LAKE ONTARIO MANAGEMENT UNIT

1995 ANNUAL REPORT

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Editor's Note: This report does not constitute publication. Many of the results are preliminary findings. The information and findings should not be quoted without the consent of the individual authors. Individual authors should be contacted prior to any application of the data herein.

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Lake Ontario Management Unit
1995 Annual Report

Introduction

The Lake Ontario Management Unit (LOMU), is part of the Fish & Wildlife Branch, Natural Resource Management Division of the Ontario Ministry of Natural Resources (OMNR). The LOMU is OMNR's lead administrative unit for fisheries management on Lake Ontario.

The 1995 Annual Report documents results of LOMU fisheries programs completed in 1995. The production of this report, normally completed in March of the year following completion of programs, was delayed this year due to a labor dispute and OMNR organizational adjustment. The 1995 report is abbreviated compared to previous years' reports. Nonetheless, the report contains much of the key information used to manage Lake Ontario's fisheries. For more detailed information or copies of this report, please contact:

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Acknowledgements

The contributions of all Lake Ontario Management Unit staff are gratefully acknowledged. Assessment Biologist, Jim Hoyle, coordinated and prepared this Annual Report.

1

Pelagic Planktivores

T. Schaner
C.P. Schneider[1]

Overview

Alewife (*Alosa pseudoharengus*) and rainbow smelt (*Osmerus mordax*) are the most abundant plankton feeding fish in Lake Ontario. They are the main prey of large salmonines, and alewife are also important in the diet of walleye. Over the past decade there was a slow decline in the numbers of alewife and smelt, which can be attributed to two factors. Firstly, the nutrient loading into the lake decreased as a result of better sewage treatment and land use practices in the watershed. Secondly, the artificial stocking of large salmonines has, until recently, been increasing. Alewife and smelt found themselves squeezed between less plankton on which to feed and higher predation by salmon and trout. The situation has recently been further aggravated by the accidental introduction of the zebra and quagga mussels, which tend to divert the energy flow from the pelagic to the benthic community.

Concern for the declining prey populations has prompted management agencies around the lake to cut down stocking of salmonines starting in 1993. The objective was to reduce the predatory pressure on alewife and smelt by a half. Because some of the predators are long-lived, a reduction in prey demand can only be achieved gradually, and it still remains to be seen whether the stocking reductions were sufficient to allow prey populations to sustain themselves.

The Ontario Ministry of Natural Resources (OMNR), in cooperation with New York State Department of Environmental Conservation (NYSDEC), conducts annual hydroacoustic and accompanying midwater trawling surveys covering both the Ontario and the New York sides of the lake. Most of the information in this chapter comes from these surveys. Additionally, the U.S. National Biological Survey (NBS) cooperates with NYSDEC to conduct annual bottom trawl surveys to assess alewife and smelt in the U.S. waters of the lake. The results of these latter surveys provide an independent assessment, and a historic context for our own observations.

The hydroacoustic data collected by OMNR/NYSDEC in past surveys are being re-processed to provide updated estimates of abundance between 1991 and 1994. Until the new estimates are available, the midwater trawls, which are an integral part of the hydroacoustic program, provide valuable information on year-class dynamics of alewife and smelt.

Alewife

Going into 1995, the prospects for the alewife population were poor. The 1992 production of young was weak, and the 1993 year-class suffered high mortality during their first winter and following spring. A good year-class was produced in 1994 but it was expected to be reduced through predation, since it would be the only suitable prey for salmonines. There was a concern for being able to maintain a healthy reproductive population of alewife.

The results of the 1995 surveys were similar to those from the previous year. In August, a group of adult fish between 130 and 150 mm fork length was observed—the history of recruitment in the past suggests that they were largely 4-yr-olds and older (Fig. 1). There were only few fish between 100 and 125 mm, confirming that the previous year's class suffered high mortality in the winter and spring of

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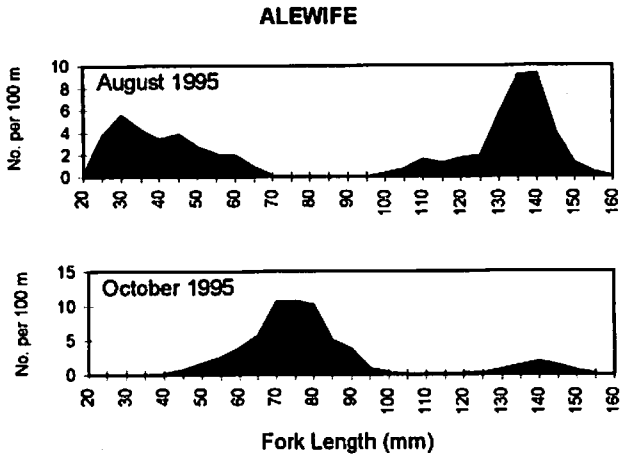

FIG. 1. Length frequency distribution of alewife from midwater trawls, August and October 1995.

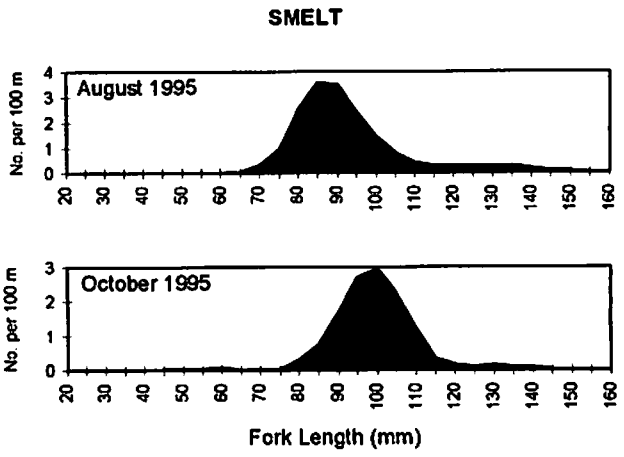

FIG. 2. Length frequency distribution of smelt from midwater trawls, August and October 1995.

1995. In both the August and the October survey, good numbers of alewife under 100 mm were seen, indicating a good production of young-of-the-year (YOY) fish.

Thus our concern for the alewife population continues. The crop of the YOY fish will likely, for the third year in a row, be reduced through winter mortality and subsequent predation by salmonines. Such continued failure to recruit significant numbers of fish to the adult population will further reduce the numbers of potential spawners.

Smelt

Rainbow smelt recruitment in Lake Ontario appears to alternate between strong and weak year classes. True to this pattern, the 1994 year-class, seen as yearlings in 1995, dominated the catches of smelt (Fig. 2). Due to the non-random nature of the midwater trawl sampling design, we cannot comment on the strength of this year-class relative to others until supplementary hydroacoustic data are considered. However, data from other sources suggest a moderately strong 1994 year-class (NBS/NYSDEC, unpublished data).

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Pelagic Piscivores

J. N. Bowlby P. Mabee T. J. Stewart
J. Clarkson M. Rawson
J. A. Hoyle T. Schaner

Overview

Salmon and trout (salmonines) are the most abundant pelagic piscivores in Lake Ontario. They are sought by anglers participating in a multi-million dollar recreational fishery.

Changes in Lake Ontario over the past decade have resulted in a situation where the food consumption by salmonines (predator demand) likely exceeds the sustainable supply of their principal prey, alewife and smelt. In response to these changes the Ontario Ministry of Natural Resources (OMNR) and the New York State Department of Environmental Conservation (NYSDEC) reduced stocking, beginning in 1993, by approximately 50% from 1991 stocking levels. The purpose of the stocking reductions was to decrease predator demand by 45 to 50% by 1996. Chinook salmon and lake trout were the species with the greatest reductions. Due to the presence of fish stocked in earlier years, the reduction in predator demand lags behind the reductions in stocking. The stocking reductions in 1993 and 1994 were expected to reduce predator demand by 10% in 1994, 29% in 1995, but the full effect will not occur until 1996. Predator demand will be managed at this level for the immediate future unless observations of prey population status suggest that a change is required. A more detailed discussion about the stocking reductions can be found in Rawson *et al.* 1995.

The status of the most abundant salmonines, chinook salmon, rainbow trout, and lake trout is reported here with emphasis on potential indicators of the stocking reductions (e.g., indices of abundance). Many of the 1995 results are consistent with reductions in stocking of chinook salmon and lake trout. The abundance of 1- and 2-yr-old chinook salmon declined by 43 and 47%, respectively in 1995 compared to 1994, while the abundance of immature lake trout declined by 63% over the same time period. The abundance of rainbow trout, whose stocking numbers were not reduced, has remained constant since 1993.

Because most of the salmonines in Lake Ontario are stocked, stocking numbers provide a good indicator of recruitment to the pelagic piscivore community. Natural reproduction is known to occur at low levels for chinook salmon and lake trout and at higher levels for rainbow trout. Incidences of natural reproduction in 1995 are also reported here for rainbow trout and lake trout. Year-class strength of naturally reproduced rainbow trout in streams along Lake Ontario's north shore has declined steadily since 1991. This decline may impact the sport fishery, where one-quarter to one-third of the boat angling rainbow trout harvest is comprised of "wild" fish, in years to come. Unlike the case for rainbow trout, lake trout natural reproduction appears to be on the rise. In 1995, 89 naturally reproduced juveniles, comprised of three year-classes, were caught, up from 11 in 1994.

As terminal predators in the Lake Ontario food web, salmon and trout growth and production are dependent on an adequate supply of alewife and smelt. To monitor the status of prey species in relation to predator demand, indices of salmonine body condition are updated here for 1995. Chinook salmon condition increased in 1995; this result is also consistent with a

decline in predator abundance associated with stocking reductions, and also suggests a better balance with prey abundance. Rainbow trout body condition was lower in 1995 than 1994 but similar to that observed in years prior to 1994. Lake trout condition remained unchanged.

Stocking

In 1995 OMNR stocked 1,568,108 salmonines (Table 1). Lake trout and chinook salmon make up the bulk of the stocked fish. Detailed information on stocking numbers and locations for 1995 by OMNR appears in Appendix A. Note that NYSDEC also stocked about three million salmonines into Lake Ontario (Eckert and Schneider 1996).

Chinook Salmon Status

Abundance Trends

Over 460,000 fingerling chinook salmon were stocked at various western Lake Ontario locations in 1995 by OMNR (Table 1). This level of stocking is about 3% above the target number of 450,000.

TABLE 1. Salmon and trout stocked into Province of Ontario waters of Lake Ontario, 1995; and expected number for 1996.

		Number Stocked	
Species	Age	1995	1996 Expected
Atlantic Salmon	Yearling	44,744	-
	Advanced Fry	76,654	120,000
	Early Fry	13,640	-
	Subtotal	135,038	120,000
Brown Trout	Yearling	166,604	170,000
	Fall Fingerling	38,566	50,000
	Subtotal	205,170	220,000
Chinook Salmon	Fingerling	461,847	440,000
Lake Trout	Yearling	525,993	487,200
Rainbow Trout	Yearling	60,000	100,000
	Fingerling	180,060	100,000
	Subtotal	240,060	200,000
LAKE TOTAL		1,568,108	1,467,200

Harvest rates from the boat angler fishery are used to index the abundance of adult chinook salmon. Effort and harvest estimates for this fishery are detailed in Chapter 5. The harvest rate of chinook salmon in the boat angler fishery was 30% lower in 1995 than in 1994, and the second lowest observed (0.039 fish-per-rod-hour) since 1985 (Fig. 1). Harvest rate peaked in 1986 because of high stocking rates in the early 1980s but declined through the late 1980s despite continued high stocking numbers.

The harvest rate of all age-classes was separated into components for 1-, 2-, and 3-yr-old and older fish to examine the effect of the stocking reductions. The harvest rate of 1-yr-old fish declined by 38% from 1993 to 1994, and by a further 43% from 1994 to 1995 (Fig. 1). Stocking reductions have now begun to affect the abundance of 2-yr-old fish as well. In 1995, the harvest rate of 2-yr-old fish declined by 47% compared to the previous year. These declines are consistent with the reduced stocking levels.

Condition Trends

The chinook salmon spawning run was monitored in the Credit River at the Streetsville Dam. The length and weight of male and female chinook salmon were collected for those fish selected for the Ringwood Fish Culture Station spawn collection. Body condition was determined as the mean weight after adjusting for length using analysis of covariance. In 1995, condition increased but the difference was only significant for females (Fig. 2). Female chinook salmon body condition approached that observed in the mid-1980s. Increased body condition is consistent with a decline in pelagic predator abundance associated with reductions in stocking rates.

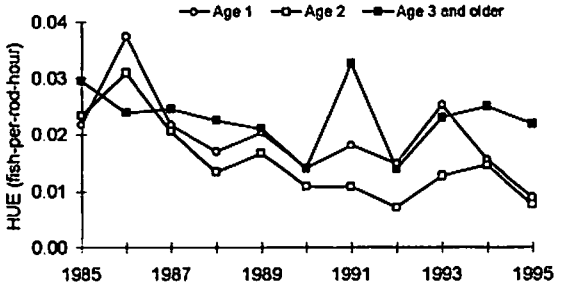

FIG. 1. Age-specific harvest rate of chinook salmon by boat anglers in the Ontario waters of Lake Ontario.

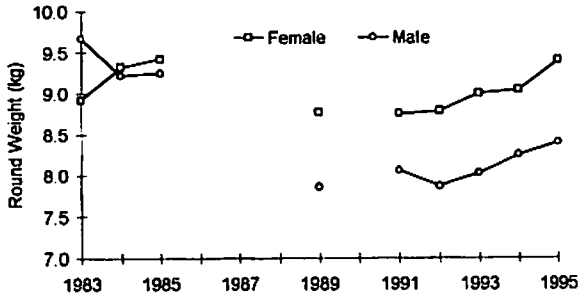

FIG. 2. Body condition of chinook salmon during the fall spawning run in the Credit River.

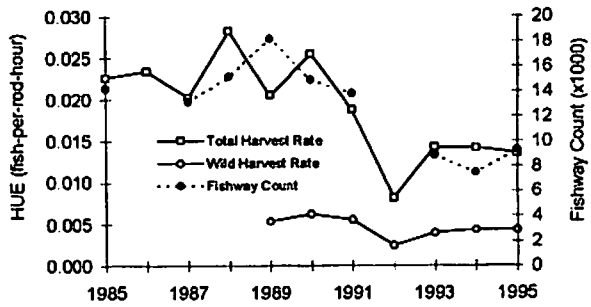

FIG. 3. Abundance indices for rainbow trout in Lake Ontario: total harvest rate of rainbow trout by boat anglers in Ontario waters of Lake Ontario, and the number of rainbow trout passing through the fishway on the Ganaraska River during April and May. Also shown is the harvest rate of wild rainbow trout caught by boat anglers.

Rainbow Trout Status

Abundance Trends

A total of 240,000 rainbow trout (180,000 fingerlings and 60,000 yearlings) were stocked in 1995. The fish were stocked primarily in western Lake Ontario to minimize impacts on naturally reproduced ("wild") fish from tributaries east of Toronto.

The harvest rate of rainbow trout in the boat angler fishery has remained stable for the time period 1993 to 1995, after having declined markedly in 1992 (Fig. 3). Counts of spawning rainbow trout at the Ganaraska River fishway also index rainbow trout abundance trends. In 1995, the count increased to 9300 fish but, as was the case for the boat fishery, this number still represents a significant decline relative to the numbers of fish observed in the mid- to late-1980s (Fig. 3).

To determine the contribution of wild rainbow trout to the sport fishery, boat angled rainbow trout sampled over the years 1989 to 1995 were examined to determine origin. Using the technique of Marcogliese and Casselman (In press), unmarked rainbow trout were classified as either "wild" (Fig. 3) or of "hatchery" origin. The proportion of wild rainbow trout in the harvest ranged from 24 to 32% of the total harvest with no clear trend over the time period sampled. However, the highest proportions of wild fish occurred in the most recent two years.

An index of wild rainbow trout recruitment has been measured in streams along the north shore of Lake Ontario since 1993. In 1995, 33 of the 40 juvenile rainbow trout sites first established in 1993 were sampled. Field and analytical methods remained the same as for 1993 (Bowlby et al. 1994).

The wild rainbow trout juveniles in Lake Ontario tributary streams was estimated to be 435,822 fish. This was down 31% from 1994 and a total of 52% from the the first year of sampling in 1993 (Fig. 4). Year-class strength of these wild rainbow trout has declined steadily since 1991 (Fig. 5). Because wild fish currently comprise one-quarter to one-third of the boat angling harvest, there may be an impact on this fishery—as early as 1997.

Survival Trends

Broad trends in total mortality rates can be assessed by examination of evidence for past spawning on the scales of returning spawners (Clarkson and Jones, In preparation a). A high incidence of fish surviving to spawn more than once is indicative of low mortality rate. Since 1976, the incidence of repeat spawners has fluctuated at a relatively high level (i.e., 55 to 80%) without any obvious trend (Fig. 6, Clarkson and Jones, In preparation b). These data suggest that mortality rates of the Ganaraska population is not excessive.

Condition Trends

Body condition for the Ganaraska spawning population was determined as the mean weight after adjusting for length using analysis of covariance. In 1995, body condition decreased significantly for both female and male rainbow trout (Fig. 7).

Whirling Disease

In October 1994, NYSDEC identified whirling disease at four state hatcheries. Subsequently, 400,000 domestic rainbow trout and 170,000

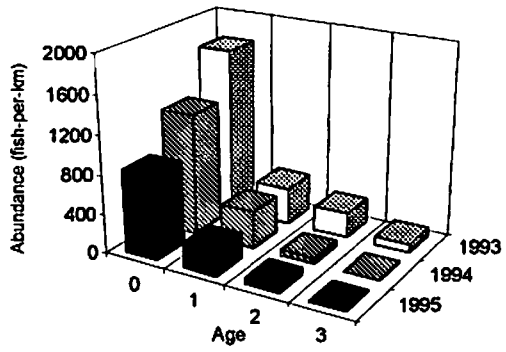

FIG. 4. Estimated number of juvenile rainbow trout, by age-class in Ontario tributaries of Lake Ontario, 1993-1995.

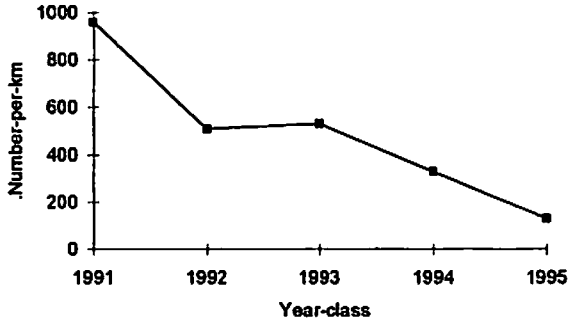

FIG. 5. Year-class strength of juvenile rainbow trout in Lake Ontario tributaries (Ontario waters). Number-per-km is based on the least squares mean for age-classes 0- to 2-yrs-old. Ages were determined by length-frequency analysis.

Skamania steelhead were destroyed after testing positive for whirling disease. NYSDEC believes that whirling disease had been in their hatchery system undetected since 1992, and that infected rainbow trout were stocked in Lake Ontario in 1993 and 1994. Whirling disease has not been detected on OMNR hatcheries.

Rainbow trout are the salmonine species most susceptible to whirling disease. In 1995, 1369 juvenile rainbow trout from 12 Lake Ontario tributaries in Ontario were tested (Table 2). The results were negative for all fish suggesting that whirling disease is not currently present in tributaries along the Ontario shoreline.

Lake Trout Status

Most information regarding lake trout status in Lake Ontario comes from a cooperative gillnet program conducted annually in the fall by the OMNR, NYSDEC, and the United States National Biological

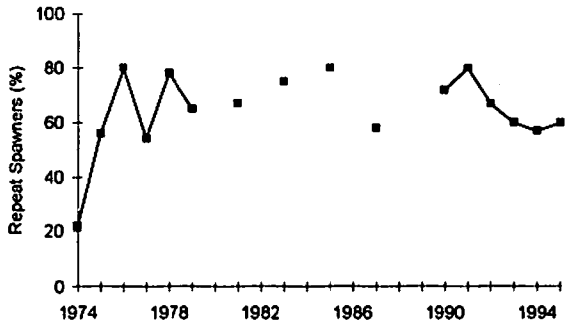

FIG. 6. Incidence of repeat spawners for rainbow trout at the Ganaraska fishway near Port Hope, Ontario, 1974-1995.

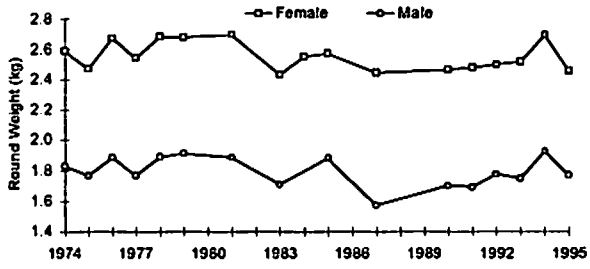

FIG. 7. Body condition of rainbow trout during the spring spawning run in the Ganaraska River.

Service (NBS). A detailed discussion of lake trout status is reported by Schneider et al. (1996).

Abundance Trends

In the spring of 1995, the province of Ontario stocked 526,000 lake trout yearling at locations throughout the north shore. This level of stocking represents roughly one-half of that stocked before 1993. The effect of this action was observed for the first time in the annual lake trout survey, in which the catch of immature fish in a standard gillnet set in the Canadian waters fell to two fish, 63% of that observed in 1994 (Fig. 8). The catch rates of mature fish continued to increase; the effects of the stocking cuts on the mature population will not be felt until two to three years from now.

Low levels of lake trout natural reproduction and emergence of fry have been documented for several years. But the capture of 11 naturally produced juvenile lake trout in 1994 was by far the most significant evidence of natural reproduction observed up to that time. In 1995, this number increased to 89, and included fish from three year-classes (ages 0, 1

TABLE 2. Number of rainbow trout from Lake Ontario tributaries tested for whirling disease in 1995.

Stream	Number of fish tested
Oakville Creek	63
Credit River *	42
Duffins Creek	74
Lynde Creek	31
Oshawa Creek	139
Bowmanville Creek	72
Wilmot Creek	315
Ganaraska River	77
Cobourg Creek	49
Barnum House Creek	167
Shelter Valley Creek	191
Butler Creek	149
TOTAL TESTED	1369

** escaped fish from private fish hatchery*

and 2). Most of the fish were caught in the U.S. waters, where extensive bottom trawling surveys provide much greater opportunities for capture of young lake trout. In Canadian waters wild lake trout were captured in both 1994 and 1995 in the Outlet Basin of eastern Lake Ontario, the only place where bottom trawls were conducted. This pattern of capture suggests that naturally produced lake trout are present throughout the lake, and perhaps more importantly, sites of natural reproduction are widespread.

Survival

Survival of adult lake trout is high, reflecting low losses to lamprey induced mortality. Lamprey wounding rates, reduced in the 1980s from the high levels observed in the 1970s (up to 0.08 wounds-per-fish, U.S. data) through a successful lamprey control program, now remain low at a level of 0.01 to 0.02 wounds-per-fish (Fig. 9).

Condition Trends

The condition of the lake trout has increased since a low in the mid-1980s, and appears to be holding despite recent declines in prey fish stocks (the condition index is calculated as the weight of an average 700 mm fish, Fig. 10).

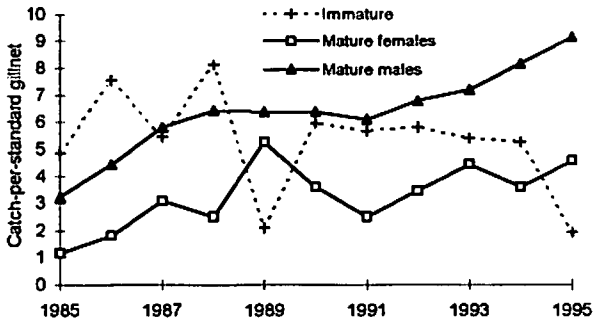

FIG. 8. Lake trout catch-per-standard gillnet set during September in Ontario waters of Lake Ontario, 1985 to 1995.

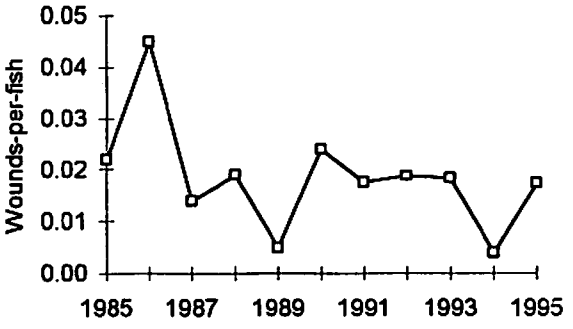

FIG. 9. Number of A1 lamprey wounds-per-lake trout caught during September gillnet surveys in Lake Ontario.

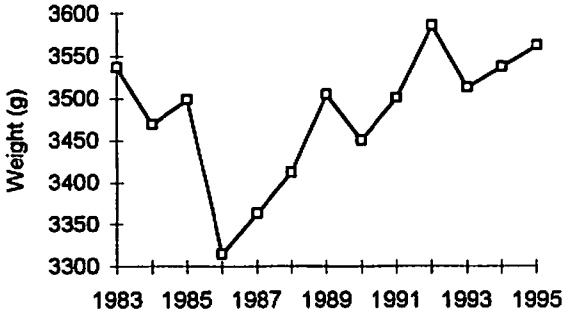

FIG. 10. Predicted weight of a 700 mm (total length) lake trout during September in Lake Ontario.

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3

Eastern Lake Ontario and Bay of Quinte

J. A. Hoyle
J. N. Bowlby

Overview

The Lake Ontario Management Unit uses annual summer index gillnetting and bottom trawling programs to detect long-term changes in the eastern Lake Ontario and Bay of Quinte fish communities. By providing trend-through-time indices of species population abundance, these programs also routinely deliver timely, stock-specific information to fisheries managers. Such information provides a sound and scientific basis for taking appropriate fisheries management action. For the deep waters of Lake Ontario's Outlet Basin and the Bay of Quinte, the gillnetting program has run for over 30 years, the trawling program for 20 years (Casselman and Scott 1992; Hurley 1992). More recently, gillnetting operations were initiated in the nearshore waters of eastern Lake Ontario as far west as Brighton. The latter studies initially focused on yellow perch, an important commercial species at the time, but expanded in 1986 to a wide range of depths, and thereby sampled a diverse assemblage of warm- and cold-water species (Hoyle 1992).

In 1992, fish community studies on eastern Lake Ontario underwent a major program overhaul to facilitate gear standardization, improve experimental design, eliminate sampling redundancies, and better coordinate programs, while preserving the continuity and integrity of the historic data series (Hoyle 1992; Casselman and Scott 1992). Also in 1992, multifilament gillnets were replaced with monofilament nets. Comparative netting studies have been completed but gear/species conversion factors have not been finalized. Hence, the trend-through-time gillnet results presented here have not been adjusted to reflect this gear change and must be interpreted accordingly.

For a summary of standardized gillnet/trawl catch-per-unit-effort for 1995, organized by geographic area (Northeast, Outlet Basin, and the Bay of Quinte), see Appendix B. This chapter provides updated trends in abundance for several fish species of local management interest including lake whitefish, lake herring, smallmouth bass, yellow perch, and walleye.

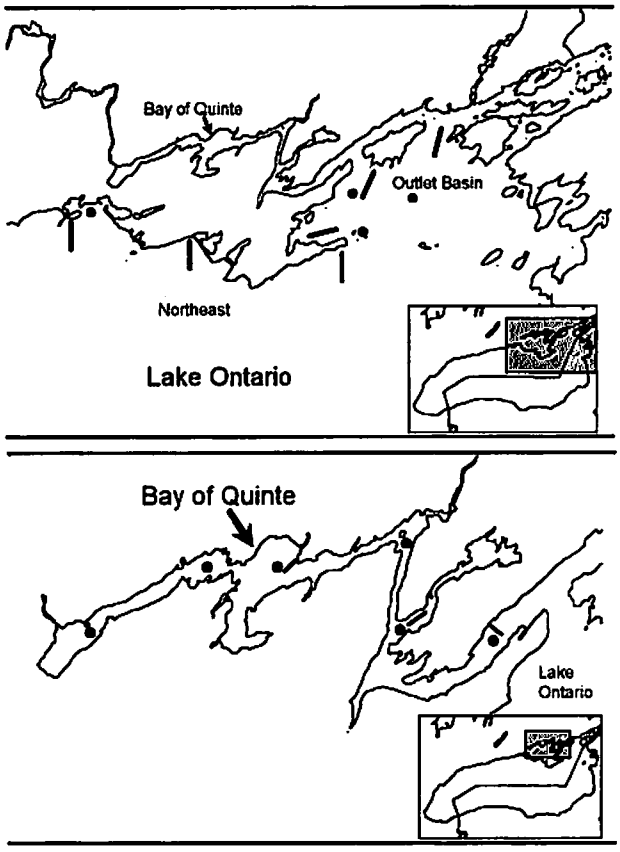

FIG. 1. Maps of eastern Lake Ontario (upper panel) and the Bay of Quinte (lower panel) showing fish community index gillnetting and trawling locations. Depth-stratified gillnetting locations are shown as bars; single depth gillnetting and trawling locations are represented by circles.

Species Population Trends

Below, an update on the population status of lake whitefish, lake herring, smallmouth bass, yellow perch and walleye is provided. Population trends for some species are assessed in other, more targeted, programs and reported elsewhere. Alewife and smelt are assessed in a lake-wide hydroacoustic/mid-water trawling program (Chapter 1 in this report). Adult lake trout are monitored in a lake-wide index gillnetting program (Chapter 2 in this report). The current status of salmon and trout inhabiting the open waters of Lake Ontario is also reported in Chapter 2. Additional information for commercially important species can be found in Chapter 4.

Lake Whitefish

Lake whitefish are the most important commercial fish in Lake Ontario (Chapter 4 in this report). There are two large spawning stocks of lake whitefish in eastern Lake Ontario; one spawning in Lake Ontario proper along the south shore of Prince Edward County, the other spawning in the Bay of Quinte.

YOY whitefish are monitored in bottom trawls at Timber Island and Conway for lake and bay whitefish stocks, respectively (Fig. 2). Small year-classes were observed, sporadically, throughout the 1970s and early 1980s. Since the mid-1980s, moderate to large year-classes have frequently been produced, especially for the bay stock. Very large year-classes, associated with extremely cold over-wintering conditions, were observed for both lake whitefish stocks in 1994 (Hoyle and Bowlby 1995). Good year-classes were again produced in 1995, especially for the lake stock which had the third largest year-class on record.

The two whitefish stocks intermix as adults during midsummer in the deep waters of the Outlet Basin. Here, their collective abundance is monitored in gillnets (Fig. 2). Catches were down in 1994 but up marginally in 1995. Larger catches of small whitefish are anticipated in 1996 as the strong 1994 and 1995 year-classes recruit to the gillnets.

Lake Herring

Historically, lake herring supported an important commercial fishery in Lake Ontario but this fishery collapsed during the 1940s. We anticipated that lake herring, like lake whitefish, would increase

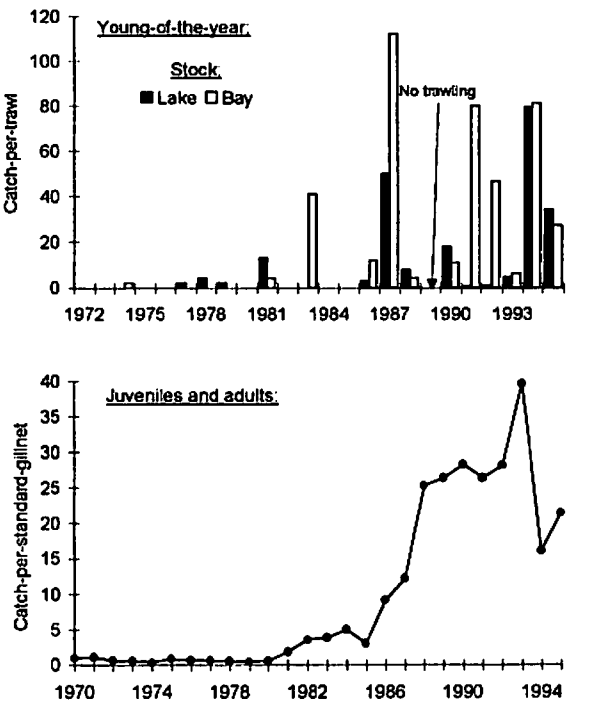

FIG. 2. Lake whitefish indices of abundance. Upper panel shows year-class strength of Lake Ontario and Bay of Quinte stocks as represented by YOY catch-per-trawl (adjusted to 12 min duration), at Timber Island and Conway, respectively, 1974 to 1995. No trawling was conducted in 1989. Lower panel shows catch-per-standard gillnet lift for juvenile and adult lake whitefish from deep-water gillnetting locations in the Outlet Basin, Lake Ontario, 1974 to 1995. Catches were calculated as the sum of the catch of eight gillnet panels (1 1/2" to 5" with 1/2" intervals), each of which were 50 ft in length. There were six netting locations prior to 1991, three in 1991 and two since 1991, therefore catches in later years were weighted based on the relative proportion of the catches at each site in previous years.

in abundance following declines in alewife and smelt in the late 1970s. To date, this has not happened. It appears that a locally strong year-class of lake herring was produced in 1987 (Hoyle and Bowlby 1995) but these did not show up in bottom trawling in the Outlet Basin (Fig. 3).

Prior to 1990, lake herring had not been observed in bottom trawls. Small numbers have been observed in 1990, 1991 and 1993 at the Conway site in the lower Bay of Quinte (Fig. 3). In 1994, a significant number of YOY lake herring were caught, along with large numbers of YOY lake whitefish, at the Conway site. Relative to the large year-classes of lake whitefish observed since the mid-1980s, the 1994

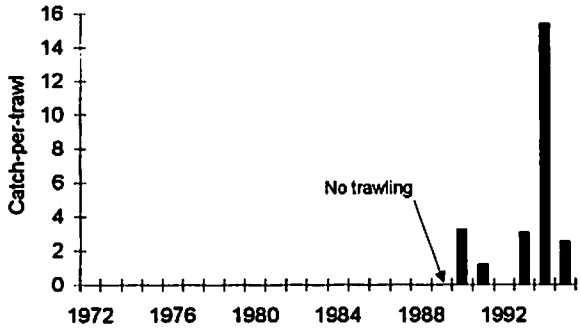

FIG. 3. Young-of-the-year lake herring catch-per-trawl (adjusted to 12 min duration), at Conway in the lower Bay of Quinte, 1982 to 1995. No trawling was conducted in 1989.

lake herring year-class could be considered of moderate size. The 1995 year-class was small but similar in size to the 1990 and 1993 year-classes.

We expect to see stronger year-classes and more adult lake herring in the near future.

Smallmouth Bass

Smallmouth bass populations, along with lake trout, provide an important recreational fishery in the Outlet Basin. Their abundance in gillnets has decreased dramatically after 1991 (Fig. 4). The reason for the decline is not clear. However, it is not uncommon for smallmouth bass populations to fluctuate grestly as a result of highly variable year-class strength.

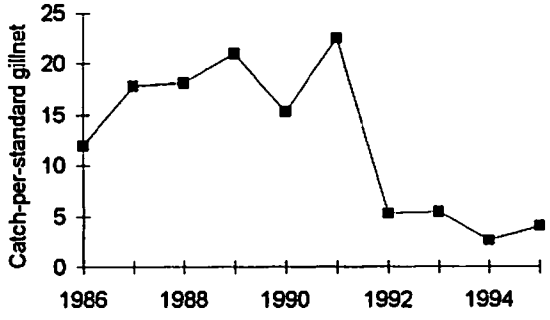

FIG. 4. Catch-per-standard gillnet lift for adult smallmouth bass from the Outlet Basin gillnet sampling locations. A standard gillnet lift represents the sum of catches in eight mesh sizes (1 1/2" to 5 " at 1/2" intervals) with catches adjusted to represent 100 m of net for each mesh size. Outlet Basin includes nets set at Flatt Point, Grape Island and Melville Shoal.

Yellow Perch

Yellow perch are found throughout eastern Lake Ontario and the Bay of Quinte. Their abundance, which declined dramatically in the early 1980s after peaking at historically high levels, now remains at comparatively low levels.

In the Northeast, yellow perch abundance has been monitored in gillnets for many years at Middle Ground, and since 1988 at several additional sites (Fig. 5). Commercially marketable-sized yellow perch (>7.5 inches) are particularly scarce, even though large numbers of small fish have been observed in some years. Gillnet catches in the Outlet Basin have fallen dramatically in the last two years, especially for small fish. Largest catches of yellow perch now come from the Bay of Quinte (Fig. 5).

Walleye

Bay of Quinte walleye are the target of one of Lake Ontario's largest recreational fisheries (see Chapter 5 in this report). Adult walleye migrate to Lake Ontario immediately following spawning in the Bay of Quinte, and then move back into the bay in the fall to overwinter.

Walleye population size increased sharply in 1980, with recruitment of the 1978 year-class, and has remained relatively stable in recent years at about 1.5 million 2-yr-old and older fish. Young-of-the-year abundance in bottom trawls for 1995 was the lowest observed since 1984 (Fig. 6). A measure of year-class strength (see Hoyle and Bowlby 1995) based on the least square mean catch-per-trawl of walleye ages 0 to 4-yrs-old was the lowest observed since 1995 (Fig. 6). Competition with the super-abundant 1994 year-class, and low spring water levels and temperatures likely contributed to the poor 1995 year-class. Nonetheless, excellent year-classes were observed for the previous five years.

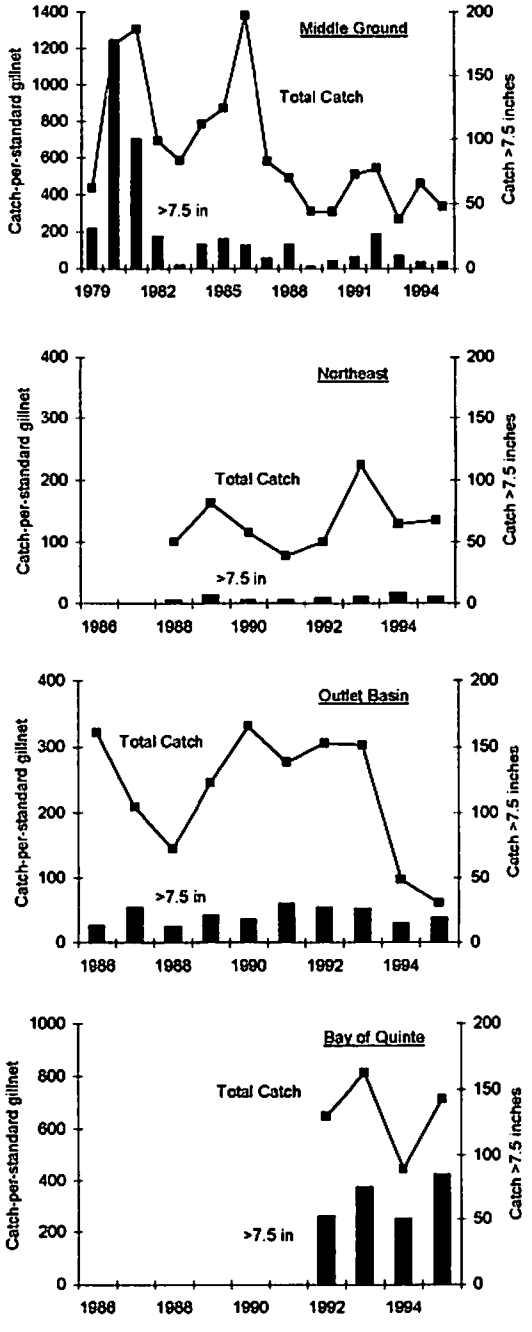

FIG. 5. Yellow perch indices of abundance for fish greater than 7.5 inches fork length (index of commercially marketable-sized fish) and for total catches. Upper panel, Middle Ground, 1979 to 1995; second panel, Northeast, 1988 to 1995; third panel, Outlet Basin 1986 to 1995; and Bay of Quinte 1992 to 1995.

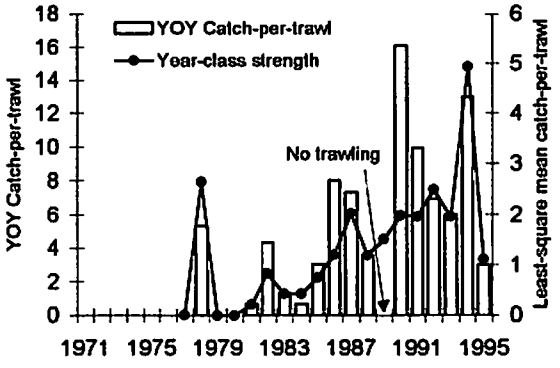

FIG. 6. YOY catch-per-trawl (6 min duration) at three Bay of Quinte sites, Big Bay, Hay Bay and Conway, 1978 to 1995 (no trawling was conducted in 1989), and a measure of year-class strength based on the least-square mean catch-per-trawl of age 0 to 4-yr-old walleye.

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4

Commercial Fisheries

J. A. Hoyle
R. Harvey

Overview

The commercial fishing industry on the Canadian waters of Lake Ontario harvests about $1,000,000 worth of fish annually, small relative to the other Great Lakes, but locally significant since it is confined mainly to the northeast corner of the lake.

This chapter updates the Lake Ontario commercial harvest (weight and value) by species, for 1995.

Quota Management

The overall direction of commercial fish management on Lake Ontario is to support and assist the commercial fishing industry where consistent with the conservation and rehabilitation of fish stocks. In addition to protection of fish stocks, licence conditions attempt to reduce problems of incidental catch, and minimize conflicts with other resource users.

Decisions on commercial allocation are made on a *quota zone* basis (Fig. 1). Fish species for which direct harvest controls are necessary to meet fisheries management objectives are placed under quota management (Table 1). These species include premium species (e.g., lake whitefish, eel, black crappie, yellow perch), species with large allocations to other users (e.g., walleye), and species at low levels of abundance or requiring rehabilitation (e.g., lake herring).

Changes to commercial fish licensing conditions in 1995 included: adjustments to quota (compare Table 1 in this report to Table 1 in Hoyle *et al.* (1995), elimination of commercial gillnetting in Prince Edward Bay (inside a line drawn from Half Moon Point in the south to the "rock" in the north) between January 1 and the third Monday in July, and exchange of eel quota for lake whitefish quota (minimum 2000 lb eel quota for equivalent lake whitefish quota,

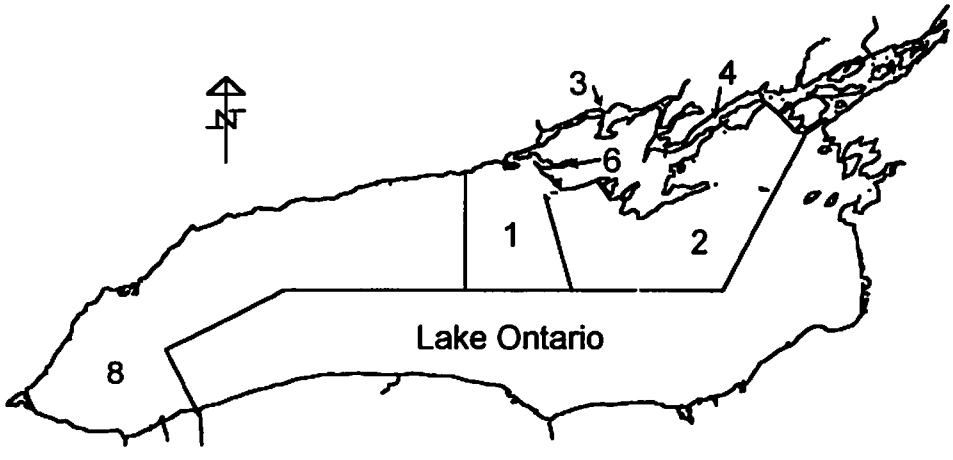

FIG. 1. Commercial fish quota zones on the Canadian waters of Lake Ontario.

TABLE 1. Commercial harvest quotas (lb) for the Canadian waters of Lake Ontario, 1995. For Quota Zone 1, eel and black crappie include quota from Consecon Lake, Quota Zone 6. See Fig. 1 for a map of the quota zones. Quota for species such as bullheads and sunfish in Lake Ontario embayments (e.g., East Lake, West Lake, Wellers Bay) are not given here but their 1995 harvest totals are included in Table 2.

	Quota (lb) by quota zone					
	1	2	3	4	8	Total
Lake whitefish	37,310	395,340	93,630	115,980	800	643,060
Lake herring	15,690	20,000	6,950	7,150	0	49,790
Round whitefish	10,000	0	0	0	0	10,000
Eel	41,830	242,725	60,314	40,718	3,600	389,187
Black crappie	4,240	15,450	11,250	800	2,400	34,140
Yellow perch	39,090	124,700	90,890	66,169	11,500	332,349
Walleye	4,960	45,660	0	9,660	300	60,580

mainly in Quota Zone 3.

Commercial Harvest Summary

The 1995 Lake Ontario commercial fishing season, as for 1994, was much improved over the 1993 season in terms of both total landings and dollar value of the fishery.

The total harvest of all species exceeded 1.2 million lb (Table 2). The total landed value of the harvest was over $1.3 million, the highest level in several years.

Again in 1995, lake whitefish was the most important commercial species on Lake Ontario in terms of harvest weight (449,884 lb). However, in terms of total dollar value, yellow perch was the highest ($454,264)—for the first time since 1991. While yellow perch harvest continued to be at a low level relative to levels observed through the 1980s, the high prices-per-lb paid to fishermen for this species has meant that this species remained an important component of the fishery (Table 2). Eel was the third most important species in terms of landed value ($179,207), in spite of the fact that eel harvest has declined by more than one-half in the past five years.

Biological Characteristics of the Harvest

Biological characteristics of the harvest were monitored for lake whitefish. Sampling activities focused on the fall trapnet fishery in the Bay of Quinte (Quota Zone 3), and the November gillnet fishery on the south shore of Prince Edward County (Quota Zone 2). As such our survey covered the largest component of the total annual harvest for lake whitefish.

Lake whitefish harvest peaked in the early 1920s. From 1930 to the early 1960s the harvest was sustained at about 420,000 lb annually prior to crashing to insignificance in the 1970s (Christie 1973). Lake whitefish populations have recovered in recent years thanks to good recruitment of both major spawning stocks (Lake Ontario and Bay of Quinte spawning stocks, Chapter 3 in this report).

The 1995 lake whitefish harvest was 449,884 lb, representing 70% of the 643,060 lb quota. Over 50% of the total harvest comes from Quota Zone 2 during the lake whitefish spawning run in November and December. The main gear type used in this fishery is 4 1/2 inch gillnets. The fact that the fishery focuses on the spawning population, using a highly selective gear type, results in the harvest of a relatively narrow size range of fish (Fig. 2).

TABLE 2. Commercial fish harvest (lb) and value ($) for fish species in the Canadian waters of Lake Ontario, 1995.

	Commercial harvest (lb) by quota zone							Price	
Species	1	2	3	4	6	8	Total	per lb	Value
Black crappie	650	6,583	1,825	7	126	2	9,193	2.42	$22,248
Bowfin	5,397	4,109	6,052	0	829	0	16,387	0.23	$3,769
Brown bullhead	31,811	25,302	119,173	5,196	7,405	284	189,172	0.36	$68,102
Burbot	2	0	0	0	0	0	2	0.00	$0
Carp	110	10,763	12,566	0	0	0	23,440	0.26	$6,094
Channel catfish	42	1,063	1,056	126	0	395	2,681	0.27	$724
Eel	9,886	52,042	20,946	5,796	377	1,462	90,509	1.98	$179,207
Freshwater drum	734	13,409	13,891	11,259	0	44	39,337	0.14	$5,507
Lake herring	3,005	7,258	1,396	3,212	0	0	14,870	0.58	$8,625
Lake whitefish	21,442	265,902	87,898	74,574	0	68	449,884	0.92	$413,893
Rock bass	1,885	6,356	3,225	320	417	1,803	14,006	0.33	$4,622
Round whitefish	802	4	4	0	0	0	811	0.80	$649
Suckers	37	5,930	12,414	2,948	0	1,627	22,957	0.10	$2,296
Sunfish sp	7,798	24,103	15,007	425	7,895	0	55,228	0.57	$31,480
Walleye	3,303	24,178	0	6,186	0	302	33,969	1.88	$63,861
White bass	7	179	1,576	1,310	0	104	3,175	0.79	$2,508
White perch	851	3,836	26,455	33,420	0	2,154	66,716	0.82	$54,707
Yellow perch	2,701	72,265	61,165	48,354	0	1,689	186,174	2.44	$454,264
Any Species	0	0	0	0	51	0	51	0.25	$13
Total							1,218,561		$1,322,569

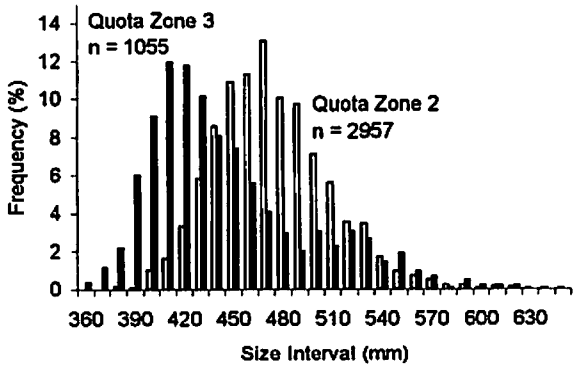

FIG. 2. Lake whitefish size distributions of the 1995 commercial harvest from Quota Zones 2 and 3. The y-axis represents the percent of the sample (sample size indicated).

Differences in size and age distributions for the other major lake whitefish fisheries can be accounted for by differences in geographic area (and therefore the stock exploited), season (and therefore whether only spawning fish or the entire population is exploited), and gear type used. For example, the trapnet fishery of Quota Zones 3 (October/November) harvested a generally smaller fish and wider size range of fish than the Quota Zone 2 gillnet fishery (Fig. 2).

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5

Recreational Fisheries

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M. Rawson
P. J. Savoie

Overview

Surveys of recreational fisheries are used to monitor trends in fishing effort and catch. They are useful in gathering demographic, socioeconomic, and angler behavioral information valuable in resource management decision making. Fisheries managers rely on recreational fishing survey information to detect changes in fish distribution and species composition that can be used to refine stocking policies or update fishing regulations. By measuring changes in catch and harvest rates, and biological characteristics of the fish harvested, angler surveys provide information on the status of fish populations. These surveys monitor fish abundance, growth, and levels of natural production, that supplements information from other surveillance programs (see other chapters in this report).

There are two major recreational fisheries in Canadian waters of Lake Ontario: the Bay of Quinte

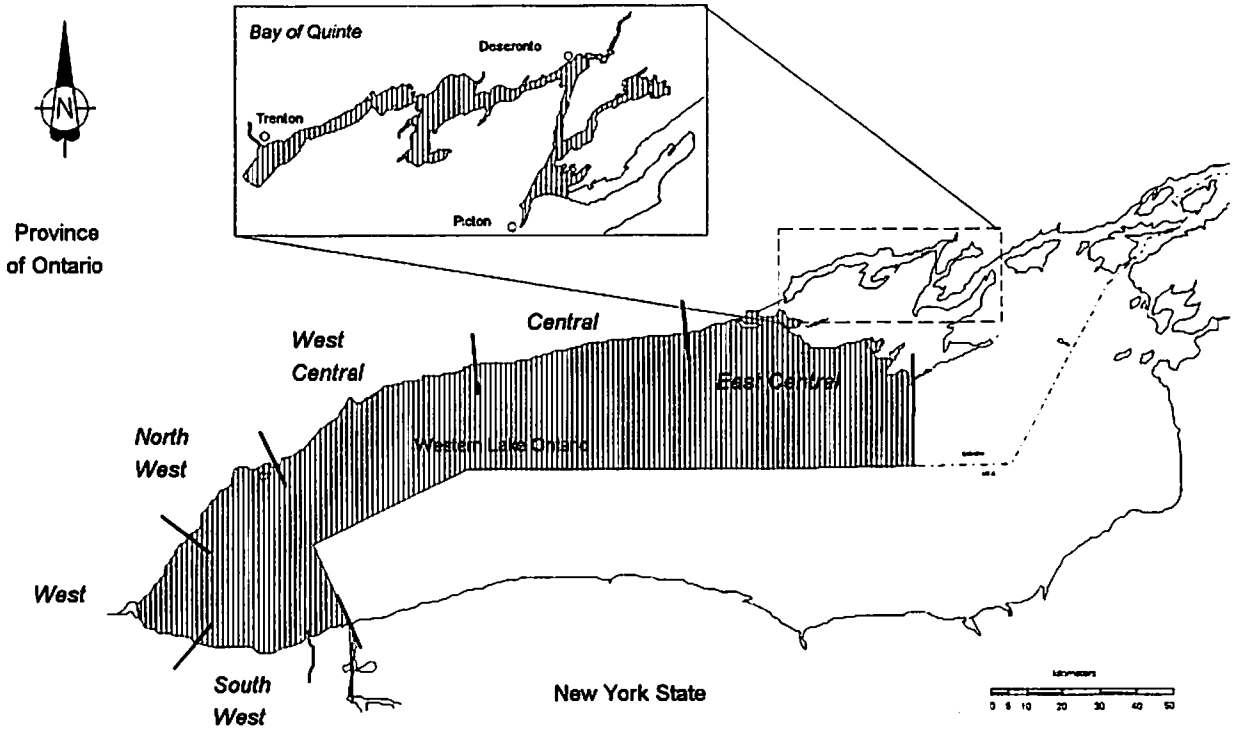

FIG. 1. Geographic areas covered by the Bay of Quinte and western Lake Ontario angler surveys in 1995.

walleye fishery, and the lake and tributary salmonine (salmon and trout) fishery.

Angler surveys have been conducted on the Bay of Quinte periodically since 1957 (Fig. 1). There is a winter ice fishery and a three season, open-water fishery on the bay. The ice fishery in the Bay of Quinte has been monitored biennially from 1982 to 1988 and annually since 1988. The open-water fishery has been monitored annually since 1979. Traditionally, walleye make up the bulk of the angling harvest. Fishing pressure was minimal on the Bay of Quinte when walleye populations were very low in the late 1960s and 1970s, and no angling surveys were conducted at that time. With the resurgence of walleye since 1978, a large sport fishery has developed. Results of the 1995 angler surveys on the Bay of Quinte indicated that total walleye angler effort and walleye harvest dropped markedly compared to recent years (854,000 rod-hours and 113,000 fish, respectively).

Monitoring of the lake salmonine fishery is centered around western Lake Ontario, launch daily, boat fishery (Fig. 1). Surveys of this fishery began in 1977, and are restricted to anglers who trailer their boats to launch ramps. Early surveys were confined to specific fishing derbies and regions. Annual surveys (April to September, inclusive) were first implemented in 1987. In 1989, this launch daily boat fishery was estimated to represent 25% of the salmonine angling effort in Canadian waters of Lake Ontario and the lower reaches of its tributaries (Savoie and Bowlby, 1991). Other components of the shore- and marina-based fisheries are sampled on an opportunistic basis. In 1995, along with the launch daily boat fishery, marina based boat anglers were also surveyed—for the first time since 1989.

Prior to 1995, with the exception of a 1992 low (attributed to poor weather conditions), launch daily boat angling salmon and trout harvest rates had not changed significantly since 1987. Although total harvest had been declining since 1989, this could be accounted for by declines in angler effort. In 1995, fishing success declined by 25% compared to the previous year—likely the result of binational stocking cutbacks beginning in 1993. Nonetheless, the western Lake Ontario salmon and trout fishery still provides a high quality fishery, comparing favorably to those of the other Great Lakes.

A summary of the 1995 survey results for the Bay of Quinte walleye and the western Lake Ontario launch daily and marina based boat fisheries is presented below.

Bay of Quinte Walleye Fishery

Bay of Quinte recreational angling surveys are conducted annually during the walleye angling season (January 1 to February 28 and first Saturday in May to December 31). Angling effort is measured using aerial counts during ice fishing surveys, and a combination of aerial counts and on-water counts during open-water surveys. On-ice and on-water angler interviews provide information on catch/harvest rates and biological characteristics of the harvest. In 1995, as in most recent years, the on-ice/on-water interviews component of the angler surveys consisted of index surveys based on the geographic (ice fishing survey) or seasonal (open-water survey) patterns of fishing effort and catch/harvest rates observed during full surveys. Full surveys are scheduled every five years. The last full surveys were completed in the summer of 1988, winter 1989, and winter and summer 1993). Ice angler interviews were conducted in areas where most fishing pressure occurred and where ice conditions permit. Results were then extrapolated to represent the whole Bay of Quinte. Open-water angler interviews were conducted in May, June, July and August, and the results are extrapolated to represent the entire open-water walleye fishing season. Aerial counts, to estimate total angling effort, are conducted across all geographic areas, and in all seasons, every year. Detailed survey designs are reported by Hoyle (1994, 1995) for on-ice and on-water surveys, respectively.

Ice Fishery

Ice angling effort was estimated to be 321,510 rod-hours (Table 1) down somewhat from the previous year (Fig. 2). An estimated 21,326 walleye were caught of which 14,816 were harvested (Table 1). The harvest, and the harvest-per-unit-effort (HUE) of 0.113 walleye-per-rod-hour were up considerably from the two previous years (Fig. 3 and Fig. 4). The average walleye harvested during the ice fishery was 522 mm fork length, weighed 1.9 kg and was 7-yrs-old.

Open-water fishery

Open-water fishing effort was estimated at 532,548 rod-hours, down over 20% from the previous year (Table 1, Fig. 2). Walleye catch was estimated at

*TABLE 1. The seasonal distribution of angling effort and walleye catch and harvest for Bay of Quinte ice and open-water recreational fisheries, 1995. *Ice fishing walleye catch and harvest totals represent extrapolations from a partial geographic on-ice survey to the whole Bay of Quinte (note that aerial counts to determine fishing effort encompassed the whole Bay of Quinte), and are based on the geographic distribution of fishing success observed in 1993. **Open-water fishing effort and walleye catch and harvest for the fall season represent an extrapolation based on the seasonal pattern of fishing effort and success observed in 1993.*

Season	Effort (rod-hours)	Catch	Harvest
Ice Fishery:			
Ice fishing total*	321,510	21,326	14,816
Open-water fishery:			
Opening weekend	106,820	12,992	10,121
May	208,036	86,194	47,852
June	61,064	24,680	13,228
July	55,083	25,721	17,301
August	57,634	11,379	8,071
Fall**	43,911	4,374	1,897
Open-water total	532,548	165,340	98,470
Annual total	854,058	186,666	113,286

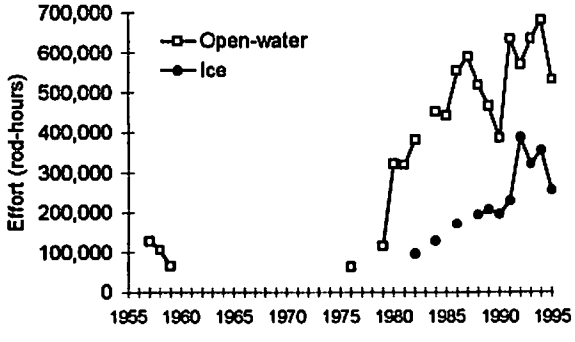

FIG. 2. Angling effort during the Bay of Quinte ice and open-water recreational fisheries, 1957 to 1995.

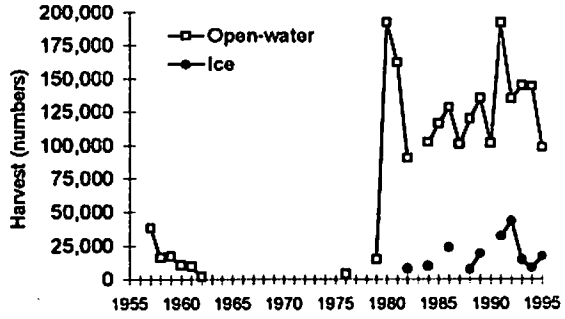

FIG. 3. Walleye harvest during the Bay of Quinte ice and open-water recreational fisheries, 1957 to 1995.

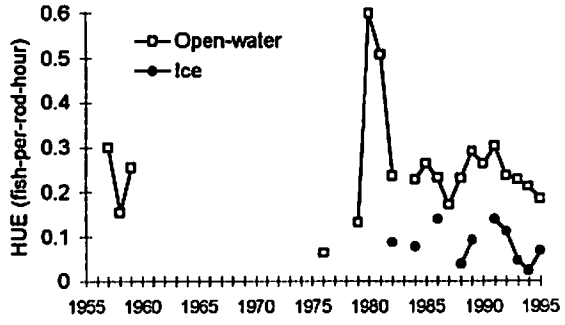

FIG. 4. Walleye harvest-per-unit-effort (HUE) during the Bay of Quinte ice and open-water recreational fisheries, 1957 to 1994.

165,340 fish of which 98,470 were harvested. This level of harvest is down over 30% form 1994 (Fig. 3). It appears that relatively poor angling success (0.185 walleye harvested-per-rod-hour), which has been declining since 1991, is causing the decline in angling effort and walleye harvest—especially during May. Counter to the overall angling trends, fishing success in June has increased from 0.128 walleye-per-rod-hour in 1988 to 0.181 in 1993, and to 0.217 in 1995. This increasing trend is likely the result of a decline in the number of alewife, the walleye's major prey, migrating to the Bay of Quinte in June to spawn.

The average walleye harvested during the open-water fishery was 388 mm fork length, weighed 0.7 kg and was 4-yrs-old.

Western Lake Ontario Boat Fishery

The salmon and trout fishery has been monitored in western Lake Ontario since 1977. Surveys have been largely restricted to boat anglers who launch daily, and this survey was repeated in 1995. Also in 1995, a survey of marina based boat anglers was conducted for the first time since 1989. Other components of the lakeshore and tributary based fisheries have been surveyed periodically.

The 1995 surveys were based on completed trip interviews from mid-April to September inclusive, at 26 launching ramps and 27 marinas for launch daily and marina based surveys respectively, from the Niagara River to Wellington (Fig. 1). The surveyed sites were estimated to account for 95% of the recreational boat fishery in Canadian waters of western Lake Ontario.

The 1995 western Lake Ontario launch daily boat angling effort was 365,369 rod-hours of which 92% was directed at salmonines. The salmonine catch was 43,250 fish with a catch-per-unit-effort (CUE, number-per-rod-hour) of 0.129. Salmonine release rates averaged 47%. The salmonine harvest was 23,018 fish with a HUE of 0.069 (Table 2).

The 1995 marina based fishery exerted 177,809 rod-hours of fishing effort of which all but 117 rod-hours was directed at salmonines. The salmonine catch was 23,608 fish with a CUE of 0.133. Salmonine release rates averaged 38%. The salmonine harvest was 14,692 fish with a HUE of 0.083 (Table 3).

Effort

The 1995 launch daily boat angling effort was down by 18% compared to 1994, down by nearly 50% compared to a peak in 1989, and was the lowest effort observed in ten years (Fig. 5). The decline in effort for the last two years was largely due to the loss of heavy advertising in one of Canada's largest newspapers—a result of the cancellation of the Toronto Star Great Salmon Hunt. There has also been a declining interest in the fishery since 1989 due to several factors: general decline in the economy, possibly increased sensitivity to contaminants issue, anglers in the Hamilton to Niagara areas shifting some effort to improving walleye fishery in Lake Erie, and perhaps a response to stocking reductions.

Results from the 1989 marina based fishery are not available for comparison to 1995, at the present time. It is thought that marina based fishing effort, as for the launch daily boat fishery, has declined because there has been a declining trend in charterboat effort since 1989 (Savoie and Hoyle 1995). The combination of the loss of the Toronto Star Great Salmon Hunt and the recent economic downturn has negatively affected the marina based boat fishery.

TABLE 2. Launch daily boat angler summary statistics for western Lake Ontario, 1995. Total angling effort was 365,369 rod-hours of which 335,047 rod-hours were directed at salmonines. Catch-per-unit-effort (CUE) and harvest-per-unit-effort (HUE) are reported as number of fish caught or harvested-per-rod-hour of fishing effort. Release rates are given as percentages.

	Catch	Harvest	CUE	HUE	Release Rate (%)
Chinook salmon	24,681	13,708	0.0737	0.0409	44
Rainbow trout	8,341	4,524	0.0249	0.0135	46
Lake trout	7,210	3,343	0.0215	0.0100	54
Brown trout	1,551	749	0.0046	0.0022	52
Coho salmon	1,041	547	0.0031	0.0016	47
Atlantic salmon	97	65	0.0003	0.0002	33
Unknown	329	82	0.0010	0.0002	75
Total salmonine	43,250	23,018	0.1291	0.0687	47
Walleye	923	802	0.0304	0.0264	13

TABLE 3. Marina based boat angler summary statistics for western Lake Ontario, 1995. Total angling effort was 177,809 rod-hours of which 177,692 rod-hours were directed at salmonines. Catch-per-unit-effort (CUE) and harvest-per-unit-effort (HUE) are reported as number of fish caught or harvested-per-rod-hour of fishing effort. Release rates are given as percentages

	Catch	Harvest	CUE	HUE	Release Rate (%)
Chinook salmon	11,100	7,347	0.0625	0.0413	34
Rainbow trout	9,003	6,101	0.0507	0.0343	32
Lake trout	2,755	682	0.0155	0.0038	75
Brown trout	360	300	0.0020	0.0017	17
Coho salmon	326	198	0.0018	0.0011	39
Atlantic salmon	64	64	0.0004	0.0004	0
Unknown	0	0	n/a	n/a	n/a
Total salmonine	23,608	14,692	0.1329	0.0827	38
Walleye	48	48	0.4103	0.4103	0

Harvest

The 1995 launch daily total salmonine harvest declined by 37% compared to the previous year. This was the second lowest harvest since 1983. The 77% decline in harvest since 1986 can be largely attributed to the decline in fishing effort (Fig. 5).

Chinook salmon continued to dominate the launch daily boat fishery, representing 59% of the harvest, followed by rainbow trout at 19%, lake trout at 14%, brown trout 3%, coho salmon at only 2% and walleye at 3%.

Walleye had not been observed in previous surveys, and their contribution to the harvest was almost exclusively from the Wellington area.

Rainbow trout featured more prominently in the marina based harvest but chinook salmon made up the largest component of the harvest at 50%, followed by rainbow trout at 42%, lake trout at only 5%, brown trout at 2%, and coho at 1%. Atlantic salmon still do not contribute significantly to the harvest of either the launch daily or marina based fisheries.

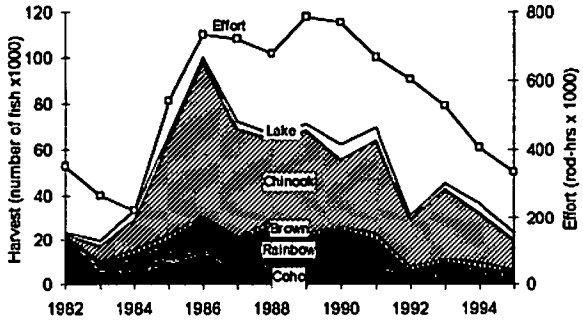

FIG. 5. Western Lake Ontario launch daily boat angler effort and salmonine harvest trends from 1982 to 1995.

Harvest Rates

The salmonine HUE for the 1995 launch daily boat fishery decreased by 25% from 1994. Previously, the harvest rate had remained relatively stable since 1987—with the exception of a low in 1992 attributed to bad weather (Fig. 6). Thus, the decline in harvest from 1987 to 1994 was related more to decreased angler effort, and not to any significant decline in fishing quality. The 1995 decline in HUE was anticipated (Savoie and Hoyle 1995), and likely represents the first tangible effect of stocking reductions.

Catch rates from launch daily and marina boat anglers combined are: 7.0 fish-per-100 hrs of effort for chinook salmon, 3.4 for rainbow trout, 1.9 for lake trout, 0.4 for brown trout and 0.3 for coho salmon.

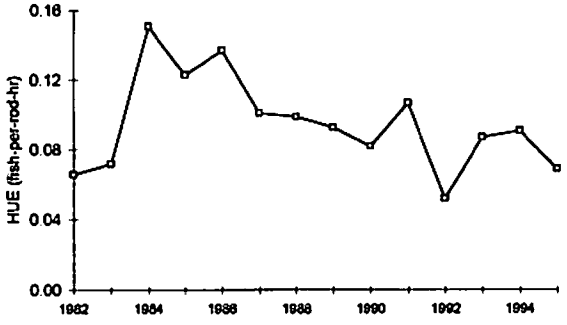

Fig. 6. Salmonine HUE trends for the western Lake Ontario launch daily boat angler fishery, 1982 to 1995.

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Appendices

Atlantic salmon stocked in the Province of Ontario waters of Lake Ontario, 1995.

Waterbody Name	Site Name	Month Stocked	Year Spawned	Hatchery/Source	Strain/Egg Source	Age (months)	Mean Wt. (g)	Marks	Number Stocked
ATLANTIC SALMON - EARLY FRY									
Duffin Creek	Hwy 7	4	1994	White Lake/Normandale	LeHave/Normandale	4	0.2	None	3,410
Ganaraska River	Canton	4	1994	White Lake/Normandale	LeHave/Normandale	4	0.2	None	3,410
	Kendal MNR Property	4	1994	White Lake/Normandale	LeHave/Normandale	4	0.2	None	3,410
GANARASKA RIVER TOTAL									6,820
Wilmot Creek	Below 5th	4	1994	White Lake/Normandale	LeHave/Normandale	4	0.2	None	3,410
ATLANTIC SALMON - ADVANCED FRY									
Credit River	Black Creek	4	1994	Ringwood/Normandale	LeHave/Normandale	5	0.57	None	9,601
	Silver Creek		1994	Ringwood/Normandale	LeHave/Normandale	5	0.57	None	8,000
CREDIT RIVER TOTAL									17,601
Duffin Creek	Du6thCon	4	1994	Ringwood/Normandale	LeHave/Normandale	5	0.51	None	5,431
	Dufb7thswp	4	1994	Ringwood/Normandale	LeHave/Normandale	5	0.51	None	1,931
DUFFIN CREEK TOTAL									7,362
Ganaraska River	Ca7thCon	4	1994	Ringwood/Normandale	LeHave/Normandale	5	0.51	None	5,781
	CaFishClub	4	1994	Ringwood/Normandale	LeHave/Normandale	5	0.50	None	1,800
	CaHydro	4	1994	Ringwood/Normandale	LeHave/Normandale	5	0.52	None	3,399
	Canomansl	4	1994	Ringwood/Normandale	LeHave/Normandale	5	0.52	None	3,802
GANARASKA RIVER TOTAL									14,782
Wilmot Creek	Wm35/115	4	1994	Ringwood/Normandale	LeHave/Normandale	5	0.52	None	10,268
	Wm4thCon	4	1994	Ringwood/Normandale	LeHave/Normandale	5	0.53	None	10,000
	WmHwy2	4	1994	Ringwood/Normandale	LeHave/Normandale	5	0.51	None	4,492
	WmPisany	4	1994	Ringwood/Normandale	LeHave/Normandale	5	0.58	None	6,206
	WmNursbr	4	1994	Ringwood/Normandale	LeHave/Normandale	5	0.52	None	5,943
WILMOT CREEK TOTAL									36,909
ATLANTIC SALMON - YEARLINGS									
Credit River	Forks of the Credit	3	1993	Ringwood/Normandale	LeHave/Normandale	14	23.9	None	4,376
	Inglewood	3	1993	Ringwood/Normandale	LeHave/Normandale	14	23.9	None	4,374
CREDIT RIVER TOTAL									8,750
Ganaraska River	Canton	3	1993	Ringwood/Normandale	LeHave/Normandale	14	24.5	None	11,999
	Kellogg Rd Bridge	3	1993	Ringwood/Normandale	LeHave/Normandale	14	25.9	None	11,995
	Sylvan Glen	3	1993	Ringwood/Normandale	LeHave/Normandale	14	24.6	None	12,000
GANARASKA RIVER TOTAL									35,994
TOTAL ATLANTIC SALMON EARLY FRY									13,640
TOTAL ATLANTIC SALMON ADVANCED FRY									76,654
TOTAL ATLANTIC SALMON YEARLINGS									44,744
TOTAL ATLANTIC SALMON									135,038

Brown trout stocked in the Province of Ontario waters of Lake Ontario, 1995.

Waterbody Name	Site Name	Month Stocked	Year Spawned	Hatchery/Source	Strain/Egg Source	Age (months)	Mean Wt. (g)	Marks	Number Stocked
BROWN TROUT - FALL FINGERLINGS									
Lake Ontario	Bluffer's Park	10	1994	Harwood	Ganaraska/Normandale	11	15.5	Ad	6,626
	Bluffer's Park	11	1994	Normandale	Ganaraska/Normandale	11	18.0	Ad	31,940
BLUFFER'S PARK TOTAL									38,566
BROWN TROUT - YEARLINGS									
Duffin Creek	Rotary Park	3	1993	White Lake	Chatsworth/Normandale	15	33.6	RV	12,500
Etobicoke Creek	Marie Curtis Ramp	4	1993	Harwood	Chatsworth/Normandale	17	54.3	RV	12,814
Lake Ontario	Ashbridges Bay	4	1993	Harwood	Ganaraska/Normandale	17	50.4	RV	12,696
	Bluffer's Park	4	1993	Harwood	Ganaraska/Normandale	17	40.1	RV	5,806
	Burlington Canal	4	1993	Harwood	Ganaraska/Normandale	17	46.1	RV	14,702
	Collin's Bay	3	1993	White Lake	Chatsworth/Normandale	15	33.6	RV	14,732
	Fifty Point CA	4	1993	Harwood	Ganaraska/Normandale	17	44.9	RV	15,349
	Jordan Harbour	3	1993	Ringwood	Chatsworth/Normandale	17	39.6	RV	15,028
	Lakefront Promenade	4	1993	Harwood	Ganaraska/Normandale	17	53.1	RV	12,232
	Millhaven Wharf	3	1993	White Lake	Chatsworth/Normandale	15	33.6	RV	20,476
	Port Dalhousie East	3	1993	Ringwood	Ganaraska/Normandale	17	38.9	RV	30,269
LAKE ONTARIO TOTAL									141,290
TOTAL BROWN TROUT FINGERLINGS									38,566
TOTAL BROWN TROUT YEARLINGS									166,604
TOTAL BROWN TROUT									205,170

Chinook salmon stocked in the Province of Ontario waters of Lake Ontario, 1995.

Waterbody Name	Site Name	Month Stocked	Year Spawned	Hatchery/Source	Strain/Egg Source	Age (months)	Mean Wt. (g)	Marks	Number Stocked
CHINOOK SALMON - SPRING FINGERLINGS									
Bowmanville Creek	CLOCA Ramp	4	1995	Ringwood	Lake Ontario	5	4.4	None	25,089
Bronte Creek	2nd Side Rd Bridge	4	1995	Ringwood	Lake Ontario	5	4.5	None	25,209
Cobourg Creek	South of King St	4	1995	Ringwood	Lake Ontario	5	4.6	None	35,175
	South of King St	4	1995	S. S. Fleming College	Lake Ontario	7	5.2	None	4,851
COBOURG CREEK TOTAL									40,026
Credit River	Eldorado Park	4	1995	Ringwood	Lake Ontario	5	3.9	None	40,313
	Huttonville	4	1995	Ringwood	Lake Ontario	5	3.6	None	35,000
	Norval	4	1995	Ringwood	Lake Ontario	5	4.1	None	30,000
CREDIT RIVER TOTAL									105,313
Lake Ontario	Bluffer's Park	4	1995	Ringwood	Lake Ontario	5	4.0	None	50,190
	Burlington Canal	4	1995	Ringwood	Lake Ontario	5	3.8	None	50,186
	Port Dalhousie East	4	1995	Ringwood	Lake Ontario	5	4.6	None	100,311
	Presqu'ile Park	4	1995	Ringwood	Lake Ontario	5	4.7	None	15,438
	Wellington Channel	4	1995	Ringwood	Lake Ontario	5	4.7	None	24,997
	Whitby Harbour	4	1995	Ringwood	Lake Ontario	5	4.4	None	25,088
LAKE ONTARIO TOTAL									607,186
TOTAL CHINOOK SALMON									461,847

Lake trout stocked in the Province of Ontario waters of Lake Ontario, 1995.

Waterbody Name	Site Name	Month Stocked	Year Spawned	Hatchery/Source	Strain/Egg Source	Age (months)	Mean Wt. (g)	Marks	Number Stocked
LAKE TROUT - YEARLINGS									
Lake Ontario	Cobourg Harbour Pier	3	1993	Harwood	Slate Island/Dorion	16	32.5	AdCWT	40,135
	Cobourg Harbour Pier	4	1993	Harwood	Slate Island/Dorion	17	n/a	AdCWT	38,985
	Cobourg Harbour Pier	4	1993	Harwood	Seneca/Normandale	18	n/a	AdCWT	16,781
COBOURG HARBOUR TOTAL									95,901
Lake Ontario	Fifty Point CA	3	1993	Harwood	Slate Island/Dorion	16	21.7	AdCWT	43,317
	Fifty Point CA	4	1993	Harwood	Slate Island/Dorion	17	29.5	AdCWT	42,104
FIFTY POINT CA TOTAL									85,421
Lake Ontario	N of Main Duck Sill	4	1993	Harwood	Michipicoten/Dorion	18	28.3	AdCWT	35,823
Lake Ontario	N of Main Duck Sill	4	1993	Harwood	Seneca/Normandale	18	29.7	AdCWT	18,093
Lake Ontario	N of Main Duck Sill	5	1993	Harwood	Slate Island/Dorion	19	27.0	AdCWT	48,261
Lake Ontario	N of Main Duck Sill	5	1993	Harwood	Slate Island/Dorion	19	32.5	AdCWT	41,535
NORTH OF MAIN DUCK SILL TOTAL									143,712
Lake Ontario	S of Long Point	4	1993	Harwood	Michipicoten/Dorion	19	17.4	AdCWT	93,353
Lake Ontario	S of Long Point	5	1993	Harwood	Michipicoten/Dorion	19	32.6	AdCWT	78,004
Lake Ontario	S of Long Point	5	1993	Harwood	Seneca/Normandale	19	38.4	AdCWT	29,602
SOUTH OF LONG POINT TOTAL									200,959
TOTAL LAKE TROUT YEARLINGS									525,993

Rainbow trout stocked in the Province of Ontario waters of Lake Ontario, 1995.

Waterbody Name	Site Name	Month Stocked	Year Spawned	Hatchery/Source	Strain/Egg Source	Age (months)	Mean Wt. (g)	Marks	Number Stocked
RAINBOW TROUT-FALL FINGERLINGS									
Bronte Creek	5th Sideroad	11	1995	Normandale	Ganaraska/Normandale	7	3.3	Ad	20,000
	Lowville	11	1995	Normandale	Ganaraska/Normandale	7	3.1	Ad	20,000
BRONTE CREEK TOTAL									40,000
Credit River	Norval	11	1995	Normandale	Ganaraska/Normandale	7	3.1	Ad	20,000
	Huttonville	11	1995	Normandale	Ganaraska/Normandale	7	3.0	Ad	19,750
CREDIT RIVER TOTAL									39,750
Humber River	Mill Road	12	1995	Normandale	Ganaraska/Normandale	8	5.5	Ad	19,950
Rouge River	Silver Springs Farm	11	1995	Normandale	Ganaraska/Normandale	7	5.2	Ad	10,000
	Berczy Creek	11	1995	Normandale	Ganaraska/Normandale	7	5.2	Ad	10,000
	Bruce Creek	11	1995	Normandale	Ganaraska/Normandale	7	5.2	Ad	10,000
	Robinson Creek	11	1995	Normandale	Ganaraska/Normandale	7	5.2	Ad	10,000
ROUGE RIVER TOTAL									40,000
Lake Ontario	Port Dalhousie	11	1995	Normandale	Ganaraska/Normandale	7	3.5	Ad	40,360
RAINBOW TROUT - YEARLINGS									
Bronte Creek	5th Sideroad	3	1994	Normandale	Ganaraska/Normandale	10	16.2	RV	6,000
	Lowville Park	3	1994	Normandale	Ganaraska/Normandale	10	16.2	RV	6,000
BRONTE CREEK TOTAL									12,000
Credit River	Norval	3	1994	Normandale	Ganaraska/Normandale	10	17.6	RV	6,000
	Huttonville	3	1994	Normandale	Ganaraska/Normandale	10	17.6	RV	6,000
CREDIT RIVER TOTAL									12,000
Humber River	E Branch Mill Rd	3	1994	Normandale	Ganaraska/Normandale	10	20.4	RV	2,000
	King Vaughan Line	3	1994	Normandale	Ganaraska/Normandale	10	20.4	RV	10,000
HUMBER RIVER TOTAL									12,000
Rouge River	Berczy Creek	3	1994	Normandale	Ganaraska/Normandale	10	16.2	RV	3,000
	Bruce Creek	3	1994	Normandale	Ganaraska/Normandale	10	16.2	RV	3,000
	Robinson Creek						16.2	RV	3,000
	Silver Springs Farm	3	1994	Normandale	Ganaraska/Normandale	10	16.2	RV	3,000
ROUGE RIVER TOTAL									12,000
Lake Ontario	Port Dalhousie	3	1994	Normandale	Ganaraska/Normandale	10	22.2	RV	12,000
TOTAL RAINBOW TROUT FALL FINGERLINGS									180,060
TOTAL RAINBOW TROUT YEARLINGS									60,000
TOTAL RAINBOW TROUT									240,060

Species-specific catch-per-standard gillnet lift, Northeast Lake Ontario, 1995.

	Brighton					Middle Ground	Rocky Point					Wellington				
Site depth (m)	8	13	18	23	28	5	8	13	18	23	28	8	13	18	23	28
Alewife	58	210	130	0	0	90	681	1905	1612	760	1154	22	33	23	0	0
Gizzard shad	36	3	0	0	0	7	0	0	0	0	0	3	0	0	0	0
Chinook salmon	22	0	0	0	0	0	0	0	0	0	0	0	11	0	7	11
Brown trout	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
Lake trout	72	49	77	92	49	3	3	23	49	59	92	39	70	99	63	76
Lake whitefish	0	10	7	0	10	0	0	0	0	0	33	0	0	3	23	30
Lake herring	3	7	3	0	0	0	0	0	0	0	0	0	0	3	0	0
Round whitefish	0	3	26	49	13	0	0	0	0	0	0	0	0	10	0	0
Northern pike	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
White sucker	3	7	0	0	0	13	0	3	0	0	0	3	0	0	0	0
Brown bullhead	0	0	0	0	0	33	0	0	0	0	0	0	0	0	0	0
Burbot	0	0	0	0	0	0	0	0	0	16	13	0	0	0	0	0
Rock bass	38	0	0	0	0	11	11	0	0	0	0	0	0	0	0	0
Smallmouth bass	0	0	0	0	0	0	10	16	0	0	3	0	0	0	0	0
Yellow perch	746	137	0	0	0	333	0	0	0	0	0	1052	84	17	0	0
Walleye	20	0	0	0	0	16	10	0	0	0	0	10	3	0	0	0
Freshwater drum	0	0	0	0	0	10	3	0	0	0	0	3	0	0	0	0

Species-specific catch-per-standard gillnet lift, Outlet Basin Lake Ontario, 1995.

	Outlet Basin		Flatt Point					Grape Island					Melville Shoal				
Site depth (m)	30 (02)	30 (06)	8	13	18	23	28	8	13	18	23	28	8	13	18	23	28
Alewife	78	167	362	221	434	216	1920	1014	1104	1299	22	79	264	304	424	348	65
Chinook salmon	1	0	0	0	0	10	3	0	0	0	0	0	0	0	0	0	0
Brown trout	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lake trout	184	150	82	79	90	201	260	0	0	3	159	174	0	0	0	3	89
Lake whitefish	32	43	0	0	27	206	87	0	0	0	44	30	0	0	0	3	10
Lake herring	2	0	0	0	0	16	16	0	0	0	3	0	0	0	0	0	3
Rainbow smelt	6	4	0	0	0	11	14	0	0	0	0	0	0	0	0	0	0
Northern pike	0	0	0	3	0	0	0	0	0	0	0	0	0	3	0	0	0
White sucker	0	0	7	7	13	0	0	0	0	0	0	0	0	0	0	0	0
Carp	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0
Channel catfish	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0
American eel	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Burbot	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	7	3
Rock bass	0	0	3	0	7	0	0	39	0	0	0	0	3	3	0	0	0
Smallmouth bass	0	0	3	0	0	0	0	17	3	3	0	0	13	0	3	0	0
Yellow perch	0	0	25	65	155	77	0	34	91	13	0	0	58	270	109	14	0
Walleye	0	1	3	0	0	0	0	122	105	20	0	0	214	109	7	3	0
Freshwater drum	0	0	7	0	0	0	0	3	3	0	0	0	7	0	0	0	0

Species-specific catch-per-standard gillnet lift, Bay of Quinte, 1995.

	Big Bay		Conway		Hay Bay	
Site depth (m)	5	8	13	20	8	13
Longnose gar	23	0	0	0	0	0
Alewife	0	321	704	87	199	36
Gizzard shad	163	0	0	0	2	0
Brown trout	0	0	0	10	0	0
Lake trout	0	0	0	25	0	0
Lake herring	0	0	0	0	2	12
Rainbow smelt	0	0	0	0	0	5
Northern pike	0	0	0	0	10	2
White sucker	59	21	8	16	44	67
Carp	0	2	0	0	0	0
Spottail shiner	0	0	0	0	2	0
Brown bullhead	21	0	0	0	18	3
Channel catfish	2	0	0	0	0	0
Burbot	0	0	0	0	0	2
White perch	360	35	25	0	352	13
White bass	2	0	0	0	0	0
Rock bass	0	46	3	0	0	0
Pumpkinseed	2	0	0	0	2	0
Smallmouth bass	0	3	2	0	0	0
Yellow perch	350	707	730	201	1446	1048
Walleye	115	188	102	7	49	3
Freshwater drum	76	12	2	0	16	0

Species-specific catch-per-trawl, Bay of Quinte and Outlet Basin Lake Ontario, 1995.

	Bay of Quinte						Outlet Basin		
	Trenton	Belleville	Big Bay	Deseronto	Hay Bay	Conway	EB02	EB03	EB06
Alewife	109	199	173	156	257	2	226	876	46
Gizzard shad	370	163	1482	27	40	0	0	0	0
Lake trout	0	0	0	0	0	0	0	1	1
Lake whitefish	0	0	0	0	0	28	6	20	8
Lake herring	0	0	0	0	0	1	0	1	0
Rainbow smelt	0	0	0	0	0	629	1048	1646	2458
White sucker	3	1	8	0	1	0	0	0	0
Carp	0	0	0	1	0	0	0	0	0
Spottail shiner	189	123	45	116	23	0	0	0	0
Brown bullhead	20	10	11	10	31	0	0	0	0
Trout-perch	43	6	5	39	11	117	2	120	4
White perch	305	496	789	482	59	0	0	0	0
White bass	1	1	2	1	0	0	0	0	0
Sunfish sp.	93	0	0	0	0	0	0	0	0
Rock bass	1	0	0	0	0	0	0	0	0
Pumpkinseed	21	0	0	0	8	0	0	0	0
Bluegill	0	1	0	0	0	0	0	0	0
Largemouth bass	4	0	0	0	0	0	0	0	0
Black crappie	3	22	0	0	0	0	0	0	0
Yellow perch	961	176	17	916	418	2	0	0	0
Walleye	20	11	9	22	12	4	0	0	0
Johnny darter	35	0	0	0	0	0	0	0	0
Logperch	4	0	0	0	0	0	0	0	0
Freshwater drum	47	7	4	3	1	0	0	0	0

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