Unit staff participated in the development of a Recovery Strategy for the American Eel in Ontario and the development of an agreement under the ESA regarding the protection of eels during the operation of R.H. Saunders GS. In addition, staff assisted OPG and Fisheries and Oceans Canada in the implement the OPG Action Plan to improve eel abundance in ELO and USLR and improve passage of eel around hydroelectric generating facilities in the St. Lawrence River.

In one component of the OPG plan, staff assisted in health assessment and stocking of a total of 1.3 million glass eel into the USLR and ELO during 2009 (see Section 7.1). About 211.5 kg of glass eels were obtained from the Mersey River and 87.5 kg from the Ingram River in Nova Scotia at a price of $630/kg (including holding and transportation to Ontario). Eels stocked during 2009 were somewhat larger (4,350 glass eels/kg) than in previous years. All stocked eels were marked with a fluorescent dye to distinguish them from naturally migrating eels. This brings the total number of eels stocked since 2006 to 3.9 million fish. Prior to all stocking, health screening was conducted at the Atlantic Veterinary College, and the testing results for a wide variety of fish pathogens (including *Anguillicoloides crassus*) were all negative for stocked fish. In 2009, one batch of 50 kg of glass eels was rejected because of the presence of the bacteria *Yersenia ruckeri* (which causes enteric redmouth disease in fish).

Fisheries and Oceans Canada conducted electrofishing surveys during the spring and the fall near the USLR and Bay of Quinte stocking sites to evaluate the success of eel stocking. During the 70 transect surveyed during the spring average densities of 25.7 (+/- 6.4) and 30.0 (+/- 7.6) eels/ha were observed in the USLR and Bay of Quinte sites respectively. The 91 transects surveyed during the fall revealed densities of 55.5 (+/- 15.6) and 199.1 (+/-35.0) eels/ha at the USLR and Bay of Quinte sites respectively. Transects conducted suggest that eels are found both at stocking sites and some sites nearby.

In addition, incidental eel captures reported by other agencies (e.g., DFO's sea lamprey control program, Conservation Authority surveys) showed that very small eels had traveled 100's of kilometres from the stocking sites to: Shelter Bay Creek, the Rouge River and the Credit River. The eels were too small to be naturally migrating eels, and in some cases the florescent mark unique to stocked eels was observed.

DFO was able to obtain lengths, weights, and age from a sample of the eels captured. Eels from all four years stocked (2006–2009) were sampled, and length and weight at age, and biomass per hectare were calculated. Growth rates were very high, even for newly stocked eels recaptured in the autumn. Sex determination was conducted for a small sample (45) of the eels and 11 males were confirmed to be present; mostly from the 2006 stocking year. Some of the larger males may be ready to migrate back down the St. Lawrence to spawn within a year or two. All of the eels aged by otolith showed the fluorescent oxytetracycline mark except for one of the larger eels which is assumed to be a naturally migrating eel.

In a second component of the OPG Action Plan, MNR staff assisted in the capture, tagging and transport of large yellow eels from the USLR and ELO to Lac St. Louis (a section of the St. Lawrence River below all barriers to downstream migration). This study is a continuation of the project initiated in 2008 which was undertaken by OPG as a pilot project to investigate the economics and practical feasibility of this alternative for mitigating turbine mortality at the Saunders GS during the downstream migration of mature silver eels. The project also involved local commercial fish harvesters, Raisin River Conservation Authority and Quebec Ministère des Ressources Naturelles et de la Faune (MRNF).

In 2009, the target for commercial fish harvesters was set at 1,000 large yellow eels (minimum size > 80 cm or approximately 2.5 lb) in the USLR-ELO and 2,000 eels in the Ontario portion of Lake St. Francis. In Lake Ontario, large eels were taken by 11 license holders from early May-Jun 20 as a by-catch in the existing spring hoop and trap net fishery. The Lake St. Francis fish harvesters (2 licences) also participated in the spring fishery but specifically targeted large yellow eel for this project. In the USLR-ELO, commercial fish harvesters caught 214 large yellow eels; in Lake St Francis, the commercial fish harvesters took 1,899. The catch rates in the USLR-ELO and Lake St. Francis were 0.04 and 0.92 eels/net night, respectively. It is apparent that yellow eel abundance is much higher in Lake St. Francis than in the USLR-ELO.

Eels from USLR-ELO were transported to holding facilities at the MNR's Glenora Research Station in the case of eels from Lake St. Francis a facility at Bainsville, Ontario. At both locations a passive integrated transponder (PIT) tag was implanted in each eel for subsequent identification and morphometric data were collected.

In 2009, 1,212 large yellow eels were released into Lac St. Louis immediately downstream of the Beauharnois GS. Eels came from Lake St Francis (1,000 eels) and the USLR-ELO (212 eels) and were released from shore at four locations identified by MRNF along the south shore of the river. Another 868 eels collected from Lake St. Francis were returned to Lake St. Francis as a control sample. During the release program, all the eels were observed to be in good health. The immediate mortality of large yellow eels during trap and transport was relatively low. Two eels died in the holding facilities at Glenora and 6 eels died in the holding facilities at Bainsville.

To monitor the long-term survival, condition, maturation and migration of the transported yellow eels, biologists from MRNF attempted to recover tagged eels in the silver eel fishery in the St Lawrence River estuary. MRNF sampled all 13 fish harvesters in the fishery and scanned about 85% of the harvest or 13,931 silver eels, an increase from about 50% in 2008. Sixty-four (64) PIT tags from the trap and transport study were detected and another 72 PIT tags from previous studies conducted from 1997 to 2001. Five of the 64 tags came from the USLR-ELO and the remaining tags from Lake St. Francis. Only 9 of the Lake St. Francis eels were from the group transported to Lac St. Pierre in 2008. Of the 2009 tags from Lake St. Francis, 34 of the eels had been transported to Lac St. Louis and 12 had been returned to Lake St. Francis as reference eels. The release location of the remaining four recaptured tagged eels is unknown.

The 2009 trap and transport project was successful in demonstrating that most large yellow eels can be held in captivity, tagged, transported and released without obvious detrimental effects. Lastly, longer term effects of trap and transport on eels can likely be evaluated by monitoring transported eels in the silver eel fishery in the St. Lawrence estuary.

7.4 Fisheries Advisory Council for Zone 20 (Lake Ontario / St. Lawrence River)

The establishment of Fisheries Management Zone (FMZ) Advisory Councils for each FMZ in Ontario is an important step forward in implementing the Ecological Framework for Recreational Fisheries Management. Public involvement in fisheries management will be enhanced through the FMZ Advisory Councils. Along with the existing stewardship initiatives (Ontario Stewardship, lake based stewardship councils, Fisheries Management Plan Implementation Teams, Remedial Action Planning Teams etc.) the FMZ Advisory Councils will be a key vehicle for achieving enhanced public involvement in the fisheries decision making process within each of the FMZs.

The council will work towards the provincial level objectives of resource sustainability, biodiversity conservation, landscape-scale management, enhanced stewardship, streamlined regulations, and enhanced angling opportunities. Councils will make valuable contributions to identifying and prioritizing management issues, challenges and opportunities at the FMZ level. Councils will be expected to assist MNR in public consultation initiatives within the zone. In addition, councils may focus on other FMZ based priorities e.g., tourism, commercial fishing, habitat protection.

The Zone 20 advisory council, with direction from MNR and through consultation with stakeholders and the public and in consideration of the broader public interest, will review and have input on Zone 20 fisheries objectives which clearly describe the desired character (quality and quantity, fish community type) of the fisheries resource and the associated benefits expected from that resource within the zone. Recommendations related to management planning, fishing regulations and policy generally require broader public consultation and may need to be presented to management partners (i.e. adjoining FMZ councils, MNR districts, the broader public, New York State).

2009 marked the first year of council operation for Zone 20. Eighteen volunteers, representing a broad array of stakeholder groups and the public, met nine times in 2009 to discuss issues related to Lake Ontario and St. Lawrence River fisheries resources.

Due to the geographic vastness of Zone 20 and the diversity of the aquatic resources, the council was divided into two standing sub-committees. The sub-committees are defined by the ecology of the FMZ20 which gives rise to two distinct fisheries:

1. Eastern Basin, Bay of Quinte and St. Lawrence River, and
2. Western and Central Basin Lake Ontario.

Each sub-committee will meet regularly to work on area specific issues and twice yearly the entire FMZ 20 Council will meeting to address zone wide issues and provide a forum for inter-subcommittee dialogue and provide advice to MNR.

7.5 Lake Ontario Commercial Fishing Liaison Committee

The Lake Ontario Commercial Fishing Liaison Committee (LOLC) provides recommendations to the Lake Ontario Manager regarding the commercial fishery. The LOLC was comprised of 14 elected members for part of 2009. An election was held in July-August 2009 to elect a new LOLC; the new liaison committee has 15 members with 3 vacancies. Members represent fishers in different management zones, buyers/processors, and the Ontario Commercial Fisheries' Association (OCFA). The LOLC provides a unique forum for dialogue between the Lake Unit and the commercial industry where issues are identified and management actions are discussed. Management actions were presented to all licensed commercial fishers at the Annual General Meeting during April 2009.

The LOLC met four times during 2009. Action items discussed included the revision of some license conditions, the eel trap and transfer project, the northern pike fishing seasons, and the revision of quotas for yellow perch on Lake St. Francis. The 2008 survey results were collected.

During 2009, the OCFA, in partnership with the Lake Unit, continued the onboard observer program during the northern pike and lake whitefish spring fisheries.

8. Research Activities

8.1 Offshore Food Web

Effects of exotic species on the potential for Lake Ontario to support a re-introduced bloater population
Project Leader: T. J. Stewart, Lake Ontario Management Unit and University of Toronto

The 1990s was a period of substantial ecological change associated with disruptive influence of invasive species. This project quantified the biomass, production, diet and feeding relationships of all the primary species-groups comprising the offshore Lake Ontario food web before and after the 1990s. By statistically balancing these food webs it was possible to detect changes in the pathways of energy transfer associated with the 1990s ecological change. Additionally, the balanced food webs were used to examine the potential ecological consequences of re-establishing deepwater cisco. During the 1990s, dreissenid mussels (*Dreissena spp*.) expanded and were associated with increases in water clarity and the population collapse of *Diporeia spp*. The invasive predatory cladoceran *Bythotrephes longimanus* invaded in 1984 but was abundant only sporadically prior to 1990 and another predatory cladoceran, *Cercopagis pengoi* invaded and became abundant in 1998. The combined effect of reductions in phosphorus loading and possibly the filtering effects of dreissenids led to declines in Lake Ontario phytoplankton biomass and zooplankton abundance, biomass, and production. Alewives are the dominant prey fish in Lake Ontario and they responded to the ecological change with shifts in production, diets, and distribution. Efforts are being made to re-introduce deepwater cisco to Lake Ontario to restore the native pelagic fish assemblage and increase biodiversity. Deepwater cisco and alewife co-exist in Lake Michigan, which has an offshore food web structure similar to Lake Ontario. We applied historical Lake Michigan deepwater cisco and alewife population fluctuations, and associated predator and prey fish diets to characterize possible Lake Ontario food web structures that included both alewife and re-established deepwater cisco populations. Using the mass-balance food-web models before and after the disruption, and a range of deepwater cisco and alewife populations, we assessed the potential ecological consequences of re-establishment of deepwater cisco in Lake Ontario.

In 2009, this research was completed and resulted in a Ph.D. dissertation at the University of Toronto. This research is changing our understanding of trophic relationships in the offshore Lake Ontario food web and will have implications for future rehabilitation and management of the fish community. This research relied on cooperation of the United States Geological Survey (USGS), New York State Department of Environmental Conservation (NYDEC), and the Department of Fisheries and Oceans. Support for the project was provided by the Canada-Ontario Agreement, the Great Lakes Fish and Wildlife Restoration Act, the Great Lakes Fishery Commission, and the National Sciences and Engineering Research Council.

Below are the abstracts of two manuscripts describing the results of the food web analysis and analysis of the potential trophic consequences of bloater (*Coregonus hoyi*) reestablishment in Lake Ontario before and after 1990s ecological change.

Carbon-based balanced trophic structure and flows in the offshore Lake Ontario food web before (1987-1991) and after (2001-2005) invasion-induced ecosystem change
Thomas J. Stewart and W. Gary Sprules

Abstract
We develop mass-balanced solutions describing carbon-based trophic structures and flows of the Lake Ontario offshore food web before and after invasion-induced disruption. The food webs link two pathways of energy and matter flow; the grazing chain (phytoplankton-zooplankton-fish) and the microbial loop (autotrophic bacteria-heterotrophic protozoans) and include 19 species-groups and three detrital groups. Mass-balance was achieved by randomly varying initial determinations of biomass and diet composition using constrained optimization techniques. The mass-balance solutions indicate a decline in primary productivity and a decline in the biomass and production of all species-groups except Chinook salmon. The trophic level (TL) increased for smelt, adult sculpin, adult alewife and Chinook salmon. Changes to ecotrophic efficiencies indicate a reduction in phytoplankton grazing, increased predation pressure on *Mysis*, adult smelt and alewife and decreased predation pressure on protozoans. Trophic transfer efficiencies (TTE) across aggregated TLs declined with increasing TL. After the disruption, TTEs decreased for transfers from TL-II (primary consumers) to TL-III (secondary consumers; 8.9 to 7.9%) did not change for transfers from TL III to IV (3.9 to 4.2%), and increased for transfers from TL IV to V (0.65 to 1.6%). Specific resource to consumer TTE changed; increasing for protozoans (8.0 to 11.5%), *Mysis* (0.6 to 1.0%), and Chinook salmon (1.0 to 2.3%) and other salmonines (0.4 to 0.5%) and decreasing for zooplankton (20.2 to 15.1%) , prey-fish

(9.7 to 8.8 %), and benthos (1.7 to 0.6 %). The synchrony of the decline in PP and species-group production indicates strong bottom-up influence. Examination of changes in carbon flow among species-groups suggest top-down influences of zooplankton on bacteria and protozoa, alewife on zooplankton and *Mysis*, and *Mysis* on zooplankton and *Diporeia*. We observed low, but increasing predation pressure on smelt and alewife from salmonines. The predation losses attributed to the recent invasive species were low and direct trophic effects on the offshore Lake Ontario food web were minor. If the recent invasive species are causative agents in the changed offshore food web structure, then it is through indirect effects. Carbon flows to *Mysis* indicated an important, and changing ecological role for this species, including increased predation on *Diporeia*, which may have contributed to recent *Diporeia* declines.

*Simulation of the trophic consequences of bloater (*Coregonus hoyi*) reestablishment in Lake Ontario before and after invasion-induced ecosystem change*
Thomas J. Stewart and W. Gary Sprules

Abstract
In this paper, we simulate the reestablishment of bloater (*Coregonus hoyi*) in Lake Ontario, by deriving mass-balanced descriptions of the offshore food web, that include bloater, before (1987-1991) and after (2001-2005) invasion-induced ecosystem change. We base our simulations on observed levels of coexisting biomass stanzas of Lake Michigan alewife (*Alosa pseudoharengus*) and bloater and associated predator and prey diets. Our simulations suggest that only a small population of bloater could be sustained in Lake Ontario, at approximately 12% of the combined total alewife and bloater biomass. At these low levels of bloater biomass, the intensity of predation on *Diporeia*, other benthos, and *Mysis* increased, but was unchanged for other prey groups. At higher levels of bloater biomass, initial estimates of predation loss exceeded prey production by factors of 3.2 to 10.6 for *Diporeia* and by factors of 1.5 to 3.0 for Mysis. Stochastic variations of biomass and diet composition could not alleviate these imbalances. Our simulations indicate that re-established bloater would replace alewife as the dominant consumer of *Mysis* and replace adult sculpin and *Mysis* as the dominant consumers of *Diporeia*. The simulations suggest that bloater production in Lake Ontario would be limited by low *Diporeia* production. This was the case before the decline in *Diporeia*, but the decline further limited bloater production potential and required higher proportion of *Mysis* in bloater diets than observed in Lake Michigan. The shifts in feeding relationships among alewife, bloater, *Mysis* and *Diporeia* required to balance the food webs, indicated important and complex feeding interactions among these species. Field verification and dynamic modelling of these interactions are needed to further understand the potential consequences of bloater re-establishment.

8.2 *Hemimysis*

Hemimysis – *the bloody red shrimp in Lake Ontario*

Investigator: Tim Johnson, Aquatic Research and Development Branch in partnership with Fisheries and Oceans Canada and Queen's University (Michael Yuille, M.Sc. candidate and Liang Zhang, post-doctoral fellow)

Hemimysis anomala, the bloody red shrimp, is one of the newest aquatic invasive species to be reported in Lake Ontario. Distribution and density surveys that began in 2008 were expanded in each of the spring, summer, and fall seasons to include 27 sites ringing the Canadian and US shoreline in conjunction with Cornell University and USGS. Peak density of $1{,}817 \cdot m^{-3}$ was reported at the Bronte site in the fall, with *Hemimysis* now reported at 81% of the surveyed sites. Density was highest in the north-west and lowest in the east, with density consistently increasing from spring to fall. Future surveys will concentrate on 5 focal sites (Bronte, Cobourg, Port Dalhousie, Waupoos, Big Bay (Bay of Quinte)) which span a gradient of density and habitats in order to evaluate the ecological impact of *Hemimysis* on resident biota. Monthly sampling at each of these sites included basic physicochemistry of the site and collections of samples to describe nutrients, plankton, benthos, and fish. To accomplish this intensive sampling, OMNR and Fisheries and Oceans each took lead responsibility for eastern (OMNR, n=3) or western (DFO, n=2) sites. Samples are being analysed for taxonomic composition, density and size, diet, stable isotopes, fatty acids, and contaminants. Collectively this suite of parameters will enable us to develop empirical and predictive models of the effects of *Hemimysis* on the composition, production, nutritional health, and chemical exposure at various levels of the food web.

Preliminary results from 2008 and 2009 show native fishes are not consuming *Hemimysis* as a prominent diet item. Of 15 fish species examined (almost 3,000 stomachs), only alewife, rock bass, white perch, and yellow perch consumed *Hemimysis*. Although we suspected this large and visible plankton would be a preferred diet item of plankton eating fish such as alewife and yellow perch, the nocturnal migratory behaviour of *Hemimysis* may be reducing interactions. Further, the rapid digestion of *Hemimysis* in fishes

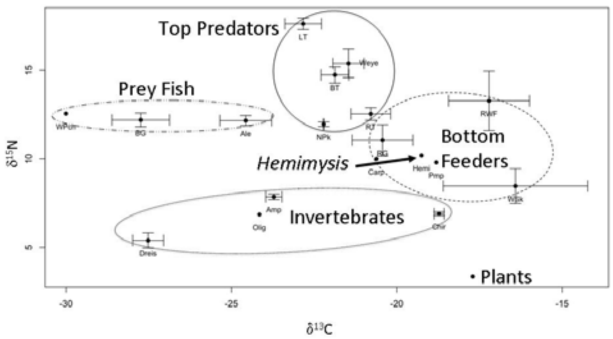


FIG. 8.2.1. Food web structure at Cobourg, Lake Ontario in fall 2009 as revealed by stable isotopes of ^{13}C and ^{15}N. Results are preliminary, with additional taxa undergoing analyses.

stomachs make their detection difficult by conventional means, and on-going stable isotope and fatty acid tracer work will provide a more time-integrated perspective on fish feeding on *Hemimysis*. Preliminary stable isotope results reveal *Hemimysis* has established a trophic position midway between invertebrates and prey fishes, relying more on terrestrial / benthic carbon sources than internal (pelagic) sources (Fig. 8.2.1).

Support for this project was provided by OMNR, the Invasive Species Centre Partnership Fund, a Ministry of Innovation Early Researcher Award to Dr. Linda Campbell (Queen's University), and the Canada-Ontario Agreement. Additional support was provided to our partners: Fisheries and Oceans Canada, the United States Geological Survey, and Cornell University.

8.3 Impediments to Lake Trout Rehabilitation

Investigators: Tim Johnson (Aquatic Research and Development Section, OMNR), Scott Rush, Gord Paterson, Aaron Fisk, Ken Drouillard (University of Windsor), Michael Arts (Environment Canada)

Lake trout is one of only two salmonines native to Lake Ontario and has historically played a pivotal role in the cycling of energy between the offshore benthic and pelagic zones. However, extensive efforts to re-establish self-sustaining lake trout populations continue to be plagued by poor survival from egg through juvenile stages resulting in low adult density and therefore number of spawners. During the first comprehensive lake-wide lake trout assessment since 1995, we sampled all 420 lake trout captured in the survey for size, sex, age, diet, and ratios of stable isotopes of carbon ($\delta^{13}C$) and nitrogen ($\delta^{15}N$) to characterise spatial demographics and feeding behaviours. A subset of samples are being analysed for fatty acids and thiamine, important nutritional

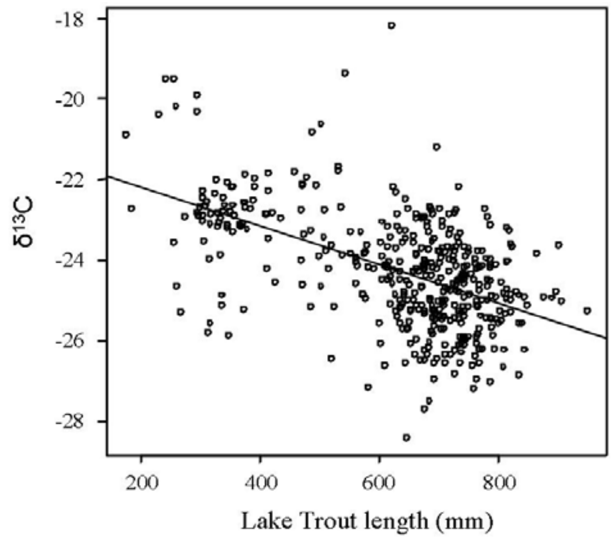


FIG. 8.3.1. Relationship between fish size and muscle $\delta^{13}C$ in Lake Ontario lake trout, 2008.

indicators. These analyses are being undertaken by scientists from the University of Windsor, Environment Canada, and OMNR's Aquatic Research & Development Section, with on-going field support from the USGS and the Lake Ontario Management Unit (OMNR). Results to date indicate lake trout had similar trophic signatures throughout Lake Ontario. However, older lake trout were depleted in muscle $\delta^{13}C$ (Fig. 8.3.1) suggesting they are foraging in deeper water. Lower lipid concentration for these same fish suggests energy acquisition costs may be higher, a possible response to reductions in the abundance of pelagic prey. We expect the nutritional indicators (fatty acid and thiamine analysis) will provide greater insight into the consequences of the shift in lake trout feeding habitat. A retrospective analysis of lake trout and dominant prey between 1990 and 2008 is now underway, and will reveal if trophic and nutritional status of lake trout is correlated with patterns in survival, recruitment, and abundance of lake trout in Lake Ontario. Such integrated analyses are informative with respect to understanding rehabilitation potential in light of on-going ecological change.

8.4 Stressed Out Fish – Influence of Temperature and Diet on Fish Health

Investigator: Jaclyn Brush, M.Sc. candidate, University of Windsor (co-supervised by Tim Johnson, ARDS and Aaron Fisk, University of Windsor)

Fish are exposed to a variety of biotic (predation, competition) and abiotic (temperature, oxygen) stressors throughout their lives. In populated regions such as the Great Lakes basin, fish are further exposed to anthropogenic stressors related to pollution, fishing pressure, species invasions and climate change. Healthy fish and populations are those that can compensate for the stresses they face. All fish have preferred temperatures where they grow and survive best, and both natural (e.g. up-wellings, depth) and artificial (e.g. industrial discharge, impoundments) factors can influence the temperatures experienced by fish. Growth is influenced by diet (both quantity and quality of food) and temperature (metabolic costs are higher at higher temperature), and rapidly growing fish are often assumed to be in better health. We sought to compare fish health, measured by a variety of methods, under varying temperature and dietary conditions. More specifically, we wanted to determine if the same species of fish living naturally under different temperature conditions would exhibit large differences in how diet was expressed in overall fitness. To accomplish our objective, we utilized stable isotopes – naturally occurring chemicals that allow us to identify feeding relationships among interacting organisms. Stable isotopes have the advantage over traditional diet analyses of integrating feeding patterns over ecologically relevant time periods.

Wild-caught fish species and prey items were collected from two areas of contrasting temperature within the Bay of Quinte-Lake Ontario ecosystem. We evaluated gut-contents along with stable carbon and nitrogen isotope signatures of all species so that food web structure, dietary niche width and trophic relationships could be estimated. A laboratory experiment using the round goby (*Apollonia melanostoma*) as a top consumer, examined the influence of temperature on consumer isotopic signatures in relation to a constant dietary source, to evaluate temperature-dependent diet-discrimination factors (the isotopic difference between a predator and its food). Preliminary results indicate significant differences in carbon source utilization for similar fish occupying the different thermal environments of eastern Lake Ontario. As temperature increased, we found that $\delta^{13}C$ became more negative and $\delta^{15}N$ decreased, opposite to our initial expectations. A significantly more negative $\delta^{13}C$ value for warm area fish is suggestive of littoral and benthic feeding with terrestrial inputs, whereas for cool area fish, we found a $\delta^{13}C$ value suggestive of a planktonic carbon source, or pelagic feeding. For nitrogen, we corrected isotope values for the baseline isotopic value (provided by zebra mussels collected in each region), and found that higher $\delta^{15}N$ for cool fish was reflected in higher trophic position for all species analyzed in relation to their warm area counterparts (Fig. 8.4.1). Our laboratory experiment provided diet-discrimination factors for $\delta^{15}N$ of 3.55 (±0.052 SE) for warm originating fish, and 4.00 (±0.057 SE) for cool originating fish. These laboratory generated factors

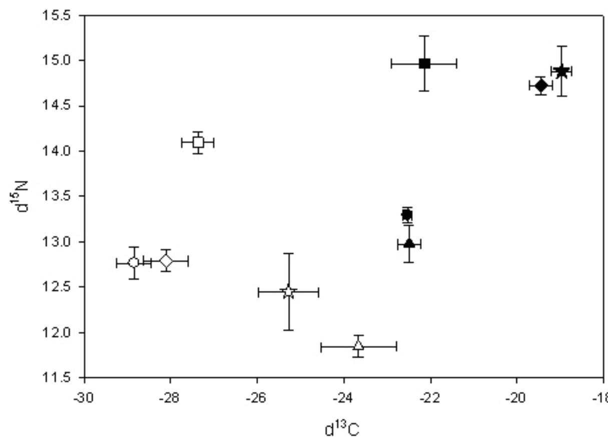


FIG. 8.4.1. Mean ± standard error $\delta^{13}C$ and $\delta^{15}N$ measurements for fish from warm (Upper Bay, open symbols) and cool (Lower Bay, solid symbols) environments in the Bay of Quinte, Lake Ontario. Species include: alewife (circles), round goby (triangles), yellow perch (diamonds), largemouth bass (stars), and walleye (squares).

will be applied to the values observed from our field study to correct for the influence of temperature on dietary isotopic fractionation and on measures of trophic position. Integration of field and laboratory data will continue in 2010 as we strive to better understand how specific factors such as temperature affect food web structure and feeding relationships among species.

8.5 Small-fish Sampling

Assessing nearshore fish communities in eastern Lake Ontario

Investigator: Tim Johnson, Aquatic Research and Development Section

Nearshore habitats and fish communities are often more complex and diverse than their pelagic neighbours, and contribute substantially to a lake's overall fish biodiversity and abundance. Nearshore fish communities are also often the first to experience effects of non-indigenous species introductions, habitat degradation, and other ecological perturbation. As a result, changes in nearshore fish communities can have substantial implications for whole lake ecosystems. Fishery monitoring programs in the nearshore zones of lakes often target large-bodied fish, and small-bodied fish tend to receive much less attention. We wish to examine which gear types and level of effort are required to adequately describe nearshore fish community biodiversity in Great Lakes environments, with an emphasis on small-bodied fish (i.e., <20 cm in length). In 2008, a literature review, solicitation of expert advice, an online survey (including 155 responses from around the Great Lakes), and a workshop of Ontario Ministry of Natural Resources (OMNR) field personnel identified fyke nets, small-mesh gillnets, and beach seines as potential gears to be evaluated. Species richness and composition from these gears were compared with results from the provincial standard Nearshore Community Index Netting (NSCIN) trapnet program employed in eastern Lake Ontario by the Lake Ontario Management Unit. Of the 30 species of fish sampled with our three selected gears, only eight were also sampled in the NSCIN gear. This led to further field testing in 2009. This time, fyke nets and small-mesh gillnets were deployed in the same geographical locations and time of year as the NSCIN trapnets. The three gears collectively captured 4822 individuals representing 29 species of fish. Of those, two species were unique to the fyke nets, five were unique to the small-mesh gillnets, and nine were unique to the NSCIN nets (Fig. 8.5.1). However, when we focused exclusively on small-bodied fish (<20 cm in length), all seven species captured in NSCIN nets were represented in fyke nets and small-mesh gillnets, and an additional 13 species captured in fyke and gill nets were not captured in NSCIN nets. These results suggest that fyke nets and

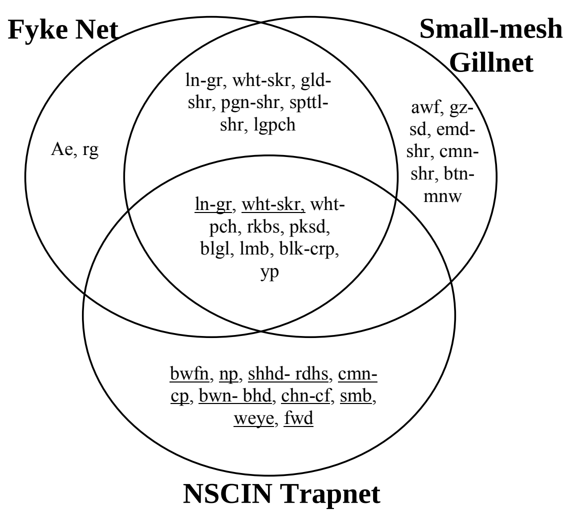


FIG. 8.5.1. All species captured in fyke nets, small-mesh gillnets, and NSCIN trapnets at eight sites in the Bay of Quinte, Lake Ontario, in the summer of 2009. Circles represent each type of net; species captured in more than one type of net are indicated in the appropriate over-lapping portion of the circles. Species names that are underlined were not small-bodied fish (i.e., they were > 20 cm in length). Ae=American eel, rg=round goby, ln-gr=longnose gar, wht-skr=white sucker, gld-shr=golden shiner, pgn-shr=pugnose shiner, spttl-shr=spottail shiner, lgpch=logperch, awf=alewife, gz-sd=gizzard shad, emd-shr=emerald shiner, cmn-shr=common shiner, btn-mnw=bluntnose minnow, wht-pch=white perch, rkbs=rockbass, pksd=pumpkinseed, blgl=bluegill, lmb=largemouth bass, blk-crp=black crappie, yp=yellow perch, bwfn=bowfin, np=northern pike, shhd-rdhs=shorthead redhorse, cmn-cp=common carp, bwn-bhd=brown bullhead, chn-cf=channel catfish, smb=smallmouth bass, weye=walleye, fwd=freshwater drum.

small-mesh gillnets can add considerable information to assessments of fish community biodiversity when fished with similar effort to NSCIN nets.

Support for this project was provided by OMNR and the Canada-Ontario Agreement.

8.6 Spotted Gar Seining Project

The purpose of this project was to assess the near-shore environments of East and West Lakes, two Lake Ontario embayments, using a seine net, to determine whether spotted gar inhabit and reproduce in these areas, or whether recently sighted specimens were introduced into these environments.

Spotted gar are not commonly found in the waters of Lake Ontario; their northern distribution is limited to only a few locations in Lake Erie. However, two specimens have been captured in Lake Ontario; the first was caught in the Bay of Quinte in 1985, while the second was caught more recently, in 2007, in East Lake.

From Jul 27-Aug 21, 2009, 27 seine samples were completed at 5 sites on East Lake and 3 sites on West Lake, in Prince Edward County, Ontario. In total, 5,137 fish from 21 different species were captured between the two lakes (Table 8.6.1). Bluntnose minnow (31%), yellow perch (18%), round goby (14%), mimic shiner (7%), spottail shiner (7%), *Lepomis sp*. (5%), brook silverside (5%) and bluegill (2%) were among the most abundant species captured during the program. Round goby abundance was significantly higher in West Lake, where 700 were captured among all 3 sample sites, while in East Lake, only 19 were captured at 1 sample site.

During the project, no spotted gar were captured at any of the sample sites, and only two longnose gar were captured. Despite the absence of spotted gar, the results obtained from this project provided great insight into the nearshore fish communities of both East and West Lakes.

TABLE 8.6.1. Species-specific total catch records of 27 samples taken from 5 sites on East Lake and 3 sites on West Lake. Locations sampled were: 01-Provincial Park Campground, 02-Apple Orchard, 03-#62 Outlet Road, 04-Outlet Boat Launch, 05-#359 County Road 11, 06-Wesley Acres, 07-Cer-a-met and 08-Dunes Beach.

	East Lake					West Lake		
Species	01	02	03	04	05	06	07	08
Longnose gar	-	1	-	-	1	-	-	-
Northern pike	-	-	-	-	-	1	-	-
White sucker	-	8	-	-	3	-	-	4
Golden shiner	-	18	-	-	1	30	-	2
Spottail shiner	36	142	16	10	51	40	20	25
Mimic shiner	2	119	63	3	59	58	-	61
Bluntnose minnow	-	431	36	28	288	89	675	66
Brown bullhead	-	1	-	-	-	-	-	-
Banded killifish	2	2	16	13	7	18	4	9
Rock bass	-	10	-	9	63	24	1	1
Pumpkinseed	-	2	13	50	7	-	2	1
Bluegill	1	15	26	48	1	5	12	6
Smallmouth bass	-	-	-	-	-	-	-	2
Largemouth bass	1	6	9	20	17	17	18	1
Lepomis sp.	1	90	-	88	43	7	5	12
Yellow perch	5	83	35	109	96	436	56	98
Walleye	-	3	-	-	1	-	-	-
Johnny darter	-	-	4	2	13	1	-	43
Logperch	-	19	23	4	4	8	20	25
Brook silverside	4	-	-	22	13	163	14	21
Round goby	-	-	-	19	-	100	103	497
Total	52	950	241	425	668	997	930	874
Number of species	8	16	10	14	17	15	12	17
Number of seines	1	4	4	4	4	4	3	3

9. Partnerships

9.1 St. Lawrence River Muskellunge Spawning and Nursery Site Identification

The muskellunge (*Esox masquinongy*) is the largest game fish in Ontario waters. Its scattered provincial distribution is made up of several genetically distinct populations. The St. Lawrence River population produces the largest individuals in the province, and supports an important sport fishery. Concern regarding this population led to the creation of The St. Lawrence River Esocid Working Group under the supervision of the Lake Ontario Committee, of the Great Lakes Fishery Commission. The Esocid Working Group consists of members from New York State Department of Environmental Conservation (NYSDEC), the Ontario Ministry of Natural Resources (OMNR), SUNY College of Environmental Science and Forestry and the Royal Ontario Museum (ROM).

In the past, the Esocid Working Group produced management plans pertaining to St. Lawrence River muskellunge, the most recent being the Update of the Strategic Plan For Management of The St. Lawrence River Muskellunge Population and Sport Fishery Phase III: 2003-2010. One objective outlined in the report was the protection of muskellunge spawning and nursery habitats. However, these habitats were not well documented or identified within the St. Lawrence River. Consequently the OMNR conducted a young of-the-year seining program from 1989-1995 in an effort to identify nursery sites within the Canadian waters of the St. Lawrence River. Efforts were discontinued following this period. During 2005-2009, efforts to identify muskellunge nursery habitats were renewed through a partnership between Muskies Canada Inc. (MCI – Gananoque Chapter), Parks Canada (St. Lawrence Islands National Park), Kemptville District MNR, Fisheries and Oceans Canada (Prescott), and the Lake Ontario Management Unit (LOMU).

Forty-one seining events were completed over a period from August 5-28, 2009. A total of 6,690 fish, comprising 34 species were captured during this program. Among the most abundant species captured were yellow perch (40%), round goby (16%), bluntnose minnow (16%), rock bass (6%), spottail shiner (5%), pumpkinseed (3%), banded killifish (3%), largemouth bass (3%) and spotfin shiner (2%). Pugnose shiner (*Notropis anogenus*), listed as 'endangered' under both the Ontario ESA and Canadian SARA legislation (see Section 7.3), were captured at 7 sites. Additionally, grass pickerel (*Esox americanus vermiculatus* – listed as 'special concern' under both the Ontario ESA and Canadian SARA legislations) were captured at 4 sites. These important observations highlight the importance of seining programs to the identification of biological diversity of the St. Lawrence River.

During 2009, 8 muskellunge were captured at 6 sites. Only one muskellunge was captured at a site which was not previously confirmed as a muskellunge nursery area, while the remaining 7 were captured at previously confirmed sites. These data are being incorporated into NRVIS mapping of muskellunge nursery habitats by MNR – Kemptville District Office and shared with partner agencies.

9.2 Large Salmonid Predation Impacts on Post-smolts

The survival of juvenile Atlantic salmon, lake trout, rainbow trout, brown trout, and coho salmon, (except Chinook salmon) declined in the mid-1990s. Increased water clarity led to an offshore redistribution of alewife during spring. We have hypothesized that, with fewer prey fish (alewife and smelt) to act as a buffer, post-smolt/stocked juvenile salmonids have became a greater target for large salmonid predators. We propose to: 1) quantify the spatial and temporal components of the diet of large salmonids during and after the spring smolt/stocking events, 2) determine the distribution shifts in salmonids and prey fish through the spring, 3) model the predation intensity on small salmonids under scenarios of higher and lower prey fish density, and 4) simulate past prey density and distribution to test hypotheses related to past changes in juvenile salmonid survival.

We are capturing fish with multi-mesh gangs of suspended (method by which nets are properly deployed and floating in water column at desired depth strata) and bottom gillnets using a randomly stratified sampling design (See Section 2.2). Stratification is by water depth and distance offshore. Sampling is conducted during May in Lake Ontario near streams where Atlantic salmon have been intensively stocked. Identification of prey is based on bones and otoliths for largely digested specimens thereby reducing unidentifiable components to <5%.

We have partnered with Dr. Mart Gross and Blake Turner at the University of Toronto to conduct this study. As part of his graduate studies Blake is analyzing the stomach contents of salmonids caught in the survey, and he is synthesizing the data. In 2009, we completed the final year of field work of a 3-year study. Preliminary results from 2007-2009 indicate that round goby, a relatively new species to Lake Ontario is the primary prey for all predators in these samples. The analysis is ongoing.

9.3 Biomonitoring – Change at the Base of the Food Web

In 2007, OMNR's Aquatic Research and Development Section (ARDS) and Lake Ontario Management Unit (LOMU) partnered with Fisheries & Oceans Canada to resurrect the eastern Lake Ontario biomonitoring program that had ended in 1995 due to budget constraints. The program involves bi-weekly sampling at Station 81 (44º01.02' N, 76º40.23' W) located in approximately 38 m water depth in the Kingston Basin. Samples are collected to describe physical limnology (temperature, oxygen, transparency, and light), primary production (algal composition and abundance and the microbial food web), and secondary production (zooplankton and benthic invertebrates). Samples have now been analysed through 2008 and some remarkable changes are evident. Zooplankton density in the warm upper layer of the water column has declined over 90% between the earlier program and the recent collections. Such large scale changes in energy at the base of the food web may be related with on-going declines in prey fish abundance seen in USGS bottom trawls and joint OMNR-NYSDEC hydroacoustic surveys in Lake Ontario.

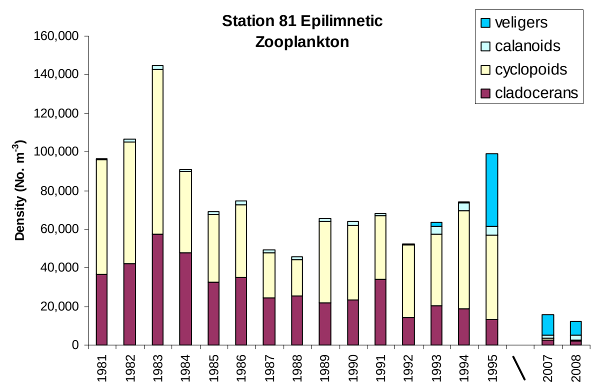


Fig. 9.3.1. Seasonal mean density (No·m^{-3}) of dominant zooplankton groups in the epilimnion at Station 81 from 1981-95 and 2007-08.

APPENDIX A: STAFF 2009

LAKE ONTARIO MANAGEMENT UNIT STAFF

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Jim Hoyle – Assessment Biologist
Ted Schaner – Assessment Biologist
Marc Desjardins – Management Biologist
Colin Lake – Operations Supervisor, Lake Manager (Acting)
Kelly Sarley – Database Technician Computer Operator
Dale Dewey – Operations Coordinator
Wayne Miller – Senior Technician Base Operations
Jon Chicoine – Vessel Master
Dave Goodfellow – Great Lakes Technician
Tom Lawrence – Great Lakes Technician
Steve McNevin – Great Lakes Technician
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Kristen Wagner – Student Fisheries Biologist, Project Biologist
Alan McIntosh – Boat Captain, Vessel Master (Acting)
Gord Meadows – Great Lakes Fisheries Technician
Tim Dale – Great Lakes Fisheries Technician
Tyson Scholz – Great Lakes Fisheries Technician
Sonya Kranzl – Great Lakes Fisheries Technician
Matt Brown – Great Lakes Fisheries Technician
Steve Wickens – Great Lakes Fisheries Technician
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Casey Reilly – Great Lakes Fisheries Technician
Megan Davies – Student Fisheries Technician
Jessica Gordon – Student Fisheries Technician
Trent Haggarty – Student Fisheries Technician
Megan Smith – Student Fisheries Technician

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Gord Rooney – Conservation Officer
Kyle Wood – Conservation Officer
Edwin Van Den Oetelaar – Conservation Officer

Randy Tippin – Conservation Officer
Rick Andrews – Conservation Officer

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Les Stanfield – Research Biologist
Brent Metcalfe – Research Biologist
Laurie Allin – Research Technician
Nina Jakobi – Research Technician
Carolina Taraborelli – Research Technician
Megan Lloyst – Student Research Technician
Mike Yuille – Research Intern

Appendix B. Lake Ontario Management Unit Operational Staff Field and Lab Schedule 2009

Field or lab project	Dates	Species assessed, monitored or stocked	Length of data series (yrs)	Lead biologist	Funding source
Ganaraska Fishway - Rainbow Trout Assessment	Mar 23 - May 9	Adult rainbow trout	36	Bowlby	
Lake Trout Tug Stocking	Apr 20 - May 8	Juvenile lake trout	n/a	Daniels	
Large Salmonid Predation Impacts on Post-smolts	May 4 - May 22	Chinook and coho salmon Lake trout Brown trout	3	Bowlby	COA
Commercial Catch Sampling	Seasonal	Lake whitefish	24	Hoyle	
American Eel Trap and Transfer	May - June	American eel	3	Mathers	
Moses Saunders Eel Ladder Monitoring	May - Oct	Migrating American eel	36	Mathers	COA
Lake St. Francis Creel Survey	May 2 - Sep 29	Multiple species	27	Desjardins	COA
Eastern Lake Ontario and Bay of Quinte Community Index Netting	Jun 22 - Sep 11	Eastern Lake Ontario and the Bay of Quinte fish community	52	Hoyle	
St. Lawrence River Fish Community Index Netting - Thousand Islands	Sep 14 - Oct 2	Walleye, yellow perch, northern pike	25	Schaner	COA
Thousand Islands Nearshore Community Index Netting	Aug 4 - Aug 28	Nearshore fish community	1	Hoyle	COA
North Channel Nearshore Community Index Netting	Aug 4 - Aug 28	Nearshore fish community	1	Schaner	COA
Upper Bay of Quinte Nearshore Community Index Netting	Aug 31 - Sep 18	Nearshore fish community	8	Hoyle	COA
Lower Bay of Quinte Nearshore Community Index Netting	Aug 31 - Sep 18	Nearshore fish community	1	Hoyle	COA
Prince Edward Bay Nearshore Community Index Netting	Aug 5 - Aug 21	Nearshore fish community	1	Hoyle	COA
Credit River Chinook Assessment and Egg Collection	Sep 30 - Oct 2	Adult chinook salmon	40	Bowlby	
Juvenile Atlantic Salmon Electrofishing	Oct 5 - Oct 22	Atlantic salmon	3	Bowlby	COA
Age and Growth	Year-round	Multiple species	n/a	Multiple	

Appendix C. Atlantic salmon stocked in the Province of Ontario waters of Lake Ontario, 2009.

SITE NAME	MONTH STOCKED	YEAR SPAWNED	HATCHERY	STRAIN/ EGG SOURCE	AGE (MONTHS)	MEAN WT (G)	MARKS	NUMBER STOCKED
ATLANTIC SALMON - EYED EGGS / SAC FRY								
HUMBER RIVER								
Chico's Restaurant - Hwy 9	1	2008	Harwood*	LaHave/Harwood			None	30,025
Coffey Creek - Coffey Creek Farm	1	2008	Harwood*	LaHave/Harwood			None	7,187
Coffey Creek - Markoff Property	1	2008	Harwood*	LaHave/Harwood			None	1,600
Hopeful Creek	2	2008	Harwood*	LaHave/Harwood			None	971
Hwy 9 - north of Concession 2	2	2008	Harwood*	LaHave/Harwood			None	15,000
Hwy 9 - north of Concession 4	2	2008	Harwood*	LaHave/Harwood			None	15,000
Coffey Creek - Coffey Creek Farm	12	2009	Harwood*	LaHave/Harwood			None	2,600
Coffey Creek - Fimes Property	12	2009	Harwood*	LaHave/Harwood			None	2,400
Coffey Creek - Markoff Property	12	2009	Harwood*	LaHave/Harwood			None	1,000
Coffey Creek - Stewart Property	12	2009	Harwood*	LaHave/Harwood			None	1,200
Hopeful Creek	12	2009	Harwood*	LaHave/Harwood			None	1,912
								78,895
ATLANTIC SALMON - ADVANCED FRY								
COBOURG BROOK								
Ball's Mill	5	2008	Fleming College	LaHave/Harwood	5	0.9	None	23,358
Crossen Rd.	5	2008	Normandale	LaHave/Harwood	5	1.0	None	27,812
Dale Rd.	5	2008	Normandale	LaHave/Harwood	5	1.1	None	35,100
Hie / McNichol Properties	5	2008	Normandale	LaHave/Harwood	5	1.2	None	27,873
								114,143
CREDIT RIVER								
Belfountain	5	2008	Normandale	LaHave/Harwood	5	1.2	None	50,032
Black Cr. - 6th Line	5	2008	Normandale	LaHave/Harwood	5	1.2	None	49,972
Forks of the Credit - Dominion St.	5	2008	Normandale	LaHave/Harwood	5	1.1	None	50,023
Forks of the Credit Prov. Park	5	2008	Normandale	LaHave/Harwood	5	1.1	None	49,703
West Credit R. - Collins Property	4	2008	Belfountain	LaHave/Harwood		0.2	None	23,595
								223,325
DUFFINS CREEK								
East Duffins Cr. - Claremont Field Centre	5	2008	Normandale	LaHave/Harwood	5	1.1	None	38,769
East Duffins Cr. - Durham Board of Education Outdoor Centre	5	2008	Normandale	LaHave/Harwood	5	1.1	None	9,353
East Duffins Cr. - Michell Cr., 8th Concession	5	2008	Normandale	LaHave/Harwood	5	1.1	None	29,395
West Duffins Cr. - Sideline 32	5	2008	Normandale	LaHave/Harwood	5	1.1	None	29,582
Stouffville Cr.	5	2008	Normandale	LaHave/Harwood	5	1.1	None	9,098
								116,197
ATLANTIC SALMON - FALL FINGERLINGS								
COBOURG BROOK								
Danforth Rd.	11	2008	Normandale	LaHave/Harwood	10	10.6	None	15,179
Division St.	10	2008	Normandale	Sebago/Normandale	10	17.3	None	6,833
West Branch - Telephone Road	10	2008	Fleming College	LaHave/Harwood	10	25.1	None	22,994
	11	2008	Fleming College	LaHave/Harwood	11	26.8	None	49
								45,055
CREDIT RIVER								
Black Creek - above Stewarttown	10	2008	Harwood	LaHave/Harwood	10	3.4	None	57,418
Grange Sideroad	10	2008	Normandale	LaHave/Harwood	9	9.2	None	22,398
	11	2008	Normandale	LaHave/Harwood	10	10.0	None	8,459
McLaren Rd.	10	2008	Normandale	LaHave/Harwood	9	9.0	None	22,408
	11	2008	Normandale	LaHave/Harwood	10	10.0	None	8,459
McLaughlin Rd.	11	2008	Normandale	LaHave/Harwood	10	9.0	None	31,074
								150,216
DUFFINS CREEK								
East Duffins Cr. - 5th Concession	10	2008	Normandale	Lac St-Jean/Normandale	11	7.9	None	13,274
East Duffins Cr. - Paulynn Park	9	2008	Pine Valley Springs	LaHave/Harwood		13.4	None	1,488
West Duffins Cr. - Wixon Cr.	10	2008	Normandale	LaHave/Harwood	9	9.9	None	32,062
								46,824

continued on next page

Appendix C. Atlantic salmon stocked in the Province of Ontario waters of Lake Ontario, 2009 continued.

SITE NAME	MONTH STOCKED	YEAR SPAWNED	HATCHERY	STRAIN/ EGG SOURCE	AGE (MONTHS)	MEAN WT (G)	MARKS	NUMBER STOCKED
			ATLANTIC SALMON - SPRING YEARLINGS					
COBOURG BROOK								
Dale Rd.	4	2007	Harwood	LaHave/Harwood	15	27.0	None	291
Danforth Rd.	5	2007	Normandale	LaHave/Harwood	17	15.4	None	7,650
Hie / McNichol Properties	4	2007	Normandale	LaHave/Harwood	16	15.4	None	7,522
								15,463
CREDIT RIVER								
Inglewood	4	2007	Normandale	LaHave/Harwood	16	13.0	None	19,902
Terra Cotta	4	2007	Normandale	LaHave/Harwood	16	13.0	None	11,984
								31,886
DUFFINS CREEK								
East Duffins Cr. - 5th Concession	4	2007	Normandale	LaHave/Harwood	16	17.2	None	6,694
East Duffins Cr. - Paulynn Park	4	2007	Normandale	LaHave/Harwood	16	17.2	None	7,502
								14,196
			ATLANTIC SALMON - ADULTS					
COBOURG BROOK								
Danforth Rd.	3	2005	Harwood	LaHave/Harwood	39	765.7	PIT tag	8
White St. - Lorenz Property	10	2004	Harwood	LaHave/Harwood	56	3003.3	PIT tag	179
								187
CREDIT RIVER								
Grange Sideroad	10	2004	Harwood	LaHave/Harwood	56	3061.9	PIT tag	90
McLaren Rd.	10	2004	Harwood	LaHave/Harwood	56	2931.4	PIT tag	90
McLaughlin Rd.	10	2004	Harwood	LaHave/Harwood	56	3195.5	PIT tag	91
West Credit - above Belfountain	10	2004	Harwood	LaHave/Harwood	56	3451.9	PIT tag	63
								334
DUFFINS CREEK								
East Duffins Cr. - 8th Concession	10	2004	Harwood	LaHave/Harwood	56	3003.3	PIT tag	**177**
TOTAL - ATLANTIC SALMON EYED EGGS / SAC FRY								**78,895**
TOTAL - ATLANTIC SALMON ADVANCED FRY								**453,665**
TOTAL - ATLANTIC SALMON FALL FINGERLINGS								**242,095**
TOTAL - ATLANTIC SALMON SPRING YEARLINGS								**61,545**
TOTAL - ATLANTIC SALMON ADULTS								**698**
TOTAL - ATLANTIC SALMON								**836,898**

*stocked by Ontario Streams

Appendix C. Brown trout stocked in the Province of Ontario waters of Lake Ontario, 2009.

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	4	2007	Chatsworth	Ganaraska/Tarentorus	16	24.4	RV	**16,578**
DUFFINS CREEK								
401 Bridge	5	2007	Harwood	Ganaraska/Tarentorus	16	46.1	RV	**9,650**
LAKE ONTARIO								
Ashbridge's Bay	4	2007	Harwood	Ganaraska/Tarentorus	15	33.3	RV	7,220
	5	2007	Harwood	Ganaraska/Tarentorus	16	45.5	RV	8,227
Athol Bay	5	2007	Harwood	Ganaraska/Tarentorus	16	38.8	RV	10,693
Bluffer's Park	4	2007	Harwood	Ganaraska/Tarentorus	15	33.2	RV	8,880
	5	2007	Harwood	Ganaraska/Tarentorus	16	45.1	RV	8,000
Burlington Canal	4	2007	Chatsworth	Ganaraska/Tarentorus	16	23.3	RV	18,909
Fifty Point CA	4	2007	Chatsworth	Ganaraska/Tarentorus	16	23.3	RV	18,908
Humber Bay Park	4	2007	Chatsworth	Ganaraska/Tarentorus	16	24.4	RV	10,029
Jordan Harbour	4	2007	Chatsworth	Ganaraska/Tarentorus	16	24.4	RV	10,223
Millhaven Wharf	4	2007	Harwood	Ganaraska/Tarentorus	15	35.4	RV	14,228
	5	2007	Harwood	Ganaraska/Tarentorus	16	38.8	RV	379
Oshawa Harbour	4	2007	Harwood	Ganaraska/Tarentorus	15	33.1	RV	11,617
Port Dalhousie East	4	2007	Chatsworth	Ganaraska/Tarentorus	16	24.4	RV	24,969
								152,282
TOTAL - BROWN TROUT								**178,510**

Appendix C. Chinook salmon stocked in the Province of Ontario waters of Lake Ontario, 2009.

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	5	2008	Ringwood	Wild - Credit R.	5	4.8	Ad/CWT	20,403
Port Darlington	5	2008	Ringwood*	Wild - Credit R.	5	5.5	Ad	9,996
								30,399
BRONTE CREEK								
2nd Side Road Bridge	4	2008	Ringwood	Wild - Credit R.	5	4.8	Ad	15,146
	4	2008	Ringwood	Wild - Credit R.	5	4.8	Ad/CWT	9,898
5th Side Road Bridge	4	2008	Ringwood	Wild - Credit R.	5	4.8	Ad	15,765
	4	2008	Ringwood	Wild - Credit R.	5	4.8	Ad/CWT	10,303
								51,112
CREDIT RIVER								
Eldorado Park	5	2008	Ringwood	Wild - Credit R.	5	5.2	Ad	30,544
Huttonville	5	2008	Ringwood	Wild - Credit R.	5	5.2	Ad	18,914
	5	2008	Ringwood	Wild - Credit R.	5	5.2	Ad/CWT	13,368
Norval	5	2008	Ringwood	Wild - Credit R.	5	5.2	Ad	24,788
	5	2008	Ringwood	Wild - Credit R.	5	5.2	Ad/CWT	6,887
								94,501
DON RIVER								
Donalda Golf Club	4	2008	Ringwood	Wild - Credit R.	4	3.7	Ad	**15,067**
HIGHLAND CREEK								
Colonel Danforth Park	4	2008	Ringwood	Wild - Credit R.	4	3.7	Ad	**15,067**
HUMBER RIVER								
East Branch Islington	4	2008	Ringwood	Wild - Credit R.	4	3.7	Ad	**15,067**
LAKE ONTARIO								
Ashbridge's Bay Ramp	4	2008	Ringwood	Wild - Credit R.	4	3.7	Ad	10,069
Barcovan	5	2008	Ringwood*	Wild - Credit R.	5	3.7	Ad	9,156
Beacon Inn	4	2008	Ringwood	Wild - Credit R.	4	3.7	Ad	25,174
Bluffer's Park	5	2008	Ringwood	Wild - Credit R.	5	4.8	Ad	14,402
	5	2008	Ringwood	Wild - Credit R.	5	4.8	Ad/CWT	20,199
Burlington Canal	5	2008	Ringwood	Wild - Credit R.	5	4.9	Ad	27,602
	5	2008	Ringwood	Wild - Credit R.	5	4.9	Ad/CWT	20,220
Consecon Robinson Pt	4	2008	Ringwood	Wild - Credit R.	4	3.7	Ad	15,050
Lakeport	4	2008	Ringwood	Wild - Credit R.	4	3.7	Ad	15,050
Oshawa Harbour	4	2008	Ringwood	Wild - Credit R.	4	3.3	Ad	22,630
Port Dalhousie East	5	2008	Ringwood	Wild - Credit R.	5	5.0	Ad	69,555
	5	2008	Ringwood*	Wild - Credit R.	5	3.7	Ad	9,997
	5	2008	Ringwood	Wild - Credit R.	5	4.7	Ad/CWT	20,205
Wellington Channel	4	2008	Ringwood	Wild - Credit R.	4	3.7	Ad	15,050
	5	2008	Ringwood*	Wild - Credit R.	5	3.5	Ad	9,999
Whitby Harbour	4	2008	Ringwood	Wild - Credit R.	4	3.3	Ad	13,578
	5	2008	Ringwood*	Wild - Credit R.	5	5.5	Ad	10,038
								327,974
TOTAL - CHINOOK SALMON								**549,187**

* Pen-imprinted

**All fish produced at Ringwood FCS by the Ontario Federation of Anglers and Hunters and volunteers from Metro East Anglers

Appendix C. **Coho salmon stocked in the Province of Ontario waters of Lake Ontario, 2009.**

SITE NAME	MONTH STOCKED	YEAR SPAWNED	HATCHERY	STRAIN/ EGG SOURCE	AGE (MONTHS)	MEAN WT (G)	MARKS	NUMBER STOCKED
				COHO - FALL FINGERLINGS				
CREDIT RIVER								
Eldorado Park	9	2008	Partnership	Wild - Cobourg Br.	9	31.7	None	6,000
Norval - Nashville North	9	2008	Partnership	Wild - Cobourg Br.	9	31.7	None	6,862
TOTAL - COHO SALMON								**12,862**

Appendix C. Lake trout stocked in the Province of Ontario waters of Lake Ontario, 2009.

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	4	2007	Harwood	Seneca Lake/Tarentorus	15	20.2	AdRP	21,891
	5	2007	Harwood	Seneca Lake/Tarentorus	16	29.0	AdRP	22,572
Fifty Point CA	5	2007	Harwood	Seneca Lake/Tarentorus	16	27.1	AdRP	65,170
	5	2007	Harwood	Slate Islands/Dorion	16	39.0	AdRP	13,188
Long Point Pier	4	2007	Harwood	Michipicoten Island/Tarentorus	16	24.6	AdRP	13,191
	4	2007	Harwood	Seneca Lake/Tarentorus	16	24.4	AdRP	16,313
North of Main Duck Sill	4	2007	Harwood	Michipicoten Island/Tarentorus	16	24.1	AdRP	24,965
	4	2007	Harwood	Seneca Lake/Tarentorus	16	27.2	AdRP	14,295
	4	2007	White Lake	Slate Islands/Dorion	15	22.8	AdRP	105,332
Pigeon Island	4	2007	White Lake	Seneca Lake/Tarentorus	15	23.9	AdRP	4,184
South of Long Point	4	2007	Harwood	Seneca Lake/Tarentorus	16	25.4	AdRP	83,887
	4	2007	White Lake	Seneca Lake/Tarentorus	14	23.9	AdRP	60,318
TOTAL - LAKE TROUT								**445,306**

Appendix C. Rainbow trout stocked in the Province of Ontario waters of Lake Ontario, 2009.

SITE NAME	MONTH STOCKED	YEAR SPAWNED	HATCHERY	STRAIN/ EGG SOURCE	AGE (MONTHS)	MEAN WT (G)	MARKS	NUMBER STOCKED
RAINBOW TROUT - SPRING YEARLINGS								
BRONTE CREEK								
Lowville Park	4	2008	Normandale	Ganaraska/Tarentorus	11	18.8	AdRV	12,003
2nd Side Road Bridge	4	2008	Normandale	Ganaraska/Tarentorus	11	18.4	AdRV	12,038
								24,041
CREDIT RIVER								
Huttonville	4	2008	Normandale	Ganaraska/Tarentorus	11	17.7	AdRV	12,146
Norval - Nashville North	4	2008	Normandale	Ganaraska/Tarentorus	11	18.1	AdRV	12,130
Norval - Carter Farm	5	2008	CRAAH*	Wild - Credit River	13	11.0	None	20,560
								44,836
HUMBER RIVER								
East Branch Islington	4	2008	Normandale	Ganaraska/Tarentorus	11	20.1	AdRV	16,188
King Vaughan Line	4	2008	Normandale	Ganaraska/Tarentorus	11	21.8	AdRV	14,652
	5	2008	Harwood	Ganaraska/Tarentorus	13	15.5	AdRV	8,689
								39,529
ROUGE RIVER								
Bruce Creek	4	2008	Ringwood*	Wild Rouge River	11	22.5	None	8,088
Little Rouge at Steeles	4	2008	Ringwood*	Wild Rouge River	11	27.2	None	8,140
Silver Spring Farms	4	2008	Ringwood*	Wild Rouge River	11	24.1	None	8,005
								24,233
LAKE ONTARIO								
Glenora	5	2008	Harwood	Ganaraska/Tarentorus	13	18.3	AdRV	8,070
Jordan Harbour	4	2008	Normandale	Ganaraska/Tarentorus	11	16.5	AdRV	20,015
Millhaven Wharf	5	2008	Harwood	Ganaraska/Tarentorus	13	15.5	AdRV	8,018
North of Main Duck Sill	5	2008	Harwood	Ganaraska/Tarentorus	13	14.9	AdRV	5,995
Port Dalhousie East	4	2008	Normandale	Ganaraska/Tarentorus	11	16.5	AdRV	20,019
								62,117
TOTAL - RAINBOW TROUT SPRING YEARLINGS								**194,756**
TOTAL - RAINBOW TROUT								**194,756**

* following the hatchery name refers to a partnership hatchery

CRAAH - Credit River Anglers Association Hatchery

**All fish produced at Ringwood FCS by the Ontario Federation of Anglers and Hunters and volunteers from Metro East Anglers

Appendix C. American eel stocked in the Province of Ontario waters of Lake Ontario, 2009.

SITE NAME	MONTH STOCKED	YEAR SPAWNED	HATCHERY	STRAIN / EGG SOURCE	AGE (months)	MEAN WT (g)	MARKS	NUMBER STOCKED
				AMERICAN EEL - ELVERS				
BAY OF QUINTE (Deseronto)								
Foresters Island	6	2008	Private	Wild - Mersey and Ingram Rivers, NS	16	0.2	Tetracycline	136,841
Long Reach (Catalaque Shoal)	6	2008	Private	Wild - Mersey and Ingram Rivers, NS	16	0.2	Tetracycline	192,624
Northport (east)	6	2008	Private	Wild - Mersey and Ingram Rivers, NS	16	0.2	Tetracycline	122,896
Northport (west)	6	2008	Private	Wild - Mersey and Ingram Rivers, NS	16	0.2	Tetracycline	104,592
Sucker Creek	6	2008	Private	Wild - Mersey and Ingram Rivers, NS	16	0.2	Tetracycline	94,568
								651,521
ST. LAWRENCE RIVER (Mallorytown Landing)								
Butternut Bay	6	2008	Private	Wild - Mersey and Ingram Rivers, NS	16	0.2	Tetracycline	227,923
Jones Creek	6	2008	Private	Wild - Mersey and Ingram Rivers, NS	16	0.2	Tetracycline	88,468
Mallorytown Landing	6	2008	Private	Wild - Mersey and Ingram Rivers, NS	16	0.2	Tetracycline	51,860
Squaw Island	6	2008	Private	Wild - Mersey and Ingram Rivers, NS	16	0.2	Tetracycline	283,270
								651,521
TOTAL - AMERICAN EEL								**1,303,042**

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